CP2405 Assignment 1
Ontology design

Assignment breakdown

This assignment has been divided into two components. For the first task (PART 1), you are to design a basic ontology given a number of axioms. For the second task (PART 2), you are given a scenario where you are to use the Ontology Requirements Specification Framework to determine the main elements and logical statements/axioms of a conceptual ontology model and the competency questions of the ontology.

> **Note**: This is *not* a group project. Each student must individually complete all parts of their submission.
>
> Students *must* start with a *new Protégé file and a new document* and they must not have another person's file in their possession at any time. Each student must work on their assignment independently and not show their work to other students.
>
> Submissions that are detected to be too similar to another student's work will be dealt with promptly according to University procedures for handling plagiarism.

Deliverables (50 marks)

1) PART 1 (21 marks)- Hand in one OWL file (.owl) file created in Protégé 4.3. Other versions of Protégé are not acceptable.

2) PART 2 (29 marks)- A single Word document (.doc or .docx) containing:

   Section 1   scenario broken into main statements

   Section 2   scenario in logical axioms; and

   Section 3   a completed Ontology Requirements Specification Framework

- Please name the file like: FirstnameLastnameP1.owl (e.g. if your name were Robert Brown, the filename would be RobertBrownP1.owl) and FirstnameLastnameP2.doc (e.g. if your name were Robert Brown, the filename would be RobertBrownP2.doc)

- Submit your files by uploading it on LearnJCU under Assessment

Due

Submit your assignment by the date and time specified on LearnJCU.
Submissions received after this date will incur late penalties as described in the subject outline.

PART 1

Design an ontology based on the following sentences:

- Accidents can be categorised as chemical, electrical, fire, kinetic or liquid.
- An accident can be a combination of types.
- An investigation is conducted for accidents.
- An investigation only covers one accident.
- Accidents can cause different types of injuries or damage, relating to the type of accident.
- A person may be involved with an accident as a victim, witness, or investigator. But an investigator cannot be a witness or victim because they may become biased.
- An object may be damaged by an accident
- A person who owns an object that is damaged is a victim.
- A victim can be injured.
- An investigation can either be In progress or complete.
- An investigation can be conducted by only 1 investigator.
- Lucy is conducting an investigation for a pet shop fire.
- Pet shop fire caused $10,000 damage to a building.
- Accident Damage has 3 levels, low up to $1000, and high is anything over $10,000
- Boris owns the pet shop and got burnt on his arms during the fire.
- Charles is investigating Charlie slipping over in a workshop.
- Charlie smashed a sensor valued at $1000 when he slipped and also hurt his head.
- Bernadette is an electrician and she often investigates electrical accidents. She is investigating two accidents for the same air-compressor. The 1st accident occurred when Sam plugged in the air compressor (while it was switched on) which shorted out the computer and scales on the same circuit, doing $2000 damage to the computer and $500 damage to the scales. The 2nd accident occurred when Herbert used the switch to turn the compressor on and received a minor shock.

Then, complete the ontology by adding inverse, symmetric, and transitive properties and appropriate property, instance and class restrictions to achieve correct inference.
You need to submit a .OWL file created in Protégé 4.3

PART 2

Context

Tourism OZ is a company that provides a tourism web portal. They would like to represent all their information about cities in Australia to be compliant for the Semantic Web. The scenario presented below is a typical description of the kind of information that is present in the portal, and that should be contained in (and queried from) a semantic knowledge base.

Scenario

Australia has six states and various territories. Canberra is the capital of Australia; it is located in the ACT, which is a territory of Australia. Melbourne is the capital of the state of Victoria. Melbourne has two airports. Tullamarine airport is served by Qantas, Rex and JetStar flights, while Avalon is served by Qantas and Rex. Melbourne has several train stations, the main station is Melbourne Central. Brisbane is the capital of the state of Queensland. Brisbane has several train stations, the main station is Brisbane Central located in the centre of Brisbane, but there is also the South Brisbane station located across Brisbane River. When getting around in Melbourne by public transport there are buses, trams and the railway line. Stations are broken up into 2 Myki ticketing zones (some stations are in the overlap between the two zones (Zone 1 and 2), where tickets for either zone may be used), as well as the City Saver area, which is within Zone 1 and covers the central business district. In Melbourne and Brisbane you can stay in a hotel. Hotels have different ratings (from five to one star), and rates within a price range. Price ranges of the hotels differ depending on the time of the year that you decide to visit Melbourne or Brisbane.

Canberra, Melbourne and Brisbane are full of sights, such as churches, monuments, museums and family attractions. For example, St. Patrick's Cathedral (Melbourne) is a popular church, the Shrine of Remembrance (Melbourne) is a popular monument and the Melbourne Museum and the Australian War Museum (Canberra) are popular museums. Brisbane is well known for its entertainment attractions such as the Gold Coast theme parks and the Dracula's Cabaret. The fee to enter the Dracula's Cabaret is $95AUD for Regular tickets and $115AUD for VIP Tickets, and the Drax4Kids show is $32AUD per person. There are organised tours to see the sights of Melbourne and surrounding regions such as the great ocean road and the Yarra valley wineries. Perth also has winery tours at Margret River, along with the Scitech Discovery Museum in the city and tours at the Fremantle Prison. While in Melbourne a visitor should take the opportunity to visit one of the many events taking place there during different periods, such as theatre and opera performances, and concerts. There are a number of travel guides available for Perth, Melbourne, Canberra or Brisbane; many of them are available in several formats, for example as a guidebook or on a CD. Maps of these cities can also be found in paper format or in an electronic format.

Section 1. Determine the main statements in the scenario

For example:
1. Australia has six states and various territories.
2. Canberra is the capital of Australia, it is located in the ACT.
3. etc

Section 2 . Determine the elements and logical statements/axioms of a conceptual ontology model.

For example:
1) Australia has six states and various territories.
   - Australia has both states and regions
2) Canberra is the capital of Australia; it is located in the ACT, which is a territory of Australia.
   - A city is the capital of a country.

- A city is located in a state or territory.

Section 3. Determine the competency questions of the ontology design using the Ontology Requirements Specification Framework (provided).

Ontology requirements specification document template

1	**What is the <u>Purpose</u> of the ontology**
2	**What is the <u>Scope</u> of the ontology**
3	**What is the <u>level of Formality</u>**
4	**Who are the <u>Intended Users</u>**
5	**What are the <u>Intended Uses</u>**
6	**List the <u>Groups of Competency Questions and answers (eg priorities)</u>**
7	**Pre-Glossary of Terms**
	List terms included in the CQs and their frequencies"
	List objects and their frequencies

Refer to the MethOntology examples on http://www.neon-project.org/nw/NeOn_Book and the lecture materials.

Example Competency Questions:

1) Canberra is the capital of Australia; it is located in the ACT, which is a territory of Australia.
   - A city is the capital of a country.
   - A city is located in a state or territory.

   CQs:
   - ∗ What city is the capital of a certain country?
   - ∗ In what territory or state is a certain city located?

Marking Rubric

Ensure that you follow the processes and guidelines taught in class to produce high quality work. This assessment rubric provides you with the characteristics of exemplary, competent, marginal and unacceptable work in relation to task criteria.

Criteria	Exemplary	Competent	Satisfactory	Unsatisfactory
Part 1				
Program Execution **Correct format**	3 Ontology using OWL load correctly in Protégé 4.3 with no anonymous classes	2 Ontology using OWL load correctly in Protégé 4.3 but has anonymous classes	1 Ontology using OWL is available but will not validate and does not load correctly in Protégé 4.3	0 No .OWL file available for marking or wrong version of Protégé used.
Classes and instances	6 All classes and instances declared and are appropriate and efficient. All appropriate constructs and set operators have been applied on classes and instances including good logical choices	4 Most classes and instances declared. Constructs and Set operators have been applied on all available classes and instances.	2 Some classes declared used with some constructs applied. Some instances declared with some constructs applied.	0 No Classes or instances available for marking.
Property restrictions and data quantifiers	6 Appropriate and efficient inverse, symmetric, and transitive property characteristics used, including good logical choices. Appropriate restrictions on properties and data properties.	4 Inverse, symmetric, and transitive property characteristics used, data properties set, includes good logical choices	2 Some attempt at data and object property characteristics used but are not logically correct.	0 No property characteristics available for marking.
Logical correctness	3 Reasoner subsumes correct sub classes to super classes. Reasoner subsumes correct instances to inferred classes	2 Reasoner subsumes most sub classes to super classes. Reasoner subsumes some correct instances to inferred classes	1 Reasoner subsumes most sub classes to super classes. Reasoner subsumes some correct instances to inferred classes. Some of the ontology is not satisfiable (some classes are turned red post reasoning).	0 Ontology is not satisfiable (some classes are turned red post reasoning).
Identifier naming	3 All classes, properties and instance names are in the correct format, appropriate, meaningful and consistent.	2 One or two classes, properties and instance names are not in the correct format, appropriate, meaningful or consistent.	1 Three or four classes, properties and instance names are not in the correct format, appropriate, meaningful or consistent.	0 More than four classes, properties and instance names are not in the correct format, appropriate, meaningful or consistent.
Part 2				
Section 1 - Scenario breakdown	6 The problem is divided into all sub-parts effectively. Clear, explicit and specific statements drawn from the scenario	4 The problem is divided into at least 2/3 of its sub-parts effectively. Clear, explicit and specific statements drawn from the scenario	2 The problem is divided into at least 1/3 of its sub-parts effectively. Clear, explicit and specific statements drawn from the scenario	0 No attempt has been made to divide the scenario into sub-parts.
Section 2 **Determine the logical statements/axioms of a conceptual ontology**	6 All sub-part statements are declared using explicit logical statements and/or axioms that translate directly to an	4 2/3s of the sub-part statements have been declared using explicit logical statements and/or axioms that	2 1/3 of the sub-part statements have been declared using explicit logical statements and/or axioms that translate directly to an	0 No attempt has been made to declare sub-parts using explicit logical statements and/or axioms that

Marking Rubric

model	ontology model	translate directly to an ontology model	ontology model	translate directly to an ontology model
Section 3 **Ontology Requirements Specification - purpose, scope and user analysis**	**6** Clear, concise and effective description of the purpose. Clear, concise and effective description of what the ontology aims to achieve Explicit and specific description of the intended end user and uses.	**4** Fairly clear description of the purpose. Fairly clear description of what the ontology aims to achieve. Fairly specific description of the intended end user and uses.	**2** Basic attempt to describe the purpose. Basic attempt to describe what the ontology aims to achieve Basic attempt to describe the intended end user and uses.	**0** Poor attempt, poorly articulated or not done.
Competency questions	**9** Clear, concise and effective list of competency questions. The CQ list is comprehensive A comprehensive glossary of terms is available.	**6** A clear list of many competency questions. The CQ list is comprehensive but missing a small number. A glossary of terms is available but not all terms in the CQs are listed.	**3** A list of some competency questions. There are many CQs missing in the list. A glossary of terms has been attempted but many terms in the CQs are not listed.	**0** Poor attempt or not done.