

B4M36OSW – Short Test 1

12. 11. 2020

Name:

Score: / 5

Download the input data from Files/Tests/Data/2020-11-12/input-data.ttl and import them to your GraphDB repository. Version shown here has shortend coordinates and lowered precision:

```
@prefix geo: <http://www.opengis.net/ont/geosparql#> .
@prefix rdfs: <http://www.w3.org/2000/01/rdf-schema#> .
@prefix ex: <http://onto.fel.cvut.cz/ontologies/test/2020-11-12/> .
@prefix skos: <http://www.w3.org/2004/02/skos/core#> .
@prefix sf: <http://www.opengis.net/ont/sf#> .
```

```
ex:Prague a geo:Feature ;
    skos:prefLabel "Prague"@en, "Praha"@cs;
    geo:hasGeometry ex:PraguePolygon, ex:PragueReferencePoint .
```

```
ex:PraguePolygon a sf:Polygon, geo:Geometry ;
    rdfs:label "Geometrie Prahy vyjádřená polygonem" ;
    geo:asWKT "<http://www.opengis.net/def/crs/OGC/1.3/CRS84>
        POLYGON((14.22 50.10, ... ,
        14.31 50.11, 14.31 50.13,
        14.22 50.10))"^^geo:wktLiteral .
```

```
ex:PragueReferencePoint a sf:Point, geo:Geometry ;
    rdfs:label "Geometrie definičního bodu Prahy" ;
    geo:asWKT "<http://www.opengis.net/def/crs/OGC/1.3/CRS84>
        POINT(14.448 50.079)"^^geo:wktLiteral .
```

```
ex:Brno a geo:Feature ;
    skos:prefLabel "Brno"@cs;
    geo:hasGeometry ex:BrnoReferencePoint .
```

```
ex:BrnoReferencePoint a sf:Point, geo:Geometry ;
    rdfs:label "Geometrie definičního bodu Brna" ;
    geo:asWKT "<http://www.opengis.net/def/crs/OGC/1.3/CRS84>
        POINT(16.610 49.198)"^^geo:wktLiteral .
```

1. (2 points) Use GeoSPARQL (do not forget to enable GeoSPARQL plugin in GraphDB) to compute the distance between Prague and Brno in kilometers. Use point geometry of each feature.

Solution:

```
PREFIX geo: <http://www.opengis.net/ont/geosparql#>
PREFIX geof: <http://www.opengis.net/def/function/geosparql/>
PREFIX my: <http://example.org/ApplicationSchema#>
PREFIX ex: <http://onto.fel.cvut.cz/ontologies/test/2020-11-12/>
PREFIX uom: <http://www.opengis.net/def/uom/OGC/1.0/>

SELECT ?d
WHERE {
  ex:BrnoReferencePoint geo:asWKT ?brnoPointWkt .
  ex:PragueReferencePoint geo:asWKT ?prahaPointWkt .
  BIND(geof:distance(?brnoPointWkt, ?prahaPointWkt, uom:metre) as ?d)
}
```

2. (2 points) Write a SHACL constraints to validate GeoSPARQL ontology rules. Include shape constraints to validate geo:Feature and geo:Geometry, while:

- geo:Feature must have at least one geo:hasGeometry property and its value must have geo:Geometry type,
- geo:Geometry must have at least one geo:asWKT property with geo:wktLiteral datatype.

Validate input data in <https://shacl.org/playground/> against your SHACL, it shall pass.

Solution:

```
@prefix sh: <http://www.w3.org/ns/shacl#> .
@prefix geo: <http://www.opengis.net/ont/geosparql#> .

geo:FeatureShape
  a sh:NodeShape ;
  sh:targetClass geo:Feature ;
  sh:property [
    sh:path geo:hasGeometry ;
    sh:minCount 1;
    sh:value geo:Geometry ;
  ] .

geo:GeometryShape
  a sh:NodeShape ;
  sh:targetClass geo:Geometry;
  sh:property [
    sh:path geo:asWKT;
    sh:datatype geo:wktLiteral ;
    sh:minCount 1;
  ] .
```

3. (1 point) Download data from Files/Tests/Data/2020-11-12/gml-example.ttl. They are very similar to the original data, only ex:BrnoReferencePoint has now geo:asGML property with

value of type `geo:gmlLiteral`. Validate it against SHACL you have created in previous task. It shall not pass, because `geo:Geometry` must have `geo:asWKT` with `geo:wktLiteral`.

Rewrite the SHACL to make it pass:

- `geo:Geometry` must have either `geo:asWKT` property with value of type `geo:wktLiteral`, or `geo:asGML` property with value of type `geo:gmlLiteral`.

HINT: look at the `sh:or` property in SHACL.

Solution:

```
@prefix sh: <http://www.w3.org/ns/shacl#> .
@prefix geo: <http://www.opengis.net/ont/geosparql#> .

geo:FeatureShape
  a sh:NodeShape ;
  sh:targetClass geo:Feature ;
  sh:property [
    sh:path geo:hasGeometry ;
    sh:minCount 1;
    sh:value geo:Geometry ;
  ] .

geo:GeometryShape
  a sh:NodeShape ;
  sh:targetClass geo:Geometry;
  sh:or ([
    sh:property [
      sh:path geo:asWKT;
      sh:datatype geo:wktLiteral ;
      sh:minCount 1;
    ] [
      sh:property [
        sh:path geo:asGML;
        sh:datatype geo:gmlLiteral ;
        sh:minCount 1;
      ]
    ]
  ]) .
```