Final Project

by

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Project Title: FIFA World cup stats using Neo4j

PROBLEM STATEMENT:

- The Data is related to FIFA World cup and its Statistics of top 15 players.
- The Problem statement is based on performing Graphical Representation and its co-relation with various entities.
- Created database of Players, Coaches, Country and defined unique relationships between them.

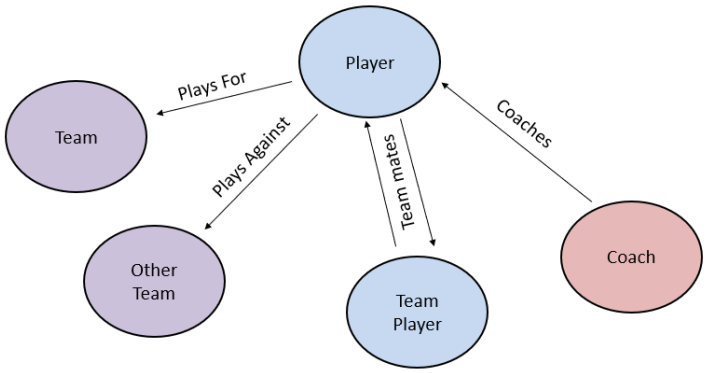
INTRODUCTION:

- We have created a graphical data of FIFA World Cup and its relationship of a player with other teammates, relationship of coaches with players and players with their respective country.
- We have taken a data of 6 countries which have been qualified through playoffs and their top 15 players with 6 coaches and created individual nodes.

WHY GRAPH DATABASE?

- The ability to add new nodes and relationships between nodes to a graph database makes it reliable for our dataset.
- Graph databases respond to complex queries more quickly than relational databases do.
- We have multiple relationship in our database so in order to display it without any constraint we have used neo4j.
- As per future aspects in our database we can create multiple relationship with ease and visualization is better.

DATABASE MODEL:



CREATE DATABASE:

- Created dataset of 15 players of FIFA World Cup and added their properties as age, number, height, weight to its nodes.
- Created 6 nodes of coaches with respect to their players.

```
CREATE
(messi:PLAYER{name:"Lionel Messi", age: 35, number: 10, height: 1.7, weight: 68}),
(maria:PLAYER{name:"Angel Di Maria", age: 34, number: 11, height: 1.8, weight: 70}),
(alvarez:PLAYER{name:"Julian Alvarez", age: 22, number: 9, height: 1.7, weight: 71}),
(ronaldo:PLAYER{name:"Cristiano Ronaldo", age: 37, number: 7, height: 1.87, weight: 83}),
(bruno:PLAYER{name:"Bruno Fernandes", age: 28, number:8,  height: 1.79, weight: 69}),
(neymar:PLAYER{name:"Neymar Jr", age: 30, number: 10, height: 1.75, weight: 68}),
(vini:PLAYER{name:"Vinicius Jr", age: 22, number:20 , height: 1.76, weight: 73}),
(silva:PLAYER{name:"thiago Silva", age: 38, number: 3, height: 1.83, weight: 76}),
(mbappe:PLAYER{name:"Kylian Mbappe", age: 23, number: 10, height: 1.78, weight: 75}),
(griezmann:PLAYER{name:"Antoine Griezmann", age: 31, number: 7, height: 1.76, weight: 73}),
(giroud:PLAYER{name:"Olivier Giroud", age: 36, number: 9, height: 1.93, weight: 91}),
```

Table

Added 15 labels, created 15 nodes, set 75 properties, completed after 52 ms.

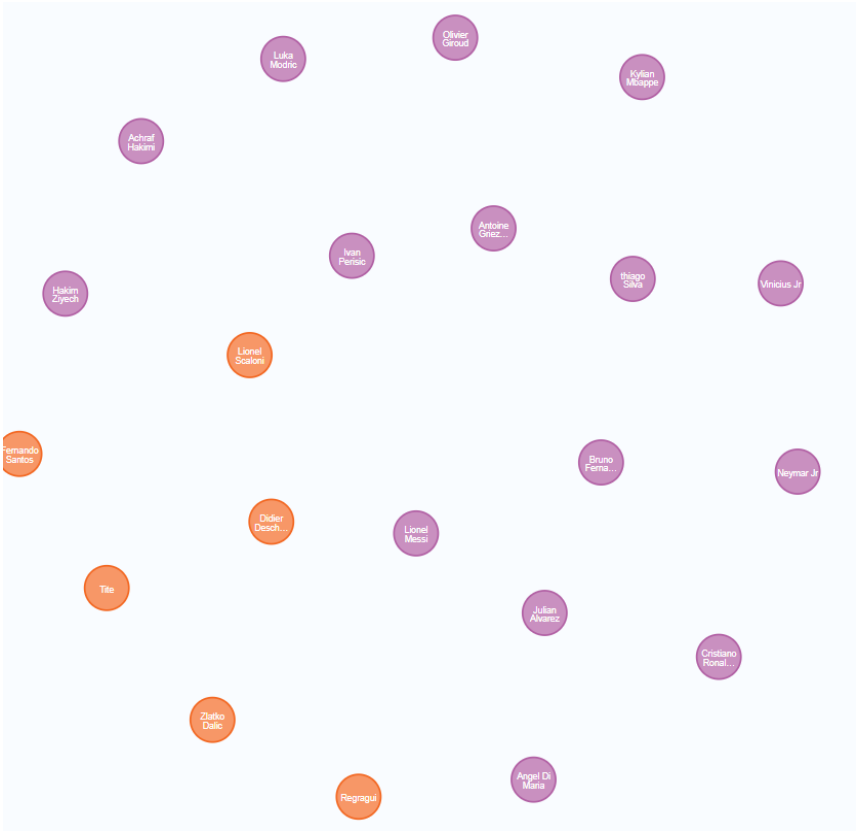
- Coach's nodes have been shown below:

```
CREATE
(lio:COACH{name: "Lionel Scaloni"}),
(santos:COACH{name: "Fernando Santos"}),
(tite:COACH{name: "Tite"}),
(didier:COACH{name: "Didier Deschamps"}),
(dalic:COACH{name: "Zlatko Dalic"}),
(regra:COACH{name: "Regragui"})
```

Table

Added 6 labels, created 6 nodes, set 6 properties, completed after 11 ms.

- Following is the graphical node representation of players and coaches.
- Node Properties of an individual player node is shown below.



Node properties

PLAYER

<id>	7
age	38
height	1.83
name	thiago Silva
number	3
weight	76

- Created 6 nodes of different teams participated in FIFA World Cup.
- Created dual relationship of team mates between players node.

```
CREATE
(arg:TEAM{name:"Argentina"}),
(por:TEAM{name:"Protugal"}),
(fra:TEAM{name:"France"}),
(bra:TEAM{name:"Brazil"}),
(cro:TEAM{name:"Croatia"}),
(mor:TEAM{name:"Morocco"})
```

Table

Added 6 labels, created 6 nodes, set 6 properties, completed after 10 ms.

```
CREATE
(messi)-[:TEAMMATES]→ (maria),
(messi)←[:TEAMMATES]- (maria),
(maria)-[:TEAMMATES]→ (alvarez),
(maria)←[:TEAMMATES]- (alvarez),
(alvarez)-[:TEAMMATES]→ (messi),
(alvarez)←[:TEAMMATES]- (messi),
(ronaldo)-[:TEAMMATES]→ (bruno),
(ronaldo)←[:TEAMMATES]- (bruno),
(neymar)-[:TEAMMATES]→ (vini),
(neymar)←[:TEAMMATES]- (vini),
(vini)-[:TEAMMATES]→ (silva),
```

Table

Created 15 nodes, created 24 relationships, completed after 34 ms.

- Created Relationship between players, teams (node) and gave properties.
- We have created property named ‘appearance’; it shows players appearance for the respected team.

```
CREATE
(messi)-[:PLAYS {appreances: 172}]→ (arg),
(maria)-[:PLAYS {appreances: 120}]→ (arg),
(alvarez)-[:PLAYS {appreances: 19}]→ (arg),
(ronaldo)-[:PLAYS {appreances: 196}]→ (por),
(bruno)-[:PLAYS {appreances: 53}]→ (por),
(neymar)-[:PLAYS {appreances: 124}]→ (bra),
(vini)-[:PLAYS {appreances: 20}]→ (bra),
(silva)-[:PLAYS {appreances: 113}]> (bra),
(mbappe)-[:PLAYS {appreances: 66}]→ (fra),
(griezmann)-[:PLAYS {appreances: 117}]→ (fra),
(giroud)-[:PLAYS {appreances: 120}]→ (fra),
(modric)-[:PLAYS {appreances: 162}]→ (cro),
(ivan)-[:PLAYS {appreances: 123}]→ (cro),
(hakimi)-[:PLAYS {appreances: 61}]→ (mor),
(ziyech)-[:PLAYS {appreances: 50}]→ (mor)
```

- Created Relationship between players, teams (node) and gave properties of goals scored, total assists, attempts and tackle during their game.

```
CREATE
messi)-[:PLAYED_AGAINST {goal: 3, assists: 2, attempt: 6, tackle: 8}]→ (fra),
(messi)-[:PLAYED_AGAINST {goal: 1, assists: 1, attempt: 3, tackle: 4}]→ (cro),
(alvarez)-[:PLAYED_AGAINST {goal: 2, assists: 0, attempt: 2, tackle: 3}]→ (cro),
(maria)-[:PLAYED_AGAINST {goal: 1, assists: 2, attempt: 1, tackle: 5}]→ (fra),
(hakimi)-[:PLAYED_AGAINST {goal: 0, assists: 1, attempt: 2, tackle: 7}]→ (cro),
(ivan)-[:PLAYED_AGAINST {goal: 0, assists: 2, attempt: 3, tackle: 4}]→ (bra),
(mbappe)-[:PLAYED_AGAINST {goal: 1, assists: 2, attempt: 3, tackle: 4}]→ (mor),
(mbappe)-[:PLAYED_AGAINST {goal: 3, assists: 0, attempt: 4, tackle: 3}]→ (arg),
(griezmann)-[:PLAYED_AGAINST {goal: 0, assists: 0, attempt: 2, tackle: 2}]→ (arg),
(maria)-[:PLAYED_AGAINST {goal: 1, assists: 0, attempt: 2, tackle: 6}]→ (cro),
(ronaldo)-[:PLAYED_AGAINST {goal: 1, assists: 0, attempt: 2, tackle: 3}]→ (mor),
(bruno)-[:PLAYED_AGAINST {goal: 1, assists: 1, attempt: 0, tackle: 1}]→ (mor),
(neymar)-[:PLAYED_AGAINST {goal: 2, assists: 0, attempt: 4, tackle: 3}]→ (cro),
(vini)-[:PLAYED_AGAINST {goal: 0, assists: 1, attempt: 1, tackle: 1}]→ (cro),
(silva)-[:PLAYED_AGAINST {goal: 1, assists: 0, attempt: 4, tackle: 3}]→ (arg),
(giroud)-[:PLAYED_AGAINST {goal: 2, assists: 1, attempt: 3, tackle: 2}]→ (por),
(ziyech)-[:PLAYED_AGAINST {goal: 0, assists: 0, attempt: 1, tackle: 2}]→ (por),
(modric)-[:PLAYED_AGAINST {goal: 3, assists: 0, attempt: 5, tackle: 7}]→ (bra),
(ivan)-[:PLAYED_AGAINST {goal: 1, assists: 2, attempt: 2, tackle: 2}]→ (bra),
(hakimi)-[:PLAYED_AGAINST {goal: 1, assists: 0, attempt: 2, tackle: 3}]→ (fra),
(neymar)-[:PLAYED_AGAINST {goal: 2, assists: 3, attempt: 4, tackle: 5}]→ (por),
(vini)-[:PLAYED_AGAINST {goal: 1, assists: 0, attempt: 2, tackle: 1}]→ (mor),
(ziyech)-[:PLAYED_AGAINST {goal: 0, assists: 1, attempt: 1, tackle: 3}]→ (fra);
```

TRANSFORM DATABASE

- Final Graphical Representation of created data and its relationships.
- There are 15 nodes of Players, 6 nodes and Team and Coach respectively, total relationships created are 77.

Overview

Node labels

* (27) PLAYER (15) COACH (6)

TEAM (6)

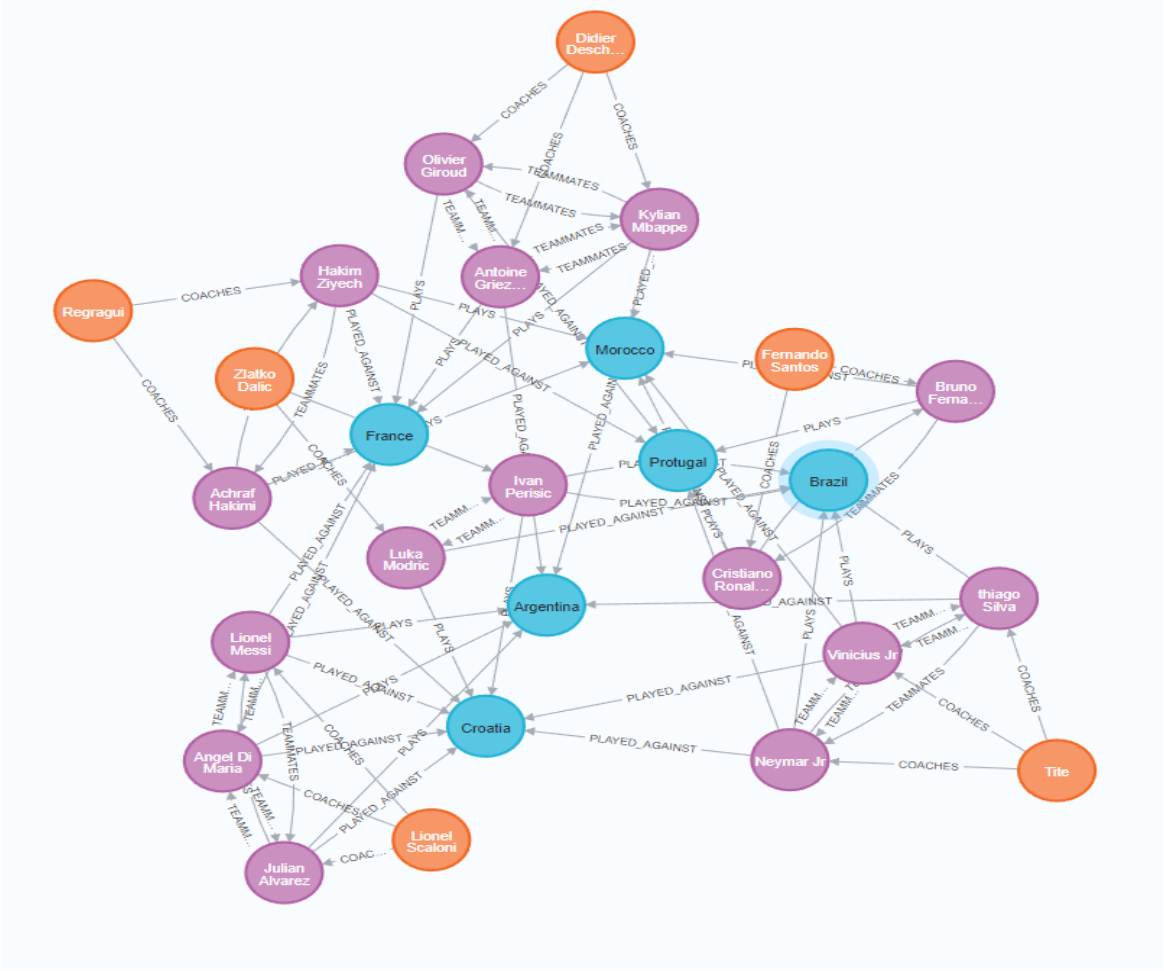
Relationship types

* (77) PLAYS (15)

PLAYED_AGAINST (23)

TEAMMATES (24) COACHES (15)

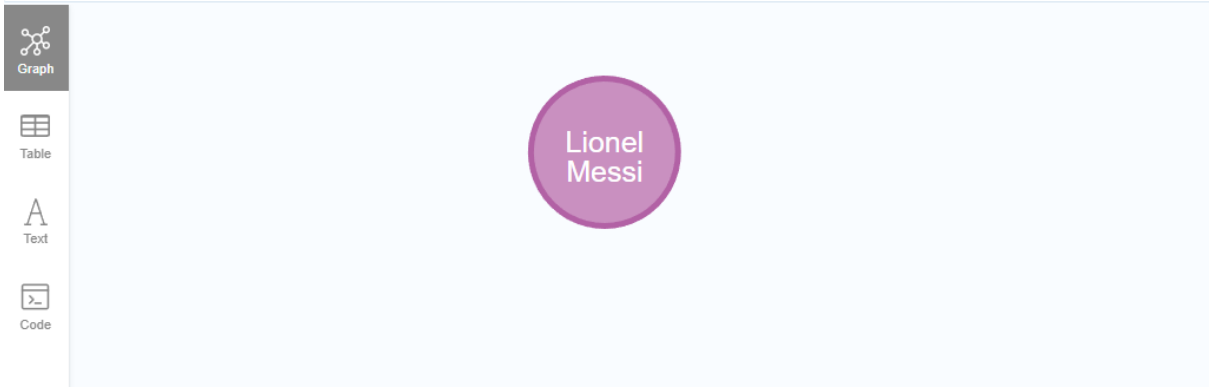
Displaying 27 nodes, 0 relationships.



Performing Different Queries

- In order to find the specification of a single node we can use this query.
- Here we have used a particular players name to find its node properties.

```
neo4j$ MATCH (player:PLAYER) WHERE player.name = "Lionel Messi" RETURN player
```



LIMIT:

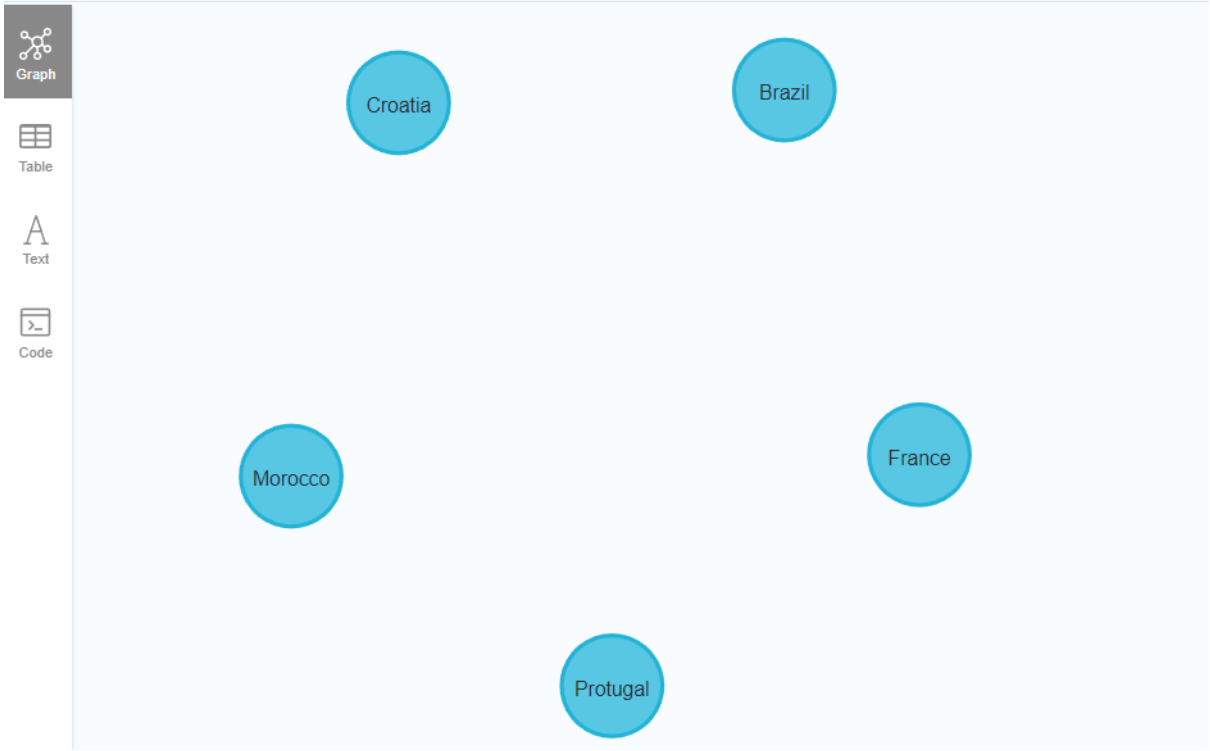
- Limit is used to put constraint to the number of outputs to be viewed.
- To determine how many players might not be able to play future world cup whose age is greater than 35 and set limit as 5.

```
neo4j$ MATCH (player:PLAYER) WHERE player.age ⩾ 35 RETURN player LIMIT 5
```

WHERE Clause:

- Where clause is used to specify any criteria to meet the users desired output.
- Here we have to find how many teams are in the dataset except Argentina.

```
neo4j$ MATCH (team:TEAM) WHERE team.name <> "Argentina" RETURN team
```



AND Operator:

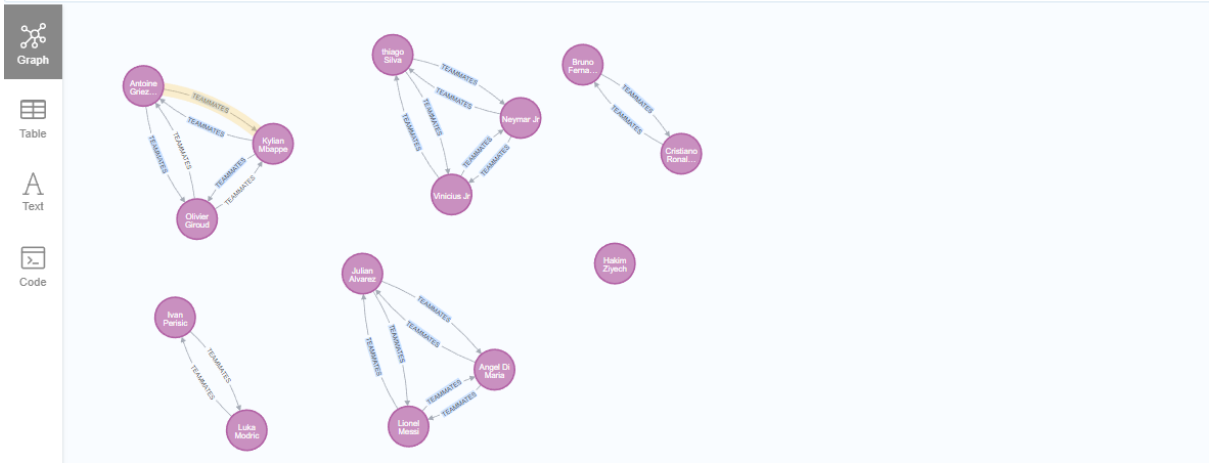
- AND operator is used to give multiple specific conditions in which all the conditions must be true to get the desired output.
- Here we have to determine players within constrained range of weight and height.

```
neo4j$ MATCH (player:PLAYER) WHERE player.weight ⩾70 AND player.height ⩽1.8 RETURN player
```

OR Operator:

- OR operator is used to give multiple specific conditions in which any of the conditions must be true to get the desired output.
- Here we have to determine players having weight more than 75 kg OR height less than 1.8m.

```
neo4j$ MATCH (player:PLAYER) WHERE player.weight ⩾75 OR player.height ⩽1.8 RETURN player
```



NOT Operator:

- NOT operator is used when we have to deny any specific condition.
- We have to determine young players from dataset which are NOT in the specified range.

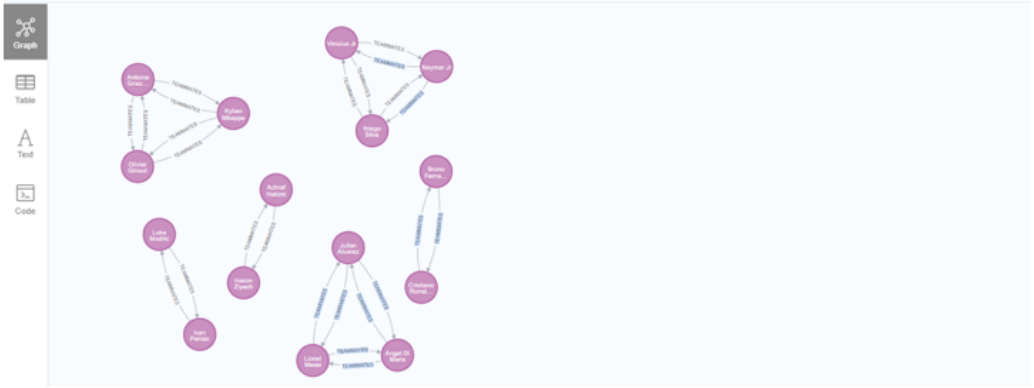
```
neo4j$ MATCH (player:PLAYER) WHERE NOT player.age ⩾25 RETURN player
```

BMI Calculations

To find the fit player.

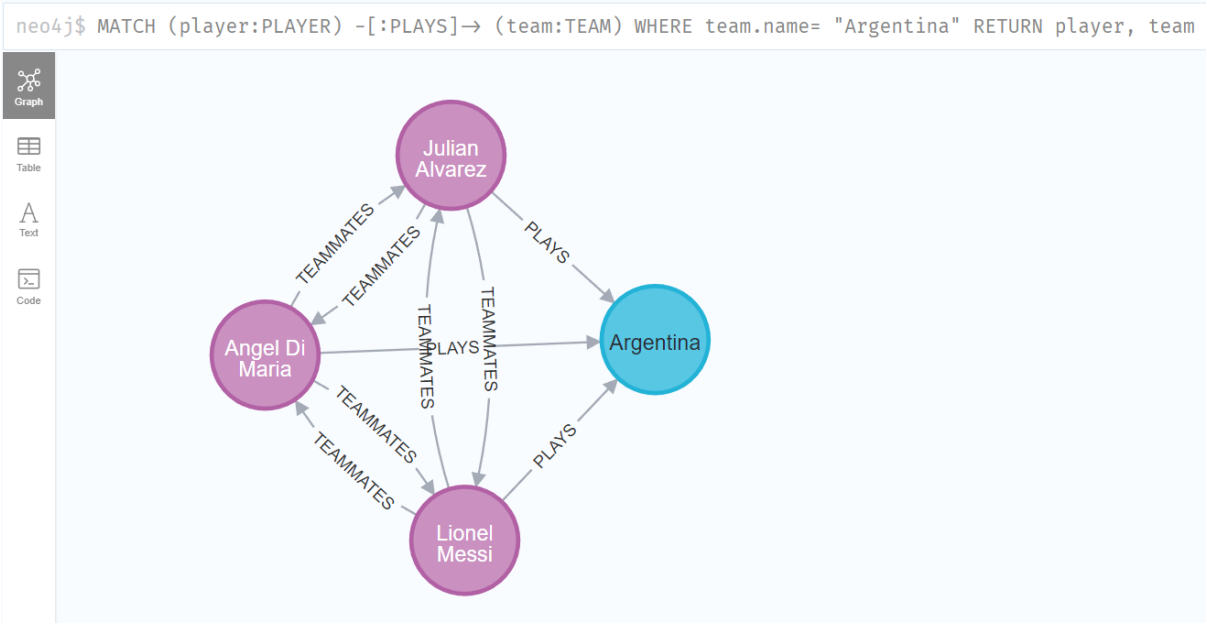
BMI: Calculated healthy players from our dataset on bmi parameter

```
neo4j$ MATCH (player:PLAYER) WHERE (player.weight / (player.height * player.height)) > 20 RETURN player
```



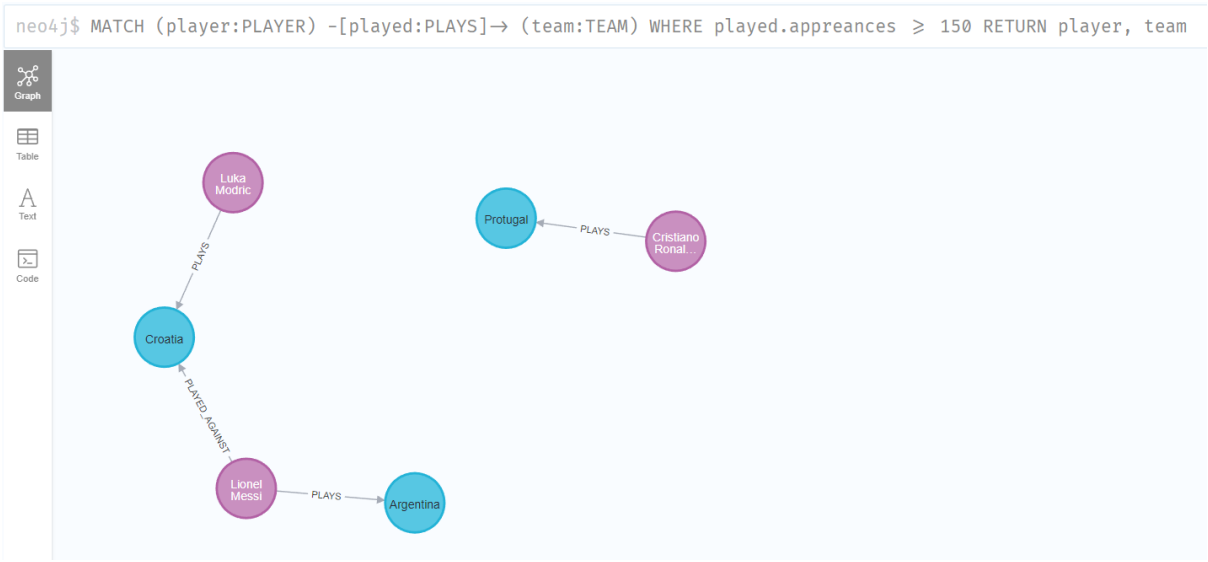
Query between relationship:

- Created query to find out the players which are playing for team ‘Argentina’.
- There are three players from out dataset who plays for Argentina team.



Query between relationship properties:

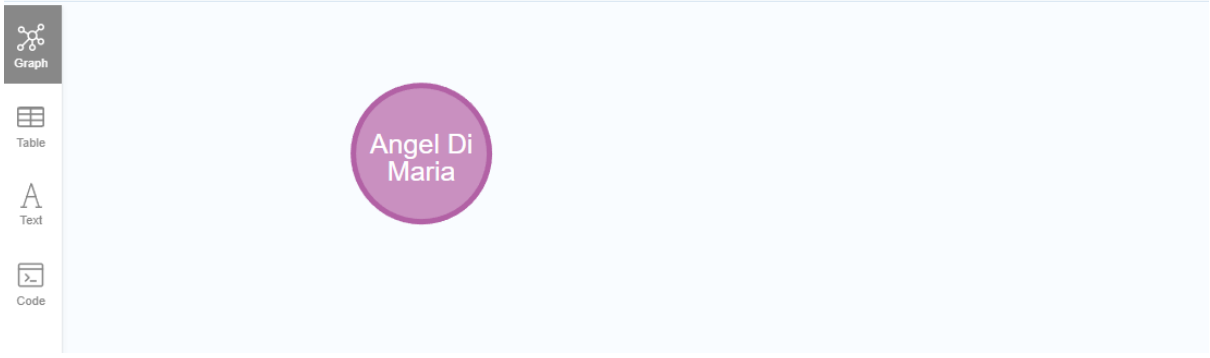
- To determine how many players have represented their country more than 150 times.
- Luka Modric, Lionel Messi and Cristiano Ronaldo have played more then 150 matches for their country.



Multiple Match Operator:

- Query is created with the help of multiple match in order to compare team mates on the basis of appearance as a property.
- We have determined which player played more than 100 times for their country which is team mate with Lionel Messi.

```
1 MATCH (player:PLAYER {name: "Lionel Messi"}) - [:TEAMMATES]→(teammate:PLAYER)
2 MATCH (teammate) - [played:PLAYS] → (team:TEAM)
3 WHERE played.appreances ⩾ 100
4 RETURN teammate
```



Aggregate Functions (MIN):

- To determine minimum tackle committed by an individual player in single match.

```
MATCH (player:PLAYER)- [matches:PLAYED_AGAINST]→ (:TEAM)
RETURN player.name, MIN(matches.tackle)  AS Tackle
ORDER BY Tackle DESC
```

Table | Text | Code

	player.name	Tackle
1	"Luka Modric"	7
2	"Angel Di Maria"	5
3	"Lionel Messi"	4
4	"Kylian Mbappe"	3
5	"thiago Silva"	3
6	"Neymar Jr"	3
7		

Started streaming 15 records after 1 ms and completed after 2 ms.

Aggregate Functions (MAX):

- To determine maximum goals scored by an individual player in single match.

```
MATCH (player:PLAYER)- [matches:PLAYED_AGAINST]→ (:TEAM)
RETURN player.name, MAX(matches.goal) AS GOALS
ORDER BY GOALS DESCS
```

Table | Text | Code

	player.name	GOALS
1	"Kylian Mbappe"	3
2	"Lionel Messi"	3
3	"Luka Modric"	3
4	"Olivier Giroud"	2
5	"Neymar Jr"	2
6	"Julian Alvarez"	2
7	"thiago Silva"	1
8	"Achraf Hakimi"	1
9	"Angel Di Maria"	1

Started streaming 15 records after 1 ms and completed after 2 ms.

Aggregate Functions (SUM):

- To determine total goals scored by an individual player in all matches from dataset.

```
MATCH (player:PLAYER)- [matches:PLAYED_AGAINST]→ (:TEAM)
RETURN player.name, SUM(matches.goal)  AS Total_Goals
ORDER BY Total_Goals DESC
```

Table | Text | Code

	player.name	Total_Goals
1	"Kylian Mbappe"	4
2	"Neymar Jr"	4
3	"Lionel Messi"	4
4	"Luka Modric"	3
5	"Olivier Giroud"	2
6	"Angel Di Maria"	2
7		

Started streaming 15 records after 1 ms and completed after 2 ms.

Aggregate Functions (AVG):

- To determine average of total attempts made by an individual player per match.

```
MATCH (player:PLAYER)- [matches:PLAYED_AGAINST]→ (:TEAM)
RETURN player.name, AVG(matches.attempt)
```

Table | Text | Code

	player.name	AVG(matches.attempt)
1	"Antoine Griezmann"	2.0
2	"Kylian Mbappe"	3.5
3	"thiago Silva"	4.0
4	"Olivier Giroud"	3.0
5	"Hakim Ziyech"	1.0
6	"Neymar Jr"	4.0
7	"Achraf Hakimi"	2.0
8	"Lionel Messi"	4.5
9	"Angel Di Maria"	1.5

Started streaming 15 records in less than 1 ms and completed after 1 ms.

Aggregate Functions (COUNT):

- To determine total matches played by an individual player from the dataset.

```
MATCH (player:PLAYER)- [matches:PLAYED_AGAINST]→ (:TEAM)
RETURN player.name, count(matches)  As Total_Matches
ORDER BY Total_Matches DESC

```

Table | Text | Code

	player.name	Total_Matches
1	"Kylian Mbappe"	2
2	"Hakim Ziyech"	2
3	"Neymar Jr"	2
4	"Achraf Hakimi"	2
5	"Lionel Messi"	2
6	"Angel Di Maria"	2
7		

Started streaming 15 records after 6 ms and completed after 6 ms.