

CS646
Example Mock Questions on Ontologies

1. An ontology for a library

For the following exercise you may show the taxonomies of primitives and roles as indented trees or graphically using arrows as in UML.

For each defined class give a definition in OWL abstract syntax (or a reasonable approximation thereof) and indicate either in the diagram or with the definition where it would be classified with respect to the primitives in the diagram.

To make it easier to draw, you may draw hierarchy of primitives as several different hierarchies omitting owl:Thing – i.e. each major branch of the hierarchy can be drawn separately. Likewise, if it helps to make the layout more understandable, show continuations below a point with ‘...’ and then draw the lower branches separately.

Clearly distinguish individuals from classes and the subclass-of relation from the individual-of relation. (If you use arrows, use closed heads for subclass-of and open heads for individual-of. If you use outlining, clearly underline all and only individuals.)

1.1 Part A) Sketch a normalised ontology for use by a library which covers the items listed below and is sufficient to allow concepts to be created representing the answers to the queries in part B.

Indicate the hierarchies for both concepts (classes) and properties (roles).

Note: you may add other concepts, and it may be necessary to do so to complete the exercise. Note any ambiguities and key design choices. Assume that all primitives are disjoint.

For properties, indicate an inverse where appropriate and note any properties that are unique (functional), transitive, or symmetric

Items to be represented: Books, card catalogue, publications, librarians, photocopies, electronic copies, shelves, rooms, categories of work such as "Computer Science", "Art History", etc., borrowers, loans.

- 1.2 B) Define classes using your ontology for the following. Use owl abstract syntax (or a reasonable approximation. Carefully distinguish *someValuesFrom* from *allValuesFrom* – which you may abbreviate to *some* and *only* if you wish.

There may be some cases that cannot be represented in OWL for some reason or another. . If so indicate this and explain why.

If the definition in English is ambiguous, paraphrase it so it is unambiguous and then express the disambiguated notion in OWL

- 1.2.1 Librarian in charge of publications
- 1.2.2 Books authored by library staff
- 1.2.3 Catalogued books
- 1.2.4 Books on art history of which there are two or more copies in the library
- 1.2.5 Journals for which there is an electronic copy but no paper copy.
- 1.2.6 Differentiate between:
 - 1.2.6.1 The book "Algorithms" by Knuth
 - 1.2.6.2 The second edition of "Algorithms" by Knuth.

2. Ontological constructs

Use either OWL abstract syntax or Conceptual Graphs (correctly with correct quantifiers) in the following

2.1 Time

- 2.1.1 What issue is revealed by the following pair of sentences:
"John read the book"
"John was interrupted while reading the book"
- 2.1.2 Represent the class of "reading situations" in each of the above using a) a point based view of time b) an interval based view of time; c) an interval based view of time graphically showing the relation from the Allen Calculus
- 2.1.3 Give an example of where using *allValuesFrom* rather than *someValuesFrom* leads to incorrect classification.

2.2 Part-whole relations

- 2.2.1 Differentiate between: *components, subdivisions, members, constituents, members and contents.*

Give an example of each

3. Important dichotomies

- 3.1.1 Why might the statement "Harry Potter and the Order of the Phoenix" is an 800 pg book by JK Rowling" post problems. Suggest two potential solutions.

The notion of being a physical object of 800 pages sits poorly with the notion of an abstract *oeuvre* and the physical object, and the class of physical objects all of which are, at this time, 800 pages long. Solutions are either to be more logically precise in the statement equivalent to "*Harry Potter and the Order of the Phoenix*" is a novel by JK Rowling all of the copies of the manifestation of which are 800 pages long" or to define a complex or disjunction of the novel and the physical book of the novel and define appropriate axioms so that the ambiguity is tolerated.

- 3.1.2 Distinguish between Continuants (aka "Endurants") and Occurrents (aka "Perdurants")**
 - 3.1.2.1 What is the key relation that holds between them?**
 - 3.1.2.2 What are some of the variants of this relation?**
- 3.1.3 What is the relation between a "Grain of sand" and "The sand on the beach"? Give other examples of this relation**
- 3.1.4 What is the key distinguishing feature of "Things" and "Stuff"**