Semantic Web Project 2020

Phase 1. Develop a **web application in any language** you want to facilitate the search and recommendation of suitable electronic teaching and learning tools, in pandemic times. Each tool should have a description, a link towards the website from where you can download it, if it is a learning or a teaching tool, its category (presentation, assessment etc), if it is web-based or not , if it is free or not (and the price, if it is not free), the list of subjects where it can be used, the author.

Tasks:

1. Create input data for at least 20 tools in XML format. You could pick them from this website https://www.toptools4learning.com/. (1 point)
2. Create DTD/ XSD for your data. (1 point)
3. Read in memory the list of tools from your local XML file. (0.5 pts)
4. Create a form in which you allow users to propose a new learning/ teaching tool. Add the tool to your XML list (in memory) and save it to your local XML file or to a database. Pay attention to validation aspects. (1.5 pts)
5. Display on your web interface the list of tools from your local XML file/ database. First, read in memory this list and then display it using XSL. The teaching tools will have yellow background and the learning tools will have green background. (1 point)
6. Allow the user to see all the information for a specific tool. Use XPATH/ XQuery. (0.5 pts)
7. Provide the list of tools proposed in the last X days, where X is inserted by the user using XPATH/ XQuery. (1 point)
8. Provide the list of tools with a certain category, where that category might be chosen by the user from a given set of options. Use XPATH/ XQuery. (1 point)
9. Provide the list of tools for engineering. Use XPATH/ XQuery. (0.5 pts)
10. Provide a graphical interface for your application. (2 points)

You must use XML, DTD/ XML Schema, XSL, XPATH/ XQUERY to store and query the data. When developing the application, have in mind it should be extensible, as during Phase 2 you will work on the same application.

Deadline: upload on the 5th of December 2020, 23:59, on Moodle.
Maximum value gained: 1 point from the final grade. This phase will be graded from 0 to 10.
Attention: To receive the grade, you must present the project during laboratories, to Mrs. Iuliana Marin.
Maximum 2 students can work on the assignment.

Phase 2.

1. Write a RDF/XML for the following scenario (1 pt):

   YouTube is the number one learning resource from https://www.toptools4learning.com/. It is a web-based teaching resource, which can be used in any domain, including engineering. Other web-based learning resource is Wikipedia, also having a general purpose and positioned on number 11 on “Top 200 Tools for Learning” from the same website. LinkedIn (position 8), Twitter (position 9) and Facebook (position 12) are social networks used in collaborative learning from any domain. AutoCAD is a specialized desktop learning tool, used only in engineering and architecture, which does not exist in “Top 200 Tools for Learning”, but it is highly appreciated as well. “Learn to dance in VR” is a mobile learning application which is used in dancing.

2. In the web application from Phase 1, add a feature to upload a RDF/XML file and visualize its RDF graph with Jung (http://jung.sourceforge.net/) or a similar API. Test the feature with the file created at point 1. You have to use RDF and JENA API in order to write, read, query and perform operations (https://jena.apache.org/tutorials/) (1pt).

3. In the web application, add a feature to let you modify or add the position in "Top 200 Tools for Learning" for a learning/ teaching tool. Test the feature for AutoCAD (add position) and YouTube (change position). You have to use RDF and JENA API in order to write, read, query and perform operations (https://jena.apache.org/tutorials/) (0.5 pt modify+0.5 pt add).

4. In the web application, add a feature to query the tools who can be applied in engineering. The result of the query should be text-based and graph-based (in the graph from point 2, those tools' nodes should be colored in green). You have to use RDF and JENA API in order to write, read, query and perform operations (https://jena.apache.org/tutorials/) (0.5 pt text-based+0.5 pt graph-based).

5. In the web application, add a feature to query the tools positioned in top 10. You have to use RDF and JENA API in order to write, read, query and perform operations (https://jena.apache.org/tutorials/) (0.5 pt).

6. In the web application, list the tools which are used for collaborative learning (aka social networks). You have to use RDF and JENA API in order to write, read, query and perform operations (https://jena.apache.org/tutorials/) (0.5 pt).

7. Design an OWL ontology in Protégé to model teaching/ learning tools. The designed ontology should have at least 30 classes and subclasses, 15 properties (10 object properties and 5 data properties), 3 individuals from the scenario from point 1; also, your properties have to be at least of 3 types (e.g. functional, inverse, transitive); at least 2 of your properties have to have domain and range; please add comments to your entities (2 pts).

8. Classify your ontology using a reasoner. Demonstrate the automated classification in your ontology with at least 2 examples. Create a graphical representation of your ontology in OWLViz and save it as an image (1 for asserted ontology, one for inferred ontology). An example could be: the tools which are learning tools (not teaching tools) and web-based or mobile (not desktop) are used for collaborative learning paradigm(1 pt).

9. Make 1 SPARQL query for your ontology and save it in a txt file with the name "sparql_owl". Executed in Protégé and put a print screen with the result. (1 pt).

10. In the web application, add a feature to let you classify automatically the 2 examples from point 8, which are inserted by the user via the graphical interface and the classification result is communicated to the user. You may use Jena or OWL API (or any other ontology API you want) (1 pt).

Bonus: 2 points at your project grade if you succeed in making automatically an ontology of learning/ teaching tools from the text from point 1 using Text2Onto (https://sourceforge.net/projects/texttoonto/) or any other text mining framework.

Deadline: upload on the 16th of January 2021, 23:59, on Moodle.
Maximum value gained: 2 points from the final grade. This phase will be graded from 0 to 10.
Attention: To receive the grade, you must present the project during laboratories on 18.01.2020 (17-20) or course on 21.01.2020 (14-16), to Mrs. Maria Dascalu and Mrs. Iuliana Marin.
Maximum 2 students can work on the assignment.