Linked data
- SPARQL -

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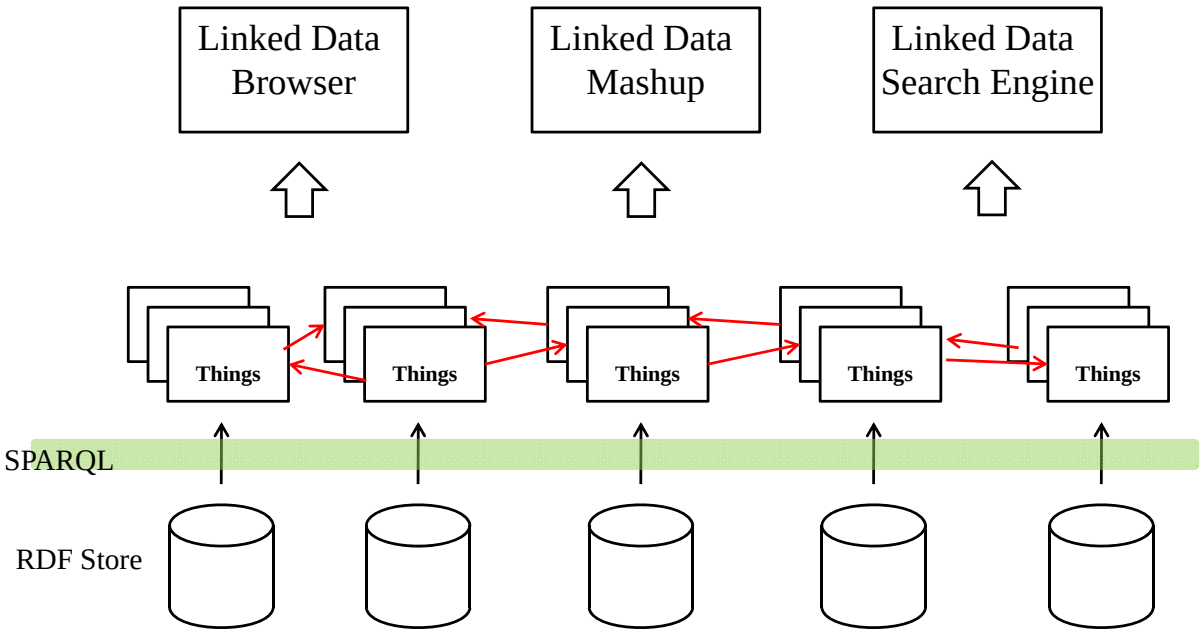
I used some slides by Fumi Kato by his courtesy

How to use Linked Data



SPARQL Query Language for RDF
W3C Recommendation 15 January 2008
http://www.w3.org/TR/rdf-sparql-query/

SPARQL

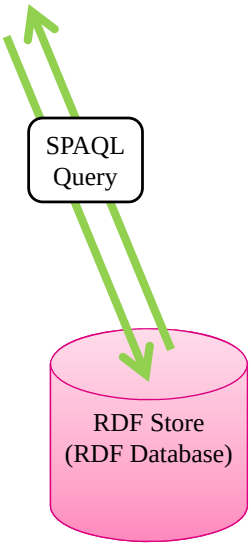
- Data query language for RDF
- Similar syntax with SQL

Query form

```
PREFIX foaf: <http://xmlns.com/foaf/0.1/>
SELECT ?name
WHERE {
 ?person foaf:name ?name .
}
```

Variable for query

Query pattern (Turtle syntax)



Query form and results

Query form	Results
SELECT, ASK	XML, (JSON)
CONSTRUCT, DESCRIBE	RDF Graph

CONSTRUCT

```
PREFIX foaf: <http://xmlns.com/foaf/0.1/>
CONSTRUCT {
  ?person foaf:name ?name .
}
FROM <http://fumi.me/foaf.rdf>
WHERE {
  ?person foaf:name ?name .
}
```


Multiple query patterns

```
PREFIX foaf: <http://xmlns.com/foaf/0.1/>
SELECT *
WHERE {
  ?person foaf:name ?name .
  ?person foaf:mbox ?email .
}
```

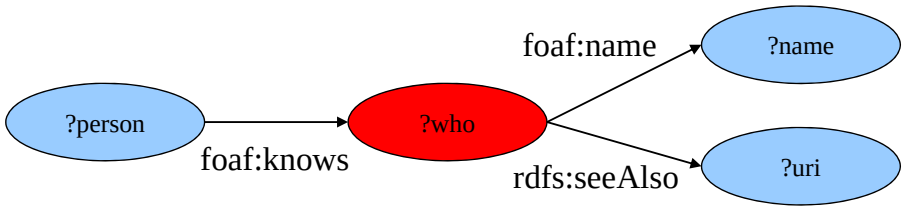
All variabls

Matching multiple patterns

```
PREFIX foaf: <http://xmlns.com/foaf/0.1/>
SELECT *
WHERE {
  ?person foaf:name ?name;
          foaf:mbox ?email .
}
```

Connected graph

```
PREFIX foaf: <http://xmlns.com/foaf/0.1/>
PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
SELECT ?name ?uri
WHERE {
  ?person foaf:knows ?who .
  ?who foaf:name ?name;
       rdfs:seeAlso ?uri .
}
```



Optional values

- OK if it is not matched but return values if matched

```
PREFIX foaf: <http://xmlns.com/foaf/0.1/>
PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
SELECT ?name ?uri
WHERE {
  ?person foaf:knows ?who .
  ?who foaf:name ?name .
  OPTIONAL {
    ?who rdfs:seeAlso ?uri .
  }
}
```

Modifiers

```
PREFIX foaf: <http://xmlns.com/foaf/0.1/>
PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
SELECT ?name ?uri
WHERE {
  ?person foaf:knows ?who .
  ?who foaf:name ?name;
  OPTIONAL {
        rdfs:seeAlso ?uri .
  }
}
 ORDER BY ?name
LIMIT 10
```

Ascending Sort
(if descending ORDER BY DESC(?name))

Upper bound on the number of solutions

UNION

```
PREFIX foaf: <http://xmlns.com/foaf/0.1/>
SELECT ?name ?mbox
WHERE {
  { ?person foaf:name ?name;
          foaf:mbox ?mbox .
  } UNION {
    ?person foaf:name ?name;
          foaf:mbox_sha1sum ?mbox .
  }
}
```

FROM

```
PREFIX foaf: <http://xmlns.com/foaf/0.1/>
SELECT ?name
FROM <http://fumi.me/foaf.rdf>
WHERE {
  ?person foaf:name ?name .
 }
```

Default dataset

Multiple Dataset

重複削除

```
PREFIX foaf: <http://xmlns.com/foaf/0.1/>
SELECT DISTINCT ?name
FROM <http://www.w3.org/People/Berners-Lee/card>
FROM <http://fumi.me/foaf.rdf>
FROM <http://www.tom.sfc.keio.ac.jp/~hagino/foaf.rdf>
WHERE {
  ?person foaf:name ?name .
 }
```

Merging dataset

Named Graph

- Distinguish data resources by URI/IRI
- Query for specifying Graphs

```
PREFIX foaf: <http://xmlns.com/foaf/0.1/>
SELECT ?g ?name
FROM NAMED <http://www.w3.org/People/Berners-Lee/card>
FROM NAMED <http://fumi.me/foaf.rdf>
WHERE {
 GRAPH ?g {
    ?person foaf:name ?name .
  }
}
```

Specifying graph resource

Default graph and Named graph

```
PREFIX foaf: <http://xmlns.com/foaf/0.1/>
PREFIX rss:  <http://purl.org/rss/1.0/>
PREFIX dc:   <http://purl.org/dc/elements/1.1/>
SELECT ?name ?title ?link ?date
FROM <http://planetrdf.com/index.rdf>
FROM NAMED <http://fumi.me/foaf.rdf>
WHERE {
  ?item dc:creator ?name .
  ?item rss:title ?title .
  ?item rss:link ?link .
  ?item dc:date ?date .

  GRAPH <http://fumi.me/foaf.rdf> {
    ?me foaf:name "加藤文彦"@ja .
    ?me foaf:knows ?who .
    ?who foaf:name ?name .
  } .
}
```

FILTER: regex

```
PREFIX foaf: <http://xmlns.com/foaf/0.1/>
PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
SELECT DISTINCT ?name ?email
FROM <http://fumi.me/foaf.rdf>
WHERE {
  ?person foaf:name ?name;
          foaf:mbox ?email .
  FILTER regex(str(?email), "w3.org", "i")
}
```


FILTER: xsd:Date

```
PREFIX foaf: <http://xmlns.com/foaf/0.1/>
PREFIX rss:  <http://purl.org/rss/1.0/>
PREFIX dc:   <http://purl.org/dc/elements/1.1/>
SELECT ?name ?title ?link ?date
FROM <http://planetrdf.com/index.rdf>
WHERE {
  ?item dc:creator ?name .
  ?item rss:title ?title .
  ?item rss:link ?link .
  ?item dc:date ?date .
  FILTER ( xsd:dateTime(?date) > "2008-03-31T00:00:00Z"^^xsd:dateTime )
}
```

Or compare as string FILTER (str(?date) > "2008-03-31")

FILTER

- Logical connectives: !, &&, ||
- Arithmetic connectives: +, -, *, /
- Test: =, !=, >, <, ...
- Unary Test: isURI, isBlank, isLiteral, BOUND
- Data type: xsd:integer, xsd:decimal, xsd:float, xsd:double, xsd:string, xsd:boolean, xsd:dateTime
- Language Tag: @EN, @JP
- regex, str

Language tag

- Specifying language for literals
  - Turtle: “Tokyo”@en
  - RDF/XML: xml:lang=“en“
- FILTER
  - FILTER (lang(?name)=“en”)
- Note: literal with language tag is not equivalent to one without language tag
  - FILTER (?city = “Tokyo”)
    - No match with ”Tokyo”@en

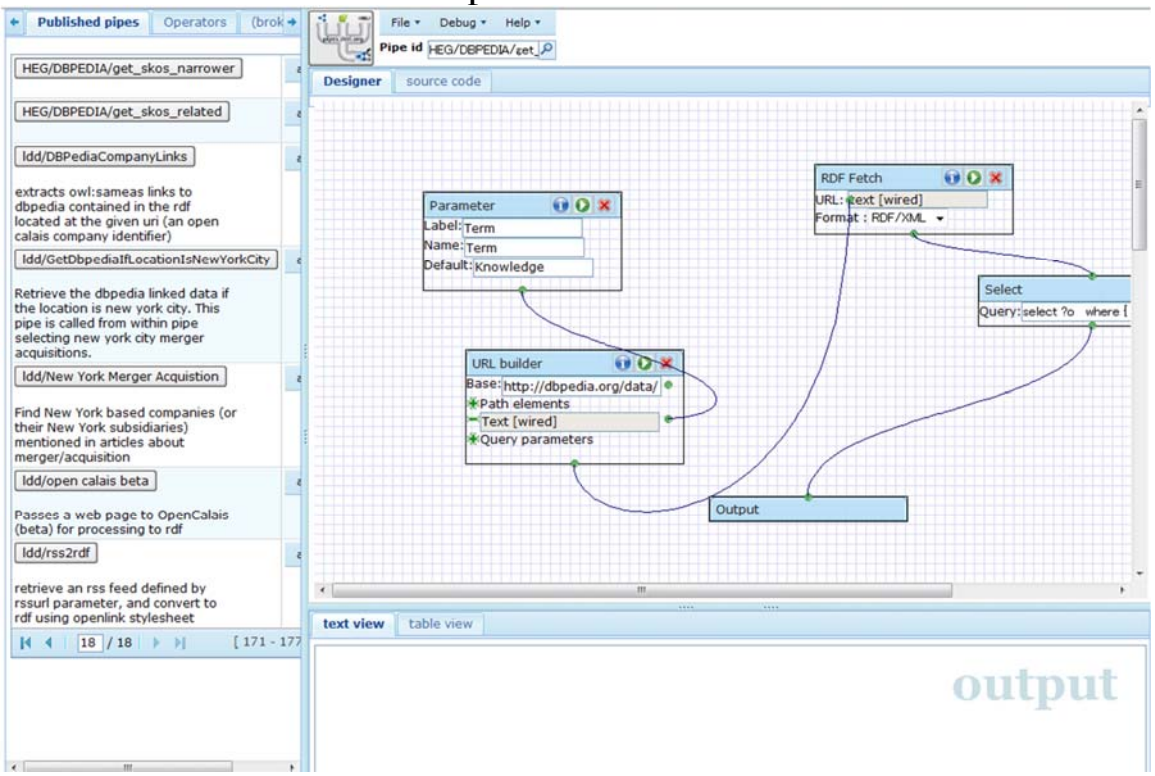
Data type

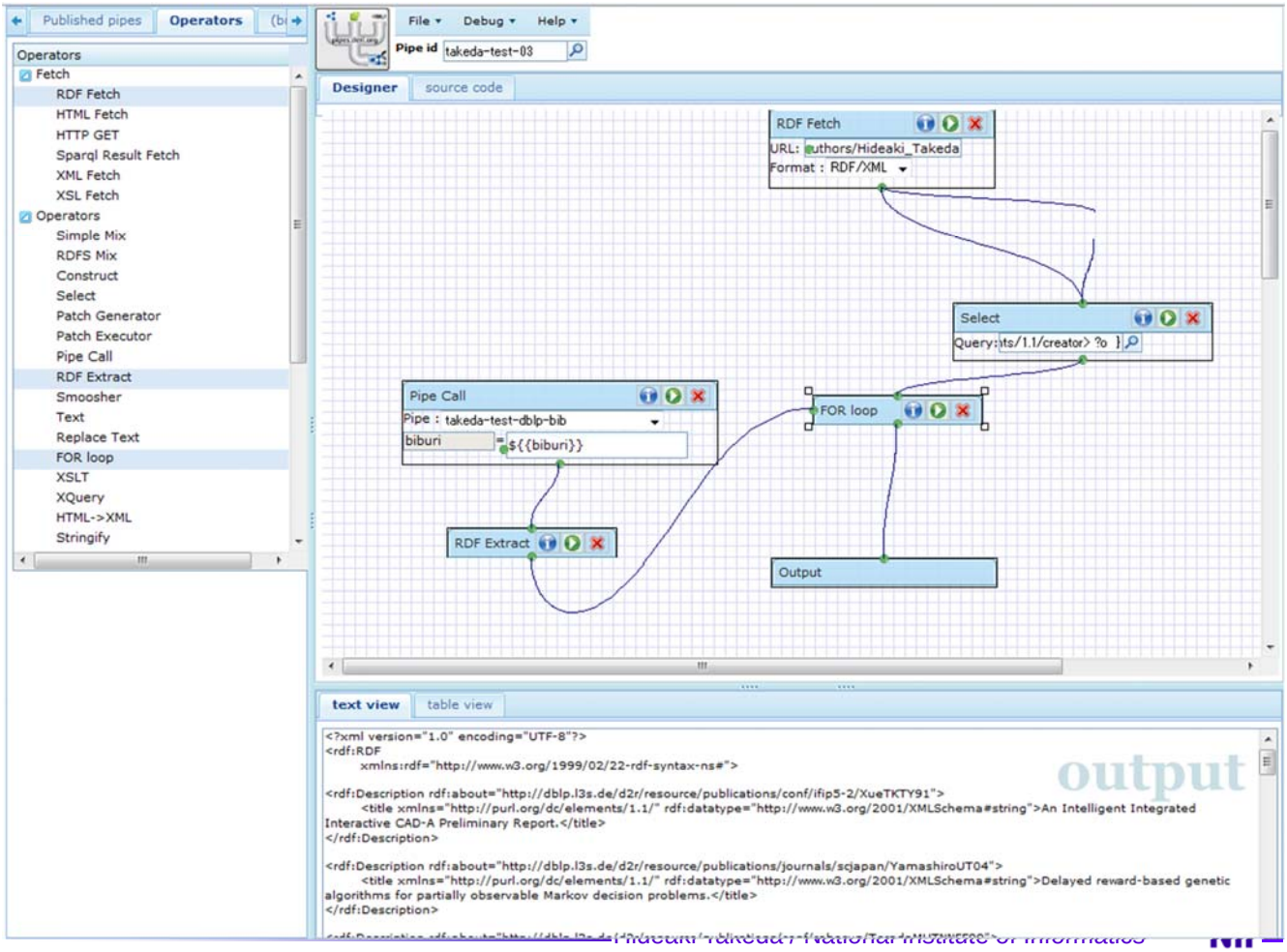
- Types for literals
  - “1.3”^^xsd:decimal
  - “2008-05-01T09:12:58Z”^^xsd:dateTime
  - “true”^^xsd:boolean
  - “SFC”^^xsd:string
- Casting
  - Casting may be needed for applying operaters.
    - FILTER regex(str(?title), “Semantic”)
    - FILTER xsd:int(?age) > 19
    - FILTER

DERI Pipes

- RDF-version of Yahoo! Pipes

http://pipes.deri.org/





DERI Pipes Operators

- Fetch Operator
  - RDF Fetch
  - SPARQL Result Fetch
  - …
- General Operator
  - Simple Mix
  - RDF Mix
  - SELECT
  - CONSTRUCT
  - …
- URL Operator
  - URL Builder
  - SPARQL Endpoint
  - …
- Choose Operator
  - Choose (if/then/else)
  - …
- Inputs
  - Parameter
  - …

DERI Pipes Operators

- SELECT
  - Just similar to SPARQL
  - ex.
- select ?uri where {?s <http://xmlns.com/foaf/0.1/knows?> ?uri} ORDER by desc(?uri) LIMIT 2 offset 10

Usage

- Use Firefox (or Chrome)
- Access Editor
  - http://pipes.deri.org:8080/pipes/
- Retrieve pipe
  - http://pipes.deri.org:8080/pipes/?pipeid=TBLonTheSW
- Run pipe
  - http://pipes.deri.org:8080/pipes/pipes/?id=TBLonTheSW
- My examples
  - http://pipes.deri.org:8080/pipes/?pipeid=takeda-test-03

Assignment

- Build some DERI Pipes application
  - Mix two or more resources
- Deadline: August 31, 2011
- Report & Application