

# Week 6 Suggested Tutorial Solution: Formal Upper Ontologies

Semester 1, 2006

## Suggested Solution for Week 7 Tutorial

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

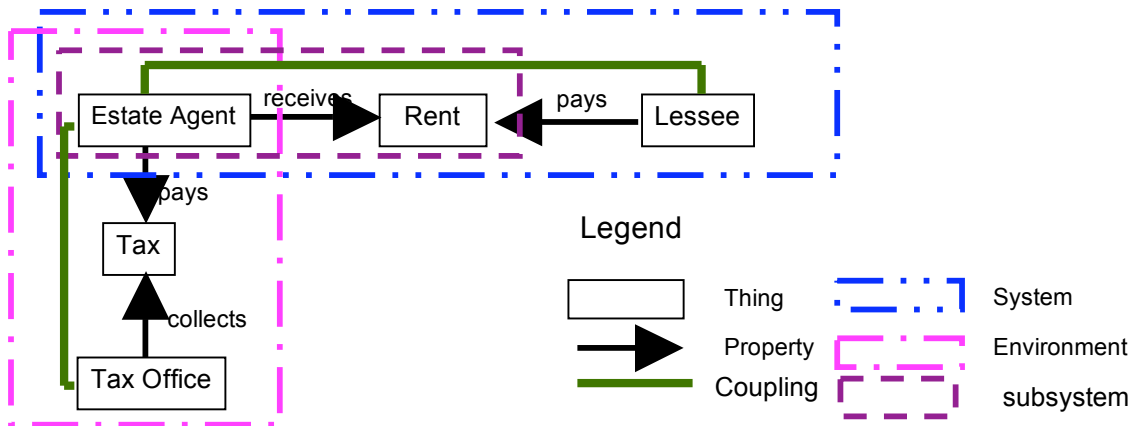


Figure 1

From Figure 1, a *system* (SYS) consists of a lessee, rent and estate agent because the lessee and estate agent are coupled by rent payment. There are two events occurring in order. For example, the lessee (*thing*) pays (*event*) \$1,000 for rent to the estate agent (*thing*) who receives (*event*) the rent (*thing*). Meanwhile, there are changes on both the lessee and estate agent account balances (*states*) correspondingly.

Meantime, there is an environment (ENV) outside SYS: i.e. the estate agent and the tax office that is not a thing in SYS, because the tax office and estate agent are coupled by tax payment.

There is a subsystem in SYS: i.e. SUB is composed of the estate agent and rent. There are three conditions with which that SUB complies: Firstly, SUB's composition (the estate agent and rent) is a subset of SYS's composition. Secondly, SUB's environment, ENV itself in this case, is a subset of the ENV, joined with the difference between the

composition of SYS and SUB, in this case this difference is SUB itself. Last, the SUB's structure is a subset of the SYS's structure.

*Find some coupled objects in the ontology.*

Lessees vs. estate agents by rent payments; and estate agents vs. the tax office by tax payments.

*Identify hereditary and emergent properties of the systems.*

Regarding to *hereditary properties*, which are quite similar to metonymy in complex objects, for example, John Howard is the prime minister (*thing*) of the incumbent government (*composition*), so the government can be identified by the prime minister's family name, Howard government. Thus, John Howard's family name is the *hereditary property* of the incumbent government.

Under the accommodation ontology, leases are complex objects, but also compositions in BWW. Obviously, lessee's names are one of the things in the compositions. Leases can be identified by the lessee names under certain circumstances, For example, there are totally three leases in hand belonging to Mary, Jane and John respectively, so we can use their names as *hereditary properties* to identify the leases.

Regarding to *emergent properties*, for example, an annual rent payment (*composition*) is the aggregate of all fortnight rent payments (*things of the composition*) in a year. Each fortnight payment is component of the annual rent payment. The emergent properties of the annual rent payment are:

- ✧ Its amount
- ✧ its starting and ending date
- ✧ The tax amount deducted from the annual payment.

*Describe endurants and perdurants in the ontology.*

Regarding to *endurants*, there are a number of *endurants* in our ontology or relevant to it, e.g. a lease, an advertisement for a brief description of an accommodation and a layout of a house or unit.

There are a number of *perdurants* as well in our ontology: -

- A unit is vacant. (*stative - state*)

- A unit is leased, so there are a series of regular rent payment by the lessee in the leased duration. (*stative - process*)
- As a lessee commits to a unit, she/he needs to do a list of things for completing the transaction; they are signing the lease, paying the bond and the first two-week rent, and taking the key. (*event - accomplishment*)
- An estate agent advertises a house for let on Courier Mail (*event - achievement*).

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

“A lease is a legal document specifying the duration the lessee can stay on a house. The lessee is allowed for staying on the house as he/she pays full amount of the rent on time”.

- *Endurants*: a lease, lessee and rent,
- The perdurants in which the endurants participate: Lessees pay rent according to their leases.
- The histories of the endurants: copies of the signed leases and their rent receipts.

*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, we know Class *Clause* as property for Class *Lease*. However, we do not really know what particular relationship between those two classes. We can make the implicit *whole/part* relationship explicit for those classes by *part of* property in BWW.

- *History* is not part of our ontology. Through BWW, we can have *history* for some classes.

For example, the objects of Class *lease* are shared among the instances of Class *estate agent, lessee and lessor*. For a particular instance of estate agent – Ray White, it must keep the histories – the copies of leases. Thus, Ray White can monitor on behalf of the lessors if the lessees comply with the clauses of the leases.

- *Perdurants* and *Endurants* – Endurants are created, and then destroyed by perdurants.

For example, how are owners created in the accommodation ontology? Actually, in our ontology, we did not illustrate how the owners are introduced, but we did describe the introduction of lessees by signing leases. So, if we adopted Dolce as an upper ontology to our ontology, the appearance of the owners would not be accounted for because no perdurants are involved to create the owners.