

SPARQL

CSC480: Semantic
Web Technologies

Dr. Lisa Frye

frye@kutztown.edu

Kutztown University

SPARQL

- Query language and data access protocol
- Query
 - RDF graphs
 - Other data sources that can be mapped to RDF
- Query at triple level
- Directed graph

Query Forms

- SELECT **
- CONSTRUCT
- ASK
- DESCRIBE

Variables

- Begin with ?

PREFIX swp:

<http://www.semanticwebprimer.org/ontology/apartments.ttl#>

PREFIX dbpedia-owl <<http://dbpedia.org/resource/>>

SELECT ?location

WHERE {

 swp:BaronWayBuilding dbpedia-owl:location ?location

}

WHERE Clause

PREFIX traffic:

```
<http://faculty.kutztown.edu/frye/res/onto/reason/withInstances/traffic.owl#>
```

```
SELECT ?packet
```

```
FROM
```

```
<http://faculty.kutztown.edu/frye/res/onto/reason/withInstances/traffic_instances.owl>
```

```
WHERE {
```

```
    ?packet traffic:destIP "192.168.2.200"
```

```
}
```

Filters

PREFIX traffic:

<<http://faculty.kutztown.edu/frye/res/onto/reason/withInstances/traffic.owl#>>

PREFIX xsd: <<http://www.w3.org/2001/XMLSchema#>>

PREFIX rdf: <<http://www.w3.org/1999/02/22-rdf-syntax-ns#>>

SELECT DISTINCT ?srcMAC ?destMAC

FROM

<http://faculty.kutztown.edu/frye/res/onto/reason/withInstances/traffic_instances.owl>

WHERE {

 ?packet rdf:type traffic:L2Packet;

 traffic:srcMAC ?srcMAC;

 traffic:destMAC ?destMAC .

Regular Expressions (regex)

```
SELECT * FROM <traffic_instances.owl>
WHERE {
    ?p1 traffic:destIP ?destIP;
        traffic:dateTime ?dateTime;
        traffic:l4DestPort ?l4DestPort;
        traffic:appData ?appData .
    FILTER ((?dateTime > xsd:dateTime("2010-07-14T00:00:00Z"))
        && (?dateTime < xsd:dateTime("2010-07-14T23:59:59Z"))
        && (xsd:integer(?l4DestPort) = xsd:integer(80))
        && regex(str(?appData), "/level/99/exec", "i"))
}
ORDER BY ?destIP
```

Additional Keywords

- OPTIONAL
- DISTINCT
- ORDER BY


```
SELECT ?destIP ?srcIP
```

```
FROM
```

```
http://faculty.kutztown.edu/frye/res/onto/reason/withInstances/traffic\_instances.owl
```

```
WHERE {
```

```
  ?packet traffic:destIPoctet1 156 .
```

```
  ?packet traffic:destIPoctet2 12 .
```

```
  ?packet traffic:destIPoctet3 ?destIPoctet3 .
```

```
  ?packet traffic:destIPoctet4 ?destIPoctet4 .
```

```
  ?packet traffic:destIP ?destIP .
```

```
  ?packet traffic:srcIP ?srcIP
```

```
}
```

```
GROUP BY ?destIP ?srcIP
```

```
ORDER BY ?destIP
```

Aggregates

- GROUP BY
- HAVING
- Aggregates
 - Count
 - MIN
 - MAX

Aggregates Example

```
SELECT ?pcoll ?dateTime ?destIP (count(?destIP) as ?cnt)
FROM
<http://faculty.kutztown.edu/frye/res/onto/reason/withInstances/traffic_instances.owl>WHERE {
    ?pcoll rdf:type traffic:PingPacket;
    traffic:dateTime ?dateTime;
    traffic:destIP ?destIP
}
GROUP BY ?destIP
```

```
SELECT ?destIP ?dateTime FROM <traffic_instances.owl>
{ ?packet rdf:type traffic:TCPPacket;
  traffic:dateTime ?dateTime;
  traffic:destIP ?destIP .
```

```
{
  SELECT ?destIP1 ?dateTime1
  {
    ?packet rdf:type traffic:UDPPacket;
    traffic:dateTime ?dateTime1;
    traffic:destIP ?destIP1 .
  }
}
FILTER (?destIP = ?destIP1) .
}
```

```
GROUP BY ?destIP
```

More Keywords

- BASE
- FROM
- FROM NAMED
- Active Graph
- GRAPH

Other Query Forms

- CONSTRUCT
- ASK

SPARQL Update

- Modify contents of dataset (KB)
- Insert
 - INSERT DATA
 - LOAD

PREFIX dc: <http://purl.org/dc/elements/1.1/>

INSERT DATA

```
{ <http://example/book3> dc:title "A new book" ;  
    dc:creator "A.N.Other" .  
}
```

```
INSERT {
```

```
  ?pcoll rdf:type traffic:PacketCollection;
```

```
  traffic:pcTimeInterval ?timeInt;
```

```
  traffic:pcType \"PingFlood\";
```

```
  traffic:pcDestIP ?destIP;
```

```
  traffic:pcFrequency ?cnt .
```

```
}
```

```
WHERE {
```

```
  SELECT ?pcoll ?dateTime ?destIP (count(?destIP) as ?cnt)
```

```
  WHERE {
```

```
    ?pcoll rdf:type traffic:PingPacket;
```

```
    traffic:dateTime ?dateTime;
```

```
    traffic:destIP ?destIP .
```

```
  } GROUP BY ?destIP .
```

```
LET (?timeInt := 10) .
```

```
LET (?cnt := :count(?destIP)) .
```

```
}
```


Delete Data

- DELETE DATA
- DELETE WHERE
- CLEAR

```
DELETE DATA FROM <http://example/bookStore>  
{ <http://example/book3> dc:title  
    "Fundamentals of Compiler Desing" }
```

DELETE

```
{ ?book ?p ?v }
```

WHERE

```
{
```

```
  ?book dc:date ?date .
```

```
  FILTER ( ?date < "2000-01-01T00:00:00"^^xsd:dateTime )
```

```
  ?book ?p ?v
```

```
}
```

ARQ

- SPARQL processor for Jena
- Function library

Examples on bill

- My public directory
 - csc480sw sub-directory