



GeoSPARQL

7th tutorial

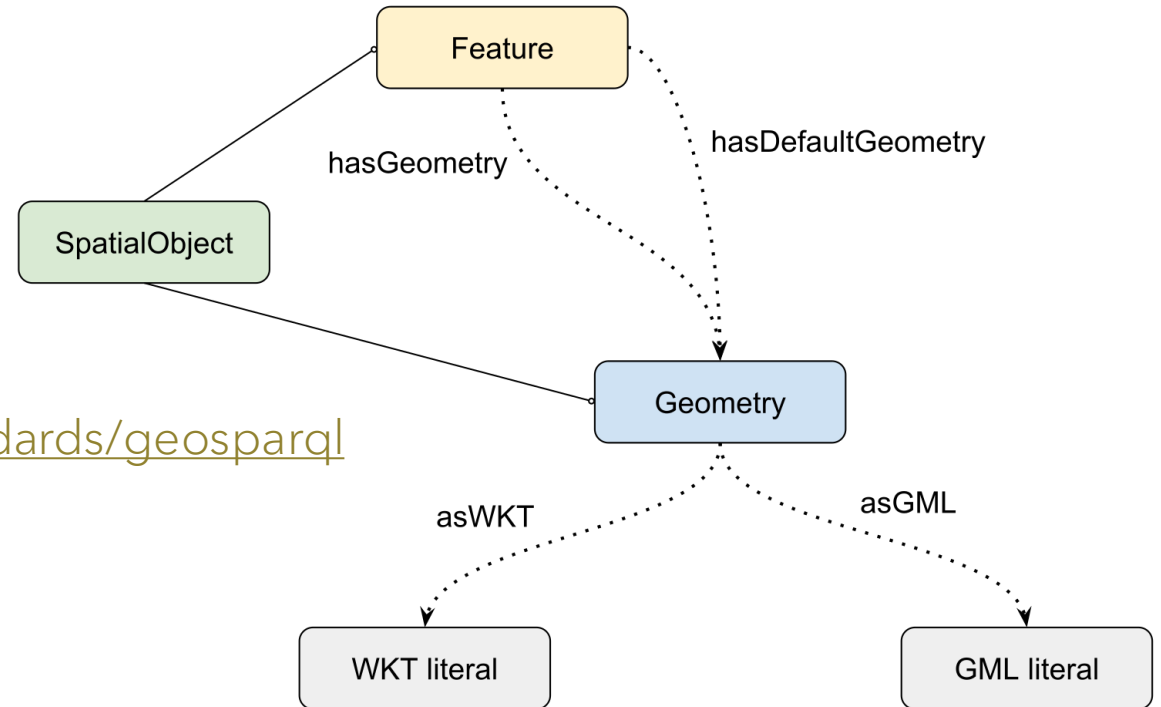
Ontologies and Semantic Web

Michal Med

michal.med@fel.cvut.cz

GeoSPARQL

- Ontology
- query language
- OGC Standard - <https://www.ogc.org/standards/geosparql>



- Support in GraphDB

<https://graphdb.ontotext.com/documentation/10.4/geosparql-support.html>

Setup

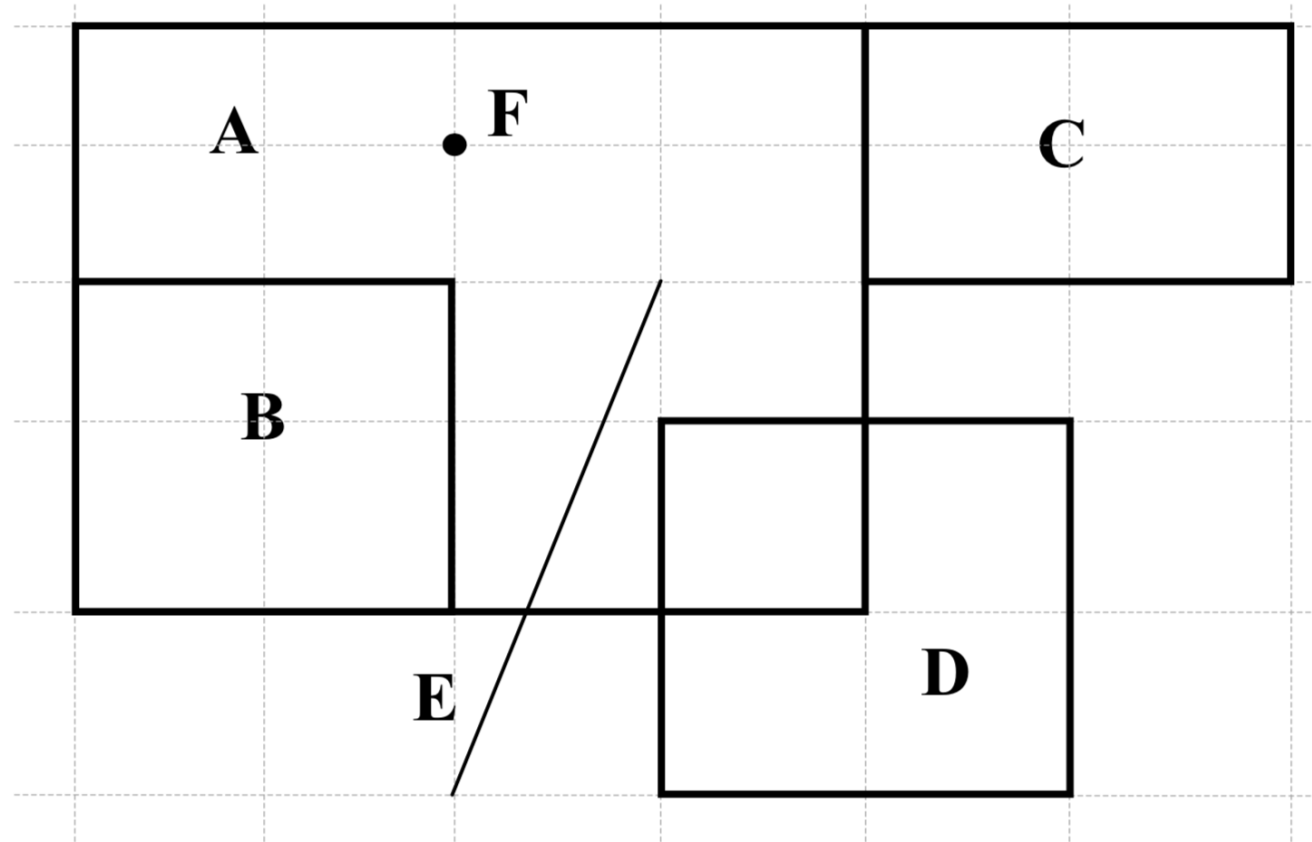
- To enable GeoSPARQL plugin, run

```
PREFIX geosparql: <http://www.ontotext.com/plugins/geosparql#>
```

```
INSERT DATA {  
  [] geosparql:enabled "true" .  
}
```

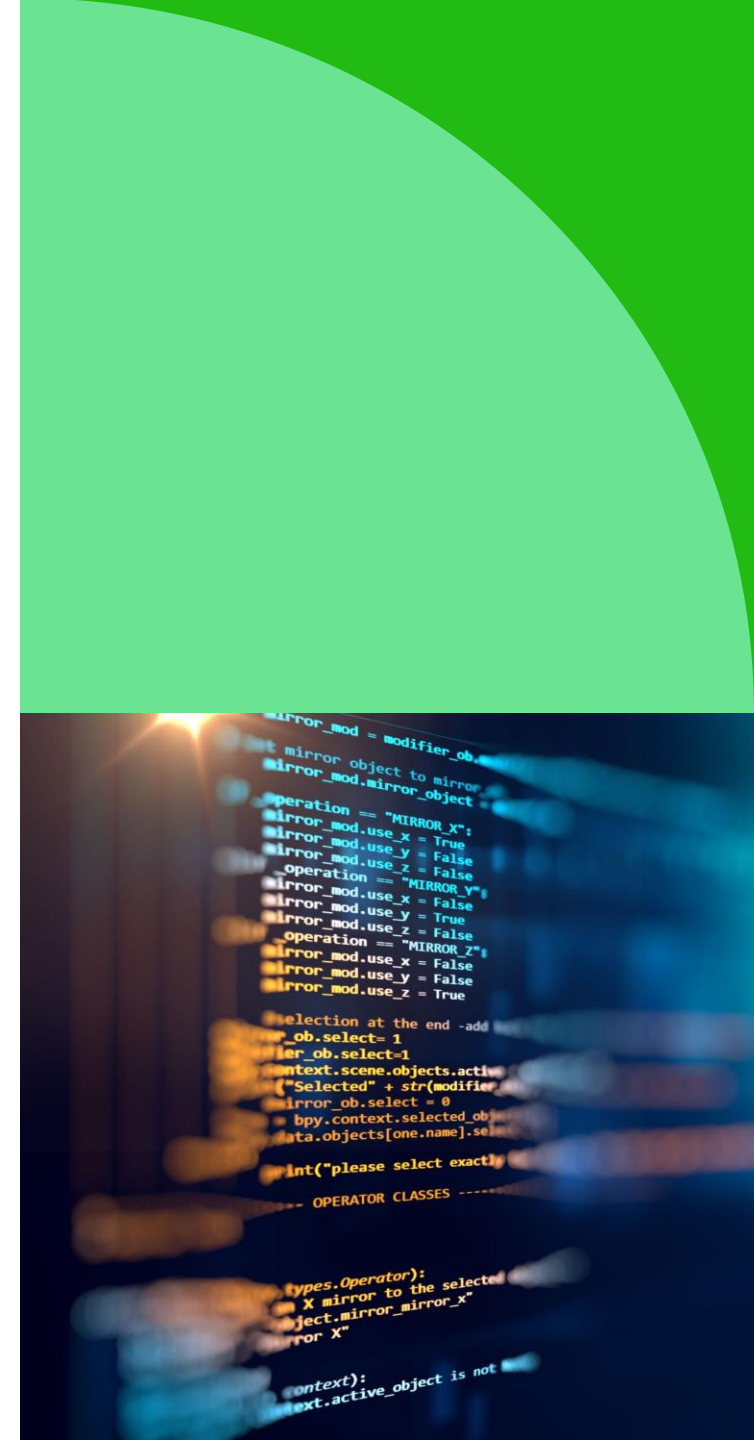
Quick overview

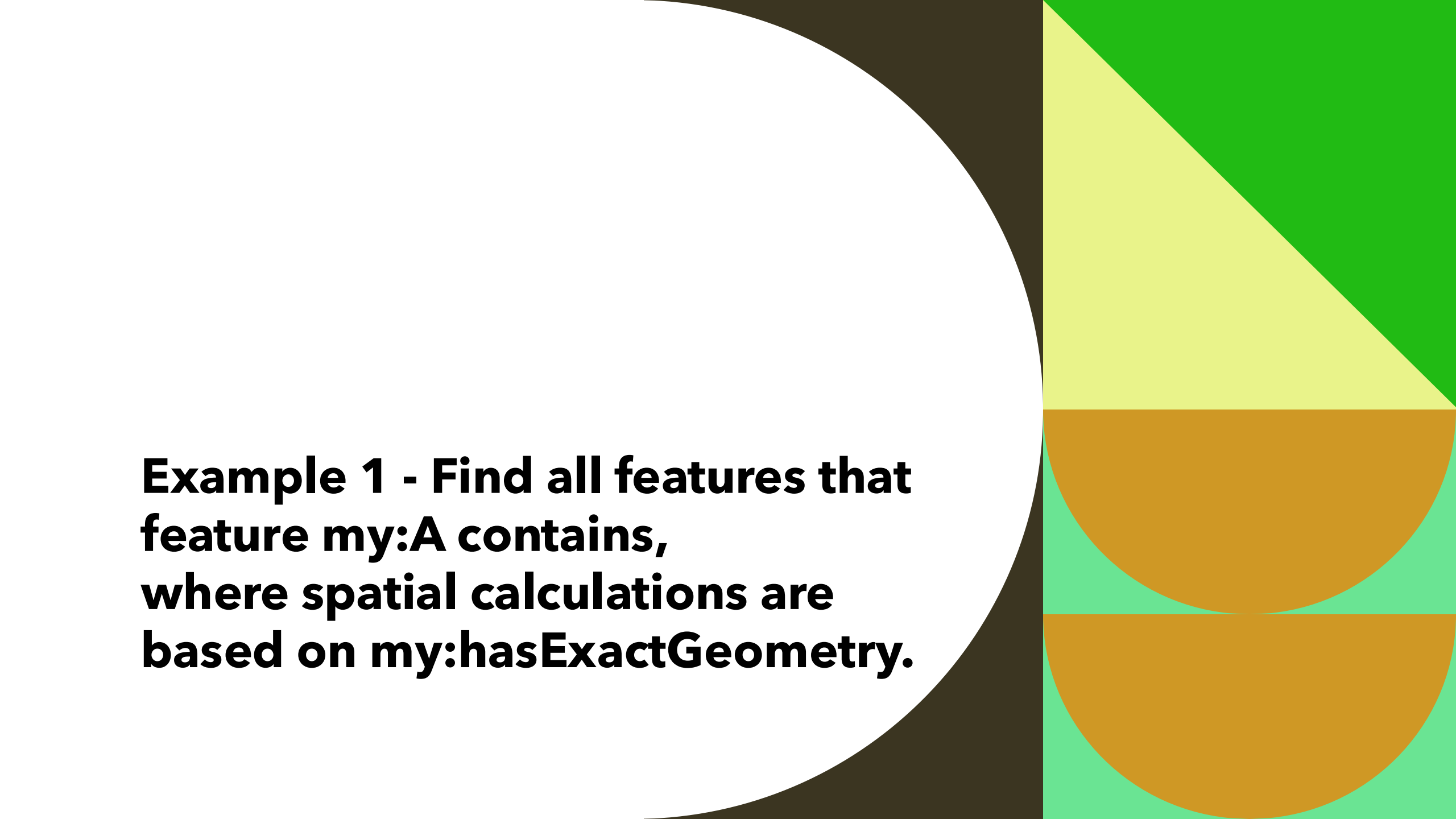
- Download data from <https://graphdb.ontotext.com/documentation/10.4/downloads/d10860b42c7c39e3d05ef397f5756ca1/geosparql-example.rdf> and import them into GraphDB into the named graph



Quick overview - functions examples

Following examples are taken from <https://graphdb.ontotext.com/documentation/standard/geosparql-support.html#geosparql-examples>





Example 1 - Find all features that feature my:A contains, where spatial calculations are based on my:hasExactGeometry.

1 - solution using a function

PREFIX my: <http://example.org/ApplicationSchema#>

PREFIX geo: <http://www.opengis.net/ont/geosparql#>

PREFIX geof: <http://www.opengis.net/def/function/geosparql/>

SELECT ?f

WHERE {

my:A my:hasExactGeometry ?aGeom .

?aGeom geo:asWKT ?aWKT .

?f my:hasExactGeometry ?fGeom .

?fGeom geo:asWKT ?fWKT .

FILTER (geof:sfContains(?aWKT, ?fWKT) && !sameTerm(?aGeom, ?fGeom))

}

1 - solution using a predicate

PREFIX my: <http://example.org/ApplicationSchema#>

PREFIX geo: <http://www.opengis.net/ont/geosparql#>

PREFIX geof: <http://www.opengis.net/def/function/geosparql/>

SELECT ?f

WHERE {


my:A my:hasExactGeometry ?aGeom .

?f my:hasExactGeometry ?fGeom .

?aGeom geo:sfContains ?fGeom .

FILTER (!sameTerm(?aGeom, ?fGeom))

}



Example 2 - Find all features that touch the union of feature my:A and feature my:D, where computations are based on my:hasExactGeometry.

2 - solution using a function

PREFIX my: <http://example.org/ApplicationSchema#>

PREFIX geo: <http://www.opengis.net/ont/geosparql#>

PREFIX geof: <http://www.opengis.net/def/function/geosparql/>

SELECT ?f

WHERE {

 ?f my:hasExactGeometry ?fGeom .

 ?fGeom geo:asWKT ?fWKT .

 my:A my:hasExactGeometry ?aGeom .

 ?aGeom geo:asWKT ?aWKT .

 my:D my:hasExactGeometry ?dGeom .

 ?dGeom geo:asWKT ?dWKT .

 FILTER (geof:sfTouches(?fWKT, geof:union(?aWKT, ?dWKT)))

}

2 - solution using a predicate

PREFIX my: <http://example.org/ApplicationSchema#>

PREFIX geo: <http://www.opengis.net/ont/geosparql#>

PREFIX geof: <http://www.opengis.net/def/function/geosparql/>

SELECT ?f

WHERE {

?f my:hasExactGeometry ?fGeom .

?fGeom geo:asWKT ?fWKT .

my:A my:hasExactGeometry ?aGeom .

?aGeom geo:asWKT ?aWKT .

my:D my:hasExactGeometry ?dGeom .

?dGeom geo:asWKT ?dWKT .

BIND(geof:union(?aWKT, ?dWKT) AS ?union) .

?fGeom geo:sfTouches ?union

}

Using GeoSPARQL with real world data



Using geometry in query



Download data for the lecture
from https://cw.fel.cvut.cz/wiki/_media/courses/b4m36osw/tut7.zip



Import zchu.ttl and zchu-schema.ttl into GraphDB

Topology errors

- To ignore topology errors while importing data, run

```
PREFIX geosparql: <http://www.ontotext.com/plugins/geosparql#>
```

```
INSERT DATA {  
  [] geosparql:ignoreErrors "true" .  
}
```

**Find out if there is any
protected area(s) on
specific coordinates
and return its name
and category**

14.7038 48.6663

PREFIX geo: <<http://www.opengis.net/ont/geosparql#>>

PREFIX geof: <<http://www.opengis.net/def/function/geosparql/>>

PREFIX skos: <<http://www.w3.org/2004/02/skos/core#>>

prefix zchu: <<http://osw.felk.cvut.cz/medmicha/zvláště-chráněná-území/>>

prefix zchu-s: <<http://osw.felk.cvut.cz/medmicha/ontologies/zvláště-chráněná-území/>>

SELECT ?nazev ?typNazev

WHERE {

 ?f zchu-s:má-polohu ?fGeom ;

 zchu-s:má-název ?nazev ;

 a ?typ .

 ?typ skos:prefLabel ?typNazev .

 ?fGeom geo:asWKT ?fWKT .

 FILTER (geof:sfWithin('"<<http://www.opengis.net/def/crs/OGC/1.3/CRS84>> POINT (14.7038
48.6663)'"^^geo:wktLiteral, ?fWKT))

}

A wide-angle photograph of a coastal dune landscape. In the foreground, a wooden boardwalk made of light-colored planks curves from the bottom center towards the middle ground. The boardwalk is flanked by tall, green grasses. In the background, there are rolling sand dunes with patches of green vegetation and some exposed sand. The sky is overcast with grey clouds. The text is overlaid in the center of the image.

Which especially protected areas lies on the route in file route.wkt? Divide it into segments per each protected area.

Steps

- Save geometry into repository (use snippet or INSERT keyword) - only for better visualization of query
- Find protected areas crossing with the route
- Return all points common for route and every single protected area (intersection)



```
SELECT ?zchu ?label
WHERE {
  my:route geo:hasGeometry ?myGeom .
  ?myGeom geo:asWKT ?wkt .
  ?zchu zchu-s:má-polohu ?geom ;
    zchu-s:má-název ?label .
  ?geom geo:asWKT ?zWKT .
  FILTER (geof:sfCrosses(?wkt, ?zWKT))
}
```

Returns IDs and labels of protected areas crossed by route

My:route is artificial feature with saved geometry form route.wkt file

```
SELECT ?zchu ?název ?intersection
WHERE {
  my:route geo:hasGeometry ?myGeom .
  ?myGeom geo:asWKT ?wkt .
  ?zchu zchu-s:má-polohu ?poloha ;
    zchu-s:má-název ?název .
  ?poloha geo:asWKT ?zWKT .
  FILTER (geof:sfCrosses(?wkt, ?zWKT)) .
  BIND(geof:intersection(?zWKT, ?wkt) AS ?intersection) .
}
```

Returns geometries
of both protected
area and route

For visualization try WKT playground

- <https://clydedacruz.github.io/openstreetmap-wkt-playground/>
- Some lines are not properly visualized - WHY?