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How to effectively calculate message sent between 2 teams in a organization graph?

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★

We have a graph for email communication which has the following nodes. Person{ name, title, role} Message { sent_time, property1, property2,.....}

The relationships are as follows

node:Person --> rel:REPORTS_TO --> node:Person

node:Person --> rel:SEND_EMAIL --> node:Message ---> rel:RECEIVES_EMAIL --> node:Person

As you can imagine in a team communication, there is a 1:1 relationship between a employee to his/manager manager. More than 1 employee can report to same manager. An employee can send a single message to multiple employees, so there is 1:1 relation SENDS_EMAIL between employee and message, while 1:n RECEIVES_EMAIL relationships between message and other employees.

Give this graph, I want to find no of messages that are exchanged between any 2 managers A and B in the graph ie, no of emails that are sent by any one in the management chain of manager "A" (not just direct reports) to any one in the management chain of manager "B".

The graph has 100K employee nodes and 15M messages with 180M relationships in total. We are using latest neo4j 2.2 community edition with schema indexes on all properties of nodes and relations.

I have written the following cypher query to get this info. But this is very slow ie > 1 min to return results on a 64GB RAM windows server.

```
MATCH (:Person { name:'A' }) <-[:ReportTo*]-(AO:Person) WITH AO
MATCH (:Person { name:'B' }) <-[:ReportTo*]-(BO:Person) WITH BO,AO

MATCH (AO)-[m:SENDS_EMAIL]-->(BO) RETURN COUNT(m)
```

Is there a more efficient way to write this cypher query? If not, how else can we model the graph to serve this query quickly ie, < 1-2 seconds.

Thanks for you your help

neo4j   cypher

share improve this question   edited Apr 12 at 19:12   asked Apr 12 at 18:07
                                                                                 user330612
                                                                                 320 ● 1 ● 6 ● 21

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1   There are inconsistencies/errors in your problem statement. For example, your query uses the `Person`
    label, but your text uses `Employee`. Also, your text says there is a `Message` node label and a
    `RECEIVES_EMAIL` relationship type, but your query does not use them at all. – cybersam Apr 12 at 18:50

    Other than employee and person name confusion, which I corrected above, the rest is correct. This query
    works! We dont need to use recieves_email relationship..do we? – user330612 Apr 12 at 19:04

    Your query cannot work as you've written it [`(AO)-[m:SENDS_EMAIL]-->(BO)` is not a legal Cypher
    pattern]. Also, your text does not show that it is possible for a `SENDS_EMAIL` relationship to go directly
    between two `Person` nodes. So either you need to show more of your intended data model, or your data is
    not following your intended model. – cybersam Apr 12 at 20:32 ✏

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     Use Neo4j 2.2.

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{} Straight line in TikZ with 'continued' marking in the middle

0

You would want to start from 0.. so to include the manager himself.

It has to compute the cross product between your two sets,

you might want to limit that to distinct users.

```
MATCH (:Person { name:'A' }) <-[:REPORTS_TO*0..]-(AO:Person)
// reduce cardinality to 1, to execute the following matches not n times
WITH collect(distinct AO) as first
MATCH (:Person { name:'B' }) <-[:REPORTS_TO*0..]-(BO:Person)
WITH distinct BO,first
UNWIND first as AO
RETURN SUM(SIZE((AO)-[:SENDS_EMAIL]->(BO)))
```

share improve this answer

answered Apr 12 at 21:17

Michael Hunger
25.2k ● 2 ● 21 ● 41

> Thanks Michael. Not sure why we need distinct here? An employee can only belong to one manager so it's always the case that the employees under a manager will be distinct. Am I missing something? – user330612 Apr 13 at 0:25

> Ok, just wanted to rule that out. But the collect reduces the # of rows to 1 for the second match. And the pattern expression should be more efficient. – Michael Hunger Apr 13 at 1:20

> What's collect' function here? A0 should be all employees under manager A so it should not be 1 row. It should be total no of employees under A in the tree. Also not sure if we really nees unwind here if we dint use collect above. I can check if sum(size x) us more performant than return count m – user330612 Apr 13 at 2:20

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