

NATIONAL AND KAPODISTRIAN UNIVERSITY OF ATHENS



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Abstract

The document contains the questions and the returned results. The results are reported if only they were computed in a logical time interval (from 1minute to 1hour). If the result took longer to compute the result is not reported. Moreover, the queries for each question are included in the document *stSparql_queries.txt*. Finally, in most of the queries the results are sampled by using the *LIMIT* operator. Due to long computational time the results were sampled by returning only a small number of them (i.e. 5 or 10 rows).

[Exercise 1]

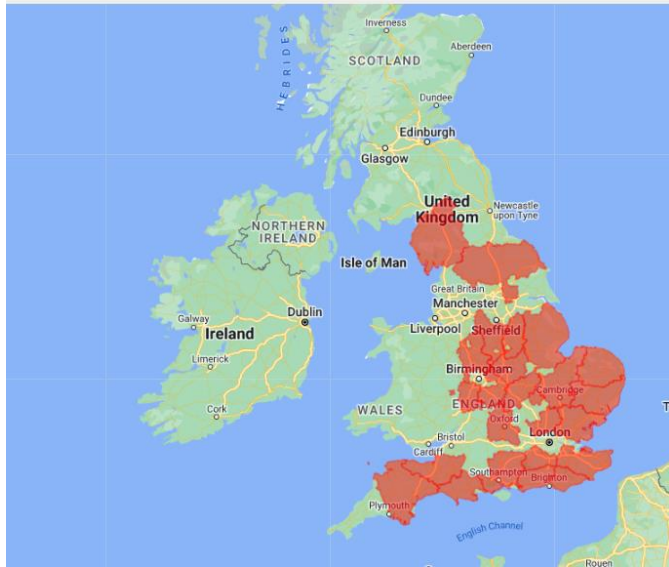
[Question a]

Find name and geometries of the administrative units having United Kingdom as an upper-level unit.



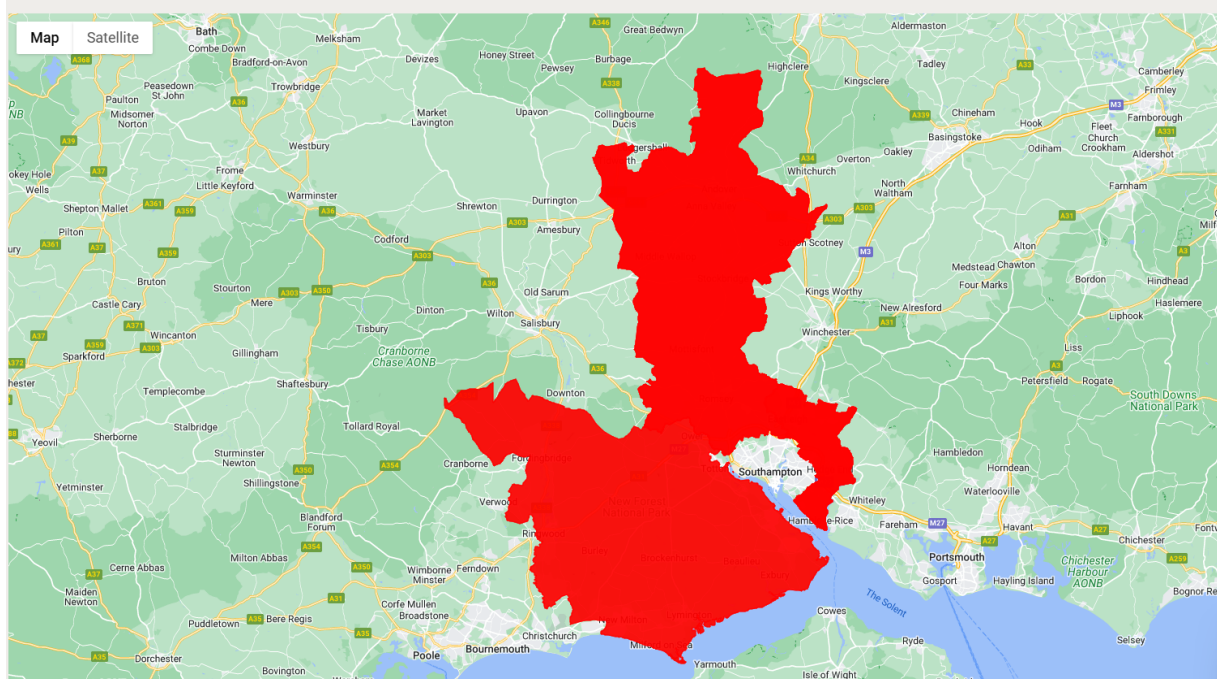
[Question b]

Find geometries and names of all the administrative counties of England.



[Question c]

Find names of all the administrative units that are neighbors of Southampton.



[Question d]

Compute the total area of all counties of Ireland.

```

myarea
"9.321064781963573"^^<http://www.w3.org/2001/XMLSchema#double>

```

[Question e]

Compute the minimum bounding box of the geometry of Ireland.

Option 1 | Using the strdf:extent command.

```

minbbox
"POLYGON ((-10.662837999999965 51.419913000000065,
-10.662837999999965 55.435136000000006, -5.994503 3999999893
55.435136000000006, -5.994503999999893 51.419913000000065,
-10.662837999999965 51.419913000000065))"^^<http://strdf.di.uoa.gr/ontology#WKT>
less

```

Option 2 | Using the strdf:envelope command.

```

minbbox
"POLYGON ((-10.662837999999965 51.419913000000065,
-10.662837999999965 55.435136000000006, -5.994503 3999999893
55.435136000000006, -5.994503999999893 51.419913000000065,
-10.662837999999965
51.419913000000065))"^^<http://strdf.di.uoa.gr/ontology#WKT>
less

```

[Question f]

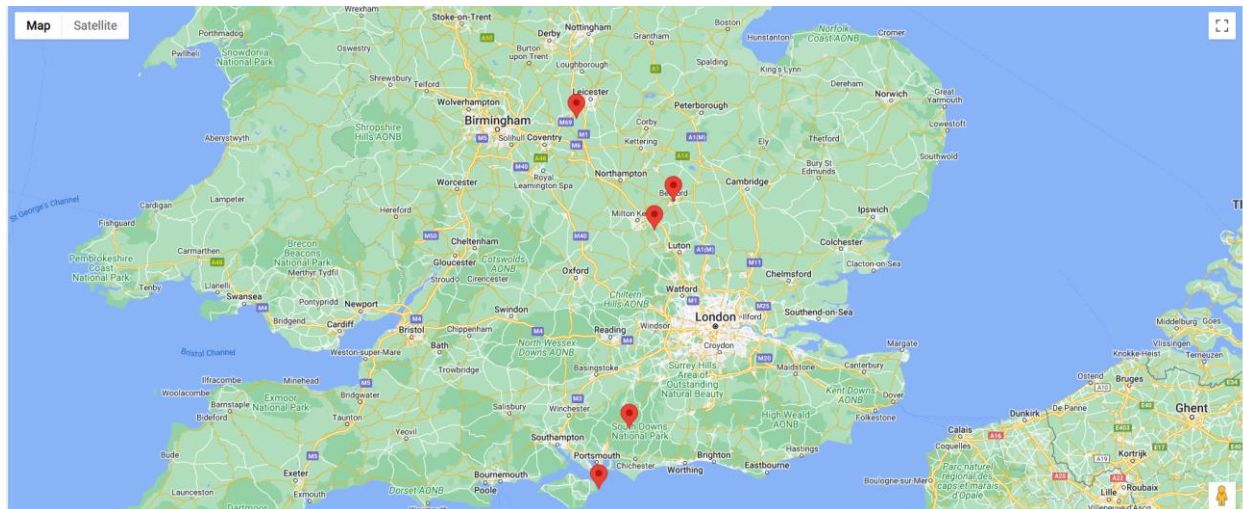
Find administrative units that are on the border of England.

targetName	type	inBoundary
"Blackpool"^^<http://www.w3.org/2001/XMLSchema#string>	"NA"^^<http://www.w3.org/2001/XMLSchema#string>	"true"^^<http://www.w3.org/2001/XMLSchema#boolean>

[Exercise 2]

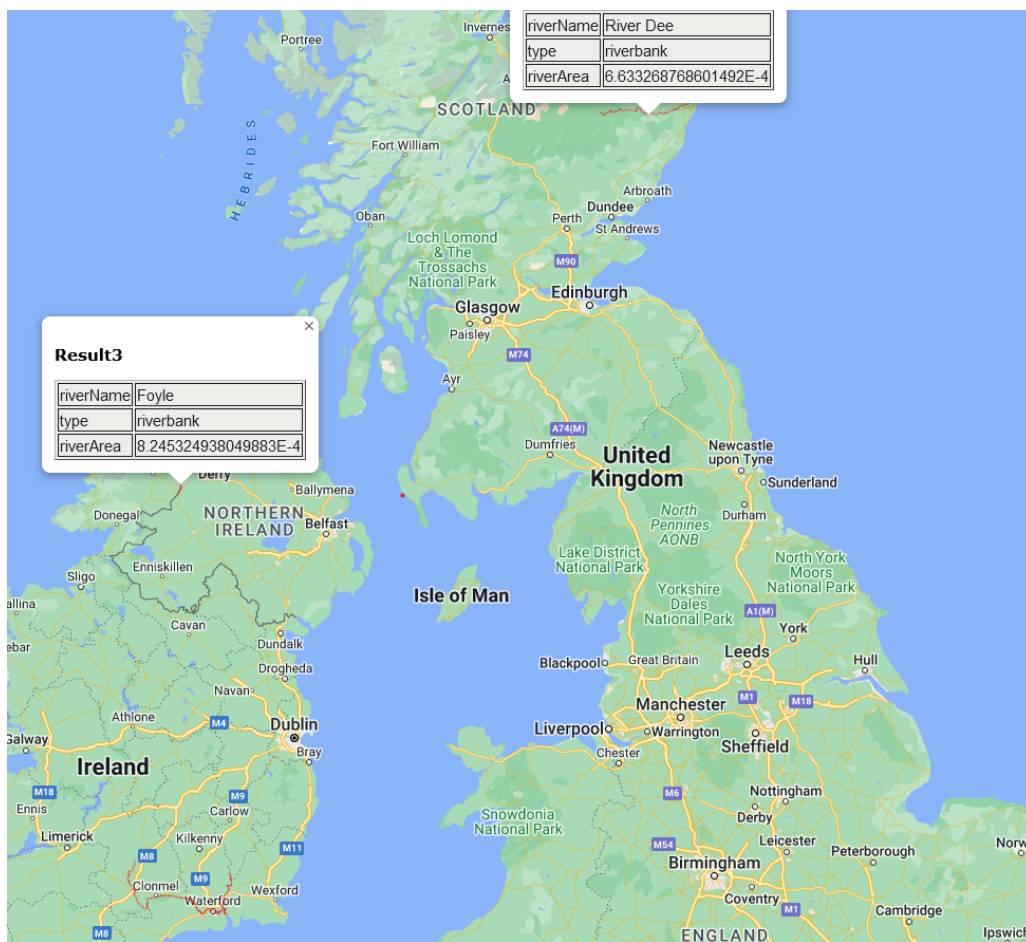
[Question a]

Find all hotels and show them on the map.



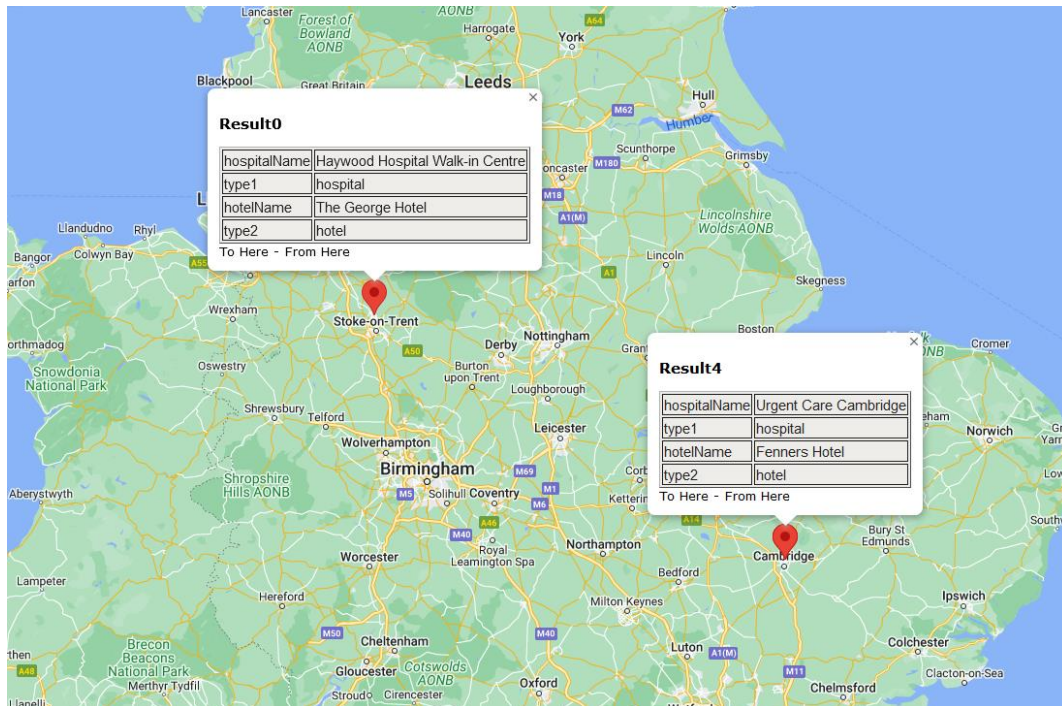
[Question b]

Find the longest five rivers and show them on a map.



[Question c]

Find all hospitals that are within 3 kilometers of a hotel.



[Question d]

Find all the libraries that are in 2-kilometer radius of a university.

univName	libName
"St Bartholomew's and the Royal London School of Medicine and Dentistry"^^<http://www.w3.org/2001/XMLSchema#string>	"Holborn Library"^^<http://www.w3.org/2001/XMLSchema#string>
"The Courtauld Institute of Art"^^<http://www.w3.org/2001/XMLSchema#string>	"Holborn Library"^^<http://www.w3.org/2001/XMLSchema#string>
"University of the Arts London"^^<http://www.w3.org/2001/XMLSchema#string>	"Holborn Library"^^<http://www.w3.org/2001/XMLSchema#string>
"University of Chicago Booth School of Business"^^<http://www.w3.org/2001/XMLSchema#string>	"Holborn Library"^^<http://www.w3.org/2001/XMLSchema#string>
"UCL Centre for Medical Image Computing"^^<http://www.w3.org/2001/XMLSchema#string>	"Holborn Library"^^<http://www.w3.org/2001/XMLSchema#string>

[Exercise 3]

[Question a]

Which river crosses London?

(LIMIT applied)

"River Lea"^^<http://www.w3.org/2001/XMLSchema#string>

"River Wandle"^^<http://www.w3.org/2001/XMLSchema#string>

"Denham Marina"^^<http://www.w3.org/2001/XMLSchema#string>
"River Crane"^^<http://www.w3.org/2001/XMLSchema#string>

[Question b]

Find all counties of London that have a theatre.

territory	admin_names	type	theatreNames
"Greater London"^^<http://www.w3.org/2001/XMLSchema#string> "Greater London"^^<http://www.w3.org/2001/XMLSchema#string>	"Sutton"^^<http://www.w3.org/2001/XMLSchema#string> "Ealing"^^<http://www.w3.org/2001/XMLSchema#string>	"theatre"^^<http://www.w3.org/2001/XMLSchema#string> "theatre"^^<http://www.w3.org/2001/XMLSchema#string>	"Charles Crier Studio Theatre" "Questors Theatre,Performance Centre" "Piccadilly Comedy Club,Charing Cross Theatre,Comedy Store,The Puppet Theatre,Barge,Leicester Squar re Theatre,The Susie Sainsbury Theatre,Canal Cafe Theatre,Boulevard Theatre,@shopplace,Peacock Theatre,Rogent's Park Open Air Theatre,Lyceum Theatre,Royal Opera House,London Palladium,Fortune Theatre,Theatre Royal, Drury Lane,The Vaudeville Theatre,Playhouse Theatre,London Coliseum,Victoria Palace Theatre,Wyndham's,Trafalgar Studios,Her Majesty's Theatre,NoA(Axi Coward Theatre,Apollo Theatre,Criterion,Duke of York's,Garrick,Gielgud Theatre,Jermyn Street Theatre,Lyric Theatre,Palace Theatre,Piccadilly Theatre,Prince Edward Theatre,Prince of Wales Theatre,Sondheim Theatre,Soho Theatre,Victoria Embankment Open Air Theatre,Wigmore Hall,Aldwych Theatre,Theatre Royal Haymarket,London Hippodrome,Arts Theatre,Amphitheatre,Duchess Theatre,Apollo Victoria Theatre,Harold Pinter Theatre,Adelphi Theatre,Novello Royal Albert Hall,Amaryllis Fleming Concert Hall,Savoy Theatre,The Other Palace,The DukesAgA&A's Hall,David Josefowitz Recital Hall,The Cockpit Theatre,Marylebone Theatre" less
"Greater London"^^<http://www.w3.org/2001/XMLSchema#string>	"City of Westminster"^^<http://www.w3.org/2001/XMLSchema#string>	"theatre"^^<http://www.w3.org/2001/XMLSchema#string>	"The Tabard Theatre" "White Bear Theatre Pub,The Hideaway,Stockwell Playhouse,Above The Stag Theatre,Waterloo East Theat re,Waterloo East Theatre,The Vaults (Launcelot St.),Dorfmann Theatre,Lyttelton Theatre,Closer Theatre,Streatham Space Project,Omnibus Theatre,Streatham Hill Theatre,Royal Festival Hall,The Old Vic,Queen Elizabeth Hall & Purcell Room,O2 Academy Brixton,The Young Vic, South London Theatre,Ovalhouse Theatre,The White House, Oval House Theatre" less
"Greater London"^^<http://www.w3.org/2001/XMLSchema#string>	"Hounslow"^^<http://www.w3.org/2001/XMLSchema#string>	"theatre"^^<http://www.w3.org/2001/XMLSchema#string>	
"Greater London"^^<http://www.w3.org/2001/XMLSchema#string>	"Lambeth"^^<http://www.w3.org/2001/XMLSchema#string>	"theatre"^^<http://www.w3.org/2001/XMLSchema#string>	

Please note that in Greater London no Counties were found.

territory	admin_names	level
"Greater London"^^<http://www.w3.org/2001/XMLSchema#string>	"NA"^^<http://www.w3.org/2001/XMLSchema#string>	"London borough"^^<http://www.w3.org/2001/XMLSchema#string>
"Greater London"^^<http://www.w3.org/2001/XMLSchema#string>	"Barking and Dagenham"^^<http://www.w3.org/2001/XMLSchema#string>	"London borough"^^<http://www.w3.org/2001/XMLSchema#string>
"Greater London"^^<http://www.w3.org/2001/XMLSchema#string>	"Barnet"^^<http://www.w3.org/2001/XMLSchema#string>	"London borough"^^<http://www.w3.org/2001/XMLSchema#string>
"Greater London"^^<http://www.w3.org/2001/XMLSchema#string>	"Bexley"^^<http://www.w3.org/2001/XMLSchema#string>	"London borough"^^<http://www.w3.org/2001/XMLSchema#string>
"Greater London"^^<http://www.w3.org/2001/XMLSchema#string>	"Brent"^^<http://www.w3.org/2001/XMLSchema#string>	"London borough"^^<http://www.w3.org/2001/XMLSchema#string>
"Greater London"^^<http://www.w3.org/2001/XMLSchema#string>	"Camden"^^<http://www.w3.org/2001/XMLSchema#string>	"London borough"^^<http://www.w3.org/2001/XMLSchema#string>
"Greater London"^^<http://www.w3.org/2001/XMLSchema#string>	"City of London"^^<http://www.w3.org/2001/XMLSchema#string>	"NA"^^<http://www.w3.org/2001/XMLSchema#string>
"Greater London"^^<http://www.w3.org/2001/XMLSchema#string>	"City of Westminster"^^<http://www.w3.org/2001/XMLSchema#string>	"NA"^^<http://www.w3.org/2001/XMLSchema#string>
"Greater London"^^<http://www.w3.org/2001/XMLSchema#string>	"Croydon"^^<http://www.w3.org/2001/XMLSchema#string>	"London borough"^^<http://www.w3.org/2001/XMLSchema#string>
"Greater London"^^<http://www.w3.org/2001/XMLSchema#string>	"Ealing"^^<http://www.w3.org/2001/XMLSchema#string>	"London borough"^^<http://www.w3.org/2001/XMLSchema#string>
"Greater London"^^<http://www.w3.org/2001/XMLSchema#string>	"Enfield"^^<http://www.w3.org/2001/XMLSchema#string>	"London borough"^^<http://www.w3.org/2001/XMLSchema#string>
"Greater London"^^<http://www.w3.org/2001/XMLSchema#string>	"Greenwich"^^<http://www.w3.org/2001/XMLSchema#string>	"London borough"^^<http://www.w3.org/2001/XMLSchema#string>
"Greater London"^^<http://www.w3.org/2001/XMLSchema#string>	"Hackney"^^<http://www.w3.org/2001/XMLSchema#string>	"London borough"^^<http://www.w3.org/2001/XMLSchema#string>
"Greater London"^^<http://www.w3.org/2001/XMLSchema#string>	"Hammersmith and Fulham"^^<http://www.w3.org/2001/XMLSchema#string>	"London borough"^^<http://www.w3.org/2001/XMLSchema#string>
"Greater London"^^<http://www.w3.org/2001/XMLSchema#string>	"Haringey"^^<http://www.w3.org/2001/XMLSchema#string>	"London borough"^^<http://www.w3.org/2001/XMLSchema#string>
"Greater London"^^<http://www.w3.org/2001/XMLSchema#string>	"Harrow"^^<http://www.w3.org/2001/XMLSchema#string>	"London borough"^^<http://www.w3.org/2001/XMLSchema#string>
"Greater London"^^<http://www.w3.org/2001/XMLSchema#string>	"Havering"^^<http://www.w3.org/2001/XMLSchema#string>	"London borough"^^<http://www.w3.org/2001/XMLSchema#string>
"Greater London"^^<http://www.w3.org/2001/XMLSchema#string>	"Hillingdon"^^<http://www.w3.org/2001/XMLSchema#string>	"NA"^^<http://www.w3.org/2001/XMLSchema#string>
"Greater London"^^<http://www.w3.org/2001/XMLSchema#string>	"Hounslow"^^<http://www.w3.org/2001/XMLSchema#string>	"London borough"^^<http://www.w3.org/2001/XMLSchema#string>
"Greater London"^^<http://www.w3.org/2001/XMLSchema#string>	"Islington"^^<http://www.w3.org/2001/XMLSchema#string>	"London borough"^^<http://www.w3.org/2001/XMLSchema#string>
"Greater London"^^<http://www.w3.org/2001/XMLSchema#string>	"Kensington and Chelsea"^^<http://www.w3.org/2001/XMLSchema#string>	"NA"^^<http://www.w3.org/2001/XMLSchema#string>
"Greater London"^^<http://www.w3.org/2001/XMLSchema#string>	"Lambeth"^^<http://www.w3.org/2001/XMLSchema#string>	"NA"^^<http://www.w3.org/2001/XMLSchema#string>
"Greater London"^^<http://www.w3.org/2001/XMLSchema#string>	"Lewisham"^^<http://www.w3.org/2001/XMLSchema#string>	"London borough"^^<http://www.w3.org/2001/XMLSchema#string>
"Greater London"^^<http://www.w3.org/2001/XMLSchema#string>	"Merton"^^<http://www.w3.org/2001/XMLSchema#string>	"NA"^^<http://www.w3.org/2001/XMLSchema#string>
"Greater London"^^<http://www.w3.org/2001/XMLSchema#string>	"Newham"^^<http://www.w3.org/2001/XMLSchema#string>	"London borough"^^<http://www.w3.org/2001/XMLSchema#string>
"Greater London"^^<http://www.w3.org/2001/XMLSchema#string>	"Redbridge"^^<http://www.w3.org/2001/XMLSchema#string>	"London borough"^^<http://www.w3.org/2001/XMLSchema#string>
"Greater London"^^<http://www.w3.org/2001/XMLSchema#string>	"Richmond upon Thames"^^<http://www.w3.org/2001/XMLSchema#string>	"London borough"^^<http://www.w3.org/2001/XMLSchema#string>
"Greater London"^^<http://www.w3.org/2001/XMLSchema#string>	"Sutton"^^<http://www.w3.org/2001/XMLSchema#string>	"London borough"^^<http://www.w3.org/2001/XMLSchema#string>
"Greater London"^^<http://www.w3.org/2001/XMLSchema#string>	"Tower Hamlets"^^<http://www.w3.org/2001/XMLSchema#string>	"NA"^^<http://www.w3.org/2001/XMLSchema#string>
"Greater London"^^<http://www.w3.org/2001/XMLSchema#string>	"Waltham Forest"^^<http://www.w3.org/2001/XMLSchema#string>	"London borough"^^<http://www.w3.org/2001/XMLSchema#string>
"Greater London"^^<http://www.w3.org/2001/XMLSchema#string>	"Wandsworth"^^<http://www.w3.org/2001/XMLSchema#string>	"NA"^^<http://www.w3.org/2001/XMLSchema#string>

[Question c]

Find all parks that have a museum inside.

parkName	museumNames
"Water Tower Gardens"^^<http://www.w3.org/2001/XMLSchema#string>	"Water Tower"
"Walpole Park"^^<http://www.w3.org/2001/XMLSchema#string>	"Pitzhanger Manor House and Gallery"
"West Park"^^<http://www.w3.org/2001/XMLSchema#string>	"West Park Museum, West Park Conservatory"
"Temple Newsam Estate"^^<http://www.w3.org/2001/XMLSchema#string>	"Colton Medieval Village, Temple Newsam House"
"Calke Park (National Trust)"^^<http://www.w3.org/2001/XMLSchema#string>	"Calke Abbey"

[Question d]

Find all rivers in the region of Scotland that are entirely contained in a single administrative unit of Scotland.

The query is reported in the *stSparql_queries.txt*, however due to long computation time (> 1 hour) querying over 508 rivers and the ~20 units of Scotland no results are included.

[Question e]

Find all rivers that cross at least two administrative units of England.

The query is reported in the *stSparql_queries.txt*, however due to long computation time (> 1 hour) querying over 508 rivers and the ~50 units of England no results are included.

I have also tried to query a single Unit and a single River that based on Google Maps the River crosses that unit. The pair I chose was the *River Avon* and the *Unit: Bath and North East Somerset*.

The query I tried is:

```

SELECT ?riverName ( COUNT(?unitName) as ?numberOfUnitsCrossed )
WHERE
{
  {
    SELECT DISTINCT ?unitName ?riverName
    WHERE
    {
      ?r osm:hasName ?riverName;
      osm:hasFclass "riverbank"^^xsd:string;
      geo:hasGeometry [ geo:asWKT ?polygonRiver ] .
      FILTER(str(?riverName)="River Avon"^^xsd:string) .

      ?s ai:hasNAME_1 ?capitalName;
      ai:hasNAME_3 ?unitName;
      ai:hasTYPE_3 ?unitType;
      geo:hasGeometry [ geo:asWKT ?polygonUnit ] .
    }
  }
}

```

```

    FILTER( str(?capitalName)="England"^^xsd:string && str(?unitName)="Bath and North East
Somerset"^^xsd:string ) .

```

```

    }
  } FILTER(strdf:intersects(?polygonRiver, ?polygonUnit) ) .

} GROUP BY ?riverName
HAVING (?numberOfUnitsCrossed = 1)

```

If I comment any expression of `FILTER(strdf:intersects(?polygonRiver, ?polygonUnit))` the query successfully returns the river name and the number 1 since only 1 river is selected. However, if I uncomment the above expression the correct result is returned after 1 hour for only one pair “River Avon”-“Bath”. Given this computational time and the resource, the query could not be executed for the whole dataset even after 5 hours of execution.

[Question f]

Is there any river that crosses at least two countries of the United Kingdom?

The query is reported in the *stSparql_queries.txt*, however due to long computation time (> 1 hour) querying over 508 rivers and the ~50 units of England no results are included.

[Question g]

Which city of Wales has most schools? Cardiff has the most schools.

unitName	totalSchools
"Cardiff"^^<http://www.w3.org/2001/XMLSchema#string>	"138"^^<http://www.w3.org/2001/XMLSchema#integer>
"Carmarthenshire"^^<http://www.w3.org/2001/XMLSchema#string>	"115"^^<http://www.w3.org/2001/XMLSchema#integer>
"Powys"^^<http://www.w3.org/2001/XMLSchema#string>	"113"^^<http://www.w3.org/2001/XMLSchema#integer>
"Rhondda Cynon Taf"^^<http://www.w3.org/2001/XMLSchema#string>	"113"^^<http://www.w3.org/2001/XMLSchema#integer>
"Caerphilly"^^<http://www.w3.org/2001/XMLSchema#string>	"85"^^<http://www.w3.org/2001/XMLSchema#integer>
"Flintshire"^^<http://www.w3.org/2001/XMLSchema#string>	"83"^^<http://www.w3.org/2001/XMLSchema#integer>
"Conwy"^^<http://www.w3.org/2001/XMLSchema#string>	"72"^^<http://www.w3.org/2001/XMLSchema#integer>
"Pembrokeshire"^^<http://www.w3.org/2001/XMLSchema#string>	"70"^^<http://www.w3.org/2001/XMLSchema#integer>
"Ceredigion"^^<http://www.w3.org/2001/XMLSchema#string>	"58"^^<http://www.w3.org/2001/XMLSchema#integer>
"Newport"^^<http://www.w3.org/2001/XMLSchema#string>	"50"^^<http://www.w3.org/2001/XMLSchema#integer>
"Isle of Anglesey"^^<http://www.w3.org/2001/XMLSchema#string>	"43"^^<http://www.w3.org/2001/XMLSchema#integer>
"Monmouthshire"^^<http://www.w3.org/2001/XMLSchema#string>	"42"^^<http://www.w3.org/2001/XMLSchema#integer>

[Question h]

Which district of Northern Ireland has most neighbouring districts?

Please note that for this question I have filtered the districts of Northern Island comparing each other with districts from Northern Ireland in UK. No district outside Northern Island was selected. Thus, the result below denotes that Magherafelt has 8 neighbor districts, meaning 8 neighbors from Northern Ireland.

sourceName	neighborDistrict
"Magherafelt"^^<http://www.w3.org/2001/XMLSchema#string>	"8"^^<http://www.w3.org/2001/XMLSchema#integer>

[Question i]

Which country has largest area covered by rivers, United Kingdom or Republic of Ireland?

The query is reported in the *stSparql_queries.txt*, however due to long computation time (> 1 hour) querying over 508 rivers and the more than 100 units in total for United Kingdom and Ireland and GC overhead limit exceed, the result couldn't be reported.

References

<https://www.w3.org/2015/spatial/wiki/images/2/20/Kyzirakos-stRDF-stSPARQL.pdf>

<https://event.cwi.nl/eswc2015-geo/03-stsparql-geosparql.pdf>

https://cgi.di.uoa.gr/~koubarak/publications/2021/GeoQA_updated_Arxiv.pdf

<https://defs.opengis.net/vocprez/object?uri=http%3A//www.opengis.net/def/function/geosparql/>