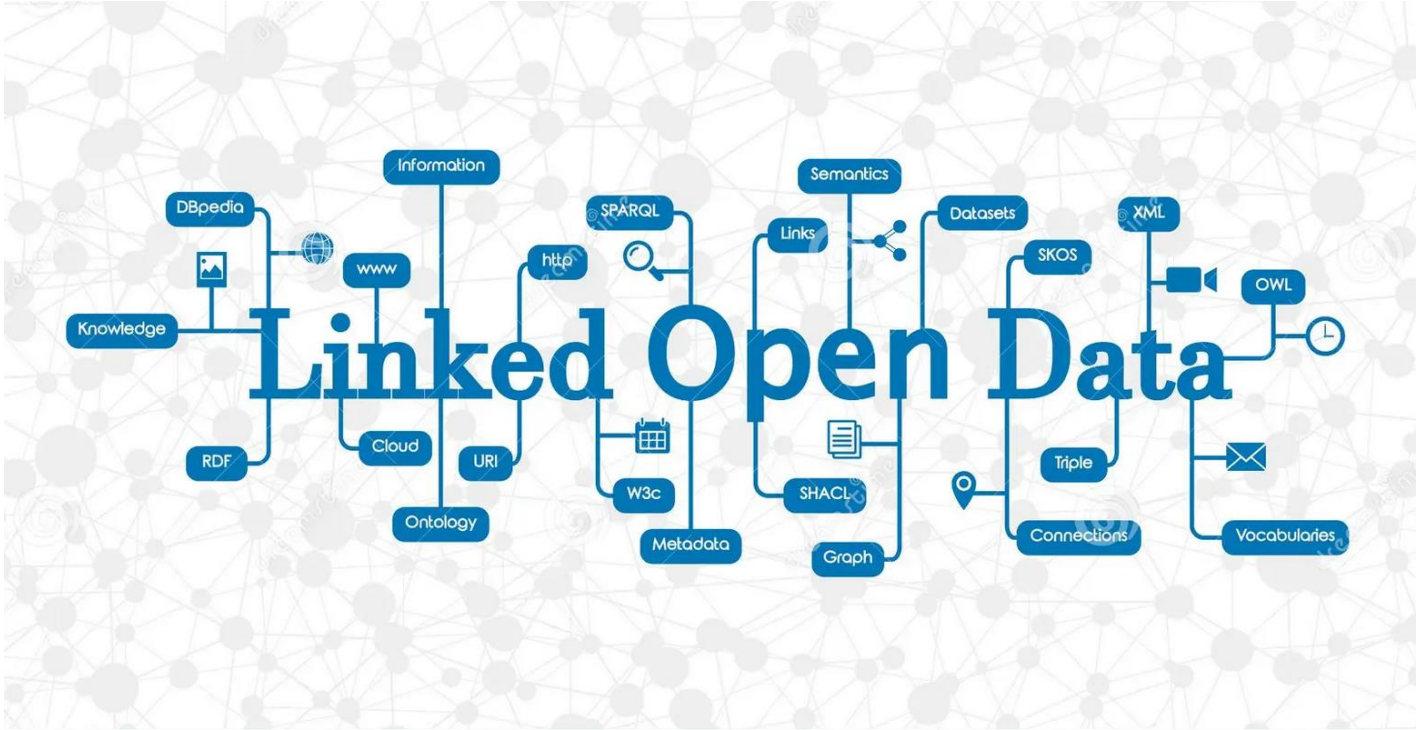


Property Graphs

Linked-Open Data and Knowledge Graphs

Agenda

1. Introduction
2. Structure of property graphs
3. Example of a property graph
4. Querying and manipulating property graphs
5. Advantages and possible applications of property graphs
6. Challenges and limitations of property graphs
7. Sources

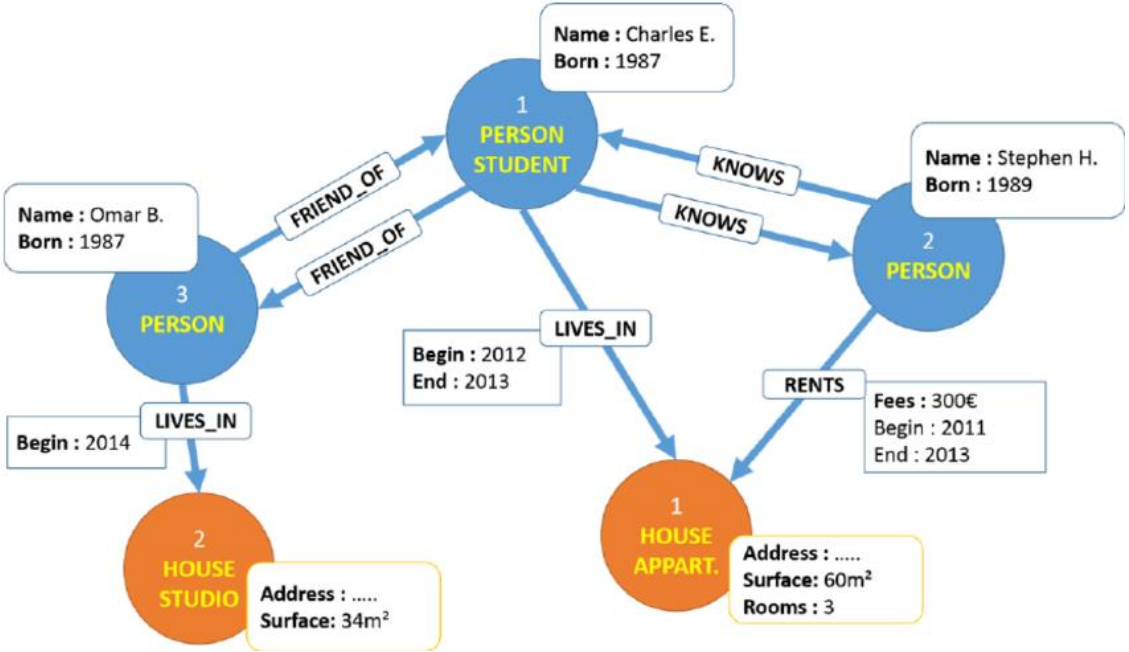
Introduction

- problem statement: How can we enrich knowledge graphs with additional information?
- the property graph model is a subtype of the graph model and forms the underlying model of a graph database
- definition: Property graphs are a data structure for representing and analyzing relationships between entities. They consist of nodes representing entities and edges representing relationships between nodes.
- property graphs are a flexible and powerful method for data modeling
- they enable the representation of complex relationships between data points

Structure of property graphs

- Nodes represent entities in a property graph
  - each node can have different properties that are stored as key-value pairs
  - for example, a node “person" can have the properties “name", “age", and “residence"
- Edges represent relationships between nodes
  - can be directed or undirected and can also have properties
  - for example, an edge “friendship" between two people can have the property “since" to store the time of the friendship

Example of a property graph



Source: https://www.researchgate.net/figure/Example-of-a-Property-Graph-illustrating-all-the-characteristics-of-the-model_fig2_286897101

Querying and manipulating property graphs

- Graph Query Language (GQL):
  - GQL is a query language developed specifically for property graphs
  - it allows complex querying and filtering of nodes and edges based on their properties
- example of GQL syntax
  - simple example of GQL syntax to query all persons older than 30 years:
    - MATCH (p:person) WHERE p.age > 30 RETURN p
- graph algorithms
  - property graphs also support the application of algorithms to perform complex analysis
  - examples of Graph Algorithms include Shortest Path, PageRank, Community Detection and many more
  - these algorithms can be used to gain insights into the relationships and structure of the graph

Advantages and possible applications of property graphs

- flexibility in modeling complex data
  - property graphs enable the modeling and storage of complex relationships between entities
  - they provide a flexible data structure that allows different types of entities and relationships to be represented and analyzed
- efficient queries and analysis of relationships
  - property graphs enable efficient queries and analysis of relationships between entities
    - by using GQL and Graph Algorithms, complex questions can be asked and answered over the graph to gain insights and patterns
- application examples in various industries
  - property graphs find application in various industries such as social networks, recommender systems, knowledge graphs, and many more
  - they are used to model and analyze connections between users, products, knowledge, and other entities to enable personalized recommendations, network analytics, and knowledge management

Challenges and limitations of property graphs

- scalability
  - property graphs can reach their limits when dealing with very large data sets
  - performance can be impacted and it can be difficult to efficiently execute complex queries
- the query language for property graphs, can be complex and require some training
  - it can be challenging to build the right query, especially for complex applications
- storage requirements
  - property graphs can require a lot of storage due to their memory-intensive nature
  - this can lead to increased costs, especially when large amounts of data need to be processed

Sources

- https://www.dataversity.net/what-is-a-property-graph/
- https://www.researchgate.net/figure/Example-of-a-Property-Graph-illustrating-all-the-characteristics-of-the-model_fig2_286897101
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Thank you for your attention!!