



Aalto University
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Ontology Engineering

How to develop an ontology?

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Learning Objectives

- Get a general idea on how ontologies are developed
 - A process in seven steps
- Learn how an ontology editor (Protégé) is used
 - Videos for creating an ontology in practice

An Ontology Editor: Protégé

The screenshot displays the Protégé ontology editor interface. The browser address bar shows the URL: `http://www.co-ode.org/ontologies/pizza/pizza.owl`. The main menu includes `File`, `Edit`, `Reasoner`, `Tools`, `Refactor`, `Tabs`, `View`, `Window`, and `Help`. The toolbar contains icons for navigation and editing. The main window is divided into several panes:

- Active Ontology:** Shows the current ontology name: `http://www.co-ode.org/ontologies/pizza/pizza.owl`.
- Entity Selection:** A dropdown menu with options: `Active Ontology`, `Entities` (selected), `Classes`, `Object Properties`, `Data Properties`, `Individuals`, `OWL Viz`, and `DL Query`.
- Asserted Class Hierarchy: PizzaTopping:** A tree view showing the class hierarchy. The `PizzaTopping` class is selected. The hierarchy includes:
 - Thing
 - DomainConcept
 - Country
 - Food
 - IceCream
 - Pizza
 - PizzaBase
 - PizzaTopping** (selected)
 - CheeseTopping
 - FishTopping
 - FruitTopping
 - HerbSpiceTopping
 - MeatTopping
 - NutTopping
 - SauceTopping
 - SpicyTopping
 - VegetableTopping
 - VegetarianTopping
 - ValuePartition
 - Spiciness
 - Hot
 - Medium
 - Mild

- Object Properties:** A list of object properties: `hasCountryOfOrigin`, `hasIngredient`, `hasSpiciness`, and `isIngredientOf`.
- Selected entity: PizzaTopping:** A panel showing the class annotations and description for the selected class. The `label` annotation is set to `CoberturaDaPizza@pt`. The `Class Description` panel shows the superclass `Food` and disjoint classes `PizzaBase`, `Pizza`, and `IceCream`.

Seven-step Process of Creating an Ontology

Step 1: Determine the domain and scope of the ontology

- What is the domain that the ontology will cover?
- For what we are going to use the ontology?
- For what types of questions the information in the ontology should provide answers?
- Who will use and maintain the ontology?

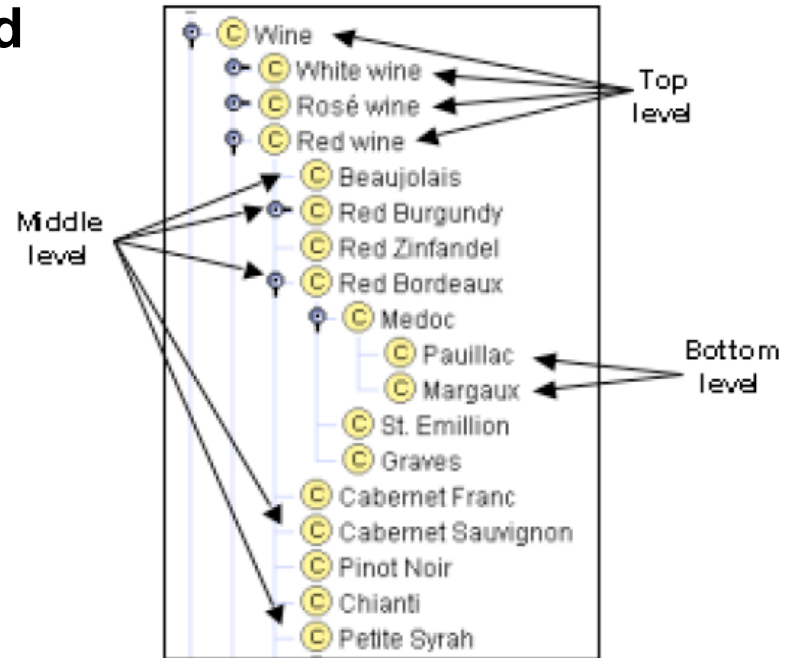
Step 2. Consider reusing existing ontologies

- E.g., ontology repositories: <http://onki.fi>, <http://finto.fi>

Step 3. Enumerate important terms in the ontology

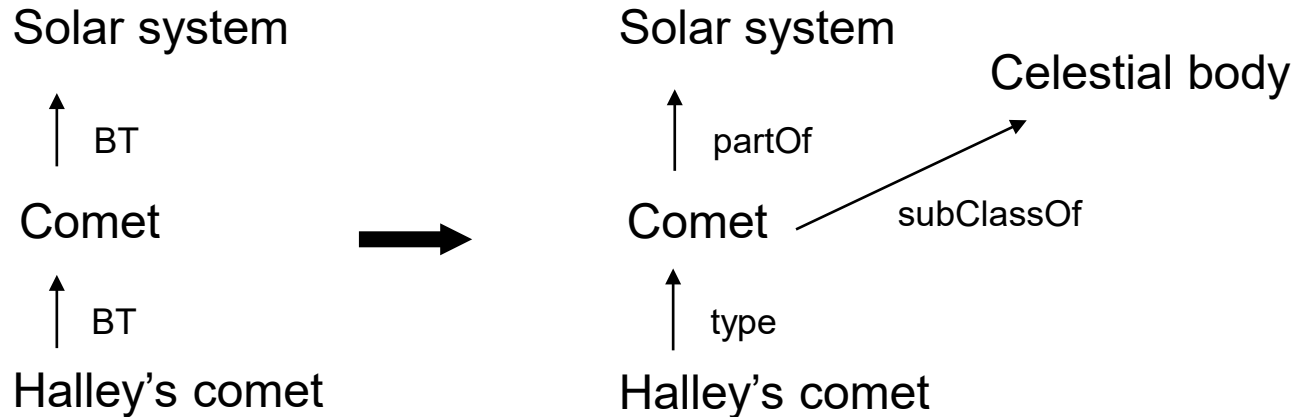
Step 4. Define the classes and the class hierarchy

- Top-down
- Bottom-up
- Mixed approach



The most important principle in constructing the class hierarchy

- If a class A is a superclass of class B, then every instance of B is also an instance of A



Step 5. Define the Properties of classes

- Object properties and data properties
- To be inherited by the instances

Step 6. Define the Properties

- Domain and range
 - E.g., the producer of a wine must be a winery
 - Value type: string, number, Boolean, Enumerated, Instance
- Cardinality
- Relational properties of properties
- Property hierarchy

Step 7. Create Instances (= populate the ontology with data)

- Choose a class
- Create an instance
- Fill in property values

More Information on Ontology Engineering

- A good starting point:
 - *Natasha Noy, Deborah McGuinness: Ontology Development 101: A Guide to Developing Your First Ontology. Stanford University, 2001.*
- A good textbook
 - D. Allemang, J. Hendler: *Semantic Web for the Working Ontologist: Effective Modeling in RDFS and OWL (2nd ed.)*, 2011
<https://www.amazon.com/Semantic-Web-Working-Ontologist-Effective/dp/0123859654>
- More advanced theoretical concerns
 - *DOLCE and OntoClean*
<http://www.springerlink.com/content/5p86jk323xotjktc/fulltext.pdf>

Watch Protégé Tutorials in Short Videos

By Nouredin Sadawi

[A Simple Protege Tutorial 1: Intro](#)

[A Simple Protege Tutorial 2: Creating the Ontology Classes ...](#)

[A Simple Protege Tutorial 3: Adding Object Properties](#)

[A Simple Protege Tutorial 4: Adding Data Properties](#)

[A Simple Protege Tutorial 5: Adding Individuals](#)

... more parts follow automatically 6, 7, 8, 9