SPARQL Queries

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Outline

1. RDF?
2. SPARQL?
3. Walkthrough

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RDF?

- RDF was adopted by the World Wide Web Consortium in 1999 (W3C), defined as:

  "**The Resource Description Framework (RDF) is a framework for representing information in the Web.**" (W3C RDF 1.1)

W3C®

RDF 1.1 Concepts and Abstract Syntax

W3C Recommendation 25 February 2014

- RDF encodes data as graphs, reflected in the syntax:

  "**The core structure of [RDF syntax] is a set of triples, each consisting of a subject, a predicate and an object.**" (W3C RDF 1.1)

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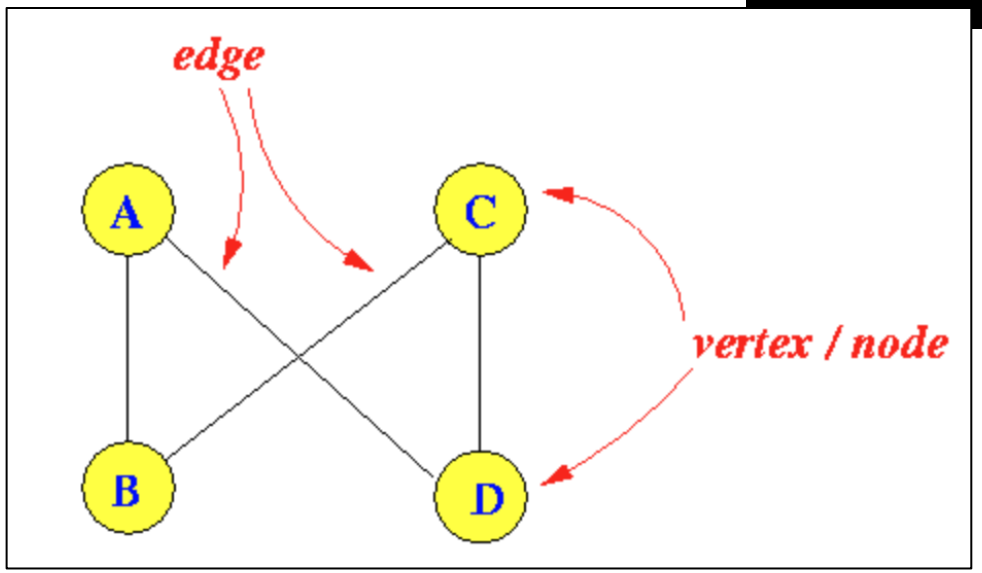
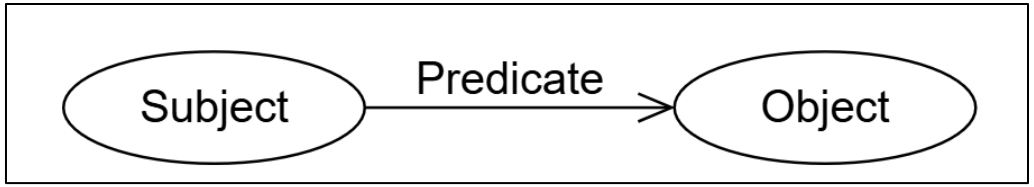
Graphs

- RDF graphs are composed of triples, where the subject and object of each triple is a **node**, and predicate is an **edge**.

- The following triples represent the graph depicted on the right:



<A> <edge> <D> .
<B> <edge> <C> .
<A> <edge> <B> .
<C> <edge> <D> .



Ontologies and RDF

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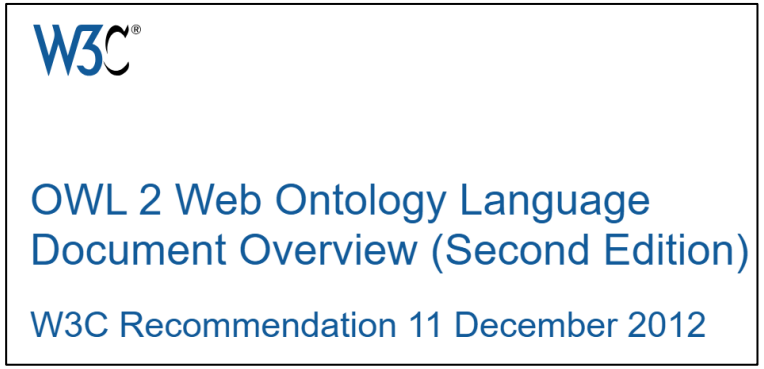
- Ontologies are typically implemented in the Web Ontology Language (OWL), that builds on RDF.

"**Any OWL 2 ontology can also be viewed as an RDF graph.**" (W3C OWL 2)

- Much (RDF W3C standard, SPARQL W3C standard) that applies to RDF also applies to OWL ontologies.



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SPARQL

- SPARQL is a query language that is built to **traverse RDF graphs**.

- SPARQL syntax reflects the syntax of RDF itself, with subjects, predicates, and objects.

W3C

SPARQL 1.1 Query Language

W3C Recommendation 21 March 2013

> "**RDF is a directed, labeled graph data format for representing information in the Web. RDF is often used to represent, among other things, personal information, social networks, metadata about digital artifacts, as well as to provide a means of integration over disparate sources of information. This specification defines the syntax and semantics of the SPARQL query language for RDF.**" (W3C SPARQL 1.1)

SPARQLing

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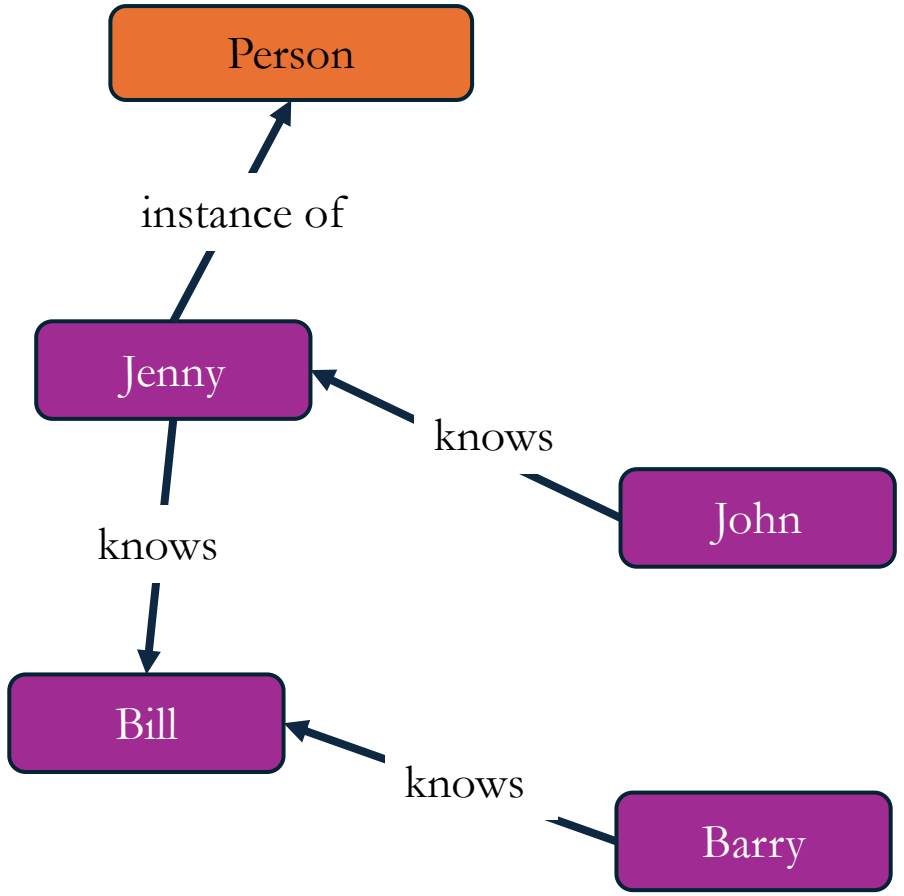
Suppose we have the following graph:

<:John> <:knows> <:Jenny> .

<:Jenny> <:knows> <:Bill> .

<:Barry> <:knows> <:Bill> .

Represented visually as =>



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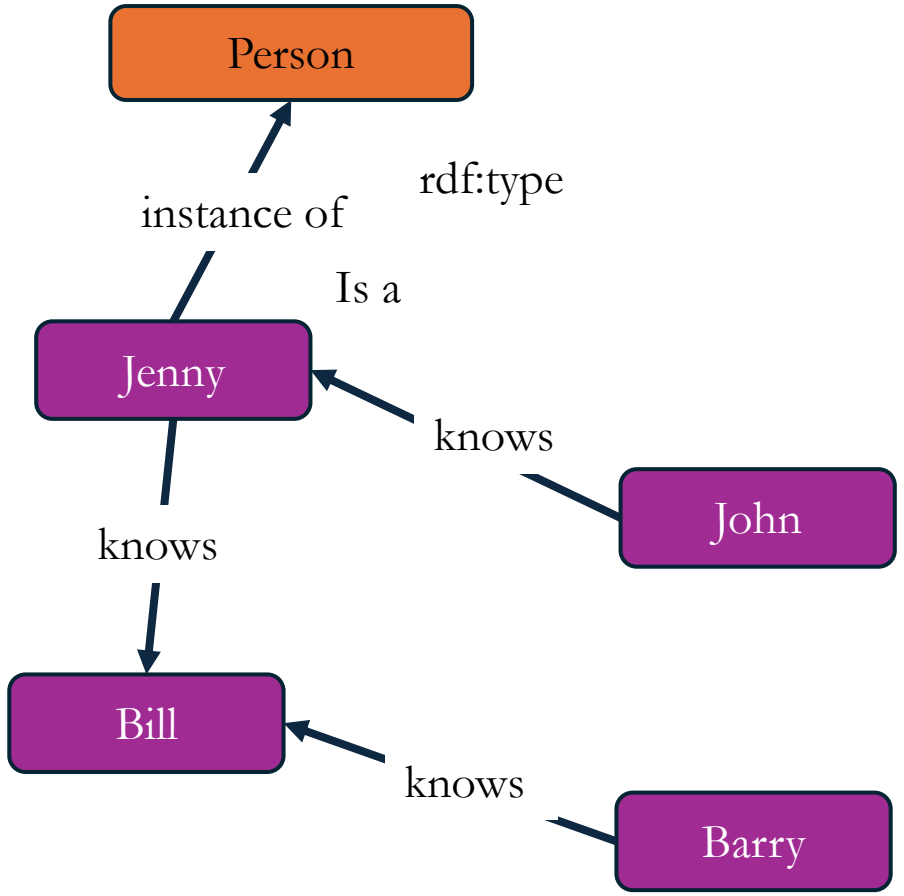
SPARQLing

Suppose we have the following graph:

<:John> <:knows> <:Jenny> .
<:Jenny> <:knows> <:Bill> .
<:Barry> <:knows> <:Bill> .

We can query, or ask, the graph questions with SPARQL. Such as, 'who are all the people that know Bill?' with a SELECT query.

```
SELECT ?person
WHERE {
?person <:knows> <:Bill> .
}
```



SPARQLing

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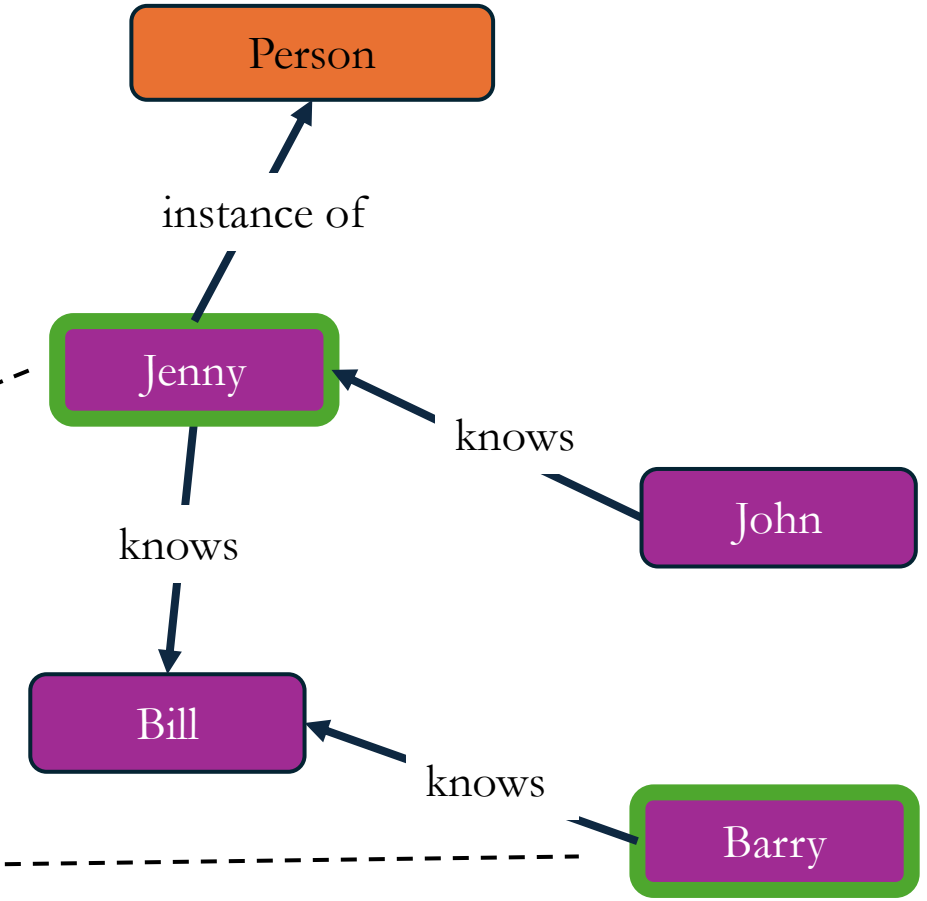
<:John> <:knows> <:Jenny> .
<:Jenny> <:knows> <:Bill> .
<:Barry> <:knows> <:Bill> .

SELECT ?person
WHERE {
?person <:knows> <:Bill> .
}

Would return:
Jenny
Barry



SPARQLing

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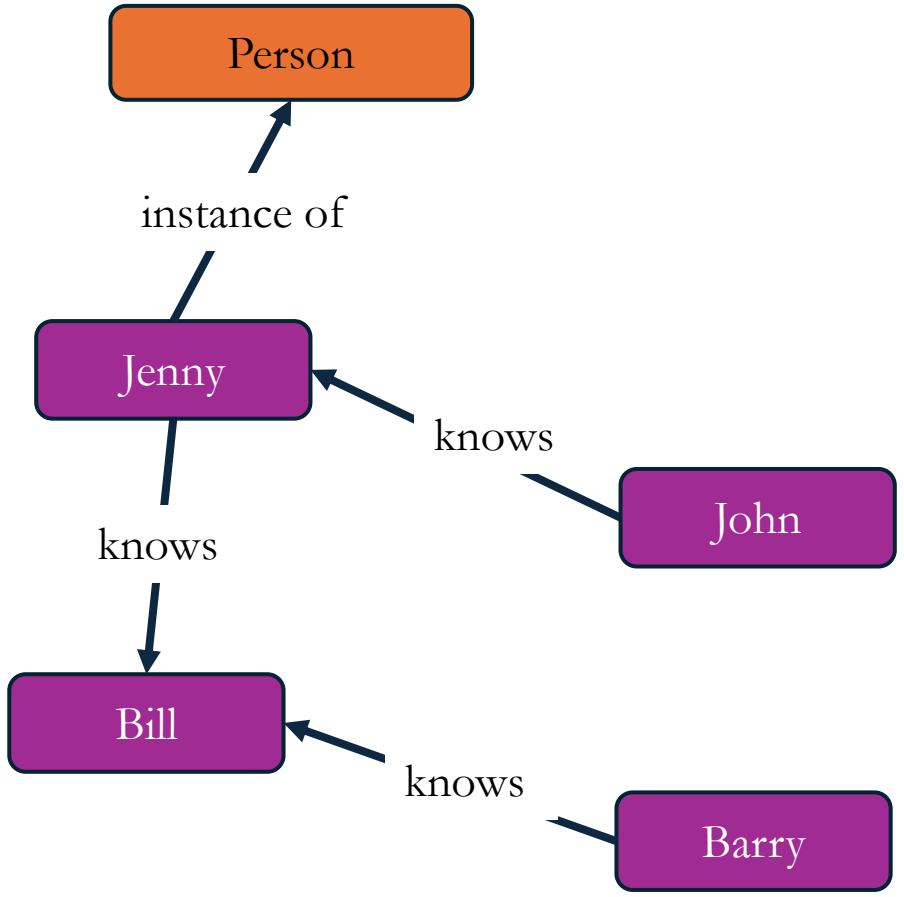
Suppose we have the following graph:

<:John> <:knows> <:Jenny> .
<:Jenny> <:knows> <:Bill> .
<:Barry> <:knows> <:Bill> .

We can query, or ask, the graph questions with SPARQL. Such as,
'Does anybody know John?' with an ASK query.

```
ASK
WHERE {
?person <:knows> <:John> .
}
```



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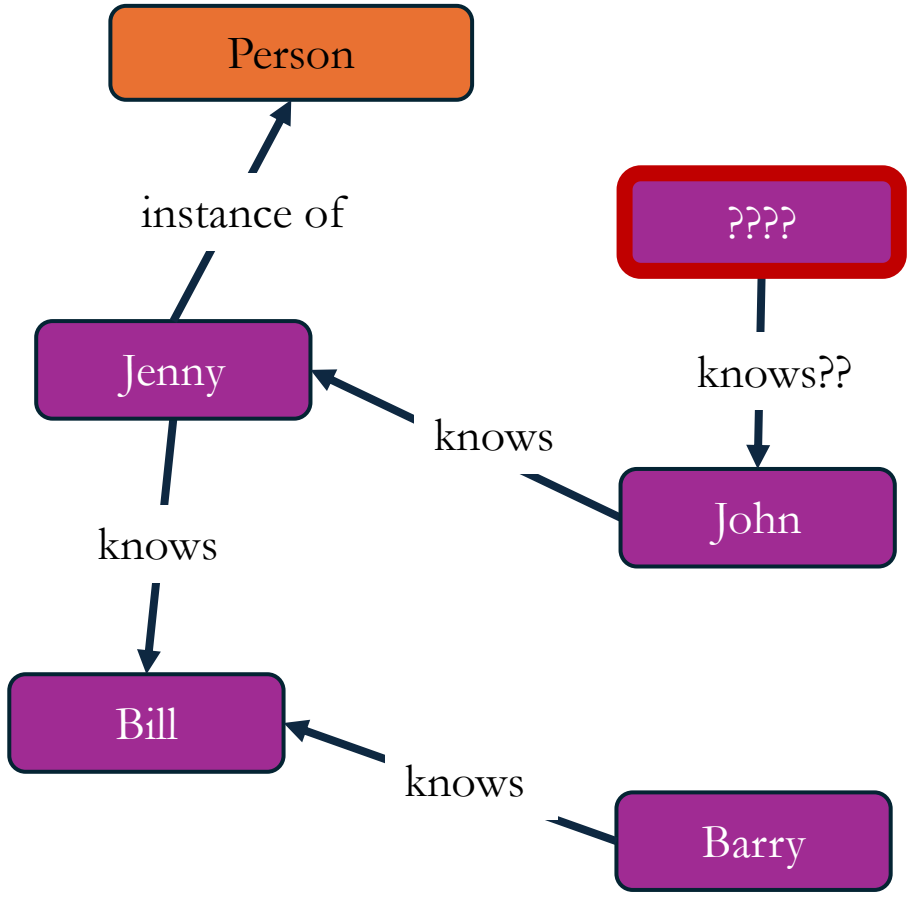
Suppose we have the following graph:

<:John> <:knows> <:Jenny> .
<:Jenny> <:knows> <:Bill> .
<:Barry> <:knows> <:Bill> .

ASK
WHERE {
?person <:knows> <:John> .
}

Would return

FALSE



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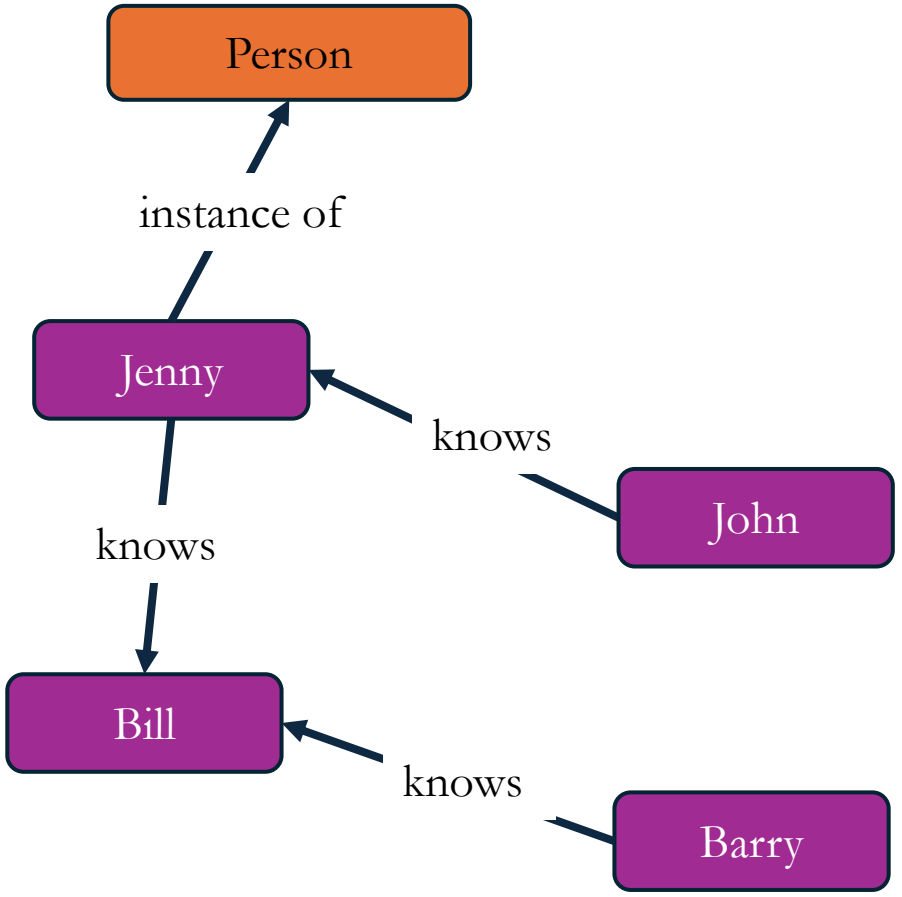
SPARQLing

Suppose we have the following graph:

<:John> <:knows> <:Jenny> .
<:Jenny> <:knows> <:Bill> .
<:Barry> <:knows> <:Bill> .

In addition to 'SELECT' and 'ASK', we can CONSTRUCT new triples.

```
CONSTRUCT ?anotherPerson :knows ?Person
WHERE {
?Person :knows ?anotherPerson .
}
```



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Suppose we have the following graph:

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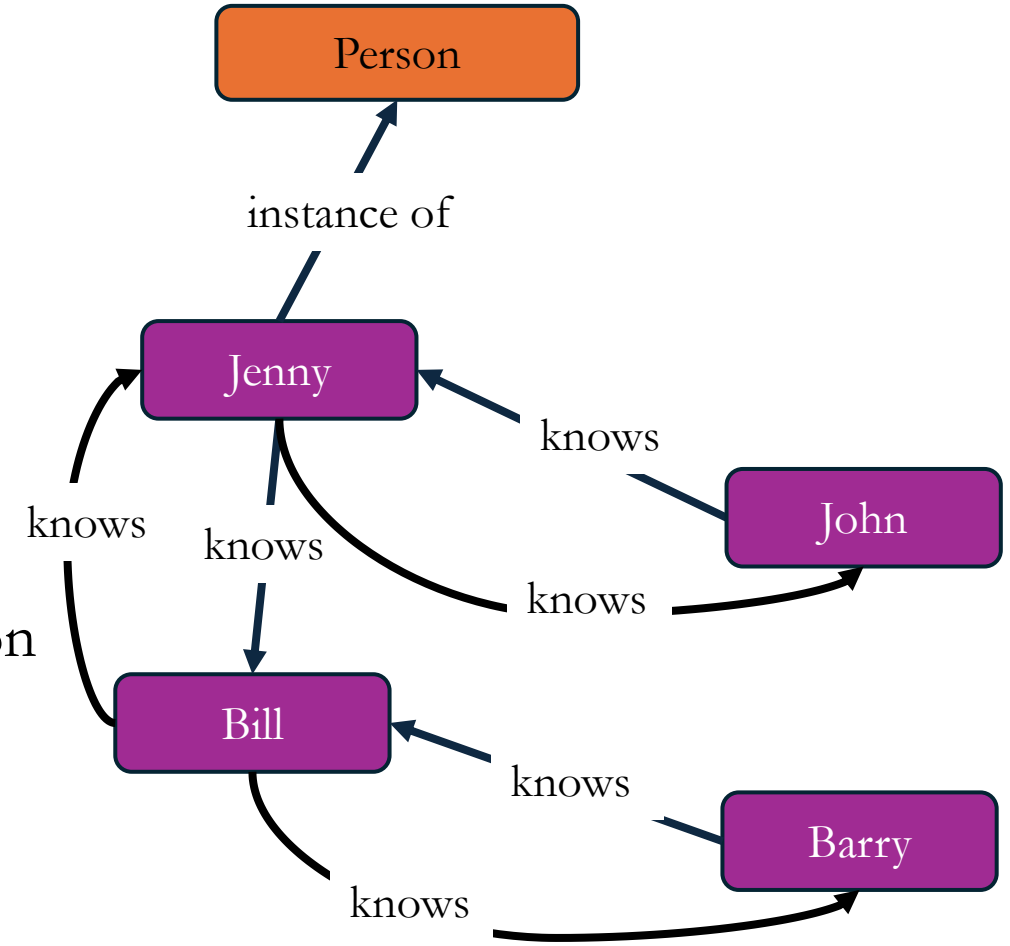

SPARQL Keywords

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- SPARQL has many keywords, some of which we will highlight:
  - Filter
  - Optional
  - Union
  - Exists
  - * (star)

Conclusion

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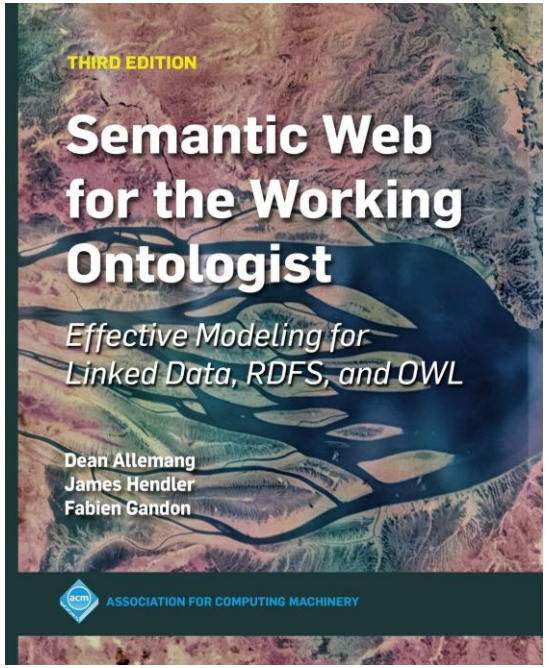
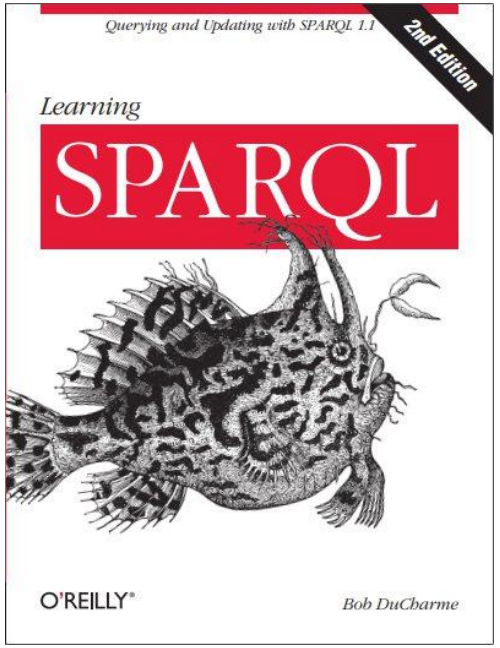
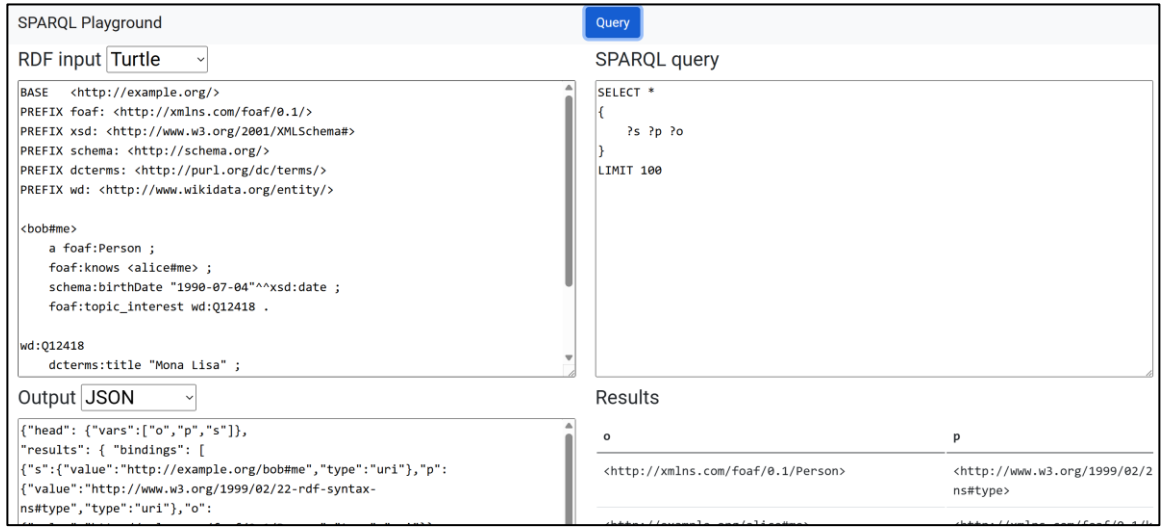
- Read and practice:







https://atomgraph.github.io/SPARQL-Playground/