Semantic Web

(KEN3140)

Assignment 2:

SPARQL Protocol & RDF Query Language (SPARQL)

21-09-2022

Please read all sections of this document very carefully before attempting the assignment, asking questions and submitting

Learning Objectives

1. How to formulate basic and complex SPARQL queries with valid structure and syntax
2. How to identify and select the appropriate SPARQL features for including in a query, in order to answer a specific question
3. How to design triple and graph patterns to match criteria that a question or task requires
4. How to include new information in an RDF graph using SPARQL queries
5. How to identify, select and include appropriate SPARQL functions in SPARQL queries to filter entities according to their literal values
6. How to distinguish between asserted and inferred statements in RDF graphs using RDFS inference in conjunction with SPARQL queries

Assignment task description

This assignment will assess your competencies with formulating SPARQL queries in order to answer a series of questions about the content of a pre-prepared RDF graph of the University. The graph is provided in the file “assignment2_dataset.ttl” in Turtle syntax included along with your assignment materials.

Before you begin formulating your queries, it might be helpful to explore the graph in some way. You are free to do this in whichever way you prefer. At the very least, you can open “assignment2_dataset.ttl” in the text editor of your choice and examine the

triples. You can also generate a picture of the graph at the following link: http://www.ldf.fi/service/rdf-grapher

Tasks

Write valid SPARQL queries to:

1. List the top four oldest people in the graph from oldest to youngest

2. Identify the shortest student who has at least four classmates

3. List the teachers who have the highest salaries (in increasing order) and have at least five colleagues?

4. Give the mean (average) age of professors, both male and female, group by gender.

5. For each employee, calculate their "net salary"
Important notes:
Net Salary Calculation = Base salary - income tax (%4 of the base salary) - pension (%6 of the base salary)

6. List all people with their first name or family name starting with the letter F, E, or A

7. List all `dbe:Researcher` using inference

Requirements: your query should also returns subclasses of `dbe:Researcher`, such as PhD Candidates and AssistantResearcher, without directly using their URI (use the `rdfs:subClassOf` properties)

8. Create missing relations when `:isSupervisedBy` is defined in one direction but not `:supervises` in the other direction. For example, if john `:isSupervisedBy` mary, then we know that mary `:supervises` john

Requirements: you should use a CONSTRUCT query to build the missing triples

9. Count the number of men and women per `rdf:type` in the graph (aka. the `a` relation)

10. Write a federated query from wikidata for retrieving inception date of Arya Parker's college

How and where to record my answers?

You will write your SPARQL queries into the appropriate sections and output the results from execution of the queries in the provided file called: “assignment2_solutions.ipynb”.

Before submitting your file to Canvas, rename that to include your student ID and name. I.e., your submission files would be named: “assignment2_solutions_(your name)_(your studentID).ipynb”

Deadline & submission instructions

The deadline for your assignment is **Monday, 03 October 2022 at 23:59**. You should upload solutions file on the Canvas page of the course under Assignments

Grading criteria

We will assess the design of your SPARQL queries on a number of criteria directly related to the learning objectives of the assignment. I.e., we will assess to what extent you have demonstrated that you have achieved or mastered the learning objectives in the formulation of your SPARQL queries. The SPARQL queries you write must be executed correctly and return correct results.

Helpful resources

1. KEN3140 Lecture 4 & 5 slides (Canvas)
2. KEN3140 Lab 4 & 5 slides and materials (Canvas & Github)
3. SPARQL W3C specs

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