



Cairo University  
Faculty of Computers and Information

## Final Exam

Department: Computer science

Course Title: Selected Topics

Course Code: SNIT462

Semester: Second

Instructor: Prof. Abeer ElKorany

Date: 11-5-2019

Exam Duration: 2 Hours

### تعليمات هامة

- حيازة التليفون المحمول مفتوحا داخل لجنة الامتحان يعتبر حالة غش تستوجب العقاب وإذا كان ضروري الدخول بالمحمول فيوضع مغلق في الحقيبة.
- لا يسمح بدخول سماعة الأذن أو البلوتوث.
- لايسمح بدخول أي كتب أو ملازم أو أوراق داخل اللجنة والمخالفة تعتبر حالة غش.

60

Question	Mark	Signature
One		
Two		
Three		
Four		
Five		
Six		
Seven		
Eight		
Nine		
Ten		
Total Marks		

Total Marks in Writing: \_\_\_\_\_

**Question 1 [20 marks]**

**A. Complete the following statements.**

**(10 Marks)**

1. There are two kinds of relationships between classes in semantic net ..... And .....
2. An ..... class that refers to the same concept in real world.
3. For the following RDF statement “BinElkasrin has-author Nagib Mahfoz”. The type of nagib Mahfoz is ‘Person’ and the type of BinElkasrin is a ‘Novel’
  - a. Domain of the property ‘has-author ’ is: .....
  - b. Range of the property ‘has-author ’ is: .....
4. Any RDF statement could be represented in three ways: ....., ....., .....
5. .... apply the open world assumption approach
6. .... primitive is used by RDF to identify where predicates are defined.

**b) State True/False (Explain in case of false) [10 Marks]**

1. A node is used to represent only classes in semantic net

2. In RDF graph , a blank node is a node that represents a specific resource for which a URI or literal is give
- 

3. RDF was introduced to allow defining vocabulary and class hierarchies.
- 

4. In Frame knowledge representation, a slot is allowed to contain procedures.
- 

5. Optional is a solution modifier used in SPARQL to specify the maximum number of rows that should be returned.
- 

6. One of the main disadvantage of semantic net is that Inheritance particularly from multiple sources
- 

7. Disjoint Classes in ontology could have common instances
- 

8. RDF graph must be directed
- 

9. A functional property is a property that can have single value for each individual
- 

10. In SPARQL ASK is used to check if there is at least one result for a given query pattern and if the result is true or false
- 

**Question 2 [4marks]**

- a) One of the main advantages of OWL is that it has the ability to provide different restrictions on the value of property, state those restrictions, with analogy to predicate logic and give example of each

### **Question3( 8 Marks)**

Given the following ontology that represent the university class

```
<rdf:RDF
    xmlns:rdf=http://www.w3.org/1999/02/22-rdf-syntax-ns#
    xmlns:rdfs=http://www.w3.org/2000/01/rdf-schema#
    xmlns:owl=http://www.w3.org/2002/07/owl#
    <owl:Ontology rdf:about="University Courses"/>
    <owl:Class rdf:ID="course">
    <rdfs:comment>Courses form a class.</rdfs:comment>
    </owl:Class>
    <owl:Class rdf:ID="laboratoryCourse">
    <rdfs:comment>Laboratory course is a type of course.</rdfs:comment>
    <rdfs:subClassOf rdf:resource="#course"/>
    </owl:Class>
    </owl:Class>
    <owl:Class rdf:ID="teacher">
    <rdfs:comment>Teachers form a class.</rdfs:comment>
    </owl:Class>
    <owl:Class rdf:ID="assistant">
    <rdfs:comment>Assistants are those teachers that teach laboratory courses.</rdfs:comment>
    <owl:Class rdf:ID="professor">
    <rdfs:comment>Professors are those teachers that teach courses.</rdfs:comment>
</rdf:RDF>
```

**It is required to add appropriate owl code to represent the following:**

1. Professors teach at least one course
2. Assistants only teach laboratory courses.
3. A course may be taught by more than one professor

### **Question4(8 Marks)**

Consider the following OWL ontology that describes a customer bank:

```
<rdf:RDF xmlns:owl="http://www.w3.org/2002/07/owl#"
  xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
  xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#">
  <owl:Class rdf:ID="A" />
  <owl:Class rdf:ID="B" /> <rdfs:subClassOf rdf:resource="#A" /> </owl:Class>
  <owl:ObjectProperty rdf:ID="C" />
  <owl:ObjectProperty rdf:ID="D"> <rdfs:subPropertyOf rdf:resource="#C" />
  </owl:ObjectProperty>
  <owl:DatatypeProperty rdf:ID="E" />
  <owl:ObjectProperty rdf:ID="#C">
    <rdf:type rdf:resource="&owl;FunctionalProperty"/>
  </owl:ObjectProperty>
  <owl:Class rdf:about="#B">
    <equivalentClass
      rdf:resource="#F"/>
    </owl:Class> <owl:Restriction>
  owl:onProperty rdf:resource="#C" />
  <owl:minCardinality rdf:datatype="&xsd;nonNegativeInteger"> 1</owl:minCardinality>
  </owl:Restriction>
  </owl:equivalentClass>
  </owl:Class>
</rdf:RDF>
```

1) Identify which of the following identifiers could be used to replace **A,B,C,D, E,F** respectively that are used by the above ontology to make it more descriptive of bank customer account and then draw the ontology graphically.

*Person, Customer, approved-loan ,has-account, interest-value, Client*

- 2) Add necessary primitive to the ontology graph (if needed) and represent domain and range of each object property.

### **Question5(10 Marks)**

**Read the following data and answer the questions based on this data:**

PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>

PREFIX owl: <http://www.w3.org/2002/07/owl#>

PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>

PREFIX ex: <http://www.semanticweb.org//ontologies/book\_ontology#>

ex:book1 ex:hasTitle "Lord of the Rings".

ex:book1 ex:writtenBy ex:JRR Tolkien.

ex:book1 ex:publishedInYear "1954".

ex:book1 ex:originalLanguage ex:English.

ex:book1 ex:hasGenre ex:Fantasy.

ex:book1 ex:hasISBN ex: "abc567"

ex:book2 ex:hasTitle "Brida".

ex:book2 ex:writtenBy ex:Paulo Coelho.

ex:book2 ex:publishedInYear "1990".

ex:book2 ex:originalLanguage ex:Portuguese.

ex:book2 ex:hasGenre ex:Novel.

ex:book2 ex:hasISBN ex: "abc123"

ex:book2 ex:hasTitle "The Valkyries".

ex:book2 ex:writtenBy ex:Paulo Coelho.

ex:book2 ex:publishedInYear "1992".

ex:book2 ex:originalLanguage ex:Portuguese.

ex:book2 ex:hasGenre ex:Novel.

ex:book2 ex:hasISBN ex: "abc235"

ex:book3 ex:hasTitle "Harry Potter and the Prisoner of Azkaban".

ex:book3 ex:writtenBy "ex: J. K. Rowling"

ex:book3 ex:publishedInYear "1999".

ex:book3 ex:originalLanguage ex:English.

ex:JRR Tolkien ex:hasNationality ex:British.

ex:JRR Tolkien ex:hasNationality ex:British.

ex:Paulo Coelho ex:hasNationality ex:Brazilian.

Write appropriate Queries that could do the following

1. Retrieve all books and their ISBN
2. Retrieve all books that are written by Paulo Coelho during period from 1990 till 2000
3. Retrieve all books that are written by an English author

### **Question6(10 Marks)**

**Model the following ontology using graph and model appropriate restriction using OWL**

- Herbivores, Carnivores, and Omnivores are animals
- People are omnivores
- People have names of type “string”
- Vegetarians are people who are herbivores
- “eats” is a property of animals and the values of the property must be of the type “food”
- Meat and Veggies are types of food

You must identify the following:

- i. Classes, subclasses and their restriction
- ii. Property types and restriction

