**MIDS W205**

**Lab # 11 Lab Title Working with graphs**

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**W205-5**

1. <u>**What is the shortest path between DR. STRANGE and DR. DOOM?**</u>
   a. First, I need to find DR. STRANGE

      Neo4j command:

      **MATCH (drstrange:Hero) WHERE drstrange.name STARTS WITH "DR. STRANGE" RETURN drstrange**

      I got (via export):

      **drstrange**
      **{"degree":4,"name":"DR. STRANGER YET"}**
      **{"degree":777,"name":"DR. STRANGE/STEPHEN"}**
      **{"degree":18,"name":"DR. STRANGE | MUTANT"}**
      **{"degree":9,"name":"DR. STRANGE DOPPELGA"}**

      From which, I got Dr. STRANGE/STEPHEN

   b. And DR. DOOM

      Neo4j command:

      **MATCH (drdoom:Hero) WHERE drdoom.name STARTS WITH "DR. DOOM" RETURN drdoom**

      I got (via export):

      **drdoom**
      **{"degree":52,"name":"DR. DOOM | MUTANT X-"}**
      **{"degree":13,"name":"DR. DOOM DOPPELGANGE"}**
      **{"degree":10,"name":"DR. DOOM CLONE/VICTO"}**
      **{"degree":441,"name":"DR. DOOM/VICTOR VON"}**
      **{"degree":11,"name":"DR. DOOM | TIMESLIDE"}**

      From which, I got Dr. DOOM/VICTOR VON

   c. Then I need to find the shortest path between DR. STRANGE and DR. DOOM:

Neo4j command:

**MATCH p=(drstrange:Hero {name: 'DR. STRANGE/STEPHEN'})- [:APPEARED*0..2]-
(drdoom:Hero {name: 'DR. DOOM/VICTOR VON'}) RETURN p, length(p) ORDER BY
length(p) LIMIT 1**

I got (via export as png) from Neo4J as the shortest path between DR. STRANGE and DR.
DOOM:



2. **List the 5 shortest paths between DR. STRANGE and DR. DOOM**

Neo4j command:

**MATCH p=(drstrange:Hero {name: 'DR. STRANGE/STEPHEN'})- [:APPEARED*0..2]-
(drdoom:Hero {name: 'DR. DOOM/VICTOR VON'}) RETURN p, length(p) ORDER BY length(p)
LIMIT 5**

I got via export as png for the shortest 5 paths between DR. STRANGE and DR. DOOM



3. **List 5 Friends of Friends with the most connections and COLOSSUS II.**

a. First I need to locate COLOSSUS II:

Neo4j command:

**MATCH (colossusii:Hero) WHERE colossusii.name STARTS WITH "COLOSSUS II" RETURN colossusii**

I got (via export):

**colossusii**
**{"degree":118,"name":"COLOSSUS II DOPPELGA"}**
**{"degree":760,"name":"COLOSSUS II/PETER RA"}**
**{"degree":18,"name":"COLOSSUS II | MUTANT"}**

From which, I got COLOSSUS II/PETER RA

b.  Then find 5 friends of friends with the most connections with COLOSSUS II.

Neo4j command:

**MATCH (colosusii:Hero { name: 'COLOSSUS II/PETER RA' })-**
**[:APPEARED*2..2]-(friend_of_friend)**
**WHERE NOT (colosusii)-[:APPEARED]-(friend_of_friend)**
**AND friend_of_friend.name <> 'COLOSSUS II/PETER RA'**
**RETURN friend_of_friend.name, COUNT(*)**
**ORDER BY COUNT(*) DESC , friend_of_friend.name LIMIT 5**

I got via export as csv:

| friend_of_friend.name | COUNT(*) |
|---|---|
| WONG | 453 |
| MOONSTONE II/KARLA S | 370 |
| CARTER, PEGGY | 367 |
| POWER MAN/ERIK JOSTE | 350 |
| KINGPIN/WILSON FISK | 342 |

4.  **Visualize 10 Friends of friends for IRON MAN**

a.  First I need to locate IRON MAN:

Neo4j command:

**MATCH (ironman:Hero) WHERE ironman.name STARTS WITH "IRON MAN" RETURN ironman**

I got (via export):

**ironman**

{"degree":1132,"name":"IRON MAN/TONY STARK"}
{"degree":338,"name":"IRON MAN IV/JAMES R."}
{"degree":82,"name":"IRON MAN V/TEEN TONY"}
{"degree":4,"name":"IRON MAN ARMOR"}
{"degree":112,"name":"IRON MAN DOPPELGANGE"}
{"degree":19,"name":"IRON MAN III/EDDIE M"}

From which, I got IRON MAN/TONY STARK

b.  Then visualize 10 friends of friends with IRON MAN:

Neo4j command:

**MATCH (ironman:Hero { name: 'IRON MAN/TONY STARK' })-
[:APPEARED*2..2]-(friend_of_friend)
WHERE NOT (ironman)-[:APPEARED]-(friend_of_friend)
AND friend_of_friend.name <> 'IRON MAN/TONY STARK'
RETURN friend_of_friend, friend_of_friend.name
 LIMIT 10**

I got via export as png:
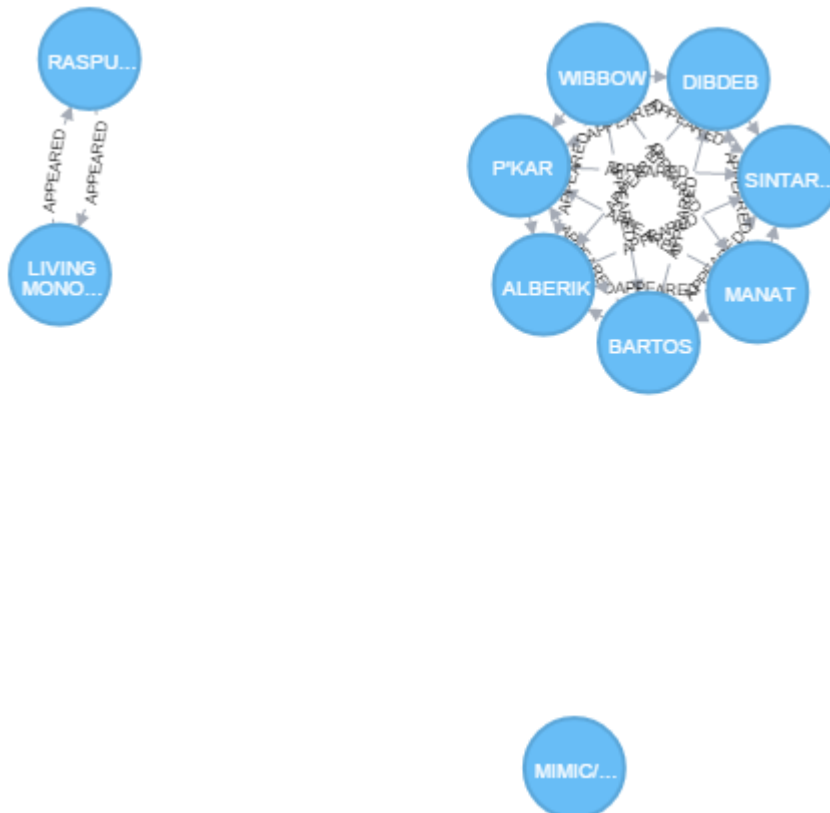
5. **Discover how the Avengers grew over time from 5 to 10. Find team members starting with 5 and incrementing to 10. Who was added to the team? Is the resulting graph ever not fully connected?**

   a. First, I will start with the IRON MAN and THOR's teammate relationship as depicted in the description as an example modified to get the whole team:
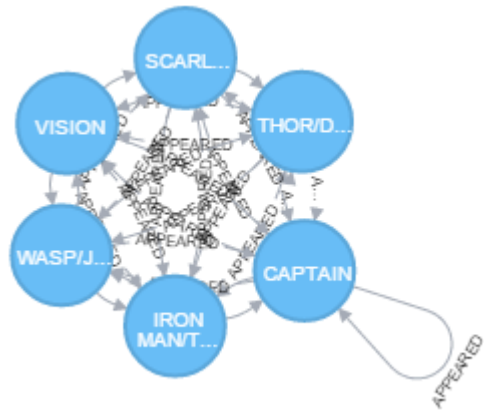      Neo4j command:

      **MATCH p=(tony:Hero {name:'IRON MAN/TONY STARK'}) -[e:APPEARED]-> (other) <-[f:APPEARED]- (donald:Hero {name:'THOR/DR. DONALD BLAK'})**
      **   with p as team**
      **   ORDER BY e.w DESC, f.w DESC**
      **unwind nodes(team) as members**
      **with distinct members as members**
      **return members limit 5**

      I got via export png:
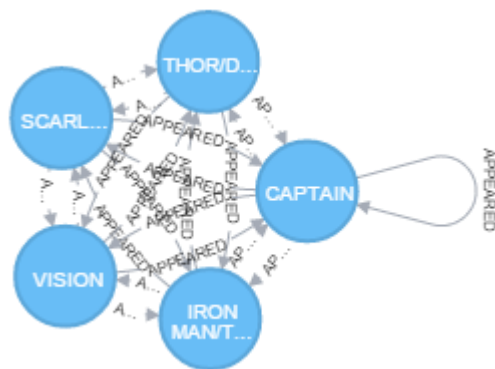
      

      That is:

      **IRON MAN,**
      **CAPTAIN AMERICA,**
      **SCARLET WITCH,**
      **VISION, and**
      **THOR**

   b. Then, I will start to grow it from limit 3 to 4 and so on until I got a team of 10.
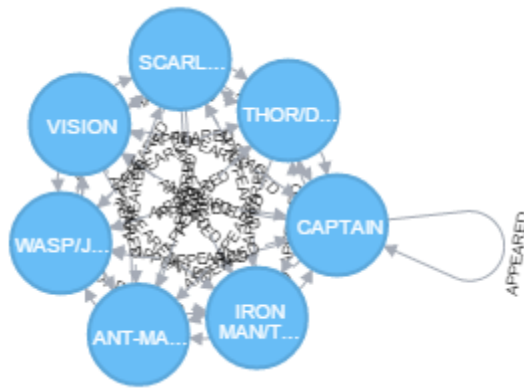
      For the 6th:

      Neo4j command:

**MATCH p=(tony:Hero {name:'IRON MAN/TONY STARK'}) -[e:APPEARED]-> (other) <-[f:APPEARED]- (donald:Hero {name:'THOR/DR. DONALD BLAK'})**
    **with p as team**
    **ORDER BY e.w DESC, f.w DESC**
**unwind nodes(team) as members**
**with distinct members as members**
**return members limit 6**

I got:



That is: new member: **WASP:**

**WASP**
**IRON MAN,**
**CAPTAIN AMERICA,**
**SCARLET WITCH,**
**VISION, and**
**THOR**

c. For the 7th:

Neo4j command:

**MATCH p=(tony:Hero {name:'IRON MAN/TONY STARK'}) -[e:APPEARED]-> (other) <-[f:APPEARED]- (donald:Hero {name:'THOR/DR. DONALD BLAK'})**
    **with p as team**
    **ORDER BY e.w DESC, f.w DESC**
**unwind nodes(team) as members**
**with distinct members as members**
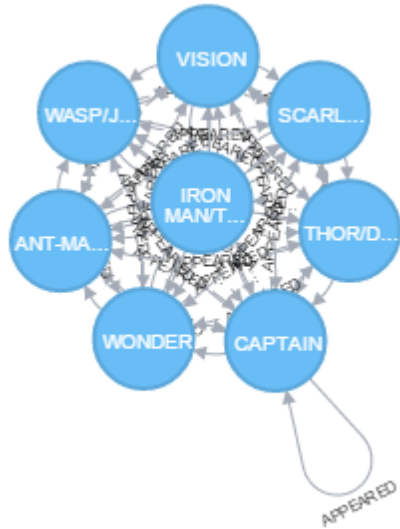**return members limit 7**

I got:

That is: new member: **ANT-MAN**

**ANT-MAN,**
**WASP**
**IRON MAN,**
**CAPTAIN AMERICA,**
**SCARLET WITCH,**
**VISION, and**
**THOR**

d.  For the 8th:

Neo4j command:

**MATCH p=(tony:Hero {name:'IRON MAN/TONY STARK'}) -[e:APPEARED]-> (other) <-[f:APPEARED]- (donald:Hero {name:'THOR/DR. DONALD BLAK'})**
    **with p as team**
    **ORDER BY e.w DESC, f.w DESC**
**unwind nodes(team) as members**
**with distinct members as members**
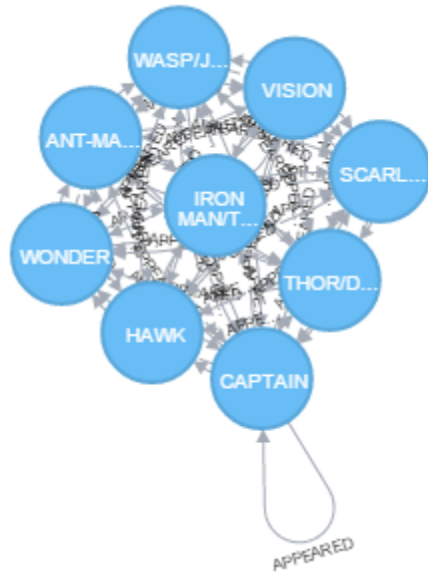**return members limit 8**

I got:

That is: new member: **WONDER MAN**

**WONDER MAN,**
**ANT-MAN,**
**WASP**
**IRON MAN,**
**CAPTAIN AMERICA,**
**SCARLET WITCH,**
**VISION, and**
**THOR**

e.  For the 9th:

Neo4j command:

**MATCH p=(tony:Hero {name:'IRON MAN/TONY STARK'}) -[e:APPEARED]-> (other) <-[f:APPEARED]- (donald:Hero {name:'THOR/DR. DONALD BLAK'})**
    **with p as team**
    **ORDER BY e.w DESC, f.w DESC**
**unwind nodes(team) as members**
**with distinct members as members**
**return members limit 9**

I got:

That is: new member: **HAWK**

**HAWK,**
**WONDER MAN,**
**ANT-MAN,**
**WASP**
**IRON MAN,**
**CAPTAIN AMERICA,**
**SCARLET WITCH,**
**VISION, and**
**THOR**

f.  For the 10<sup>th</sup>:

Neo4j command:

**MATCH p=(tony:Hero {name:'IRON MAN/TONY STARK'}) -[e:APPEARED]-> (other) <-[f:APPEARED]- (donald:Hero {name:'THOR/DR. DONALD BLAK'})**
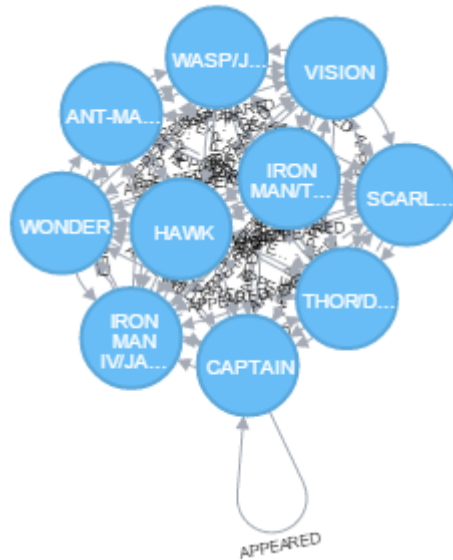 **with p as team**
 **ORDER BY e.w DESC, f.w DESC**
**unwind nodes(team) as members**
**with distinct members as members**
**return members limit 10**

I got:

That is: new member: **IRON MAN IV**

**IRON MAN IV,**
**HAWK,**
**WONDER MAN,**
**ANT-MAN,**
**WASP**
**IRON MAN,**
**CAPTAIN AMERICA,**
**SCARLET WITCH,**
**VISION, and**
**THOR**

g. Yes, this graph has been and will be fully connected because the 'definition' (the query we applied) specifies that "Appear" defines a team and appears is symmetric, so, this graph will be fully connected (i.e you can go from any node to any other node.