INFS3101/7100 Ontology and the Semantic Web

Week 12 Suggested Tutorial Solution: Advanced Issues

Semester 1, 2006

Consider the rental accommodation exchange from the week 2 tutorial and the representation in the solution to the week 4 tutorial and following, as represented in RDFS/OWL in the last tutorials.

a. *Describe examples of bulk classes in the ontology.*
    - Blank copies of leases – no identity because no lease numbers as identifiers are assigned for those blank copies, even though those copies are as unifying relations since general clauses set by Residential Tenancies Authority are printed on the leases in advance.
    - Amount of Rent – An amount including currency sign and digits results in ambiguity because its identity is unspecified. Thus, its identity depends on its container – pseudo-identity.
    - Identical chairs in a house are bulk class since there are no unique identities for each of them.

b. *Find situations where the concept/ representation class distinction is useful. (Make plausible extensions if necessary).*

- Occasionally, an object can interpreted in different representations. For example, an estate agent has a variety of representations. Firstly, a potential lessor and lessee recognise the agent with its name, e.g. Ray White and PRD. Secondly, the Tax Office recognises it by its ABN. Lastly, the Real Estate Institute of Queensland recognizes it by its membership number.
- A literal in RDF/OWL is not sufficient to represent a value with its unit. For example, "The amount of bond is $600." is represented on figure 1:-

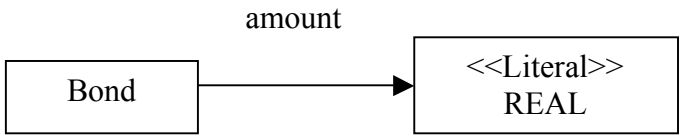

Figure 1

From the above figure, *Bond* and its *value* are represented as a class and literal that is a real number while *amount* is represented as a property. However, the currency cannot be explicitly stated unless we have dimensional systems.

c. *Find deep part/whole structures (with more than one level of part), and describe them using the formal taxonomy of the lecture. (The property holdings of a particular owner might be a good candidate.)*

- Part of is transitive – There are clauses on a lease. For example, clause *Rent* consists of clauses such as *Rent in Advance,* and then, clause *Rent in Advance* also consists of clauses such as *for a period agreement – 2 weeks rent.* Thus, *for a period agreement – 2 weeks rent* is also a clause belonging to the lease.
- Part of is intransitive – For example, Ray White, an estate agent, is one of members of The Real Estate Institute of Queensland (REIQ) where REIQ/Ray White is a whole/part relationship. However, Kylie who is a receptionist in Ray White where staff is regarded as parts of Ray White, will not be the member of REIQ, even though the company she is working is a member of REIQ.
- A company with unlimited liabilities cannot be exists without a sole proprietor. Usually, each unlimited company has a sole proprietor who will be responsible for all liabilities of his/her business personally. In this case, the owner can do his/her business alone or employ more people for helping him/her.
- The sole proprietor cannot exist unless as part of a firm with unlimited liabilities. Both sole proprietor and ex-sole proprietor are objects which can be parts, but the sole proprietor depends on being a part while the ex-sole proprietor does not.
- A particular house can be part of its owner's holdings, of its suburb and of a group of the most favourable houses in Brisbane.
- A well in a building is its part, but not is an object.
- John Smith has property holdings including 10 houses, eight of which are in Australia, but the rest of which are in America.

d. *Find examples of the metaproperties +unity, +identity +rigid, +essential. Model them using the n-ary association method from the lecture.*

- +essential – e.g. *ownership* as a +essential property for class *Bus Stop* because the values of the property for each instance of *Bus Stop* are same. The following figures 2 and 3 show the modelling at class and instance levels respectively.

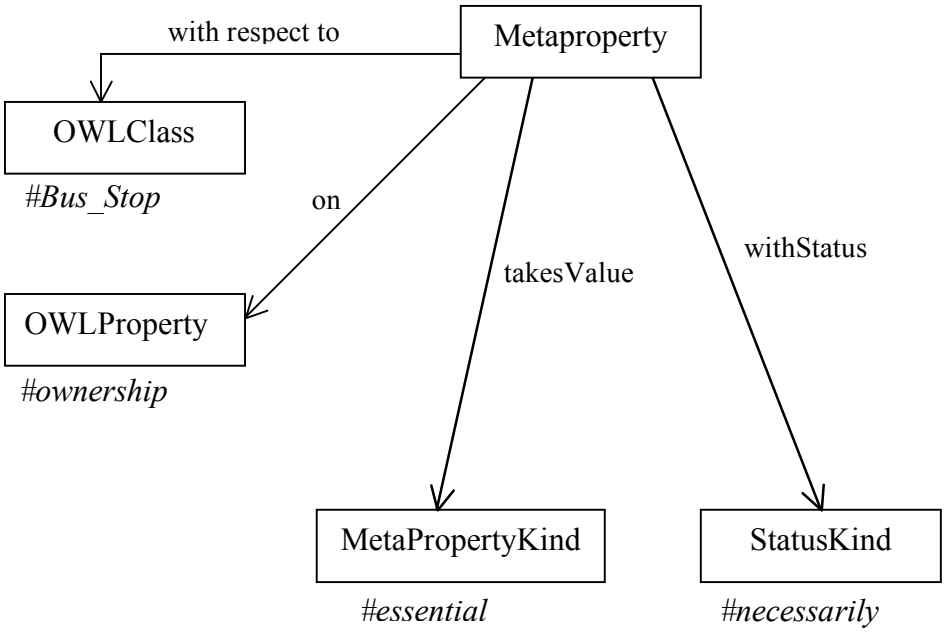

Figure 2

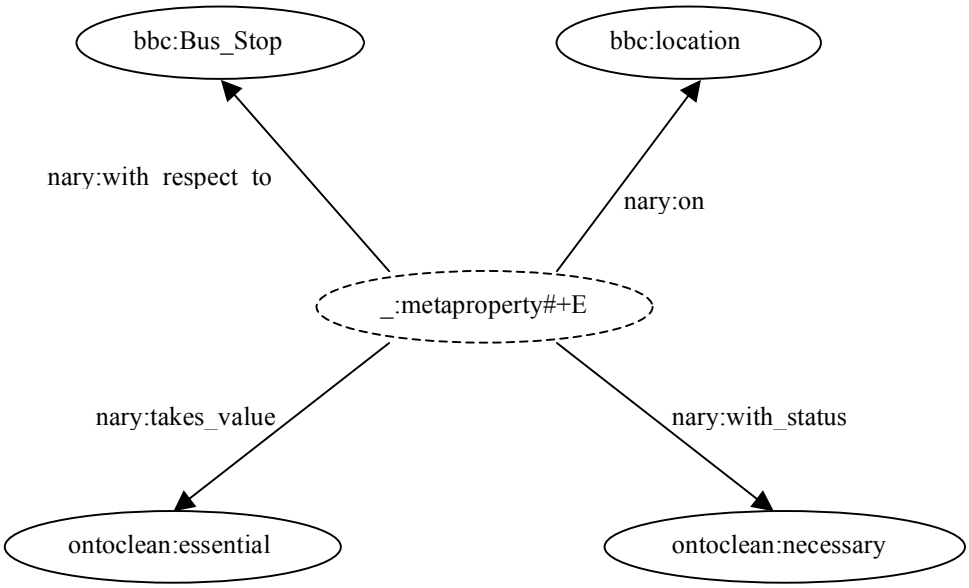

Figure 3

- +rigid – e.g. *bus_stop* is the rigid property for class *Bus Stop* because the name of class is, usually, as a rigid property for each instance of *Bus Stop.* The following figures 4 and 5 demonstrate the modelling at class and instance levels respectively.

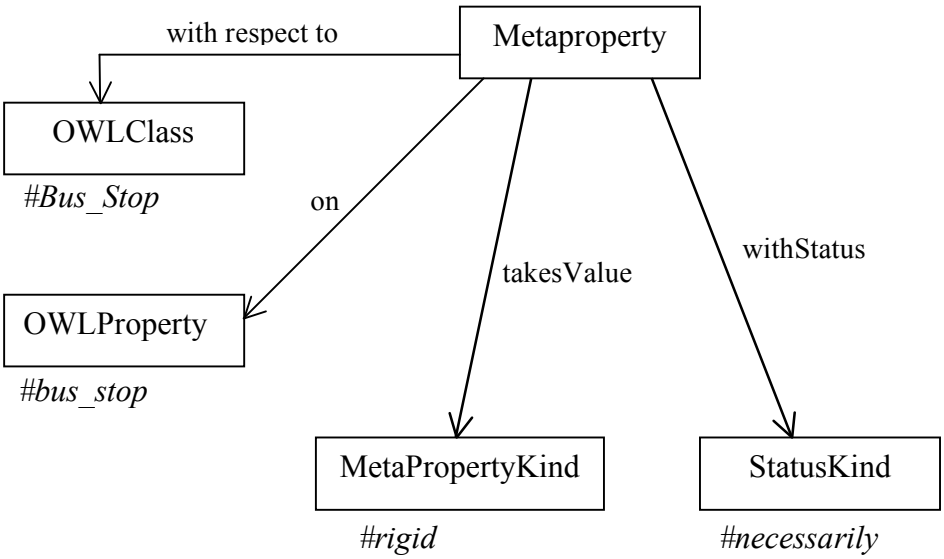

Figure 4

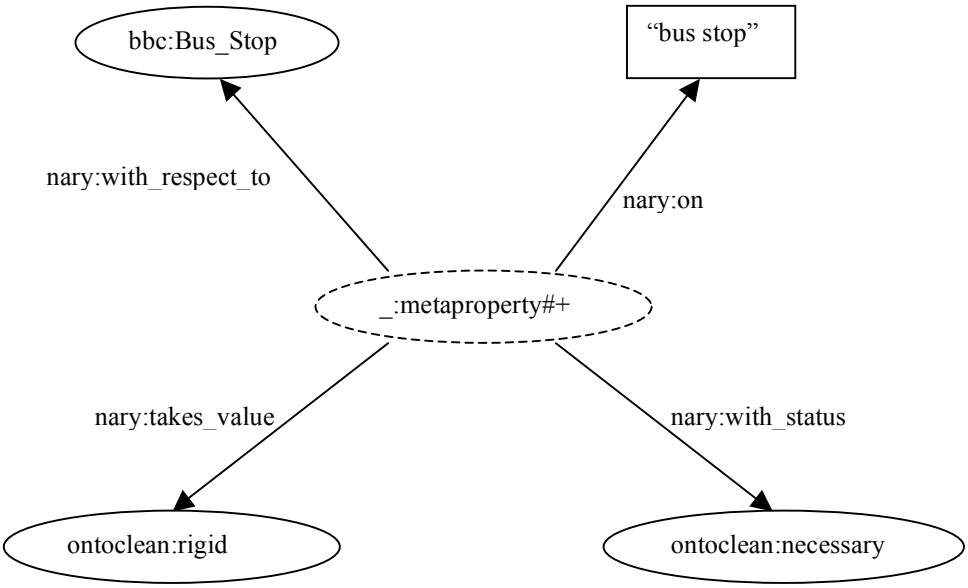

Figure 5

- +identity – bus stop numbers are +identity for *Bus Stop* because those number are as unique identifiers for each instance of *Bus Stop*. The following figures 6 and 7 show the modelling at class and instance levels respectively.

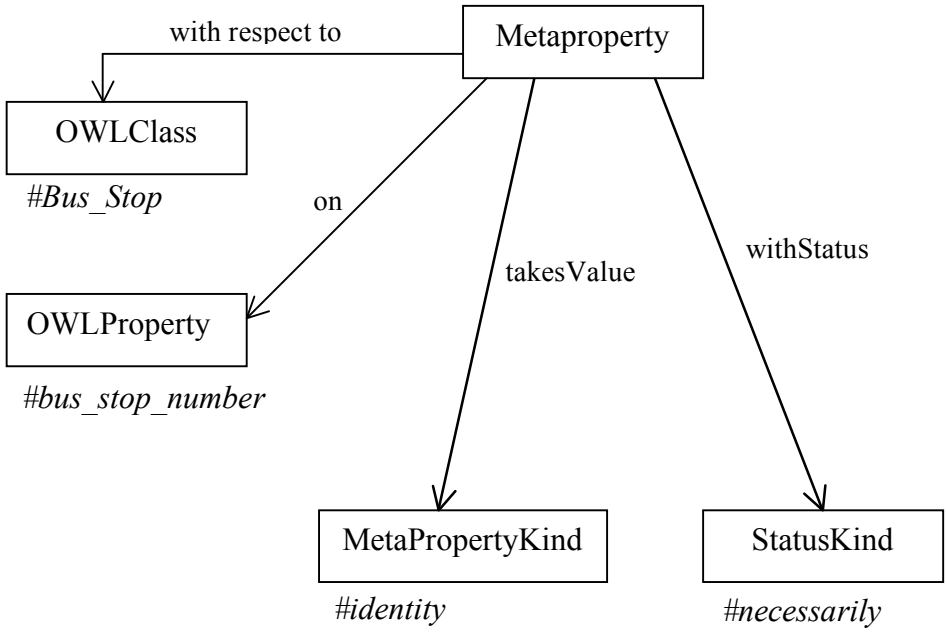

Figure 6

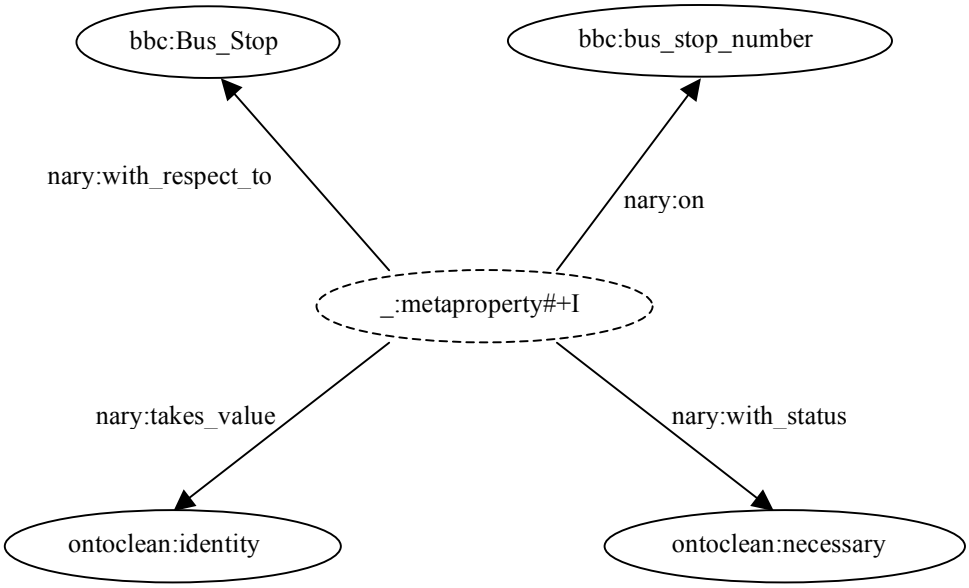

Figure 7

- +unity - *Lease/Clauses* is a whole/part relationship. In this case, each instance of *Lease* is as a container – *pseudo-identity* for each instance of *Clauses.* The following figures 8 and 9 show the modelling at the class and instance levels respectively.

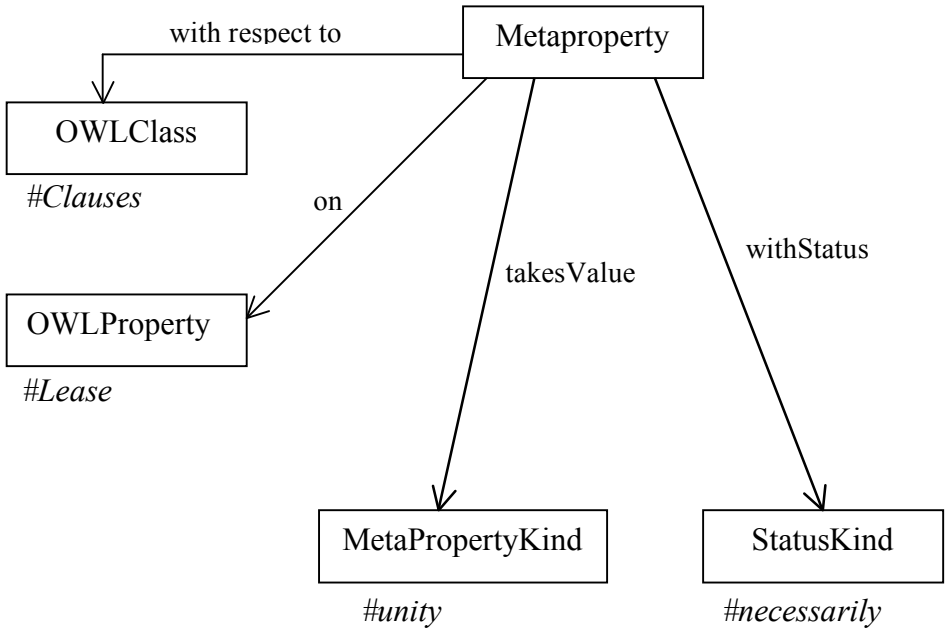

Figure 8

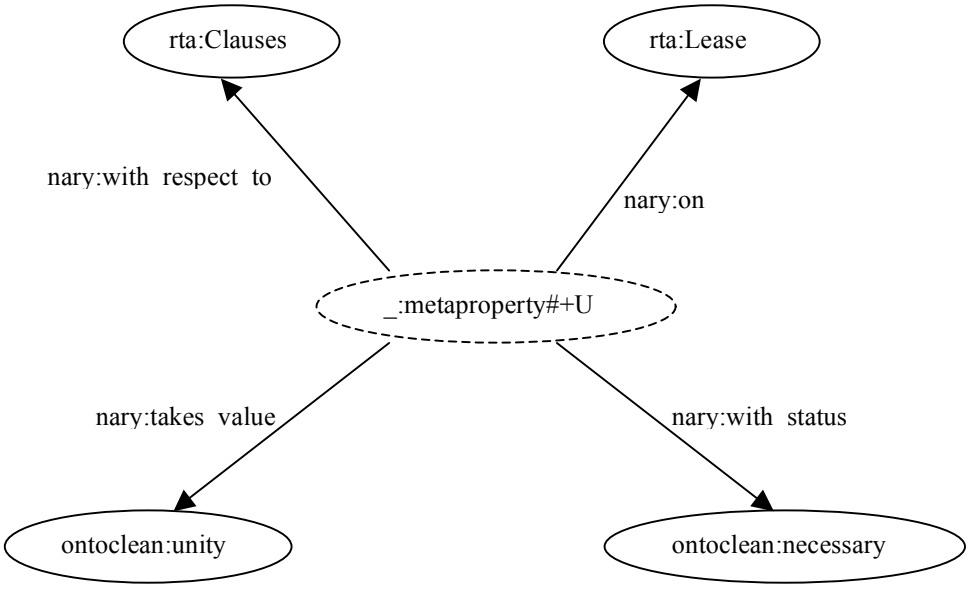

Figure 9

e. *Find situations in this ontology where various kinds of extent-descriptive metaclasses might be useful, and describe how in each case. Model them.*

- Extent descriptive metaclass can be helpful for agents to determine the quality of a system. For example, The Residential Tenancies Authority was established under the Residential Tenancies Act (1994). Its website is a reliable source to provide the most current, complete and authoritative about the government regulations for rental accommodation.
- Extent descriptive metaclass can also be a source for revealing which property is total or partial. For example, advertising a house for let, the suburb this house locates must be stated. In this case, the property *location* is total. However, the amenity is optional; this means property *nearness* is partial.
- Some unusual features of ontology can be described by Extent descriptive metaclass, hence agents can decide a strategy for dealing with those features efficiently. For example, the size of population of classes and how frequent the population changes. For example, the population of class *Bus Stop* is relatively static since there are rarely new bus stops brought into. As long as an agent grabs the information about bus stops, it can cache the information and no longer looks at such information due to its statics.