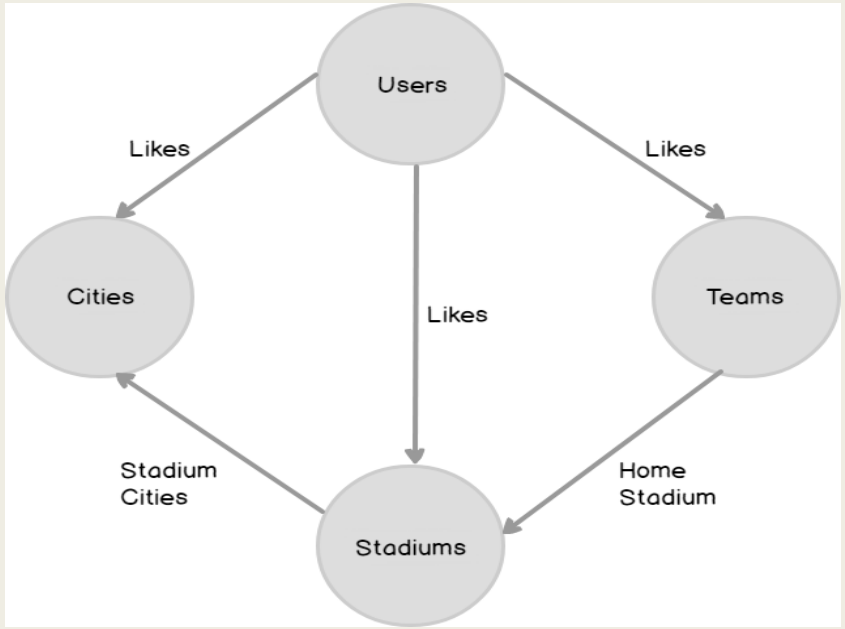
GRAPH DATABASES

Gabriella Nina

What is a Graph Database?

- A Graph Database stores Nodes and relationships rather than tables or documents.
- Graph databases allows for a very flexible structure to show relationships where there are not many constraints
- There are two popular types of Graph Databases: Property graphs and RDF graphs
  - *RDF graphs: emphasizes data integration*
  - *Property graphs: focuses on analytics and querying*



Graph database VS Relational database?

- The main difference is between the way entities are stored.
- In a graph database, relationships are stored at the individual record level
- In a relational database, relationships are stored using pre-defined structures.
- Relational databases tend to be faster and preferred when handling large amounts of data because there is a predefined structure for the data.
- Unlike relational databases graph databases do not have a predefined structure for the data

How is a graph database different from a document store?

- A document store database is a database that uses a document-oriented model to store data
- These documents are basic units of data which you can also group into collections
- They are optimal for instances that require flexibility and fast continual development.
- Graph databases help understand and draw conclusions or relationships on different data characteristics, but they do not store specific data values instead they use approximations.
- However, document database store specific data values while still providing a flexible form of classification that is not bound by context.

How is a graph database different from a Key-Value store?

- Key- Value databases are streamlined and fast but are not as flexible as graph databases.
- Graph databases are very flexible and great for research but are not as fast.
- A Key-Value is a two-column hash table with each row having a unique “key” and a value associated with the key
  - *The keys can connect with appropriate single data value extremely quickly*

How is a graph database different from a semantic store?

- A semantic data store is a method of structuring data to represent it in a specific logical way
- It includes semantic information that adds a basic meaning to the data and the relationships that lie between them
- This data model and organization allows for easy development and easy maintenance.
- Unlike graph databases, semantic stores does not depend on schema and has the freedom to build logical models in a way that its useful without having to interfere the data

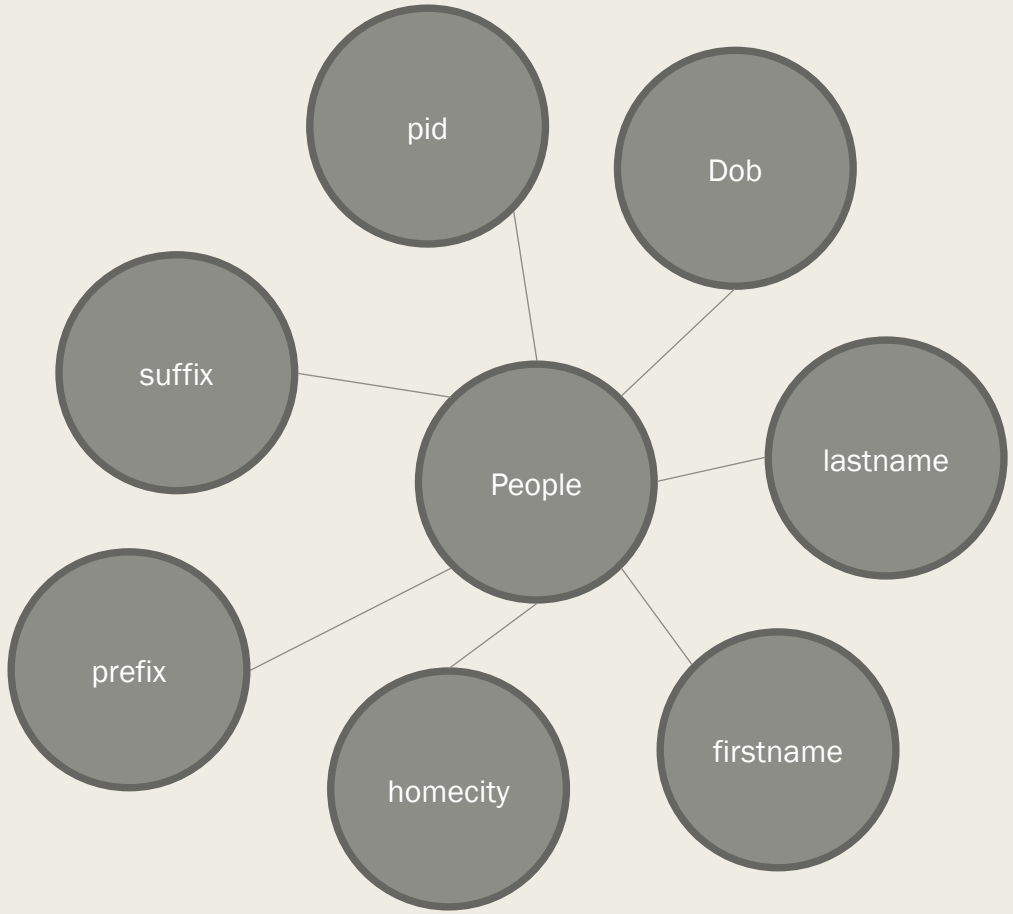
How is a graph database different from a network database?

- A network database is based on a network data model, which allows each record to be related to multiple primary records
  - *The word network refers to the relations between different data entities*
- Network databases use a schema that specifies which record type can be nested in which other record type while graph database has no restriction
- In a network database the children of each record have a preset order, and the database must maintain that ordering, but in a graph database vertices and edges are not sorted only results are sorted when running a query.
- Network databases only allow to access a record through the access path of the record while graph databases allow users to refer directly to all vertices with unique IDs, or use an index to find vertices with a specific value.

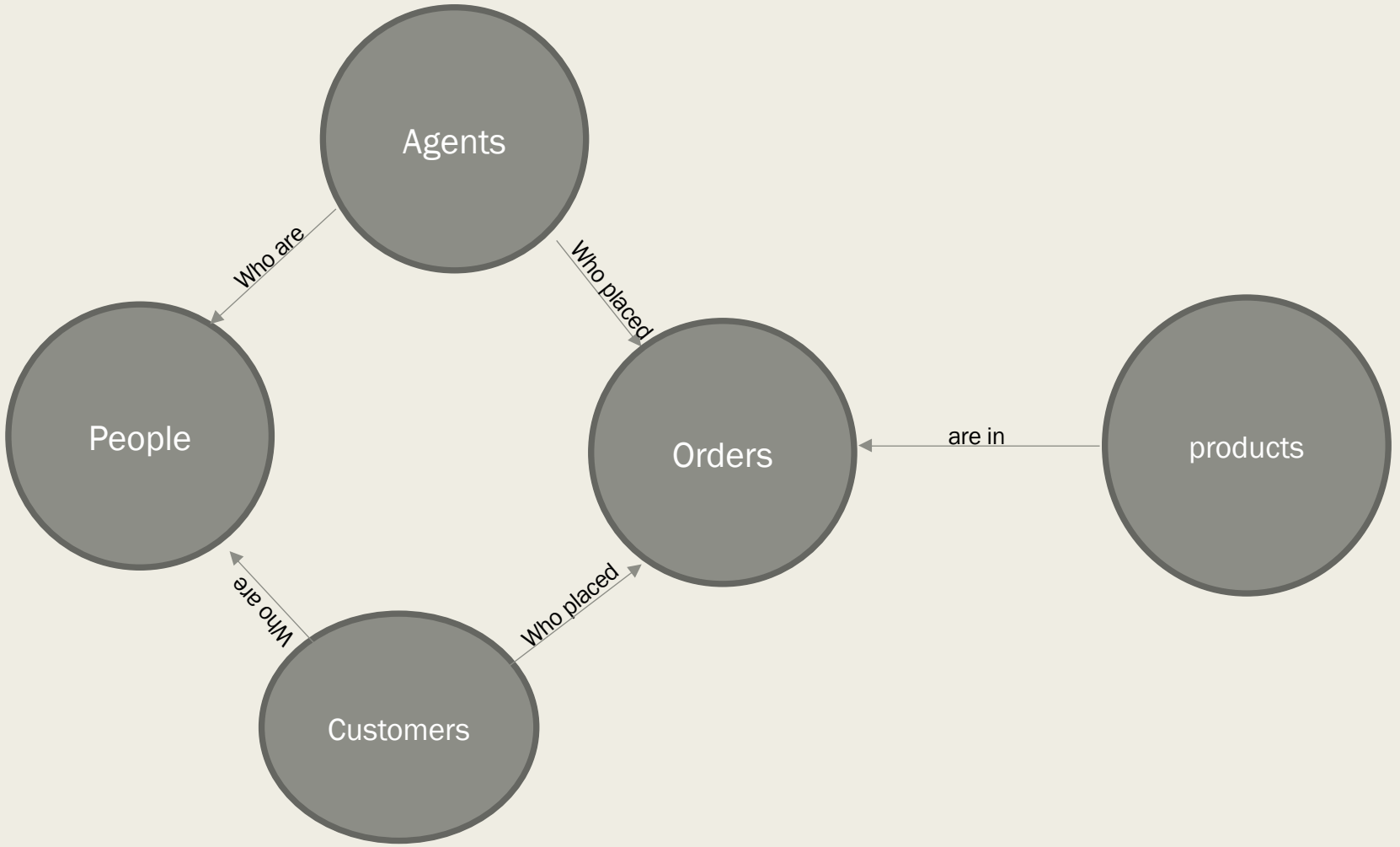
Examples of the transformation from relational CAP into graph CAP

People

pid	prefix	firstname	lastname	suffix	homecity	dob
1	Dr.	Maynard	Ferguson	Ph.D.	Montreal	1928-05-04
2	Ms.	Bria	Skonberg		Chilliwack	1987-12-29
3	Mr.	Miles	Davis	Esq.	Alton	1926-05-26
4	Mr.	Doc	Severinsen		Arlington	1927-07-07
5	Mr.	Louis	Armstrong		New Orleans	1901-08-04
6	Ms.	Tine	Helseth	Esq.	Oslo	1987-08-18
7	Dr.	Cynthia	Robinson	MD	Sacramento	1944-01-12
8	Dr.	James	Morrison	Ph.D.	Oslo	1962-11-11
9	Mr.	Dizzy	Gillespie	III	Montreal	1917-10-21



Our entire CAP database in graph form



References

- https://www.oracle.com/autonomous-database/what-is-graph-database/
- https://neo4j.com/developer/graph-database/
- https://memgraph.com/blog/graph-database-vs-relational-database
- https://www.dataversity.net/graph-database-vs-document-database-different-levels-of-abstraction/
- https://www.dataversity.net/graph-databases-vs-key-value-databases/
- https://www.techopedia.com/definition/30489/semantic-data-model
- https://www.ontotext.com/knowledgehub/fundamentals/nosql-graph-database/
- https://raima.com/network-database-relational-db-and-graph-db-compared/