Risk Analysis with Neo4j

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Agenda

- What is a Graph?
- Graph Use Cases
- Property Graph Model
- Cypher as a Graph Query Language
- Risk Analysis Use Case
- Hands On!

What is a Graph?

Google graph

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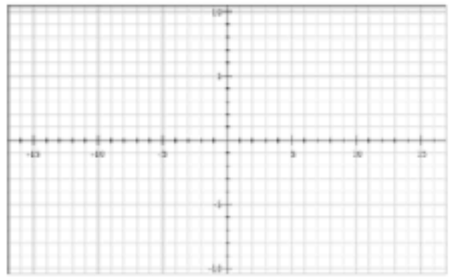
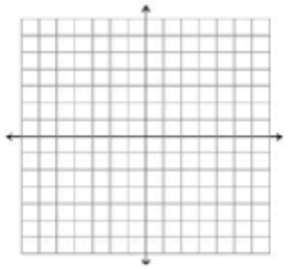
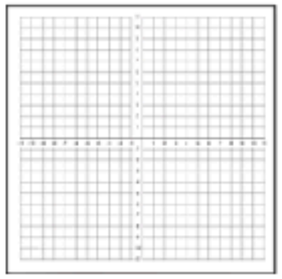
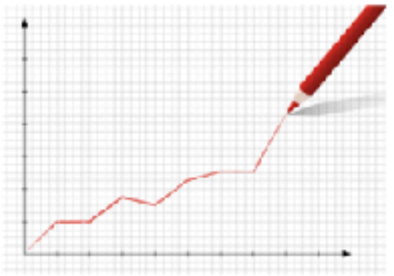
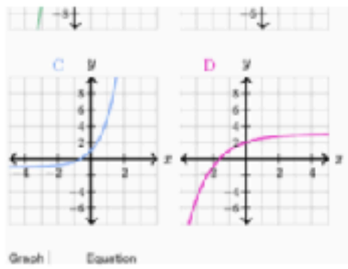
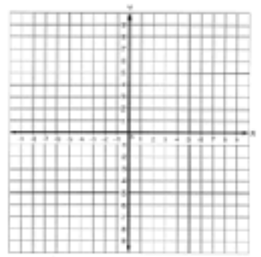
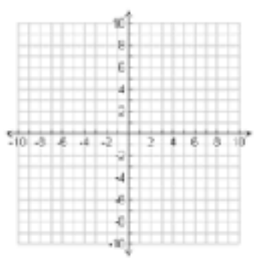
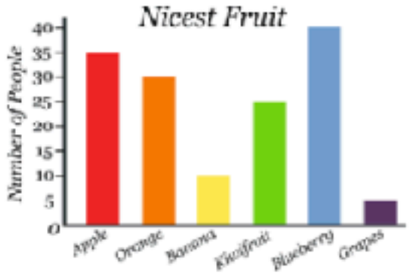
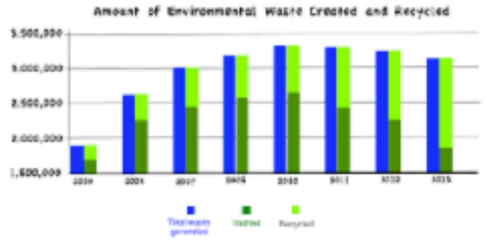
printable | math | science | example | art | statistics | economics | blank | different | cot | blank line | creative | funny | tundra climate | simple | function | linear | quadrant 1 | colorful

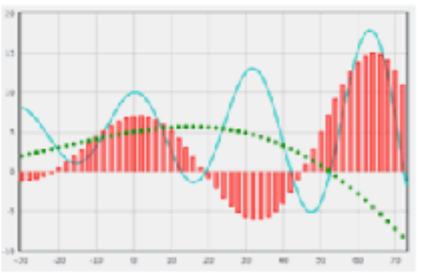
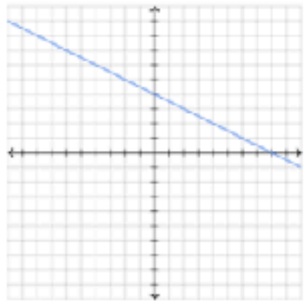
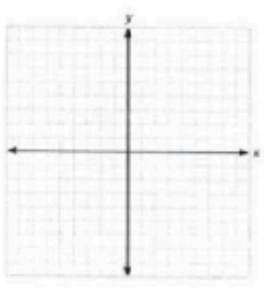
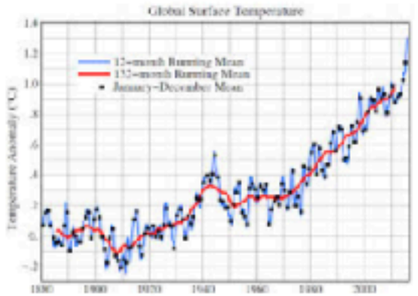



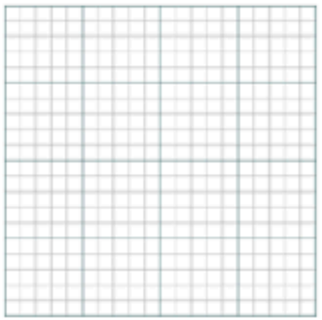




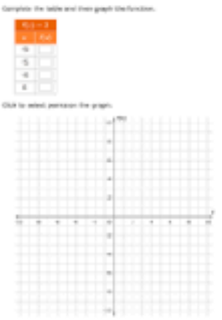
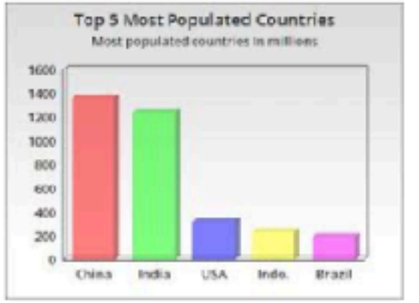



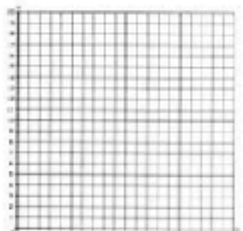
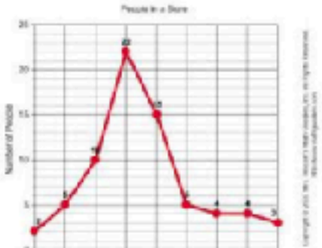
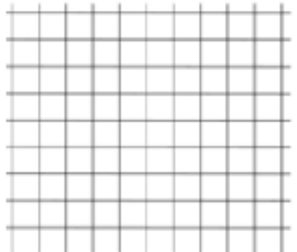



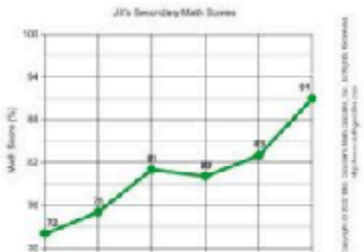
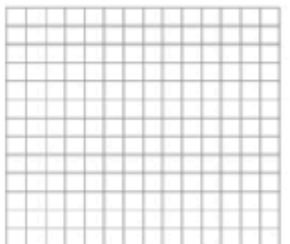


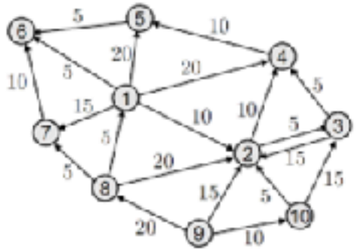





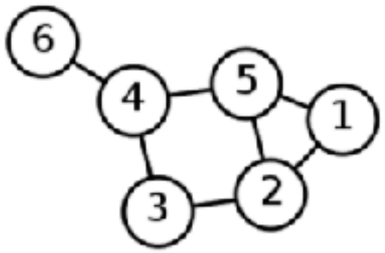


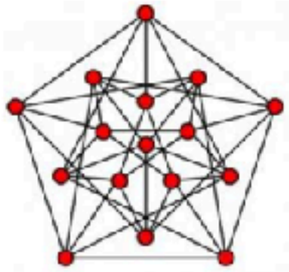



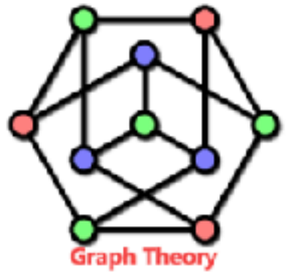




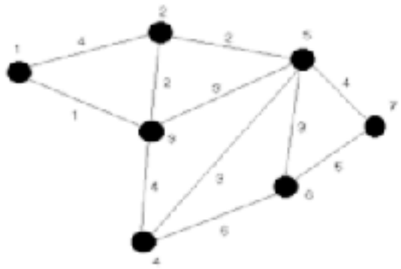



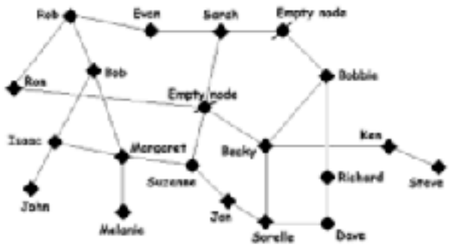



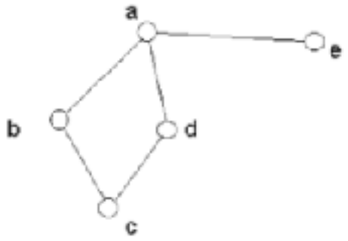


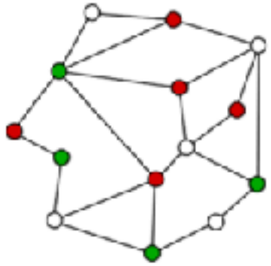


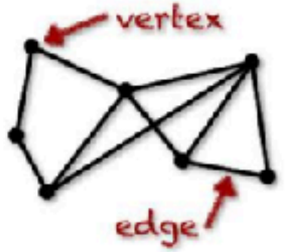

Graph Theory




Rob
Ewan
Sarah
Empty node
Ros
Bob
Empty node
Bobbie
Isaac
Margaret
Becky
Ken
Suzanne
Richard
Steve
John
Melanie
Jon
Sorelle
Dave


a
b
c
d
e

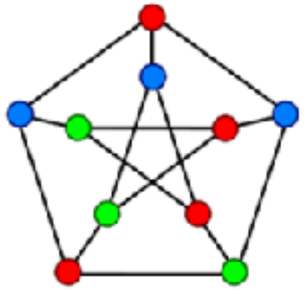


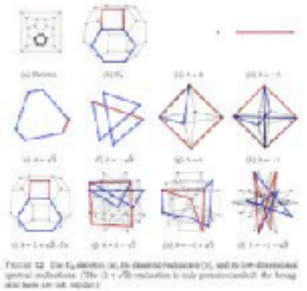

vertex
edge

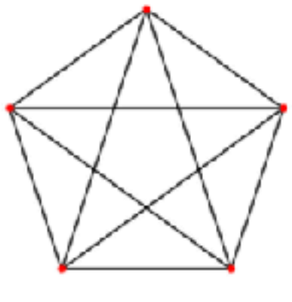

simple graph

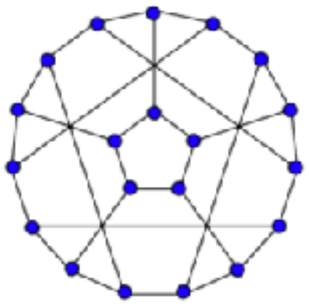

multigraph

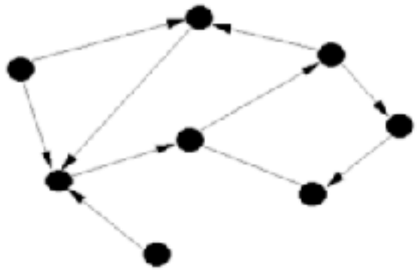

pseudograph

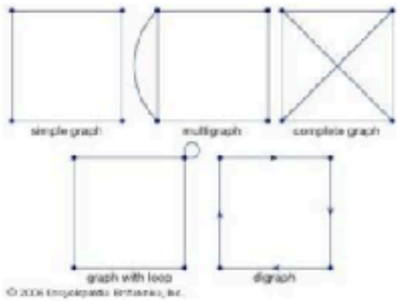


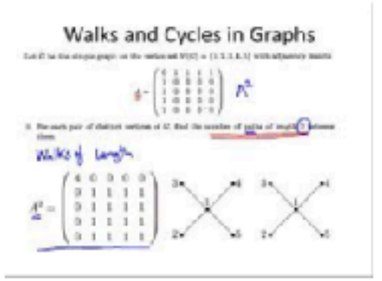


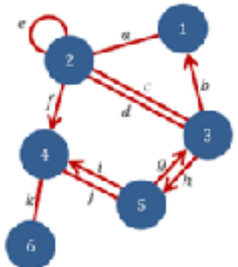


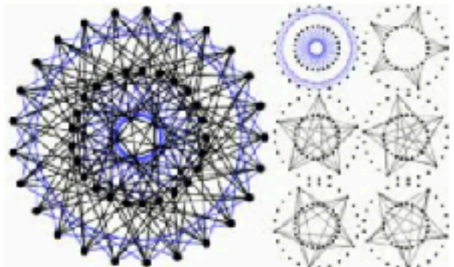


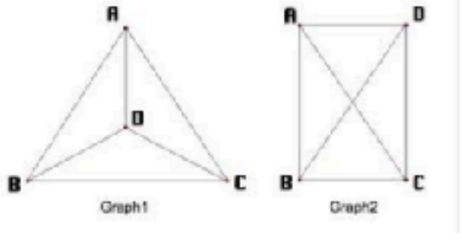


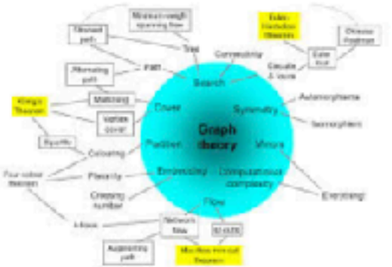

simple graph
multigraph
complete graph
graph with loop
digraph


Walks and Cycles in Graphs

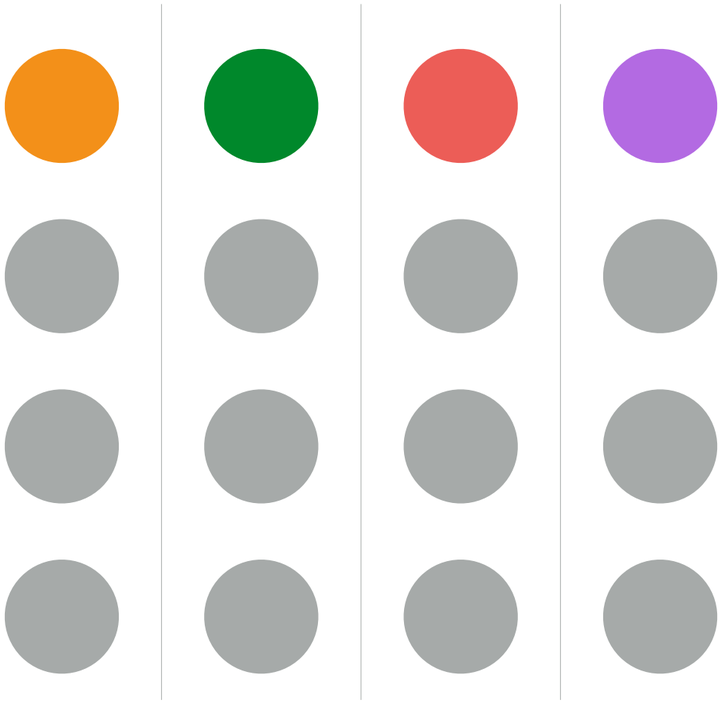




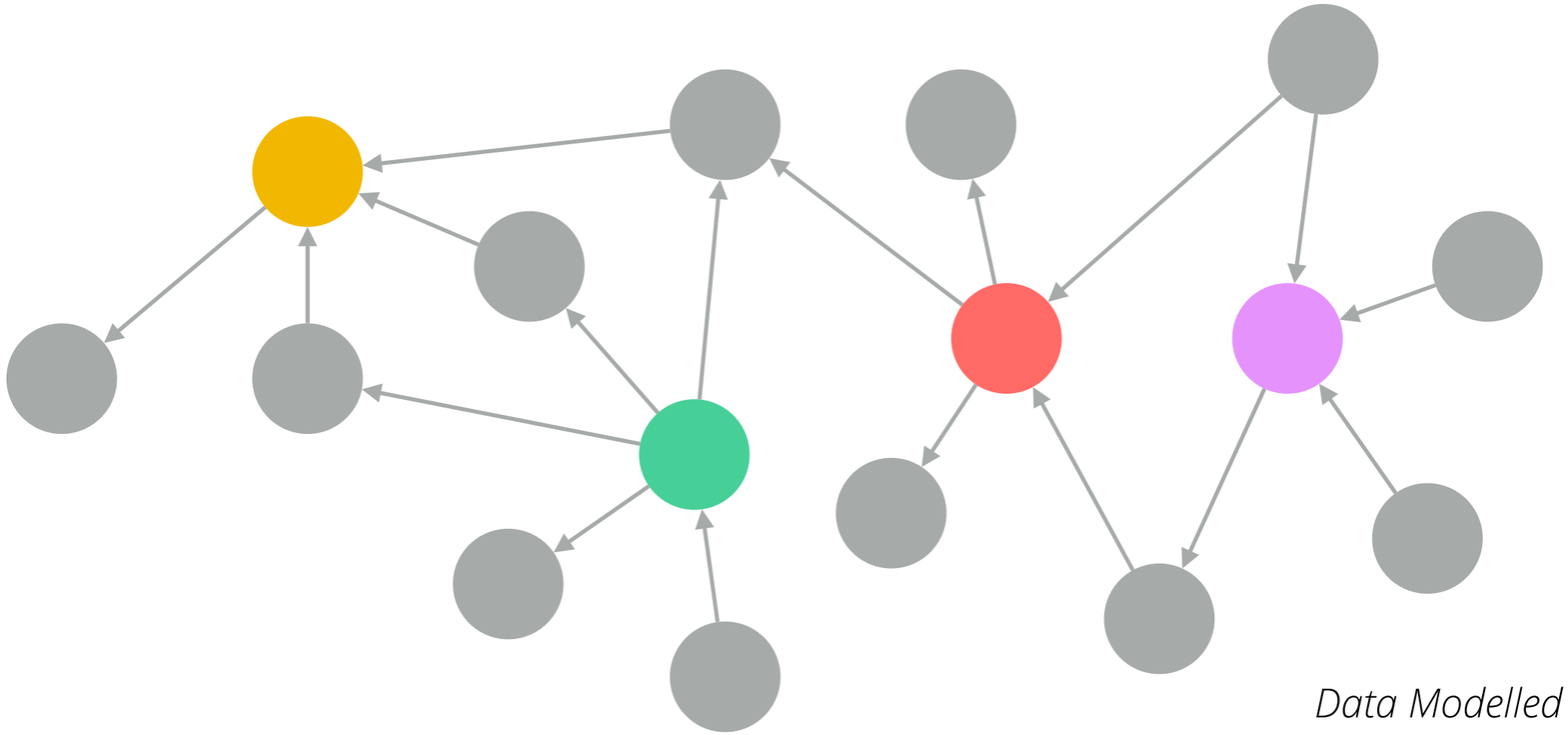

A
D
B
C
Graph1
A
D
B
C
Graph2


Graph theory

What is a graph?



What is a graph?



Data Modelled as a Graph

Graph Use Cases

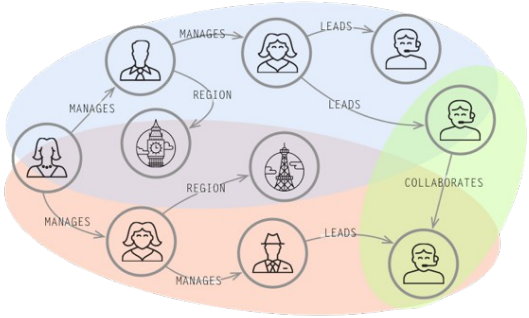
Use Cases

Internal Applications

Master Data Management

Network and
IT Operations

Fraud Detection

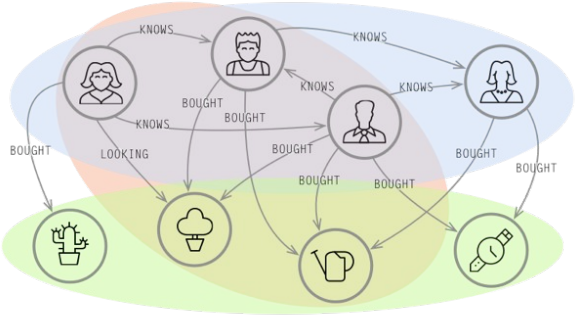


Customer-Facing Applications

Real-Time Recommendations

Graph-Based Search

Identity and
Access Management



Property Graph Model

Property Graph Model Components

Nodes

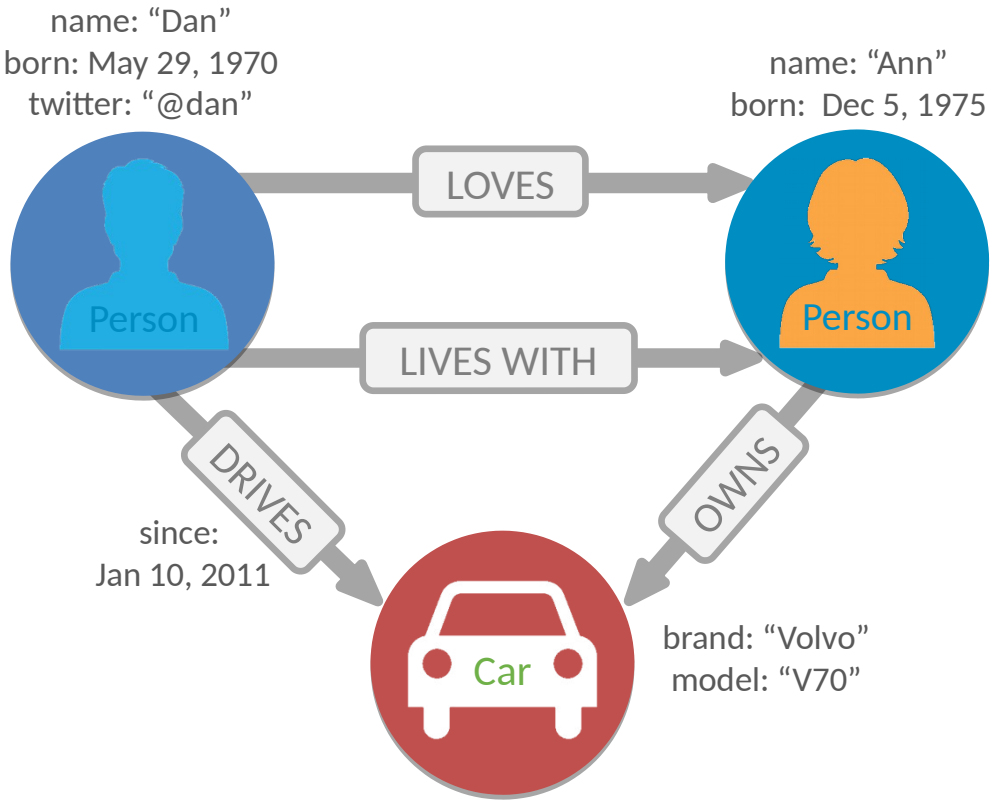
- Represent the objects in the graph
- Can be *labeled*

Relationships

- Relate nodes by *type* and *direction*

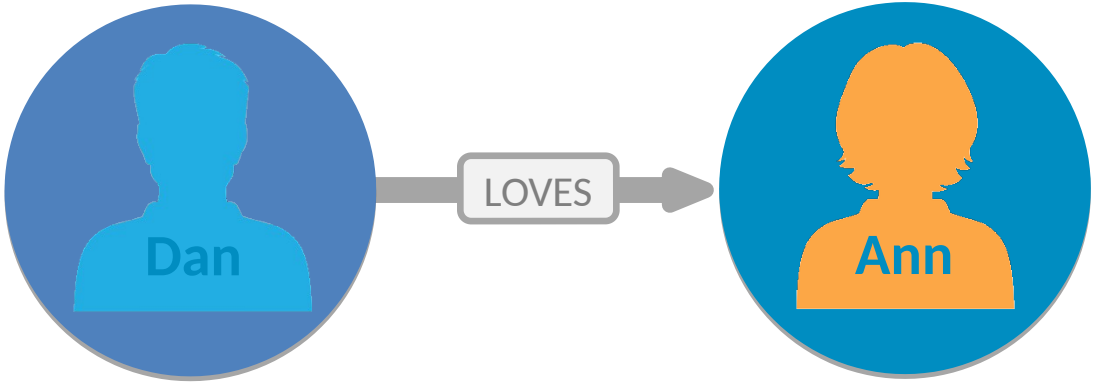
Properties

- Name-value pairs that can go on nodes and relationships.



Cypher as a Graph Query Language

Cypher: Express Graph Patterns

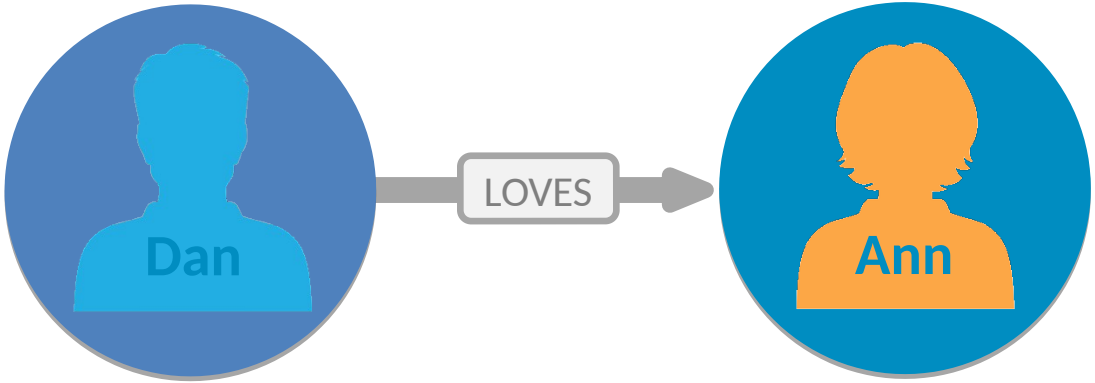


NODE — Relationship — NODE

```
(:Person { name:"Dan"} ) -[:LOVES]-> (:Person { name:"Ann"} )
```

LABEL PROPERTY — LABEL PROPERTY

Cypher: CREATE Graph Patterns

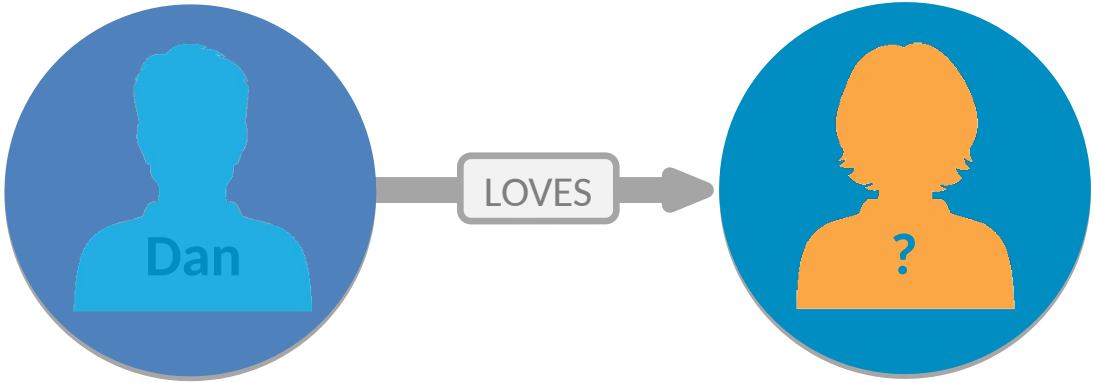


NODE — Relationship — NODE

```
CREATE (:Person { name:"Dan"} ) -[:LOVES]-> (:Person { name:"Ann"} )
```

LABEL PROPERTY LABEL PROPERTY

Cypher: MATCH Graph Patterns



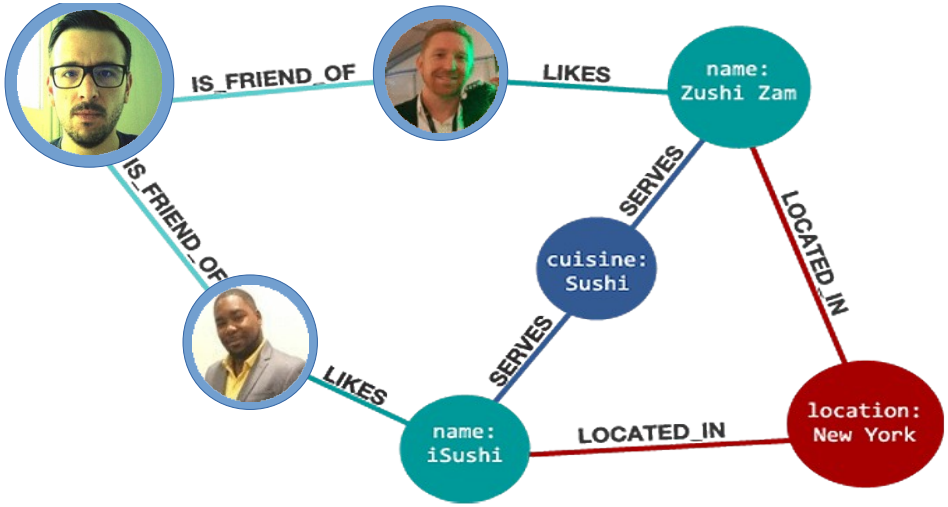
NODE — Relationship — NODE

```
MATCH (:Person { name:"Dan"} ) -[:LOVES]-> ( whom ) RETURN whom
```

LABEL — PROPERTY — VARIABLE

A graph query example

A social recommendation



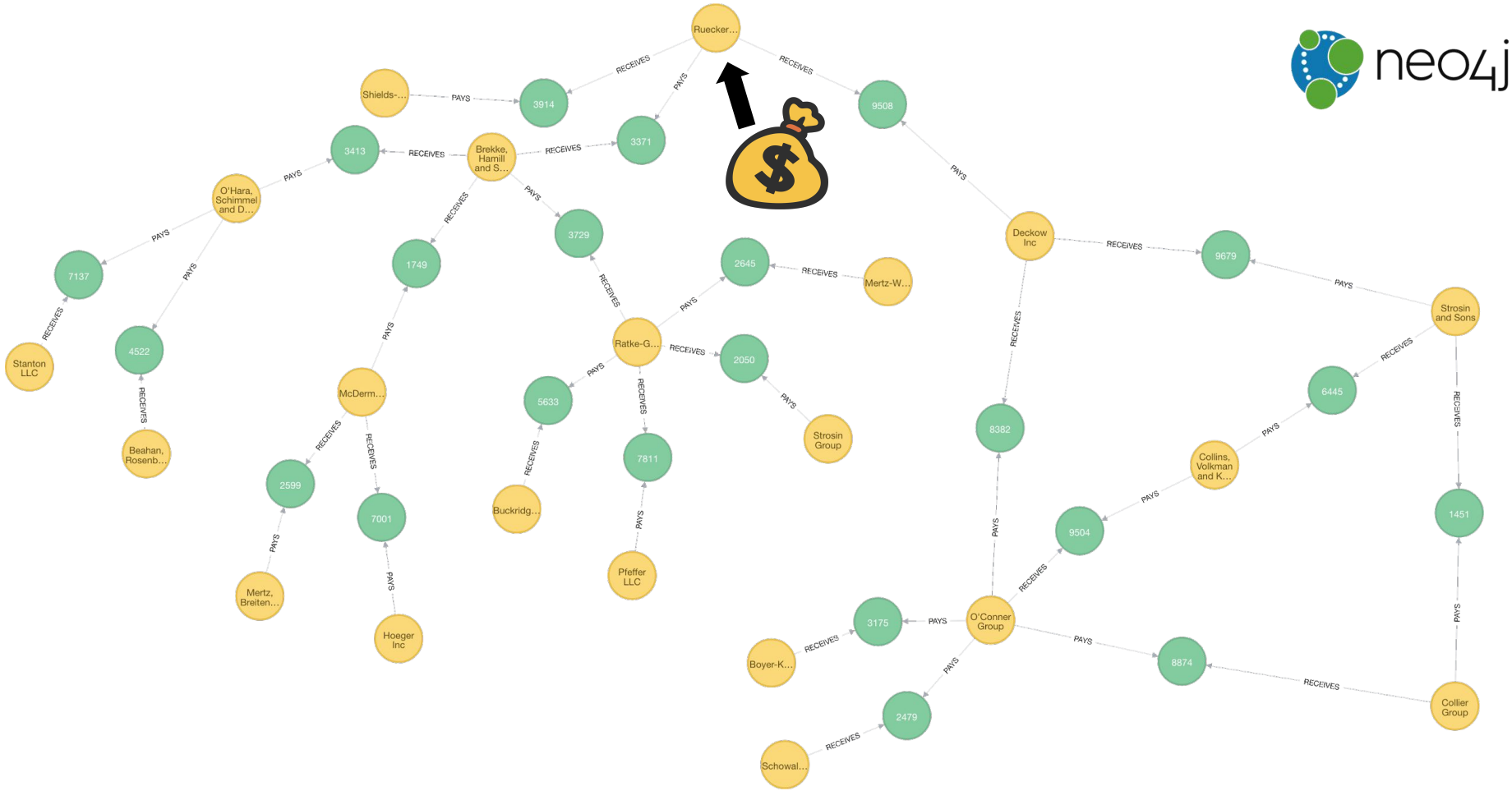
A social recommendation

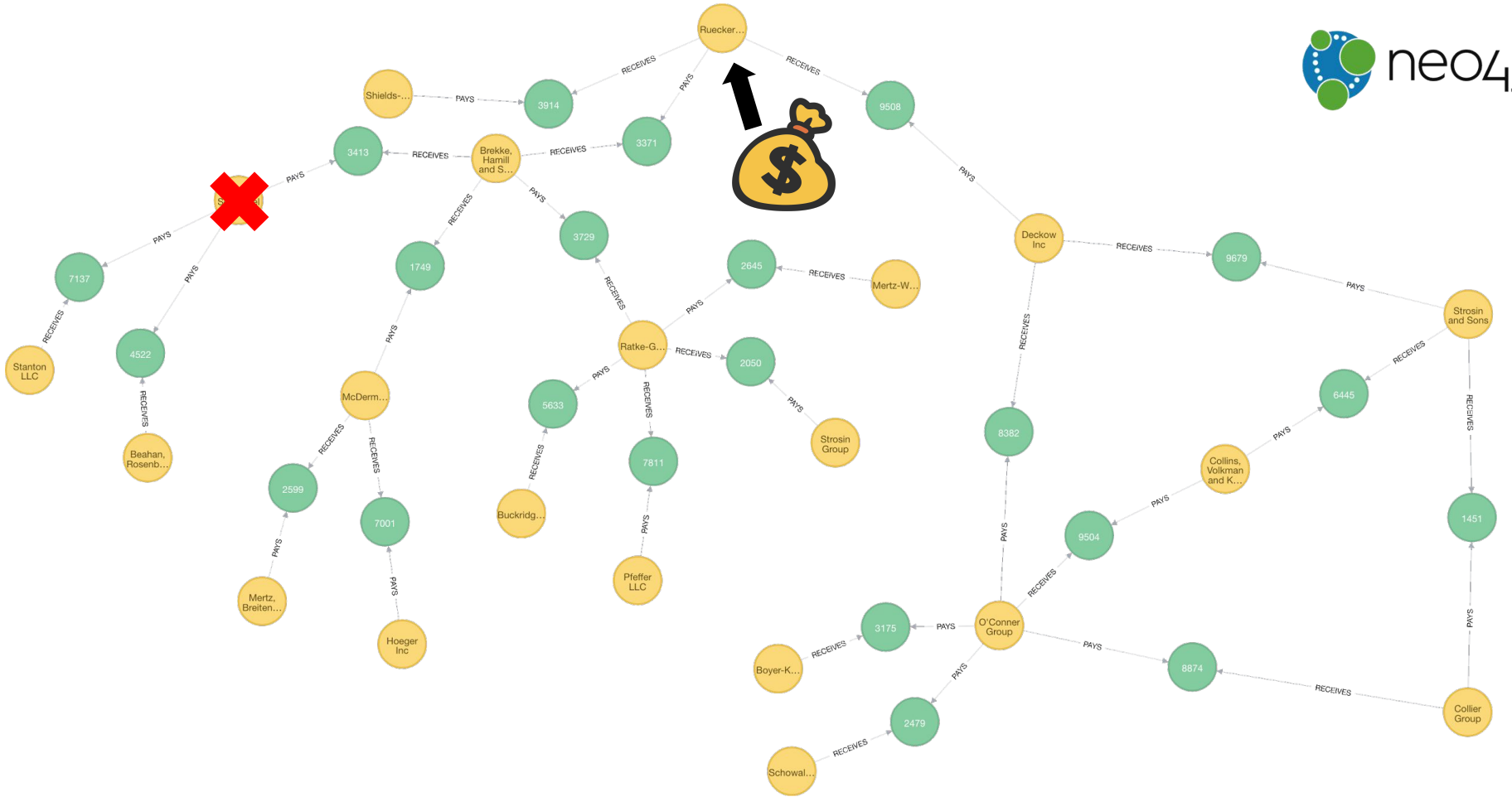

```
MATCH (person:Person)-[:IS_FRIEND_OF]->(friend),
      (friend)-[:LIKES]->(restaurant),
      (restaurant)-[:LOCATED_IN]->(loc:Location),
      (restaurant)-[:SERVES]->(type:Cuisine)
WHERE person.name = 'Matheus'
AND loc.location='New York'
AND type.cuisine='Sushi'
RETURN restaurant.name
```

Risk Analysis Use Case


Payment


Client A
PAYS
Payment
RECEIVES
Client B


Ruecker...
Shields-...
3914
3371
9508
3413
Brekke, Hamill and S...
O'Hara, Schimmel and D...
7137
4522
Stanton LLC
Beahan, Rosenb...
1749
3729
McDerm...
2599
7001
Mertz, Breiten...
Hoeger Inc
2645
Mertz-W...
Ratke-G...
2050
5633
7811
Buckridg...
Strosin Group
Pfeffer LLC
Deckow Inc
9679
Strosin and Sons
6445
1451
8382
Collins, Volkman and K...
9504
3175
O'Conner Group
8874
Collier Group
Boyer-K...
2479
Schowal...
PAYS
RECEIVES


Ruecker...
Shields-...
3914
3371
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Brekke, Hamill and S...
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1749
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Strosin and Sons
4522
Ratke-G...
2050
6445
McDerm...
5633
8382
Collins, Volkman and K...
Stanton LLC
Strosin Group
Beahan, Rosenb...
7811
9504
1451
2599
7001
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Pfeffer LLC
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Hoeger Inc
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O'Conner Group
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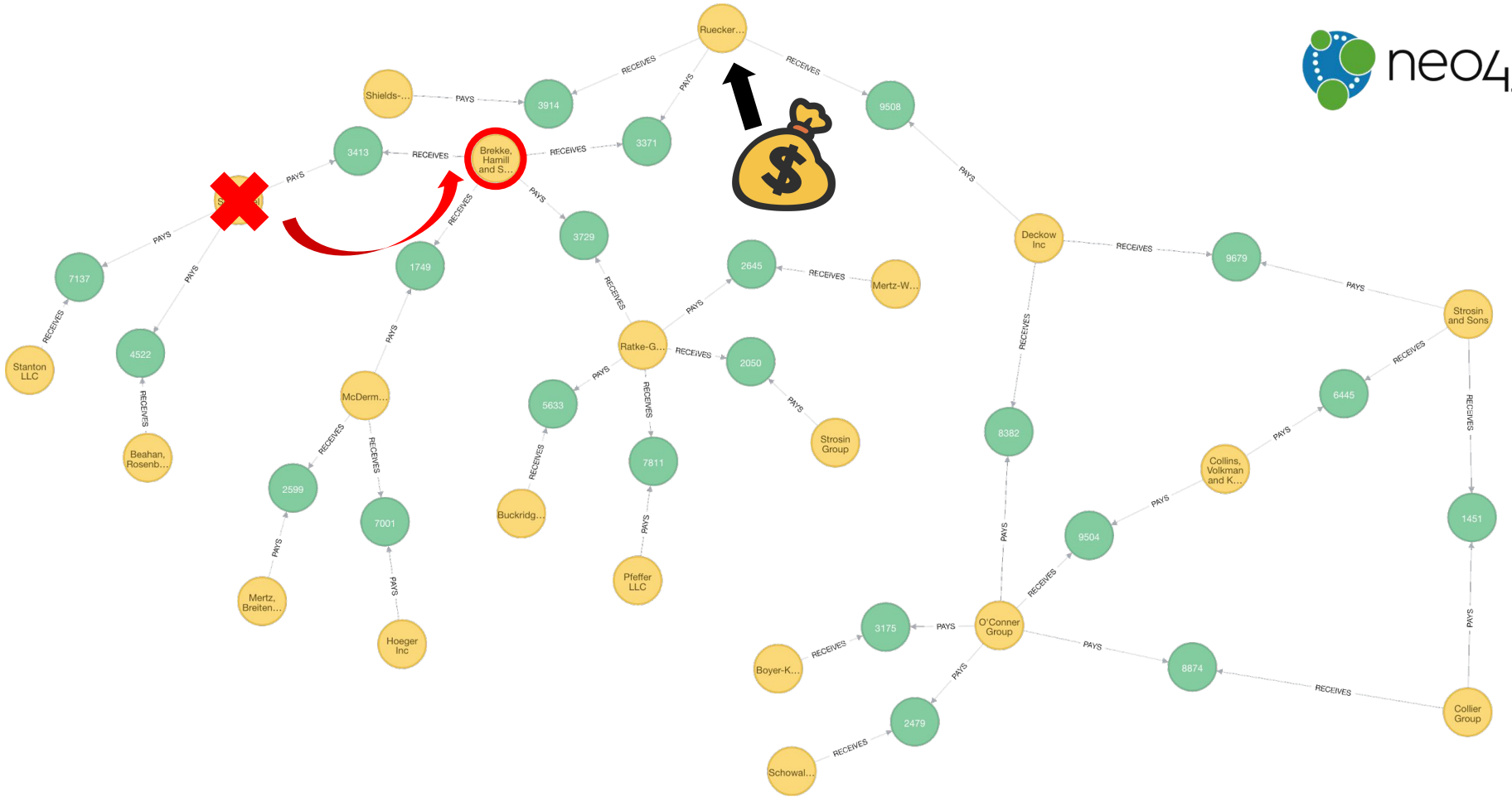
Boyer-K...
2479
Collier Group
Schowal...
PAYS
RECEIVES


Ruecker...
Shields-...
3914
3371
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Brekke, Hamill and S...
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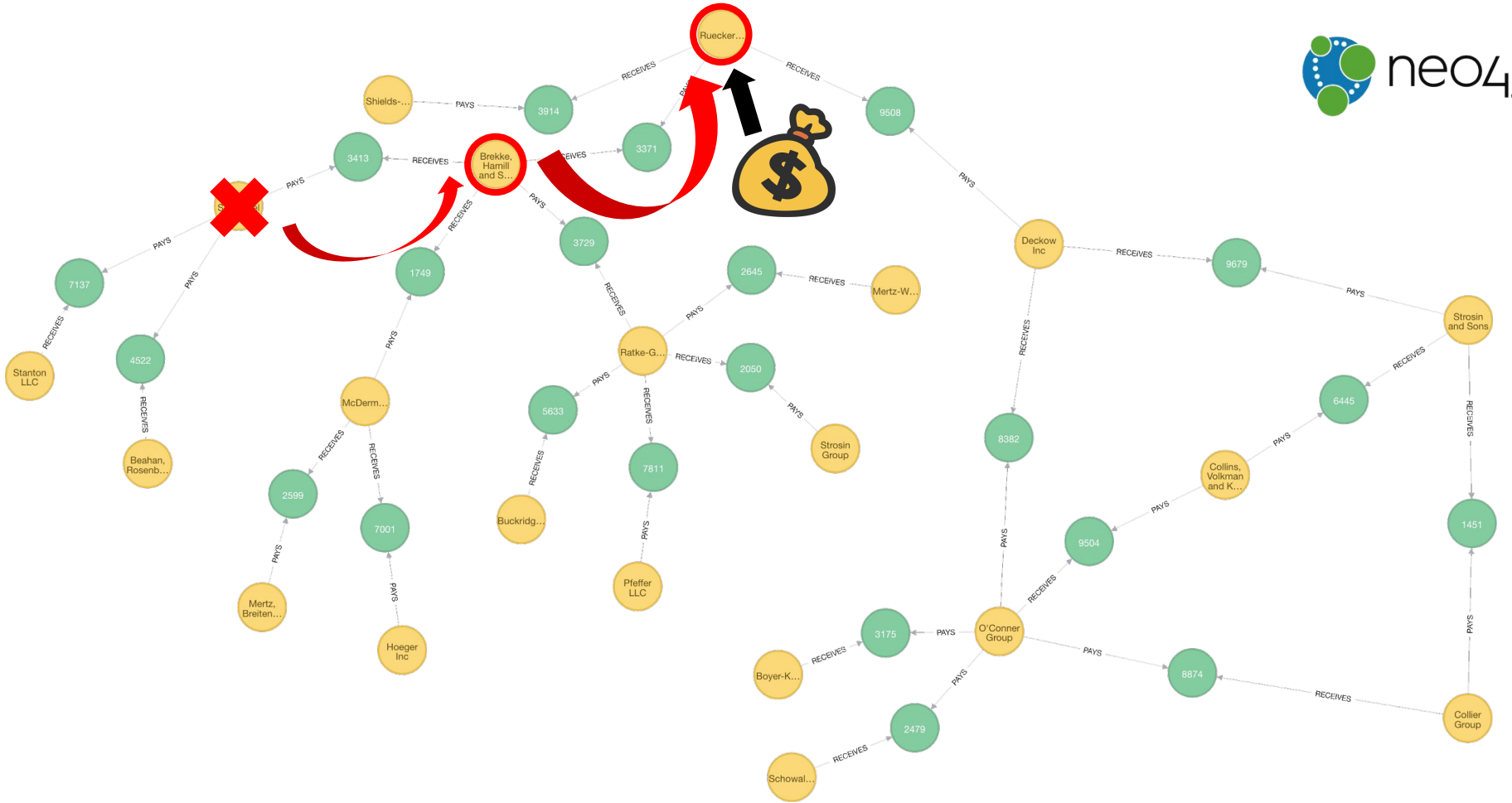
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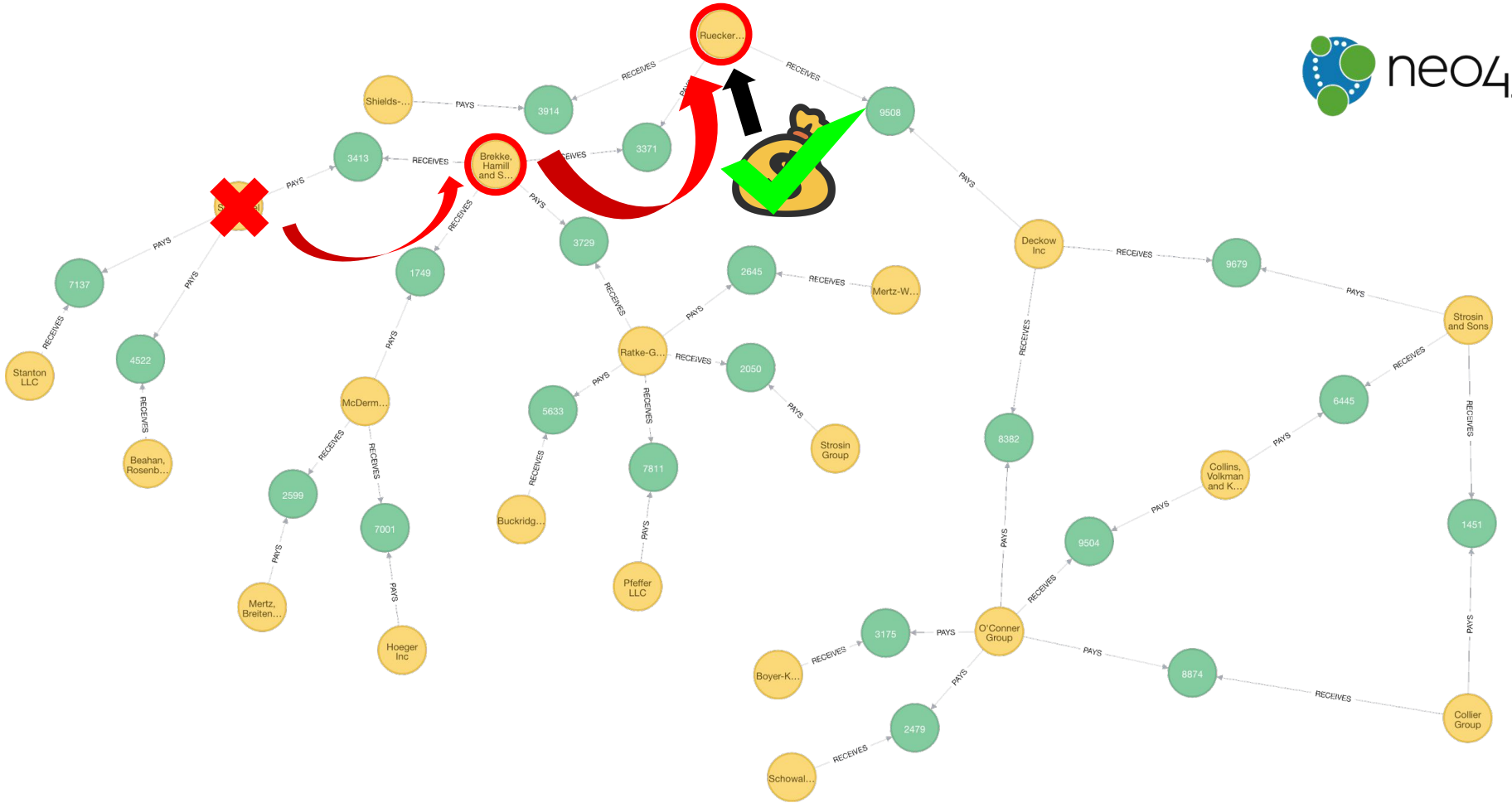
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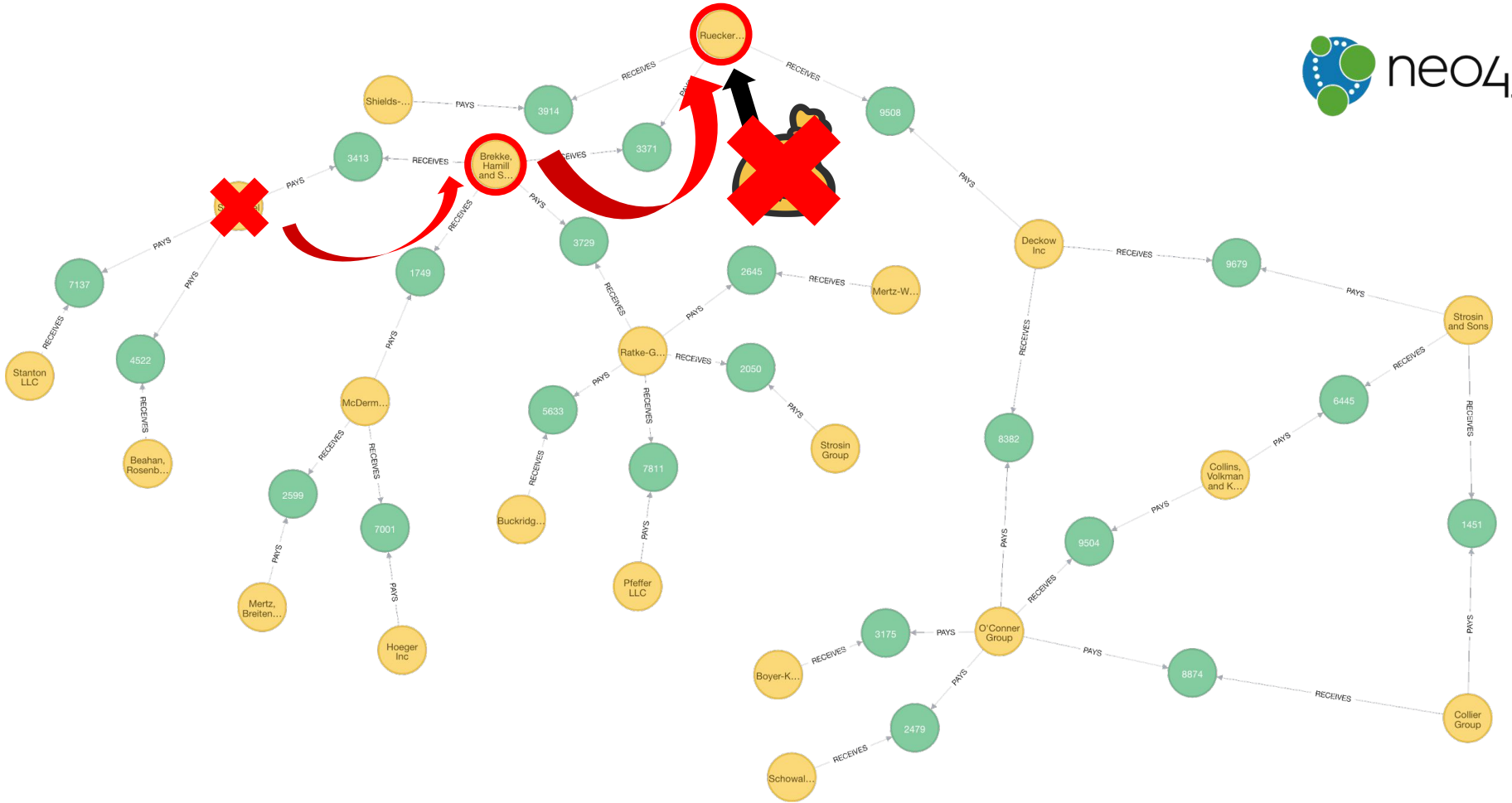
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Hands On!

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Thank you for your time

Any other questions?