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Assignment 2

CSE3021 – Social and Information Networks

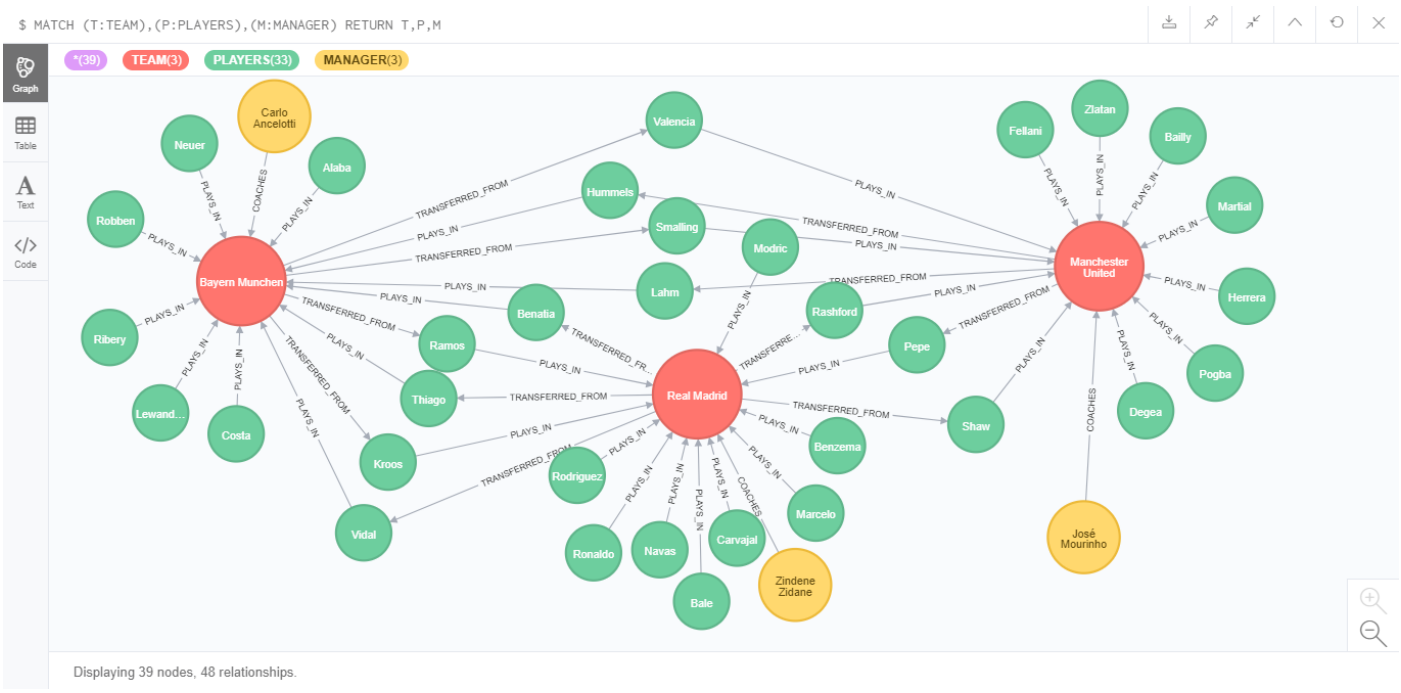
SHANTANU PRAMANIK

(15BCE2071)

Faculty: Prof. Ilanthenral K P S K

SLOT: A1 + TA1

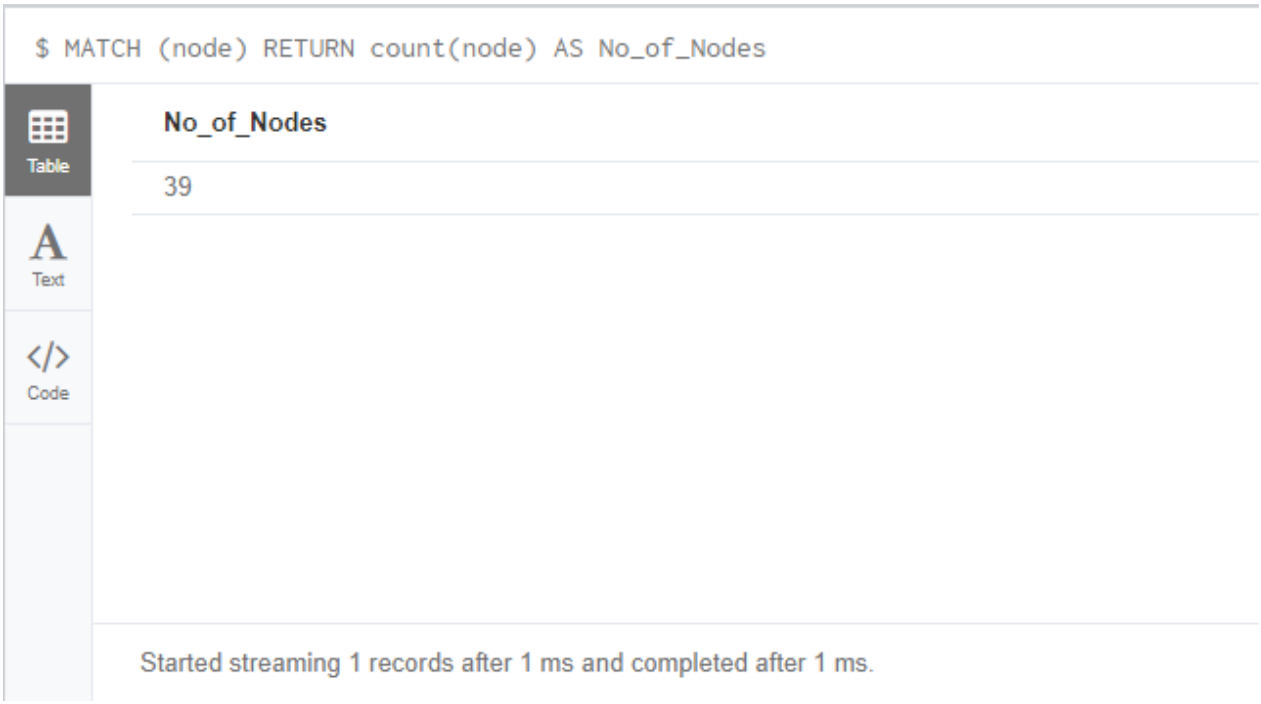
Creation of a proper social network



Basic Graph Operations with Cypher

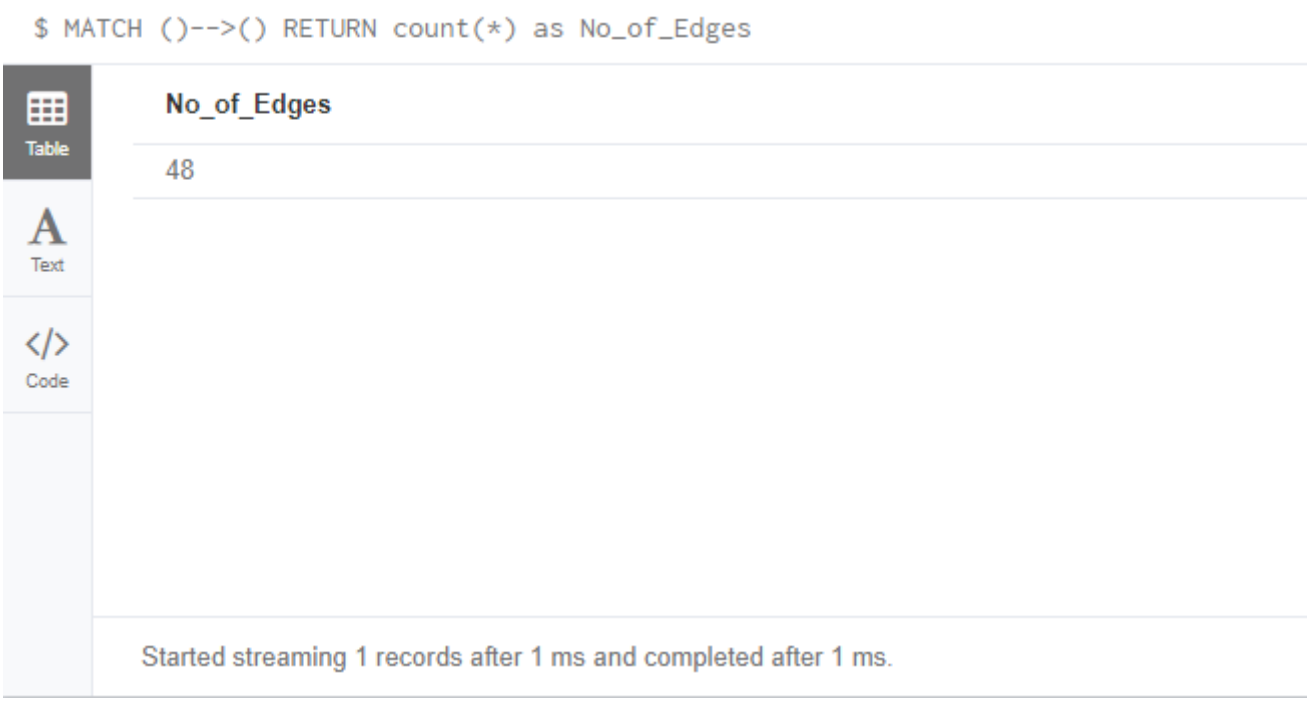
Count the number of nodes

```
$ MATCH (node) RETURN count(node) AS No_of_Nodes
```



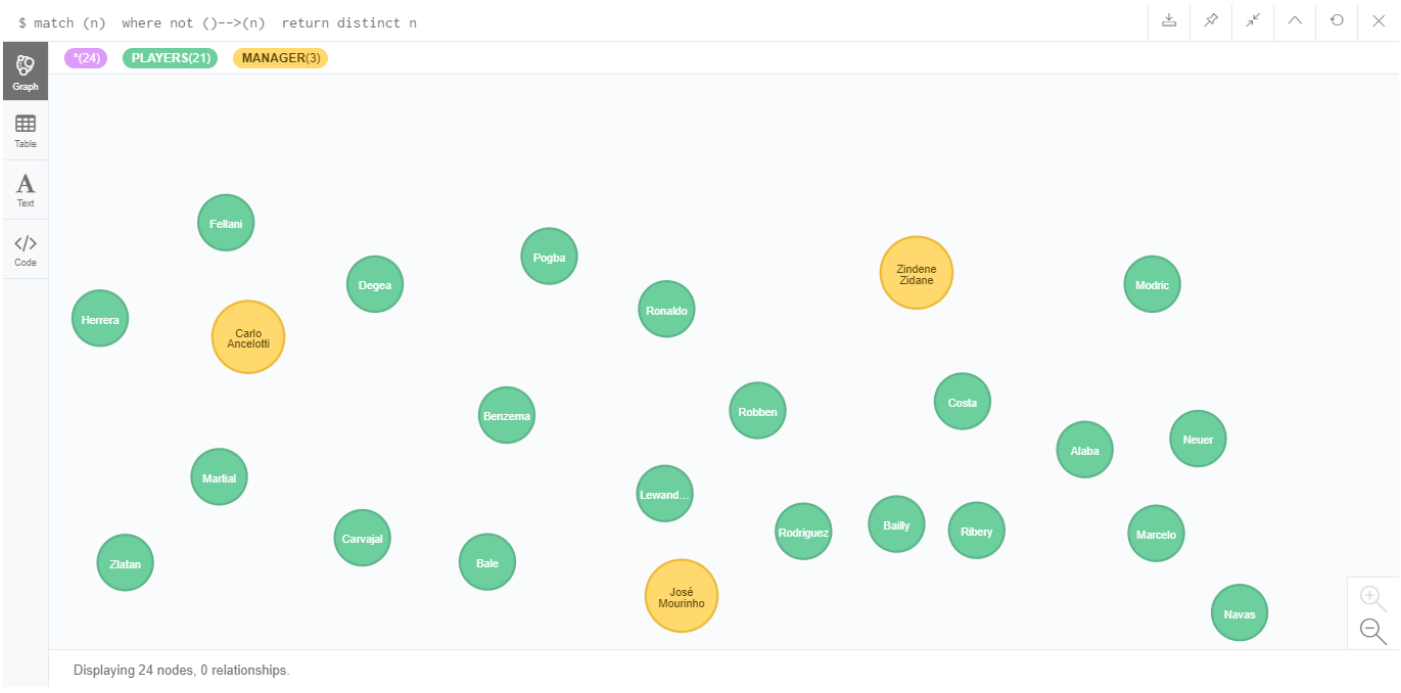
Count the number of edges

```
$ MATCH ()-->() RETURN count(*) AS No_of_Edges
```



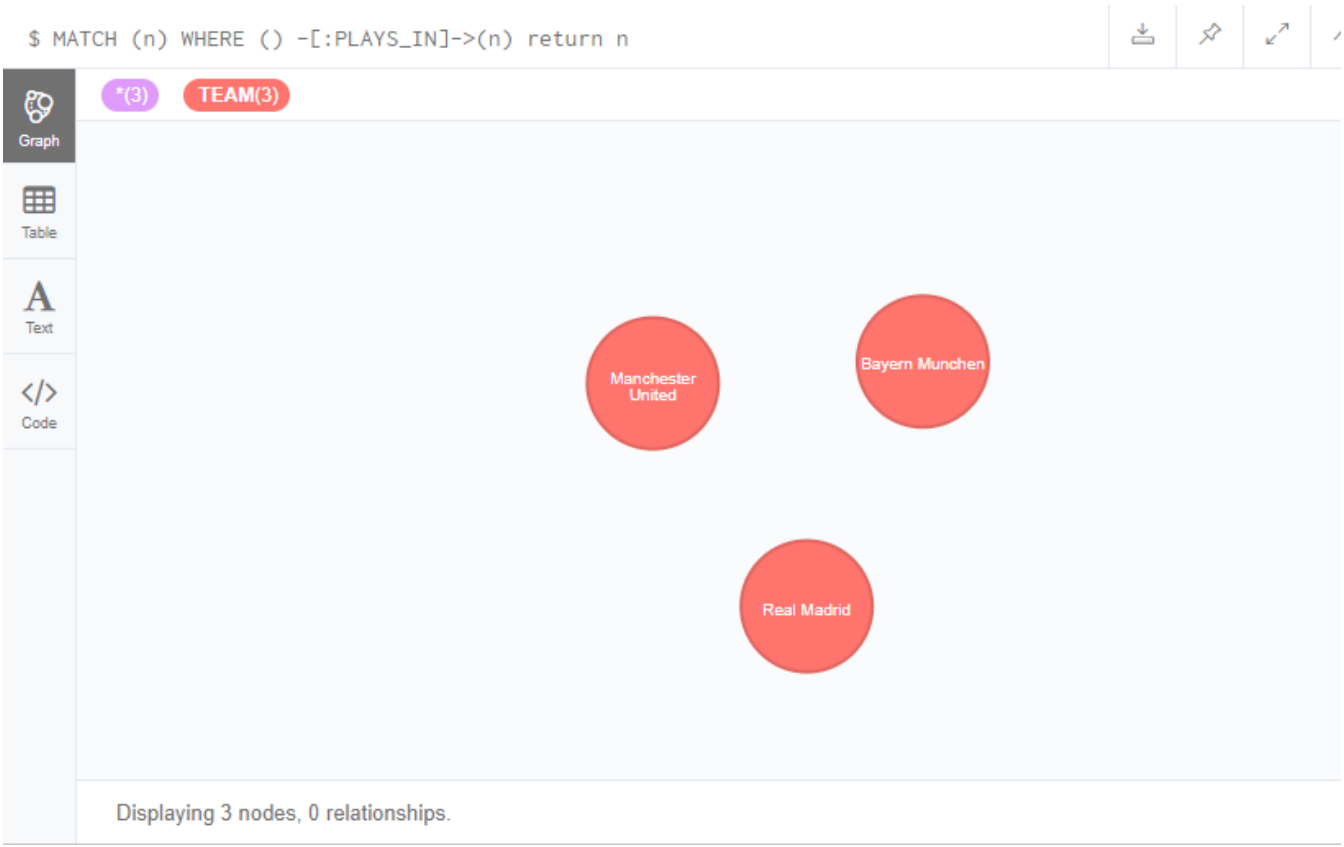
Find leaf nodes

```
$ MATCH (n) WHERE NOT ()-->(n) RETURN DISTINCT n
```



Find root nodes

```
$ MATCH (n) WHERE () -[:PLAYS_IN]->(n) RETURN n
```



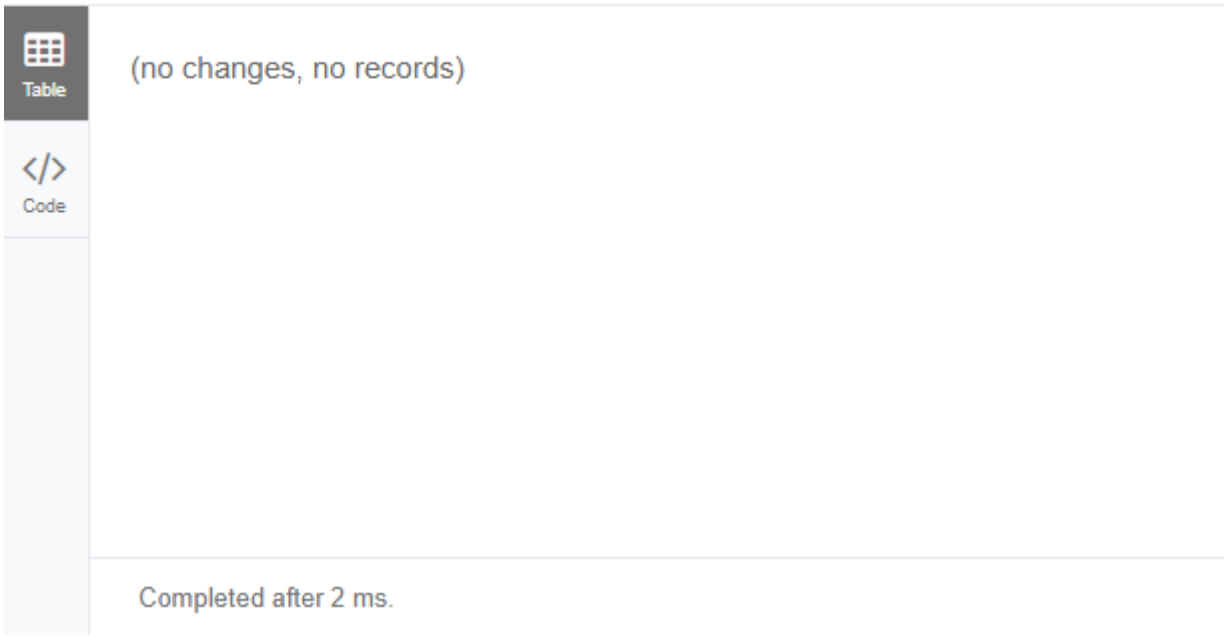
Here the root nodes have a relationship pointing outwards that's why this method was chosen to find out the root nodes rather than:

```
$ MATCH (n) WHERE NOT (n)-->() RETURN DISTINCT n
```

Find triangles

```
$ MATCH (n) -- > () --> (n) RETURN n
```

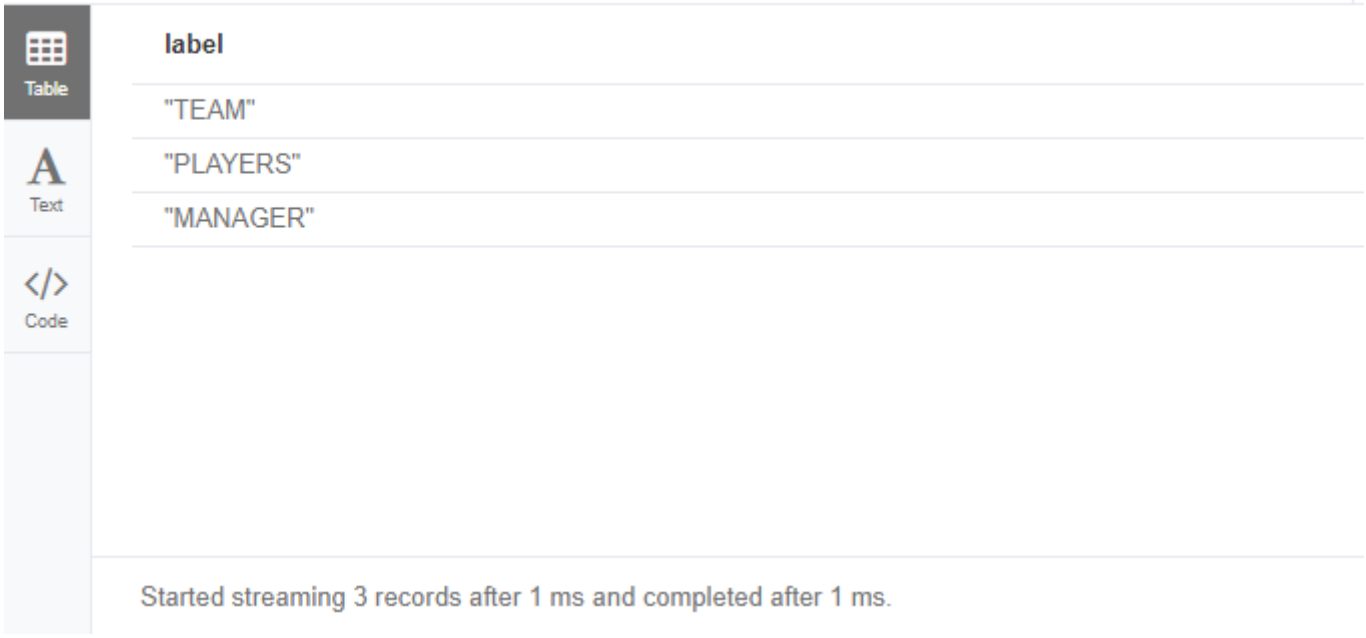
```
$ MATCH (n) -- > () --> (n) RETURN n
```



Find the types of a node

$ CALL db.labels()

```
$ CALL db.labels()
```



Find the label of an edge

$ CALL db.relationshipTypes()

```
$ CALL db.relationshipTypes()
```

Table | Text | Code

relationshipType
"PLAYS_IN"
"COACHES"
"TRANSFERRED_FROM"

Started streaming 3 records after 1 ms and completed after 1 ms.

Find all properties of a node

```
$ MATCH (node) RETURN DISTINCT keys(node) AS Properties_of_Node
```

$ MATCH (node) RETURN DISTINCT keys(node) AS Properties_of_Node

Table | Text | Code

Properties_of_Node
["stadium", "title"]
["name", "position"]
["title", "stadium"]
["title"]

Started streaming 4 records after 1 ms and completed after 3 ms.

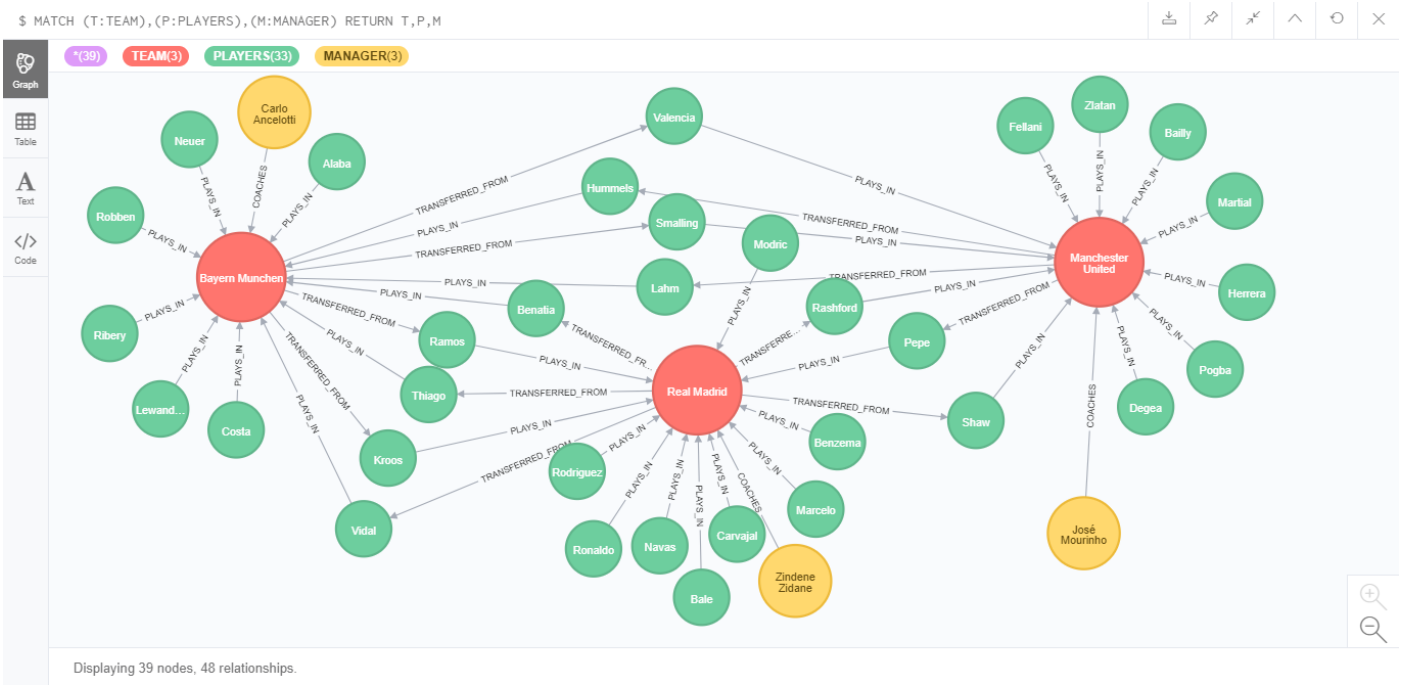
Connectivity Analytics with CYPHER (7 marks)

View the graph

```
$ MATCH (node) RETURN node
```

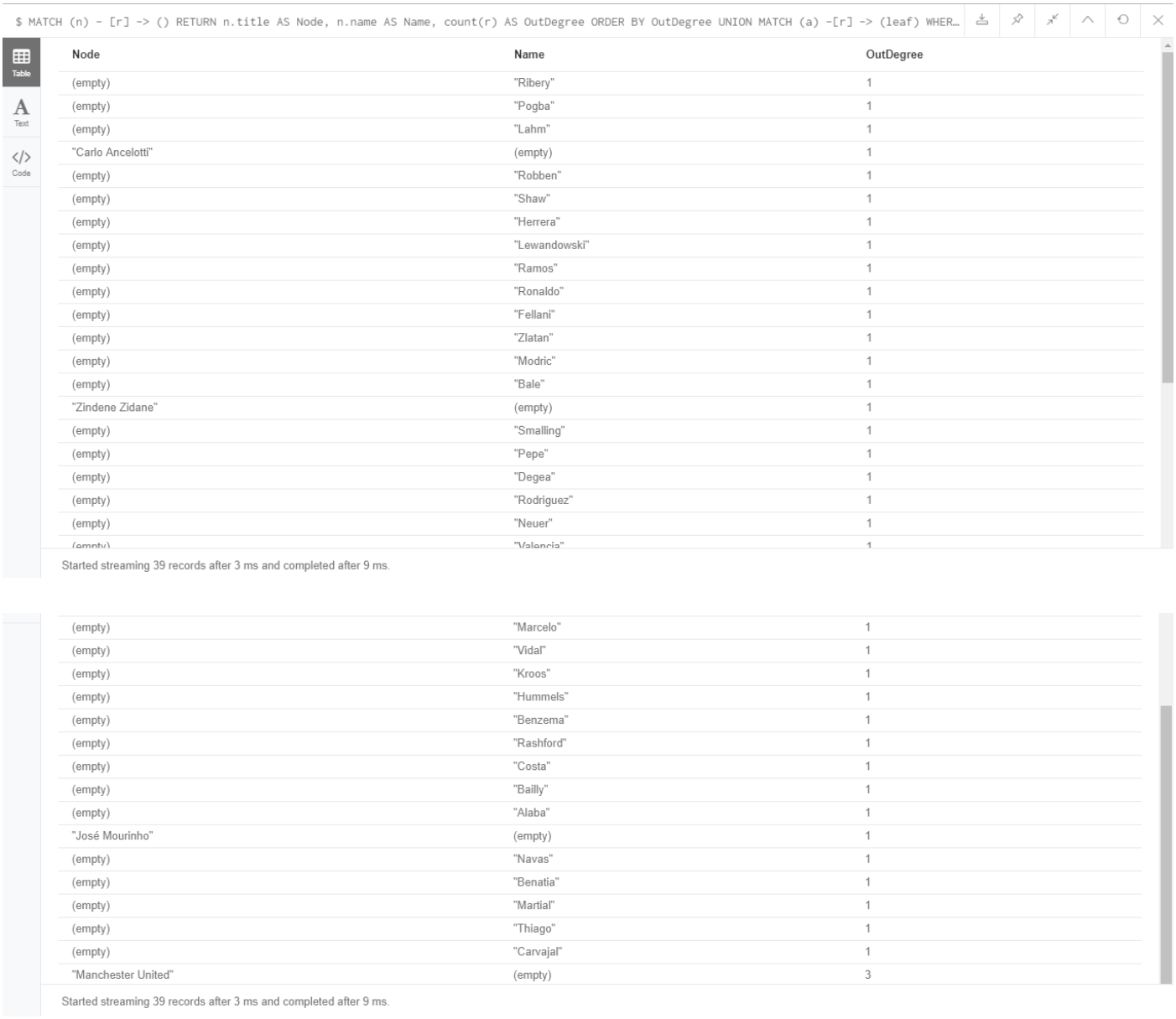
Or,

```
$ MATCH (T:TEAM),(P:PLAYERS),(M:MANAGER) RETURN T,P,M
```



Find the outdegree of all nodes

```
$    MATCH (n) - [r] -> ()

     RETURN n.title AS Node, n.name AS Name, count(r) AS
     OutDegree

     ORDER BY OutDegree

     UNION

     MATCH (a) -[r] -> (leaf)

     WHERE NOT ((leaf)-->())

     RETURN leaf.title as Node, leaf.name AS Name, 0 as OutDegree
```



$ MATCH (n) - [r] -> () RETURN n.title AS Node, n.name AS Name, count(r) AS OutDegree ORDER BY OutDegree UNION MATCH (a) -[r] -> (leaf) WHER…

Table | Text | Code

Node	Name	OutDegree
(empty)	"Ribery"	1
(empty)	"Pogba"	1
(empty)	"Lahm"	1
"Carlo Ancelotti"	(empty)	1
(empty)	"Robben"	1
(empty)	"Shaw"	1
(empty)	"Herrera"	1
(empty)	"Lewandowski"	1
(empty)	"Ramos"	1
(empty)	"Ronaldo"	1
(empty)	"Fellani"	1
(empty)	"Zlatan"	1
(empty)	"Modric"	1
(empty)	"Bale"	1
"Zindene Zidane"	(empty)	1
(empty)	"Smalling"	1
(empty)	"Pepe"	1
(empty)	"Degea"	1
(empty)	"Rodriguez"	1
(empty)	"Neuer"	1
(empty)	"Valencia"	1

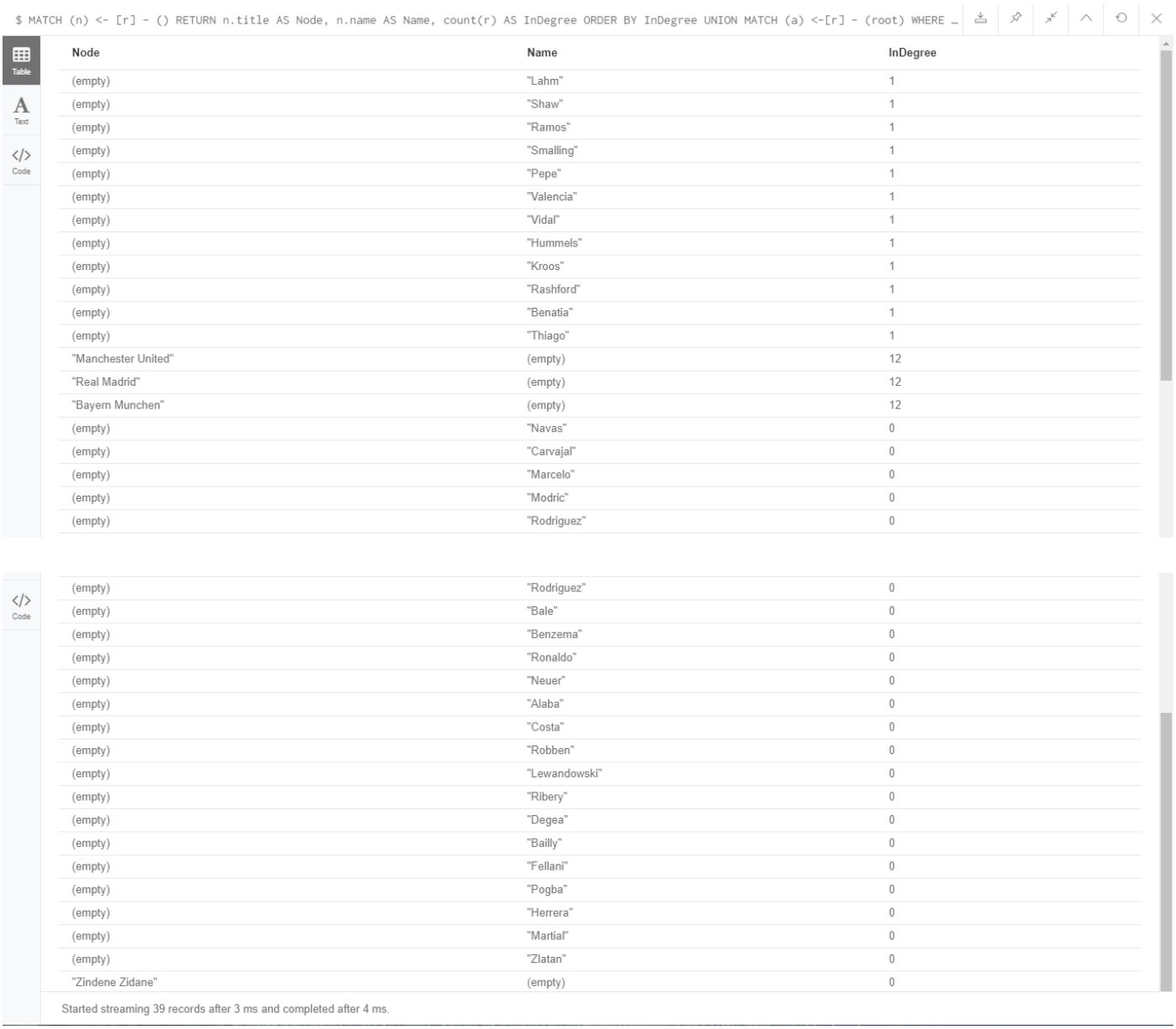
Started streaming 39 records after 3 ms and completed after 9 ms.

(empty)	"Marcelo"	1
(empty)	"Vidal"	1
(empty)	"Kroos"	1
(empty)	"Hummels"	1
(empty)	"Benzema"	1
(empty)	"Rashford"	1
(empty)	"Costa"	1
(empty)	"Bailly"	1
(empty)	"Alaba"	1
"José Mourinho"	(empty)	1
(empty)	"Navas"	1
(empty)	"Benatia"	1
(empty)	"Martial"	1
(empty)	"Thiago"	1
(empty)	"Carvajal"	1
"Manchester United"	(empty)	3

Started streaming 39 records after 3 ms and completed after 9 ms.

Find the indegree of all nodes

```
$    MATCH (n) <- [r] - ()
     RETURN n.title AS Node, n.name AS Name, count(r) AS InDegree
     ORDER BY InDegree
     UNION
     MATCH (a) <-[r] - (root)
     WHERE NOT ((root)<--())
     RETURN root.title as Node, root.name AS Name, 0 as InDegree
```



```
$ MATCH (n) <- [r] - () RETURN n.title AS Node, n.name AS Name, count(r) AS InDegree ORDER BY InDegree UNION MATCH (a) <-[r] - (root) WHERE …
```

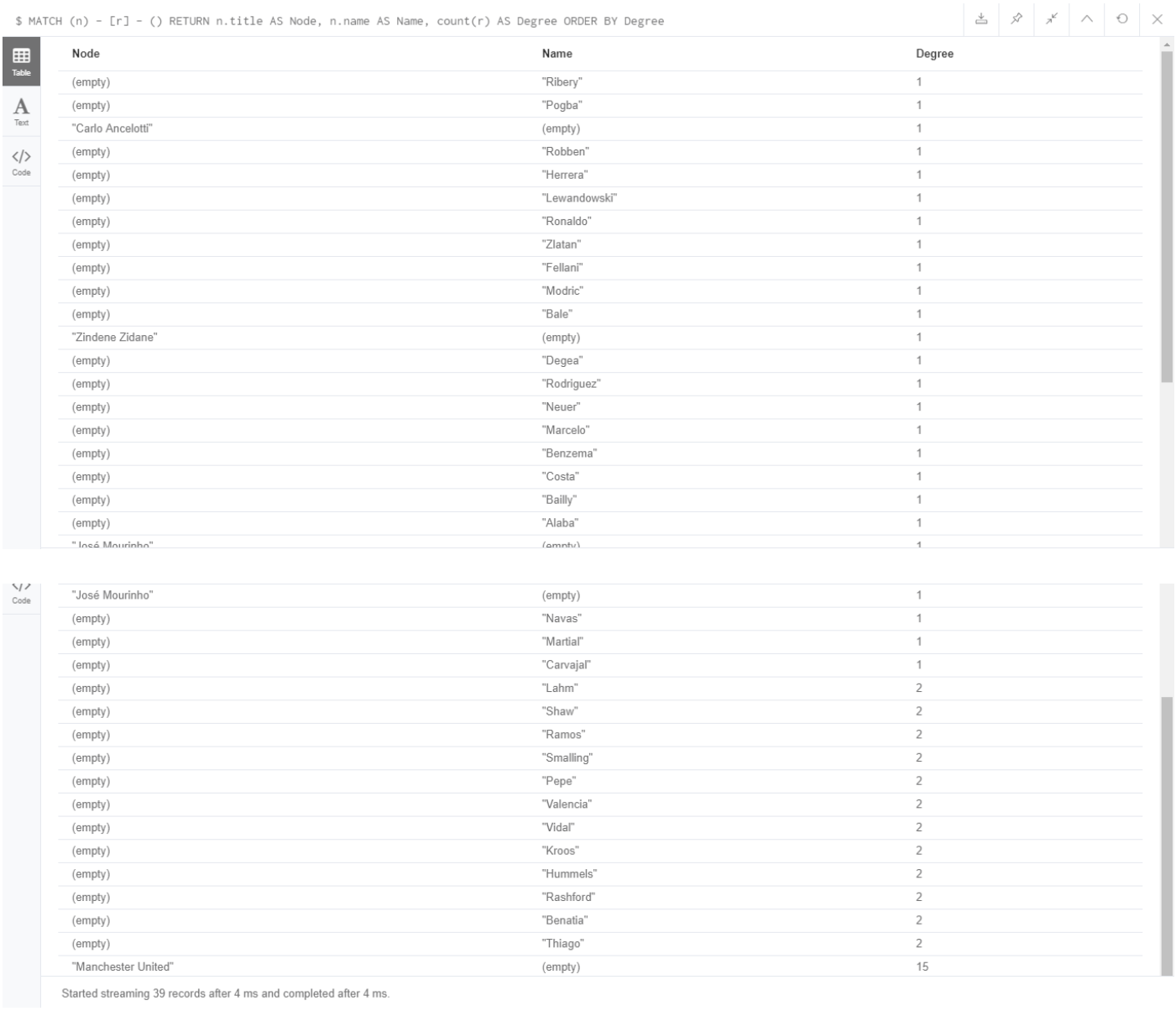
Table | Text | Code

Node	Name	InDegree
(empty)	"Lahm"	1
(empty)	"Shaw"	1
(empty)	"Ramos"	1
(empty)	"Smalling"	1
(empty)	"Pepe"	1
(empty)	"Valencia"	1
(empty)	"Vidal"	1
(empty)	"Hummels"	1
(empty)	"Kroos"	1
(empty)	"Rashford"	1
(empty)	"Benatia"	1
(empty)	"Thiago"	1
"Manchester United"	(empty)	12
"Real Madrid"	(empty)	12
"Bayern Munchen"	(empty)	12
(empty)	"Navas"	0
(empty)	"Carvajal"	0
(empty)	"Marcelo"	0
(empty)	"Modric"	0
(empty)	"Rodriguez"	0
(empty)	"Rodriguez"	0
(empty)	"Bale"	0
(empty)	"Benzema"	0
(empty)	"Ronaldo"	0
(empty)	"Neuer"	0
(empty)	"Alaba"	0
(empty)	"Costa"	0
(empty)	"Robben"	0
(empty)	"Lewandowski"	0
(empty)	"Ribery"	0
(empty)	"Degea"	0
(empty)	"Bailly"	0
(empty)	"Fellani"	0
(empty)	"Pogba"	0
(empty)	"Herrera"	0
(empty)	"Martial"	0
(empty)	"Zlatan"	0
"Zindene Zidane"	(empty)	0

Started streaming 39 records after 3 ms and completed after 4 ms.

Find the degree of all nodes

```
$    MATCH (n) - [r] - ()
     RETURN n.title AS Node, n.name AS Name, count(r) AS Degree
     ORDER BY Degree
```



```
$ MATCH (n) - [r] - () RETURN n.title AS Node, n.name AS Name, count(r) AS Degree ORDER BY Degree
```

Table | Text | Code

Node	Name	Degree
(empty)	"Ribery"	1
(empty)	"Pogba"	1
"Carlo Ancelotti"	(empty)	1
(empty)	"Robben"	1
(empty)	"Herrera"	1
(empty)	"Lewandowski"	1
(empty)	"Ronaldo"	1
(empty)	"Zlatan"	1
(empty)	"Fellani"	1
(empty)	"Modric"	1
(empty)	"Bale"	1
"Zindene Zidane"	(empty)	1
(empty)	"Degea"	1
(empty)	"Rodriguez"	1
(empty)	"Neuer"	1
(empty)	"Marcelo"	1
(empty)	"Benzema"	1
(empty)	"Costa"	1
(empty)	"Bailly"	1
(empty)	"Alaba"	1
"José Mourinho"	(empty)	1
(empty)	"Navas"	1
(empty)	"Martial"	1
(empty)	"Carvajal"	1
(empty)	"Lahm"	2
(empty)	"Shaw"	2
(empty)	"Ramos"	2
(empty)	"Smalling"	2
(empty)	"Pepe"	2
(empty)	"Valencia"	2
(empty)	"Vidal"	2
(empty)	"Kroos"	2
(empty)	"Hummels"	2
(empty)	"Rashford"	2
(empty)	"Benatia"	2
(empty)	"Thiago"	2
"Manchester United"	(empty)	15

Started streaming 39 records after 4 ms and completed after 4 ms.

Find degree histogram of the graph

```
$    MATCH (n) - [r] - ()

     WITH n AS Nodes, count(distinct r) AS Degree

     RETURN Degree, count(Nodes) ORDER BY Degree ASC
```

```
$ MATCH (n) - [r] - () WITH n AS Nodes, count(distinct r) AS Degree RETURN Degree, count(Nodes) ORDER BY Degree ASC
```

Table | Text | Code

Degree	count(Nodes)
1	24
2	12
15	1
16	1
17	1

Started streaming 5 records after 4 ms and completed after 4 ms.

Save the degree of the node as a new node property

```
$    MATCH (n) - [r] - ()

     WITH n AS Node, count(distinct r) AS Degree

     SET Node.degr = Degree

     RETURN Node.name, Node.title, Node.degr
```

```
$ MATCH (n) - [r] - () WITH n AS Node, count(distinct r) AS Degree SET Node.degr = Degree RETURN Node.name, Node.title, Node.degr
```

Table | Text | Code

Node.name	Node.title	Node.degr
"Thiago"	(empty)	2
"Ronaldo"	(empty)	1
"Carvajal"	(empty)	1
"Smalling"	(empty)	2
"Benzema"	(empty)	1
"Navas"	(empty)	1
"Vidal"	(empty)	2
(empty)	"Zindene Zidane"	1
"Fellani"	(empty)	1
"Robben"	(empty)	1
(empty)	"Bayern Munchen"	16
"Ramos"	(empty)	2
"Benatia"	(empty)	2
(empty)	"Manchester United"	15
"Martial"	(empty)	1
"Kroos"	(empty)	2
"Herrera"	(empty)	1
"Modric"	(empty)	1
"Lahm"	(empty)	2
"Ribery"	(empty)	1
"Rashford"	(empty)	2
"Valencia"	(empty)	2
"Bale"	(empty)	1
"Alaba"	(empty)	1
"Shaw"	(empty)	2
"Costa"	(empty)	1
(empty)	"José Mourinho"	1
"Pepe"	(empty)	2
(empty)	"Real Madrid"	17
(empty)	"Carlo Ancelotti"	1
"Bailly"	(empty)	1
"Lewandowski"	(empty)	1
"Neuer"	(empty)	1
"Pogba"	(empty)	1
"Marcelo"	(empty)	1
"Zlatan"	(empty)	1
"Degea"	(empty)	1

Set 39 properties, started streaming 39 records after 77 ms and completed after 77 ms.

Construct the Adjacency Matrix of the graph

```
$    MATCH (n), (m)
     RETURN n.name,n.title,m.name,m.title,
     case
     WHEN (n) --> (m) THEN 1
     ELSE 0
     END AS Value
```

```
$ MATCH (n), (m) RETURN n.name,n.title,m.name,m.title, case WHEN (n) --> (m) THEN 1 ELSE 0 END AS Value
```

Table | Text | Code

n.name	n.title	m.name	m.title	Value
(empty)	"Real Madrid"	(empty)	"Real Madrid"	0
(empty)	"Real Madrid"	"Navas"	(empty)	0
(empty)	"Real Madrid"	"Carvajal"	(empty)	0
(empty)	"Real Madrid"	"Pepe"	(empty)	0
(empty)	"Real Madrid"	"Ramos"	(empty)	0
(empty)	"Real Madrid"	"Marcelo"	(empty)	0
(empty)	"Real Madrid"	"Modric"	(empty)	0
(empty)	"Real Madrid"	"Kroos"	(empty)	0
(empty)	"Real Madrid"	"Rodriguez"	(empty)	0
(empty)	"Real Madrid"	"Bale"	(empty)	0
(empty)	"Real Madrid"	"Benzema"	(empty)	0
(empty)	"Real Madrid"	"Ronaldo"	(empty)	0
(empty)	"Real Madrid"	(empty)	"Bayern Munchen"	0
(empty)	"Real Madrid"	"Neuer"	(empty)	0
(empty)	"Real Madrid"	"Lahm"	(empty)	0
(empty)	"Real Madrid"	"Benatia"	(empty)	1
(empty)	"Real Madrid"	"Hummels"	(empty)	0
(empty)	"Real Madrid"	"Alaba"	(empty)	0
(empty)	"Real Madrid"	"Vidal"	(empty)	1
(empty)	"Real Madrid"	"Thiago"	(empty)	1

Table | Text | Code

(empty)	"Real Madrid"	"Bailly"	(empty)	0
(empty)	"Real Madrid"	"Shaw"	(empty)	1
(empty)	"Real Madrid"	"Fellani"	(empty)	0
(empty)	"Real Madrid"	"Pogba"	(empty)	0
(empty)	"Real Madrid"	"Herrera"	(empty)	0
(empty)	"Real Madrid"	"Martial"	(empty)	0
(empty)	"Real Madrid"	"Zlatan"	(empty)	0
(empty)	"Real Madrid"	"Rashford"	(empty)	1
(empty)	"Real Madrid"	(empty)	"Zindene Zidane"	0
(empty)	"Real Madrid"	(empty)	"Carlo Ancelotti"	0
(empty)	"Real Madrid"	(empty)	"José Mourinho"	0
"Navas"	(empty)	(empty)	"Real Madrid"	1
"Navas"	(empty)	"Navas"	(empty)	0
"Navas"	(empty)	"Carvajal"	(empty)	0
"Navas"	(empty)	"Pepe"	(empty)	0
"Navas"	(empty)	"Ramos"	(empty)	0
"Navas"	(empty)	"Marcelo"	(empty)	0
"Navas"	(empty)	"Modric"	(empty)	0
"Navas"	(empty)	"Kroos"	(empty)	0
"Navas"	(empty)	"Rodriguez"	(empty)	0
"Navas"	(empty)	"Bale"	(empty)	0
"Navas"	(empty)	"Benzema"	(empty)	0

Table | Text | Code

"Navas"	(empty)	"Fellani"	(empty)	0
"Navas"	(empty)	"Pogba"	(empty)	0
"Navas"	(empty)	"Herrera"	(empty)	0
"Navas"	(empty)	"Martial"	(empty)	0
"Navas"	(empty)	"Zlatan"	(empty)	0
"Navas"	(empty)	"Rashford"	(empty)	0
"Navas"	(empty)	(empty)	"Zindene Zidane"	0
"Navas"	(empty)	(empty)	"Carlo Ancelotti"	0
"Navas"	(empty)	(empty)	"José Mourinho"	0
"Carvajal"	(empty)	(empty)	"Real Madrid"	1
"Carvajal"	(empty)	"Navas"	(empty)	0
"Carvajal"	(empty)	"Carvajal"	(empty)	0
"Carvajal"	(empty)	"Pepe"	(empty)	0
"Carvajal"	(empty)	"Ramos"	(empty)	0
"Carvajal"	(empty)	"Marcelo"	(empty)	0
"Carvajal"	(empty)	"Modric"	(empty)	0
"Carvajal"	(empty)	"Kroos"	(empty)	0
"Carvajal"	(empty)	"Rodriguez"	(empty)	0
"Carvajal"	(empty)	"Bale"	(empty)	0
"Carvajal"	(empty)	"Benzema"	(empty)	0
"Carvajal"	(empty)	"Ronaldo"	(empty)	0
"Carvajal"	(empty)	(empty)	"Bayern Munchen"	0

and so on….