BUILD YOUR OWN MINI ONTOLOGY

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Building a simple ontology about a domain you know well is a good way to learn about how they work, and about some of the issues that the ontological engineer faces when working with a larger ontology for a complex domain. As well, building a simply ontology about a domain you know well illustrates that, whatever the fancy search technology, natural language processing tools, visualizations, etc., the simple act of *putting things into categories* is the most important and most rewarding task for the ontological engineer.

This worksheet is designed to walk a student through the steps of creating a small ontology. It requires a few sheets of paper (at most), a writing implement, and should take no more than an hour. A word processor can be used as well.

Instructions

1. Decide what domain you are going to model. The simpler and more concrete, the better; pick a topic you know something about. It need not have anything to do with libraries, information science, books. You want to select a part of the universe that has clearly identifiable *kinds of things* that have *easily discernible relationships.*
Examples. Espresso drinks; cooking utensils; shoes; pets; knitting or sewing equipment; fruits and vegetables; creatures and peoples of Middle Earth; The Hogwarts curriculum.

2. Start by writing down the names of five to ten objects in the domain. More than ten will be too unwieldy; fewer than five won't be interesting enough.

EXAMPLE. Since I am a Tolkien fan, I will choose the creatures and peoples of Middle Earth. I hope this subject is not too obscure for anyone. In any case, The first creatures and peoples of Middle Earth that come to mind are hobbits, elves, wizards, orcs, the Balrog, dwarves, humans (``men'').

ALERT! There is a mistake here. The Balrog is an individual, a particular

thing---not a kind. Don't put individuals in this initial list. I will change this from the name of an individual to the category applied by Gandalf to it: Demon of the ancient world.

HINT. Try to use language and ideas that describe some intuitively clear, natural distinctions among the objects. For instance, the group consisting of the enemies of the Fellowship of the Ring is not a basic class among the peoples and creatures of Middle Earth. What would be better would be to list the basic types, as I have done above, and then group them together in different ways to describe their relationships, for instance, their allegiances.

3. Try to see if there are natural groupings you can use to organize the initial list of categories you wrote down. I don't think there really are in my list above. Suppose you chose trees as the area you want to model, and your initial list includes spruce, oak, fir, and elm. This immediately suggests the subdivision of the trees into deciduous and evergreen.

4. Organize your list into a hierarchy. You can represent this using indentation in a list.

EXAMPLE.

Creatures and Peoples of Middle Earth
      Hobbits
      Elves
      Wizards
      Orcs
      Demons of the ancient world
      Dwarves
      Humans

EXAMPLE.

Trees
      Evergreens
            Spruce
            Fir
      Deciduous
            Oak
            Elm

EXPLANATION. This hierarchy represents kinds and subkinds: A spruce

is a *kind of* evergreen, for example.

WARNING. Being a kind of thing is different from being *part* of another thing, or related by some other means. Consider:

Trees
      Branches
      Leaves
      Roots

A branch is not a kind of tree, it's a part of a tree. This is a relationship between trees and their parts. Describing relationships comes next. Now, you just want to list the kinds of things, the subkinds of things, and which are subkinds of others.

ANOTHER EXAMPLE:

Trees
      Build houses
      Create shade
      Burn for fuel
      Fall on people and cars
      Splinter when hit by lightning
      Look beautiful in the Fall

This list is almost totally arbitrary. It contains things that trees are good for (building houses, creating shade, burning for fuel); dangers of trees (Falling on people and cars, splintering) and another class that's indeterminate: things trees do that people like? New England tourist attractions? Metaphors for fading beauty?

5. Think about the relationships the things you've listed take part in. Just make a list.

EXAMPLE.

- fight with swords (orcs, humans, hobbits), or bow and arrow (Elves) or axes (dwarves);

- Can be defeated only by a wizard (Demons of the ancient world);

- Native to forests (Elves), mines (dwarves); foolish and power-hungry (people, orcs).

- Hate being in forests: dwarves, Demons of the ancient world;

- Love being in the forest (Hobbits, elves, wizards);

6. Look for organization that's implicit in your choice of relationships. Some of the relationships you identified in the previous step are most probably compounds implicitly containing reference to other kinds of things, not listed in our initial list. For example, ``Fight with swords'' can be broken up into two parts: the action of fighting, and the weapon. ``Native to forests'' can be broken up into the relationship of a kind of creature to its habitat, and a particular kind of habitat, to create ``[kind of creature] has Habitat [kind of habitat].

Having noticed this, list the other kinds of things you have come across. This will be objects in ontologies of neighboring domains.

Habitats
     Forests
     Mines

Weapons
     Swords
     Axes
     Bow-and-arrow

Personality traits
     Foolish
     Power hungry

Habitats, weapons, and personality traits are ontologies of their own. ``Can be defeated only by'' does not require any new kinds of individuals. This will be seen in the next step.

7. Now you should have: (1) The initial list of objects, organized into a hierarchy; (2) A list of relationships, including implicit relationships; and (3) a list of ontologies of things related to those in your initial list. Now, you can construct your ontology, organizing the various classes of objects using the relationships you've identified. Write down (or look back at) the hierarchy you created with the initial list (steps 3 and 4 above), and connect appropriate terms using the relationship terms.

EXAMPLE. Relationships are enclosed in angle braces; the kinds of class

related to one another appear on either side.

Hobbits   <fight using> Swords

Elves   <Fight using> Bow-and-arrow;
           <Fight using> Swords
           <Native to> Forests;
           <Love being in> Forests.

Wizards   <Love being in> Forests.

Orcs   <Have personality trait> Power hungry;
           <Fight using> Swords.

Demons of the ancient world   <Can be defeated only by> Wizards;
                                   <Hate being in> Forests.

Dwarves   <Fight using> Axes;
           <Native to> Mines;
           <Hate being in> Forests.

Humans: <Have personality trait> Foolish;
           <Have personality trait> Power hungry.

8. Use the ontology to explore the domains you have organized and connected with the various relationships. Look for patterns, relationships among classes.
- Swords: who fights with them? Humans, orcs, elves, hobbits.

- Power hungry, foolish: Humans and orcs.

- Hobbits, wizards and elves love being in the forest, but Demons of the ancient world and Dwarves hate it. Hobbits and elves both fight using swords.

With the information in this last point,, a strategy for capturing the Demon of the ancient world can be put together. Create a battalion of elves and hobbits, combining these groups and buying swords in quantity to save money; send this battalion into the forest, under the command of the wizard; have the dwarves chase the Demons of the Ancient world from the underground mines into the forest, which the dwarves don't go into, instead remaining just outside, to prevent the demons from escaping.