Experiment 2 b

Aim: Demo of SPARQL using SPARQLWrapper -is a simple Python wrapper around a SPARQL service to remotely execute your queries.

Theory:

SPARQL is the standard query language and protocol for Linked Open Data and RDF databases. Having been designed to query a great variety of data, it can efficiently extract information hidden in non-uniform data and stored in various formats and sources.
SPARQL has four types of queries. It can be used to:
ASK whether there is at least one match of the query pattern in the RDF graph data;
SELECT all or some of those matches in a tabular form (including aggregation, sampling and pagination through OFFSET and LIMIT);
CONSTRUCT an RDF graph by substituting the variables in these matches in a set of triple templates;
DESCRIBE the matches found by constructing a relevant RDF graph.

Querying DBpedia:

The DBpedia data set enables some astonishing queries against Wikipedia data to be answered. You can query the DBpedia data set online via a SPARQL endpoint (described on this page) and as Linked Data.

Public SPARQL Endpoint

A public SPARQL endpoint for querying the DBpedia data set is at http://dbpedia.org/sparql. OpenLink Virtuoso serves as both the back-end database SPARQL query engine and the front-end HTTP/SPARQL server with an nginx overlay primarily to cache results for each submitted query string.The public endpoint does NOT include all available DBpedia data sets. The Loaded Datasets subsection below provides a list of all DBpedia data sets currently loaded into the public SPARQL endpoint.

- You can run queries against DBpedia using:
- the OpenLink Interactive SPARQL Query Builder (iSPARQL) at http://dbpedia.org/isparql
- the SNORQL query explorer at http://dbpedia.org/snorql (does not work with Internet Explorer)
- any other SPARQL-aware client tool

SPARQLWrapper:

SPARQLWrapper is a simple Python wrapper around a SPARQL service to remotelly execute your queries. It helps in creating the query invokation and, possibly, convert the result into a more manageable format.

How to use

You can use SPARQLWrapper either as a Python command line script or as a Python package.
Command Line Script
To use as a command line script, you will need to install SPARQLWrapper and then a command line script called rqw (spaRQl Wrapper) will be available within the Python environment into which it is installed. run $ rql -h to see all the script's options.
Python package

ASK,SELECT,DESCRIBE like queries executed via SPARQLWrapper as a python package.

Steps:

Use jupyter notebook to implement SPARQL using RDF library in python .

Install RDF library and SPARQL Wrapper by below command

!pip install rdflib

!pip install SPARQLWrapper

from rdflib import Graph

from SPARQLWrapper import SPARQLWrapper,JSON,N3

from pprint import pprint

Sample execution of Musical Instruments Knowledge base of SPARQL in RDF using python language:

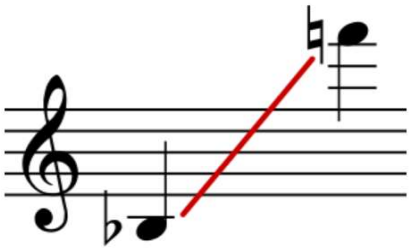
```
import io
from IPython.display import display
from io import BytesIO
from PIL import Image
import requests
sparql = SPARQLWrapper('https://dbpedia.org/sparql')
instruments = ['Trombone', 'Viola','Drum', 'Saxophone','Pan_flute']
for Musical_instrument in instruments:
    print('##########################################')
    sparql.setQuery(f'''
    SELECT ?name ?comment ?image
    WHERE {{ dbr:{Musical_instrument} rdfs:label ?name.
             dbr:{Musical_instrument} rdfs:comment ?comment.
             dbr:{Musical_instrument} dbo:thumbnail ?image.

        FILTER (lang(?name) = 'en')
        FILTER (lang(?comment) = 'en')
    }}''')

    sparql.setReturnFormat(JSON)
    qres = sparql.query().convert()
    result = qres['results']['bindings'][0]
    name, comment, image_url = result['name']['value'], result['comment']['value'], result['image']['value']
    print(name)
    response = requests.get(image_url)
    display(Image.open(BytesIO(response.content)))
    print(f'{comment}...')
```

Output:

```
##########################################
Trombone
```

```
The trombone (German: Posaune, Italian, French: trombone) is a musical instrument in the brass family. As with all brass instr
uments, sound is produced when the player's vibrating lips (embouchure) cause the air column inside the instrument to vibrate.
Most brass instruments use valves to alter the pitch, but trombones have a telescoping slide mechanism instead. Many modern tr
ombone models also have a valve attachment which lowers the pitch of the instrument. Variants such as the valve trombone and s
uperbone have three valves similar to those on the trumpet....
```

Saxophone



The saxophone is a type of single-reed woodwind instrument with a conical body, usually made of brass. As with all single-reed instruments, sound is produced when a reed on a mouthpiece vibrates to produce a sound wave inside the instrument's body. The pitch is controlled by opening and closing holes in the body to change the effective length of the tube. The holes are closed by leather pads attached to keys operated by the player. Saxophones are made in various sizes and are almost always treated as

References:

https://www.dbpedia.org/resources/sparql/
https://github.com/RDFLib/sparqlwrapper
https://www.ontotext.com/knowledgehub/fundamentals/what-is-sparql/