

INFS3101/7100 Ontology and the Semantic Web

Week 7 Tutorial Formal Upper Ontologies

Semester 1, 2006

Consultation session

- Today 2-3pm at 78-631
- An extra one-hour consultation session will take place from 1 to 2 pm on week 9 Wednesday (3 May) at 78-631.

Suggestion for the assignment

- Develop a scenario from your selected ontology like the accommodation one in week 3 tutorial
- Construct the diagram by the representation language in week 4 tutorial according to the scenario.
- The rest of questions will be answered based on the above scenario and diagram.

Key Terms

- BWW and Dolce are formal upper ontologies. Include systems, endurants, perdurants, subclasses, etc.
- Formal upper ontologies provide a rich meta vocabulary to help develop ontologies and suggest abstract data types which can be supported by ontology servers to make it easier to build rich ontologies.

Question 1a

Describe examples of systems, subsystems, and environments of systems in the ontology.

- **Thing: A basic unit in the BWW ontology is a thing, taken as primitive.**
 - Ray White's bank balance.
 - Mary's bank balance
- **Property and Attribute: Things have properties.**
 - both balances are positive.
- **State of a Thing: At a point of time, the attributes of a thing have values.**
 - Ray White's balance is AUD1,890.00 at 1st April 2006.
 - Mary's balance is AUD2,000.00 at 1st April 2006
- **Event: An event is a change of state in a thing.**
 - There was a rent deposit of AUD1,000.00 from Mary's bank account to Ray White's at 2nd April 2006.

Question 1a Continues

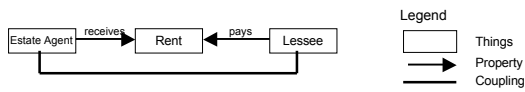
Describe examples of systems, subsystems, and environments of systems in the ontology.

- **History of a Thing: A history of a thing is a sequence of events in a thing.**
 - Ray White's
 - 1st April 2006 AUD1,890.00
 - 2nd April 2006 +AUD1,000 AUD2,890.00
 - Mary's
 - 1st April 2006 AUD2,000.00
 - 2nd April 2006 -AUD1,000 AUD1,000.00
- **Coupling/Interaction: Two things are coupled (or interact) when the history of at least one of things depends on the history of the other thing.**
 - Ray White is coupled to Mary because both bank balances are affected by the rent payment event.

Question 1a Continues

Describe examples of systems, subsystems, and environments of systems in the ontology.

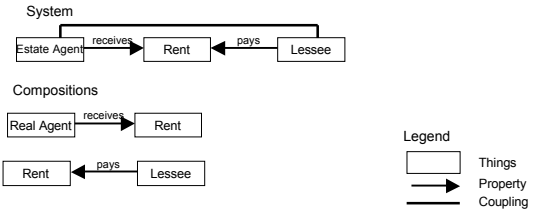
- **System:** Systems are things that are made up of other things that satisfy two conditions. First, every thing in the system must be coupled to at least one other thing. Second, it must not be possible to divide the things that make up the system into two subsets that are not coupled.
 - Things: Real Agent (Ray White), Rent (AUD1,000) and Lessee (Mary)
 - History:
 - Ray White's
 - 1st April 2006 AUD1,890.00
 - 2nd April 2006 +AUD1,000 AUD2,890.00
 - Mary's
 - 1st April 2006 AUD2,000.00
 - 2nd April 2006 -AUD1,000 AUD1,000.00
 - Coupling/Interaction
 - Real White and Mary, a lessee, are coupled by the payment event.



Question 1a Continues

Describe examples of systems, subsystems, and environments of systems in the ontology.

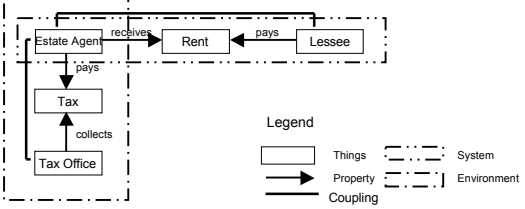
- **Composition:** The composition of a system is the set of things that are in the system.



Question 1a Continues

Describe examples of systems, subsystems, and environments of systems in the ontology.

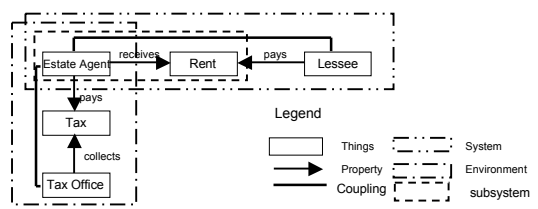
- **Environment:** The environment of a system is the set of things that are not in the system's composition but interact with (are coupled to) at least one other thing in the system's composition.



Question 1a Continues

Describe examples of systems, subsystems, and environments of systems in the ontology.

- **Subsystem:**
 - A subsystem is a system that satisfies three conditions:
 1. Its composition is a subset of another (super) system's composition.
 2. Its environment is a subset of the environment of the other (super) system joined with the difference between the composition of the other (super) system and composition of the subsystem.
 3. Its structure is a subset of the other (super) system's structure.



Question 1a Continues

Find some coupled objects in the ontology

- Lessee vs. Estate Agent by rent payment event
- Estate Agent vs. Tax Office by tax payment event

Question 1a Continues

Identify hereditary and emergent properties of the system.

- **Hereditary properties:** The hereditary properties of a thing are properties that belong also to things in the thing's composition.
- **Complex Objects**
- **Metonymy**
- **Examples:**
 - John Howard: Howard Government
 - Leases can be regarded as compositions. Obviously, lessee's name is one of the things in the composition. A lease can be identified by the lessee name under certain circumstances. For examples, there are three leases in hand belonging to Mary, Jane and John respectively, so we can use their names as hereditary properties to identify the leases.

Question 1a Continues

Identify hereditary and emergent properties of the system.

- Emergent Properties: The emergent properties of a thing are properties that are not properties of any of its components.
- A annual-rent payment is the aggregate of all fortnight-payments in a year. Each fortnight-payment is components of the annual-payment. The emergent properties are:
 - The amount of the annual payment.
 - The starting and ending dates of the annual payment.
 - The tax amount deducted from the annual payment.
 - ...

Question 1b Continues

Describe endurants and perdurants in the ontology

- Endurants are entities that **exist in time**.
 - Leases, lease advertisements.
- Perdurants are entities that **happen in time**.
 - Stative - state: A unit is vacant.
 - Stative - process: A unit is leased, so there are a series of regular rent-payments by the lessee in the leased duration.
 - Event – accomplishment: As lessees commit to a units, they need to do a list of things for completing the transaction in order, they
 1. Sign the leases,
 2. Pay the bonds and initial fortnight rents, and
 3. Take the keys.
 - Event – Achievement: Estate agents advertise houses for let on Courier Mail.

Question 1b Continues

What endurants participate in the perdurants? How are the histories of the endurants represented in the ontology?

- Scenarios
 - A lease is a legal document, one of which clauses specifies the duration the lessee is allowed to stay on a house. The lessee is permitted to staying on the house as s/he pays full amount of rent on time
- Endurants: A lease, lessee and rent
- The perdurants in which the endurants participate: Lessees pay rent according to the leases.
- The histories of the endurants: a copy of signed lease and its rent receipts.

Question 1c Continues

Think of an improvement in the ontology suggested by some aspect of the BWW/Dolce formal upper ontology. Show how the improvement follows from the upper ontologies.

- Through BWW, we can make the implicit structure explicit.
 - For example, what kind of the relationship is between classes lease and clause?
 - We can make the implicit whole/part relationship explicit for those classes by part of property of BWW .

Question 1c Continues

Think of an improvement in the ontology suggested by some aspect of the BWW/Dolce formal upper ontology. Show how the improvement follows from the upper ontologies.

- Perdurants and Endurants – Endurants are created, and then destroyed by perdurants.
- For examples, how are owners created in the accommodation ontology? Actually, in our ontology, we did not illustrate how the owners are introduced, but we did described the introduction of lessees by signing leases. So, if we adopt Dolce as an upper ontology to ours, the appearance of the owners would be no accounted for because no perdurants are involved to create the owners.

The End