

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. You will also observe the effect of RDFS inference when used in conjunction with SPARQL queries.

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>

Make note of the information in the provided graph as well as the vocabularies it uses i.e., which vocabularies are used to specify the types, object properties and data properties in the graph.

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. Return the mean (average) age of male professors, and the mean age of female professors
5. For each employee, calculate their "net salary" Important notes:

Net Salary Calculation for Professor = Base salary - income tax (%4 of the base salary) - pension (%6 of the base salary)

Net Salary Calculation for other employees = Base salary - income tax (%4 of the base salary) - pension (%3 of the base salary)

6. List the number of all students and all teachers (show ?studentcount ?teachercount in your result)

Important notes: You will provide two queries for this task. One with inference and one without. Paste both queries below, one with inference toggled off and one with inference toggled on (the queries should be in separate cells).

7. List people who are both student and employee?

Hint: Use inference

8. Open-ended question! Write a meaningful question and its corresponding SPARQL query using at least a subquery and group by.

How and where to record my answers?

You will copy and paste your queries and results from execution of the queries into the appropriate sections 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>Assignment

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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