

# KRR: Units 8 Formative Activities

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## Activity: Pizza Tutorial

This non-assessed activity allows you to check your understanding of the unit topic.

Work through a practical example by following Chapters 3 - 4 of A Practical Guide to Building OWL Ontologies Using Protégé 4 and CO-ODE Tools.

Create an ontology of pizza following the steps outlined in Exercises 2-6

Remember to record your answers to this activity in your e-portfolio.

## Answer

This follows the steps outlined in the later version of the tutorial (Debellis, 2021).

I did this in Unit 7, and did not realise it was an assignment question, so many of the activities will show as completed.

## Chapter 3 What are OWL Ontologies

TABLE 1 | Terminology from Debellis (2021)

Term	Description
OWL	W3C Web Ontology Language – semantic web language
DL	Description Logic – subset of First Order Logic (FOL)
Class	Class (Concept).
Property	Binary relation between individuals. Roles, relations (Slots)
Property restrictions	Role restrictions, axioms (Facets)
Individuals	Instances of classes (Instances)

## Chapter 4 Building an OWL Ontology

### Exercise 1: Create a new OWL Ontology

Using Protégé 5.6.3.

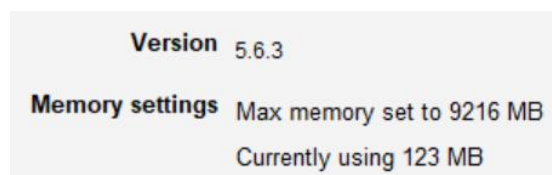


FIGURE 1 | Protege version

Installed Plugins	Name/ID	Version	Qualifier
	Browser View (OWLDoc)	3.0.3	
	Cellfie Protege 5.5+ Plugin	2.2.3	
	DL Query	4.0.1	
	ELK Reasoner Protege Plug-in	0.5.0	
	Existential Query	2.0.0	
	Explanation Workbench	3.0.1	
	Hermit Reasoner	1.4.3	456
	OntoGraf	2.0.3	
	Ontology Debugger	0.2.2	
	OWL Code Generation Plug-in	2.0.0	
	OWLAPI RDF Library	3.0.0	
	OWLViz	5.0.3	
	Pellet Reasoner Plug-in	2.2.0	
	Proof Utility Library	0.1.0	
	SHACL4Protege	1.1.0	
	snap-sparql-query-plugin	6.0.0	
	SPARQL Query Plugin	3.0.0	
	SWRLTab Plugin	2.1.2	

**FIGURE 2 |** Protege plugins

Not all of the plugins were installed at launch. Possibly Pellet, SPARQL (and snap-sparql), and SWRL were installed.

**Exercise 2: Set the Preferences for New Entities and Rendering**

New entities and renderer (set to) match tutorial.

### Exercise 3: Add a Comment Annotation to Your Ontology

The screenshot shows the Protege ontology editor interface for the PizzaTutorial ontology. The browser address bar shows the URL: <http://www.semanticweb.org/mariaingold/ontologies/2024/0/PizzaTutorial>. The menu bar includes File, Edit, View, Reasoner, Tools, Refactor, Window, and Help. The toolbar contains navigation and search icons.

The main workspace is divided into several panels:

- Ontology header:** Displays the **Ontology IRI** as `http://www.semanticweb.org/mariaingold/ontologies/2024/0/PizzaTutorial` and the **Ontology Version IRI** as `e.g. http://www.semanticweb.org/mariaingold/ontologies/2024/0/PizzaTutorial`.
- Annotations:** Shows a single annotation with the property `rdfs:comment` and the value `A tutorial ontology for the Pizza domain.`
- Ontology metrics:** A table showing various counts for the ontology.
- Class axioms:** Shows the `SubClassOf` axiom with a count of 48.
- Imported ontologies:** Sections for Direct Imports and Indirect Imports, both currently empty.

At the bottom of the interface, there is a status bar with the text: `To use the reasoner click Reasoner > Start reasoner` and a checked checkbox for `Show Inferences`.

Metric	Count
Axiom	156
Logical axiom count	95
Declaration axioms count	57
Class count	40
Object property count	9
Data property count	1
Individual count	7
Annotation Property count	1

Axiom	Count
SubClassOf	48

## Exercise 4: Create classes: Pizza, PizzaTopping, and PizzaBase

### Classes

- Main building blocks of OWL ontology
- Edit using Entities
- All classes are a subclass of owl:Thing
- Select class you want to create the relationship to
- Add the class (subclass, sibling, delete)
- Classes are sometimes red if just added and haven't run reasoner
- Class notation: CamelBack

The screenshot displays the Protege OWL editor interface for the PizzaTutorial ontology. The main window shows the class hierarchy on the left, with PizzaBase selected. The right pane shows the description for PizzaBase, including a list of relationships such as Equivalent To, SubClass Of, General class axioms, SubClass Of (Anonymous Ancestor), Instances, Target for Key, Disjoint With, and Disjoint Union Of. The Disjoint With relationship is currently set to Pizza and PizzaTopping.

Active ontology: PizzaTutorial (http://www.semanticweb.org/mariaingold/ontologies/2024/0/PizzaTutorial)

Class hierarchy: PizzaBase

Annotations: PizzaBase

Class hierarchy (inferred)

owl:Thing

- Pizza
- PizzaBase
- PizzaTopping
- Spiciness

Annotations

Description: PizzaBase

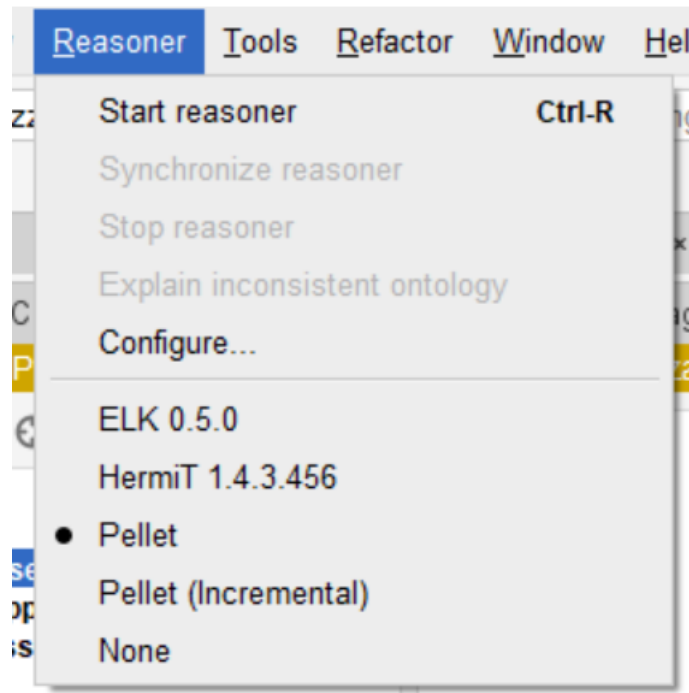
- Equivalent To +
- SubClass Of +
- General class axioms +
- SubClass Of (Anonymous Ancestor)
- Instances +
- Target for Key +
- Disjoint With +  
● Pizza, PizzaTopping
- Disjoint Union Of +

To use the reasoner click Reasoner > Start reasoner  Show Inferences

## Exercise 5: Install and Run the Pellet Reasoner

### Reasoner

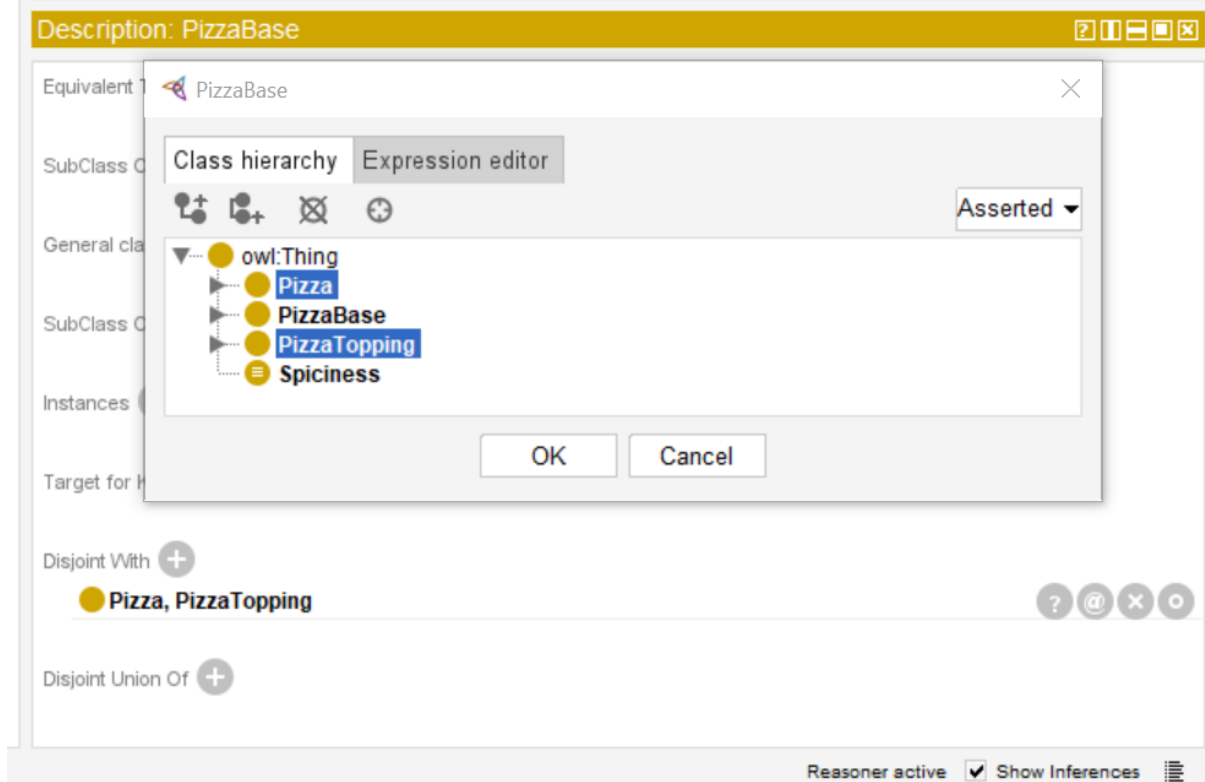
- Reasoner verifies new classes have no inconsistencies
- Run the reasoner often
- (Also save often!)
- Using Pellet reasoner as currently has best support for SWRL rules
- If start reasoner doesn't behave, do Window > Refresh user interface
- Configure reasoner (check all the tick boxes to reason all inferences)



## Exercise 6: Make Pizza, PizzaTopping, and PizzaBase disjoint from each other

### Disjoint With

- In the right hand box under Description: ClassName
- Press the +. Or if it's been done before, the far right edit button
- OWL classes are NOT disjoint by default. They are assumed to overlap. This is because multiple inheritance is permitted as it can be useful.
- Must explicitly make disjoint.
- May be better to make disjoint later as not always clear at outset



## References

Debellis, M. (2021) *A Practical Guide to Building OWL Ontologies Using Protégé 5.5 and Plugins*. Available at:  
[https://www.researchgate.net/publication/351037551\\_A\\_Practical\\_Guide\\_to\\_Building\\_OWL\\_Ontologies\\_Using\\_Protege\\_55\\_and\\_Plugins](https://www.researchgate.net/publication/351037551_A_Practical_Guide_to_Building_OWL_Ontologies_Using_Protege_55_and_Plugins) [Accessed 15 December 2023].