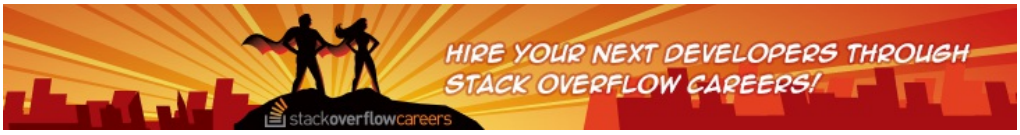
Neo4j: Fast query for getting relationships between a set of nodes



asked 4 months ago

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I'm looking for a fast Cypher statement that returns all relationships between a known set of nodes (I have their Neo4j ID's), so that I can assemble the subgraph for that particular set of nodes. I'm working within a label called `label` which has around 50K nodes and 800K edges between these nodes.

I have several working approaches for this, but none are fast enough for my application, even at small set sizes (less than 1000 nodes).

For example, the following statement does the trick:

```
MATCH (u:label)-[r]->(v:label)
WHERE (ID(u) IN {ids}) AND (ID(v) IN {ids})
RETURN collect(r)
```

Where `{ids}` is a list of numeric Neo4j ids given as parameter to the Py2Neo `cypher.execute(statement, parameters)` method. The problem is that it takes around 34 seconds for a set of 838 nodes, which returns all 19K relationships between them. I realize the graph is kind of dense, but it takes 1.76 seconds for every 1000 edges returned. I just don't think that's acceptable.

If I use the START clause instead (shown below), the time is actually a little worse.

```
START u=node({ids}), v=node({ids})
MATCH (u:label)-[r]->(v:label)
RETURN collect(r)
```

I've found many similar questions/answers, however they all fall short in some aspect. Is there a better statement for doing this, or even a better graph schema, so that it can scale to sets of thousands of nodes?

UPDATE

Thanks for the fast replies. First, to run my current query for 528 nodes as input (`len(ids)=528`) it takes **32.1 seconds** and the query plan is below.

```
NodeByIdSeek: 528 hits
Filter      : 528 hits
Expand(All) : 73,773 hits
Filter      : 73,245 hits
Projection  : 0 hits
Filter      : 0 hits
```

Brian Underwood's query, with the same input, takes **27.8 seconds**. The query plan is identical, except for the last 2 steps (Projection and Filter), which don't exist on for his query. However the db hits sum is the same.

Michael Hunger's query takes **26.9 seconds** and the query plan is identical to Brian's query.

I've restarted the server between experiments to avoid cache effects (there's probably a smarter way to do it). I'm also querying straight from the web interface to by pass possible bottlenecks in my code and the libs I'm using.

Bottomline, Neo4j seems smart enough to optimize my query, however it's still pretty slow even with fairly small sets. Any suggestions?

performance neo4j cypher

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edited Apr 10 at 5:17

asked Apr 8 at 3:28
LuamCT
6 ● 2

Is there any performance change if you change the first line to `MATCH (u:label)-[r]-(v:label)` ? – jag426 Apr 8 at 3:37

can you share your query plan? you can get it by prefixing your query with `PROFILE` – Michael Hunger Apr 8 at 8:11

Don't return collect(r) just r – Michael Hunger Apr 8 at 8:11

What's your use-case for this? (you certainly can't display this graph) Maybe you should change your strategy and only get the portion of the graph your processing? If you let me know, what your goal is, it will be easier to help – joe Apr 8 at 8:24

@jag426 It took over 7x longer for the same input of 528 nodes. I would also have to handle duplicates. – LuamCT Apr 9 at 20:21

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2 Answers

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I think the problem is that the query is doing a Cartesian product to get all combinations of the 838 node, so you end up searching 838*838=702,244 combinations.

I'm curious how this would perform:

```
MATCH (u:label)-[r]->(v:label)
WHERE (ID(u) IN {ids})
WITH r, v
WHERE (ID(v) IN {ids})
RETURN collect(r)
```

Also, why do the `collect` at the end?

share improve this answer

answered Apr 8 at 5:12
Brian Underwood
4,364 ● 4 ● 18

The `collect` made it easier to consume the results in the python's lib, but I've already dropped it. It seems Neo4j optimizes my query to be something similar to yours. Please check my update. – LuamCT Apr 9 at 20:09

Crazy thought: What if you returned all of the nodes and `collect`ed all of the relationships for those nodes and returned all of the results. Then try filtering out the relationships that you don't need. – Brian Underwood Apr 10 at 12:48

But that would be like doing Neo4j work for it, right? I moved to graph databases exactly to avoid this type of things. – LuamCT Apr 14 at 20:49

Yeah, fair enough point. I'm more curious of how it works. This is maybe an optimization that Neo4j should implement internally. – Brian Underwood Apr 15 at 13:08

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How big are your id-lists?

Try this:

```
MATCH (u) WHERE ID(u) IN {ids}
WITH u
MATCH (v)-[r]->(v)
WHERE ID(v) IN {ids}
RETURN count(*)


MATCH (u) WHERE (ID(u) IN {ids})
WITH u
MATCH (v)-[r]->(v)
WHERE ID(v) IN {ids}
RETURN r
```

Also try to create a query plan by prefixing your query with `PROFILE` then you see where the cost is.

share improve this answer

answered Apr 8 at 8:13

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answered Apr 8 at 8:13

Michael Hunger
25.2k ● 2 ● 21 ● 41

I'm assuming you meant `MATCH (u)-[r]->(v)`. However the performance is not significantly better. Please check my update. – LuamCT Apr 9 at 20:11

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