GeoQuery Tool to Pose Spatial Queries over the Web

http://geoquery.cs.jmu.edu/geoquery/

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Querying Linked Data (RDF)

Information is Stored as Triples

Subject (Karmy’s Airport)
Predicate is a type of
Object airport

Subject (Karmy’s Airport)
Predicate has label
Object “Karmy’s Airport” etc.

RDF is queried using the W3C query language called SPARQL. GeoSPARQL adds spatial operators.
### Uniform Resource Identifiers (URIs)

<table>
<thead>
<tr>
<th>Subject</th>
<th><a href="http://cegis.usgs.gov/rdf/gnis/Features/1498860">http://cegis.usgs.gov/rdf/gnis/Features/1498860</a></th>
</tr>
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<td>Predicate</td>
<td><a href="http://www.w3.org/1999/02/22-rdf-syntax-ns#type">http://www.w3.org/1999/02/22-rdf-syntax-ns#type</a></td>
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<td>Object</td>
<td><a href="http://cegis.usgs.gov/rdf/trans/airportPoint">http://cegis.usgs.gov/rdf/trans/airportPoint</a></td>
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GeoSPARQL

- Query language for geospatial RDF systems
- Specification approved by Open Geospatial Consortium (OGC) Technical Committee

```
SELECT ?m
WHERE {
  ?p  a ex:Park;
  geo:hasGeometry ?pgeo .
  ?m  a ex:Monument;
  geo:hasGeometry ?mgeo .
}
```

Find all Monuments within Parks.

GeoSPARQL queries allow spatial processing and indexing over Semantic Web datasets (Dave Kolas)
Developed by Professor Ralph Grove at James Madison University with funds from our NSF INTEROP Grant (idea from Professor James Wilson, JMU)

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GeoSparql Query Tool

GeoQuery is an interactive tool for accessing a geographical database stored as an RDF triple store, using GeoSparql queries. The following videos illustrate some sample queries executed with GeoQuery:

- **Query 1**: Find all airports within Augusta County.
- **Query 2**: Find the area within 5000m of the city of Waynesboro that also lies within the borders of Augusta County.

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Videos

Tool for posing GeoSPARQL queries
Can perform spatial operations over the Web
Uses Parliament’s implementation of GeoSPARQL (triple store)

http://geoquery.cs.jmu.edu/geoquery/
A query with one feature

Find all airports
Select Feature Type

GeoSparql Query Tool

Feature 1: ---Select Feature Type---
---Select Property---
Options: No Spatial Operation, Boundary, Convex Hull, Envelope, Buffer 1000 (m)
Search Results: +/-
...No search results yet...

Feature 2: ---Select Feature Type---
---Select Property---
Options: No Spatial Operation, Boundary, Convex Hull, Envelope, Buffer 1000 (m)
Search Results: +/-
...No search results yet...

Spatial Relationship: Go
Select: --
with relationship: --Select Relation--
to: --
Search Results: +/-
...No search results yet...

Binary Spatial Operation: Go
---Select Operation---

---Select Feature Type---
http://www.opengis.net/ont/geosparql#Geometry
http://cegis.usgs.gov/rdf/trans/airportRunway
http://cegis.usgs.gov/rdf/trans/airportPoint
http://cegis.usgs.gov/rdf/trans/roadSegment
http://cegis.usgs.gov/rdf/trans/railFeature
http://cegis.usgs.gov/rdf/struct/structPoint
http://cegis.usgs.gov/rdf/gu/incorporatedPlace
http://cegis.usgs.gov/rdf/gu/minorCivilDivision
http://cegis.usgs.gov/rdf/gu/countryOrEquivalent
http://cegis.usgs.gov/rdf/gu/stateOrTerritory
http://cegis.usgs.gov/rdf/nhd/huc/WBD_HU4
http://cegis.usgs.gov/rdf/nhd/huc/WBD_HU6
http://cegis.usgs.gov/rdf/nhd/huc/WBD_HU8
http://cegis.usgs.gov/rdf/nhd/huc/WBD_HU10
http://cegis.usgs.gov/rdf/nhd/huc/WBD_HU12
http://cegis.usgs.gov/rdf/nhd/flowline
http://cegis.usgs.gov/NHDOntology/StreamOrRiver
http://cegis.usgs.gov/NHDOntology/ArtificialPath
http://cegis.usgs.gov/rdf/nhd/area

Wiegand
Select Property for airportPoint

http://www.w3.org/2000/01/rdf-schema#label
http://www.w3.org/1999/02/22-rdf-syntax-ns#type
http://www.opengeospatial.org/ont/geosparql#hasGeometry
http://cegis.usgs.gov/rdf/trans/sourceOriginator
http://cegis.usgs.gov/rdf/trans/sourceDatasetID
http://cegis.usgs.gov/rdf/trans/sourceDataDesc
http://cegis.usgs.gov/rdf/trans/loadDate
http://cegis.usgs.gov/rdf/trans/fType
http://cegis.usgs.gov/rdf/trans/distributionPolicy
http://cegis.usgs.gov/rdf/trans/dataSecurity
http://cegis.usgs.gov/rdf/trans/airportClass
http://cegis.usgs.gov/rdf/trans/gnis/id
http://cegis.usgs.gov/rdf/trans/stCoFIPSCode
http://cegis.usgs.gov/rdf/trans/shapeLength
http://cegis.usgs.gov/rdf/trans/roadClass
http://cegis.usgs.gov/rdf/trans/interstate
http://cegis.usgs.gov/rdf/trans/fullStreetName
Type in ‘airport’

List of airports

Spatial results
Click on Karmy’s Airport to select it, Choose Buffer, See result
A query with two features

Find the county Karmy’s Airport is in
Find the county Karmy’s Airport is in Wiegand
Wiegand

Feature 1: All Feature 1
http://cegis.usgs.gov/rdf/gu/countyOrEquivalent
http://www.w3.org/2000/01/rdf-schema#label

Search Results: +/-
(Click to select: Double-click for attributes)
1. Staunton
2. Hampshire
3. Hardy
4. Washington
5. Clarke
6. Albemarle
7. Warren
8. Rappahannock
9. Shenandoah
10. Highland
11. Pendleton
12. Jefferson
13. Nelson
14. Page
15. Harrisonburg
16. Waynesboro
17. Madison
18. Rockingham
19. Loudoun
20. Greene
21. Frederick
22. Fauquier
23. Augusta
For Feature 2, Find Karmy’s Airport

Typing just ‘Kar’ in the text box finds Karmy’s Airport
Choose SF:Contains to get county containing Karmy’s Airport

Shenandoah is listed and turns a different color on the map
GeoSPARQL Query

Find the county name for Karmy’s airport:

SELECT  ?countyName
WHERE    {
?county  rdf:type   cegis:countyOrEquivalent .
?county  rdfs:label  ?countyName .

?airport  rdf:type   cegis:airportPoint .
?airport  rdfs:label “Karmy’s Airport” .
?airport  hasGeometry  ?airportGeometry .

FILTER (geof:sfContains(?countyWKT, ?airportWKT))   .
}
A feature can have multiple geometries with this model.
Summary: GeoQuery Tool

- Allows easy querying over the Web for spatial data in RDF format because SPARQL/GeoSPARQL syntax is avoided.
Land Use Code Demo

http://www.ssec.wisc.edu/landuse/main

With much appreciation to Tommy Jasmin (SSEC)!
(who helped REU students Alec Anderson and Coda Phillips)
Residential Code

Group Quarters

Areas

- All
- Bay Lakes RPC
- Eau Claire County
- Madison(city)
- SEWRPC
- Dane County
- ECWRPC
- NCWRPC

Run Query

Results

Bay Lakes RPC [170]: Group Quarters
Dane County [129]: Group Quarters
Eau Claire County [R]: Residential, superclass of Group Quarters
ECWRPC [942]: Group Quarters
Madison(city) [12]: Group Quarters
NCWRPC [5]: Residential, superclass of Group Quarters
SEWRPC [662]: Regional Group Quarters, subclass of Group Quarters
SEWRPC [661]: Local Group Quarters, subclass of Group Quarters
Thank you!

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