Publishing OWL ontologies with Presto

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An essential aspect of the Semantic Web is to ensure that the terminology defined in ontologies are web-accessible such that information about the ontological entity may be discovered and links with related entities explored. This idea is realized by the Linked Data architecture.

In practice, how can we make ontologies and their components (classes, properties, individuals) available on the web so that others can link to them and perform queries?
Overview

Presto is a tool for publishing and querying OWL ontologies on the Semantic Web.

For a given ontology, Presto provides the following:

1. A self-referential namespace for all ontological documents and entities, so as to follow linked knowledge as a static ontological snapshot.

2. A RESTful service for DL and SPARQL queries that are identified by permanent HTTP URIs.

3. Content-negotiation capabilities to retrieve dynamically generated HTML or RDF/XML.
Overview

1) The ontology (as a URL) and 2) the publishing URI.
   e.g: file:///home/me/myontology.owl → http://mydomian.org/myontology
**Overview**

**Presto Server:**
- Management of ontologies.
- Integrates third-party libraries and components (e.g., Pellet, OWL-API, etc).
- Provides internal services for querying, loading ontologies, rendering, etc.

**Motivation**

**Renaming**

**Querying**

**Future work:**
- Modularization

**Questions**
RESTFul Interface

A representation of an ontology or any of its entities can be retrieved using a GET HTTP request on its deployed URI. Content negotiation determines the format of the representation (RDF/XML or HTML).
Renaming

Presto replaces the URI of the input ontology, as well as, the URIs of all entities referred in the ontology.

Ontology: http://www.co-ode.org/galen/full-galen.owl
Publishing URI: http://dumontierlab.com/galen

http://www.co-ode.org/ontologies/galen#MalignantCancer

http://dumontierlab.com/galen/MalignantCancer
By rewriting the URIs we can assign HTTP resolvable URIs to each ontological entity.
Ontologies can be queried by sending a HTTP GET request to the ontology URI with the mandatory \textit{query} parameter. Queries can be formulated using SPARQL or Manchester OWL DL query.

\textbf{Sample Query:}
http://www.example.org/vehicles?query=Vehicle that hasPart some GasEngine
Sample Results:

```xml
<rdf:RDF ... >
<owl:Ontology>
  <owl:imports rdf:resource="http://www.example.org/vehicles" />
</owl:Ontology>

<!-- Query class expression -->
<owl:Class rdf:about="&query;Vehicle%20and%20hasPart%20some%20ManualTransmission" >
  <owl:intersectionOf rdf:parseType="Collection" >
    <rdf:Description rdf:about="Vehicle" />
    <owl:Restriction>
      <owl:onProperty rdf:resource="hasPart" />
      <owl:someValuesFrom rdf:resource="ManualTransmission" />
    </owl:Restriction>
  </owl:intersectionOf>
</owl:Class>

<!-- Individuals -->
<owl:Thing rdf:about="123-456" >
  <rdf:type rdf:resource="&query;Vehicle%20and%20hasPart%20some%20ManualTransmission" />
</owl:Thing>
...
</rdf:RDF>
```
Querying

Sample Results:
<rdf:RDF ... >
<owl: Ontology>
  <owl:imports rdf:resource="http://www.example.org/vehicles"/>
</owl:Ontology>

<!-- Query class expression -->
<owl:Class  rdf:about="&query;Vehicle%20and%20hasPart%20some%20ManualTransmission" >
  <owl:intersectionOf rdf:parseType="Collection" >
    <rdf:Description rdf:about="Vehicle" />
    <owl:Restriction>
      <owl:onProperty rdf:resource="hasPart" />
      <owl:someValuesFrom rdf:resource="ManualTransmission" />
    </owl:Restriction>
  </owl:intersectionOf>
</owl:Class>

<!-- Individuals -->
<owl:Thing rdf:about="123-456" >
  <rdf:type rdf:resource="&query;Vehicle%20and%20hasPart%20some%20ManualTransmission" />
</owl:Thing>
...
</rdf:RDF>

Query is express as a class.
Querying

Sample Results:

```rdf
<rdf:RDF ... >
  <owl:Ontology>
    <owl:imports rdf:resource="http://www.example.org/vehicles" />
  </owl:Ontology>

<!-- Query class expression -->
<owl:Class  rdf:about="&query;Vehicle%20and%20hasPart%20some%20ManualTransmission" >
  <owl:intersectionOf rdf:parseType="Collection" >
    <rdf:Description rdf:about="Vehicle" />
    <owl:Restriction>
      <owl:onProperty rdf:resource="hasPart" />
      <owl:someValuesFrom rdf:resource="ManualTransmission" />
    </owl:Restriction>
  </owl:intersectionOf>
</owl:Class>

<!-- Individuals -->
<owl:Thing rdf:about="123-456" >
  <rdf:type rdf:resource="&query;Vehicle%20and%20hasPart%20some%20ManualTransmission" />
</owl:Thing>
```

A-Box result asserted as instance of the query.
Future Directions: Modularization

Current implementation:

http://dumontierlab.com/molecule

imports

http://dumontierlab.com/molecule/Molecule

OWL ontology that contains the concept Molecule

OWL document describing the Molecule concept
Future Directions: Modularization

Future implementation:

http://dumontierlab.com/Molecule-module

Ontology module necessary for interpreting the description of the Molecule concept.

http://dumontierlab.com/molecule/Molecule

OWL document describing the Molecule concept.
Future Directions: Modularization

Future implementation:

http://dumontierlab.com/Molecule-module

OWL document describing the Molecule concept

Ontology module necessary for interpreting the description of the Molecule concept.

http://dumontierlab.com/molecule/Molecule

imports
Questions? ...