SPARQL Query Language

Graphs

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Outline (Slides based on F. Freitas, Cin/UFPE, Brazil)

1. Basic queries
2. Constraints
3. Aggregation
4. **Graphs**
5. Query Forms
6. SPARQL in Fuseki

Triple Dataset

- A Triple store may hold multiple graphs:
  - record information about each graph.
  - queries can involve information from more than one graph.
    - *RDF Dataset* in SPARQL terminology
  - the **default** graph, which does not have a name, and zero or more named graphs, identified by IRI reference.
  - The **active** graph is the graph being used for matching.
  - The **graph** keyword is used to specify the active graphs.
  - If not graph keyword is used, then the default graph is active
- The relationship between named and default graphs:
  - to have information in the default graph that includes provenance information about the named graphs (the application is not directly trusting the information in the named graphs)
  - to include the information in the named graphs in the default graph as well.

The Relationship between Named and Default Graphs (I)

```
# Default graph
@prefix dc: <http://purl.org/dc/elements/1.1/> .
<http://example.org/bob> dc:publisher "Bob" .
<http://example.org/alice> dc:publisher "Alice" .

# Graph: http://example.org/bob
@prefix foaf: <http://xmlns.com/foaf/0.1/> .
_:a foaf:name "Bob" .
_:a foaf:mbox <mailto:bob@oldcorp.example.org> .

# Graph: http://example.org/alice
@prefix foaf: <http://xmlns.com/foaf/0.1/> .
_:a foaf:name "Alice" .
_:a foaf:mbox <mailto:alice@work.example.org>
.
```

Triples in the named graphs are not visible in the default graph.

The Relationship between Named and Default Graphs (II)

```
# Default graph
@prefix foaf: <http://xmlns.com/foaf/0.1/> .
_:x foaf:name "Bob" .
_:x foaf:mbox <mailto:bob@oldcorp.example.org> .
_:y foaf:name "Alice" .
_:y foaf:mbox <mailto:alice@work.example.org> .
```

```
# Graph: http://example.org/bob
@prefix foaf: <http://xmlns.com/foaf/0.1/> .
_:a foaf:name "Bob" .
_:a foaf:mbox <mailto:bob@oldcorp.example.org> .
```

```
# Graph: http://example.org/alice
@prefix foaf: <http://xmlns.com/foaf/0.1/> .
_:a foaf:name "Alice" .
_:a foaf:mbox <mailto:alice@work.example.org> .
```

Default graph is a merge of the named graphs.

Same data co-exists in multiple graphs.

Querying the Dataset

```
# Graph: http://example.org/foaf/aliceFoaf
@prefix foaf: <http://xmlns.com/foaf/0.1/> .
@prefix rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#> .
@prefix rdfs: <http://www.w3.org/2000/01/rdf-schema#> .
_:a foaf:name "Alice" .
_:a foaf:mbox <mailto:alice@work.example> .
_:a foaf:knows _:b .
_:b rdfs:seeAlso <http://example.org/foaf/bobFoaf> .
<http://example.org/foaf/bobFoaf> rdf:type foaf:PersonalProfileDocument .
_:b foaf:name "Bob" .
_:b foaf:mbox <mailto:bob@work.example> .
_:b foaf:age 32 .

# Graph: http://example.org/foaf/bobFoaf
@prefix foaf: <http://xmlns.com/foaf/0.1/> .
@prefix rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#> .
@prefix rdfs: <http://www.w3.org/2000/01/rdf-schema#> .
 _:1 foaf:mbox <mailto:bob@work.example> .
 _:1 rdfs:seeAlso <http://example.org/foaf/bobFoaf> .
_:1 foaf:age 35 .
<http://example.org/foaf/bobFoaf> rdf:type foaf:PersonalProfileDocument .
```

Querying the Dataset

 # Graph: http://example.org/foaf/aliceFoaf

```
@prefix foaf: <http://xmlns.com/foaf/0.1/> .
@prefix rdf: <http://www.w3.org/1999/02/22-rdf-syntax
@prefix rdfs: <http://www.w3.org/2000/01/rdf-schema#
_:a foaf:name "Alice" .
_:a foaf:mbox <mailto:alice@work.example> .
_:a foaf:knows _:b .
_:b rdfs:seeAlso <http://example.org/foaf/bobFoaf> .
<http://example.org/foaf/bobFoaf> rdf:type foaf:PersonalProfileDocument .
_:b foaf:name "Bob" .
_:b foaf:mbox <mailto:bob@work.example> .
_:b foaf:age 32 .
```

 # Graph: http://example.org/foaf/bobFoaf

```
@prefix foaf: <http://xmlns.com/foaf/0.1/> .
@prefix rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#> .
@prefix rdfs: <http://www.w3.org/2000/01/rdf-schema#> .
 _:1 foaf:mbox <mailto:bob@work.example> .
 _:1 rdfs:seeAlso <http://example.org/foaf/bobFoaf> .
_:1 foaf:age 35 .
<http://example.org/foaf/bobFoaf> rdf:type foaf:PersonalProfileDocument .
```

```
PREFIX foaf: <http://xmlns.com/foaf/0.1/>
SELECT ?src ?bobAge
WHERE { GRAPH ?src
      { ?x foaf:mbox <mailto:bob@work.example> .
        ?x foaf:age ?bobAge }}
```

src	bobAge
<http://example.org/foaf/aliceFoaf>	32
<http://example.org/foaf/bobFoaf>	35

Querying the Dataset

```
# Graph: http://example.org/foaf/aliceFoaf
@prefix foaf: <http://xmlns.com/foaf/0.1/> .
@prefix rdf: <http://www.w3.org/1999/02/22-rdf-syntax-n
.
@prefix rdfs: <http://www.w3.org/2000/01/rdf-schema#>
_:a foaf:name "Alice" .
_:a foaf:mbox <mailto:alice@work.example> .
_:a foaf:knows _:b .
_:b rdfs:seeAlso <http://example.org/foaf/bobFoaf> .
<http://example.org/foaf/bobFoaf> rdf:type
foaf:PersonalProfileDocument .
_:b foaf:name "Bob" .
_:b foaf:mbox <mailto:bob@work.example> .
 :b foaf:age 32 .
```

```
# Graph: http://example.org/foaf/bobFoaf
@prefix foaf: <http://xmlns.com/foaf/0.1/> .
@prefix rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#> .
@prefix rdfs: <http://www.w3.org/2000/01/rdf-schema#> .
 _:1 foaf:mbox <mailto:bob@work.example> .
 _:1 rdfs:seeAlso <http://example.org/foaf/bobFoaf> .
_:1 foaf:age 35 .
<http://example.org/foaf/bobFoaf> rdf:type foaf:PersonalProfileDocument .
```

```
PREFIX foaf: <http://xmlns.com/foaf/0.1/>
PREFIX data: <http://example.org/foaf/>
SELECT ?age
WHERE
    { GRAPH data:bobFoaf  {
          ?x foaf:mbox <mailto:bob@work.example> .
           ?x foaf:age ?age  }
     }
```

age
35

Querying the Dataset - Restricting via Query Pattern

```
PREFIX data: <http://example.org/foaf/>
PREFIX foaf: <http://xmlns.com/foaf/0.1/>
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
SELECT ?mbox ?age ?ppd
 WHERE
    { GRAPH data:aliceFoaf
        { ?alice foaf:mbox <mailto:alice@work.example> ;
                 foaf:knows ?whom .
          ?whom foaf:mbox ?mbox ;
                  rdfs:seeAlso ?ppd .
          ?ppd a foaf:PersonalProfileDocument . } .
      GRAPH ?ppd { ?w foaf:mbox ?mbox ;
                       foaf:age ?age } }
```

mbox	age	ppd
<mailto:bob@work.example>	35	<http://example.org/foaf/bobFoaf>