CS 548—Fall 2022
Enterprise Software Architecture and Design
Assignment Ten—OWL

Use the N3 notation to make the following statements in OWL. Use clinic: as the namespace qualifier in qnames for resources and properties, with whatever namespace you choose. Declare all classes as OWL classes. Ensure that your results are syntactically correct N3 before submitting. You may use an online form to validate your facts and generate RDF triples, e.g.,

http://rdf-translator.appspot.com/
https://www.easyrdf.org/converter

Alternatively you can install the cwm (Closed World Machine) tool and use this to validate your facts and generate RDF triples:

http://www.w3.org/2000/10/swap/doc/cwm.html

You should provide the RDF triples (in XML format) for your N3 code as part of your submission.

1. (5 marks) Surgeons are a type of Provider
2. (5 marks) Radiologists are a type of Provider.
3. (5 marks) Internists are a type of Provider.
4. (5 marks) Surgery is a form of Treatment.
5. (5 marks) Radiology is a form of Treatment.
6. (5 marks) DrugTreatment is a form of Treatment.
7. (5 marks) ProvidedBy is a property that relates Treatments to Providers.
8. (5 marks) ReceivedBy is a property that relates Treatments to Patients.
9. (10 marks) RadiologistProvided is any form of Treatment that is provided by a Radiologist. *It is not necessarily the same as Radiology; a radiologist may prescribe medication, for example.*
10. (10 marks) A RadiologyPatient is any Patient who receives treatment from a Radiologist. *Hint: Define a property that is the inverse of ReceivedBy, and define the class RadiologistProvided to be a subclass of a restriction class that implies membership of RadiologyPatient.*
11. (5 marks) A patient has a unique patient id.
12. (5 marks) Two patients cannot share a patient id.

You should also test your solutions by showing the results of queries against a test knowledge base that you define[1]. You are be provided with an app that automates this testing for you. Here is an example of its use (where the RDFS and OWL definitions use the namespace `http://www.cs.stevens.edu/cs548#`):

[1] Use the Apache Jena query engine, which can be downloaded from `http://jena.apache.org`. A tutorial on SPARQL is available at https://jena.apache.org/tutorials/sparql.html. Information about reasoners for Jena is available at https://jena.apache.org/documentation/inference.

```
$ java -jar owl.jar
owl> namespace http://www.cs.stevens.edu/cs548#
owl> schema Assignment10-Schema.owl
owl> props Joe
-------------------------------------------------------------------
| prop                | object                                      |
===================================================================
| <http://...#type>   | <http://www.cs.stevens.edu/cs548#Provider> |
| <http://...#type>   | <http://www.w3.org/2002/07/owl#Thing>      |
| <http://...#type>   | <http://www.cs.stevens.edu/cs548#Surgeon>  |
| <http://...#sameAs> | <http://www.cs.stevens.edu/cs548#Joe>      |
-------------------------------------------------------------------
owl> elems RadiologyPatient
-----------------------------------------
| subject                               |
=========================================
| <http://www.cs.stevens.edu/cs548#Peter> |
-----------------------------------------
owl> isa Joe Provider
Joe IS recognized as a Provider
owl> isa Joe Internist
Joe is NOT recognized as a Internist
```

Submission

Your solution should be uploaded via the Canvas classroom, as a zip file. This zip file should have the same name as your Canvas userid. It should unzip to a folder with this same name, which should contain the files and subfolders with your submission.

It is important that you provide a document that documents your submission, included as a PDF document in your submission root folder. Name this document README.pdf. As part of your submission, compile your N3 definitions and sample data to RDF triples, and include both the N3 code, the RDF triples, and your queries as part of your archive file. Your report should include a video demonstrating the execution of your queries against a knowledge base that includes your solutions and sample data, using the Jena engine (using the tool provided). Your report should explain the testing in the video. In particular, your testing should demonstrate the correctness of the definitions of RadiologistProvided and RadiologyPatient in your knowledge base.