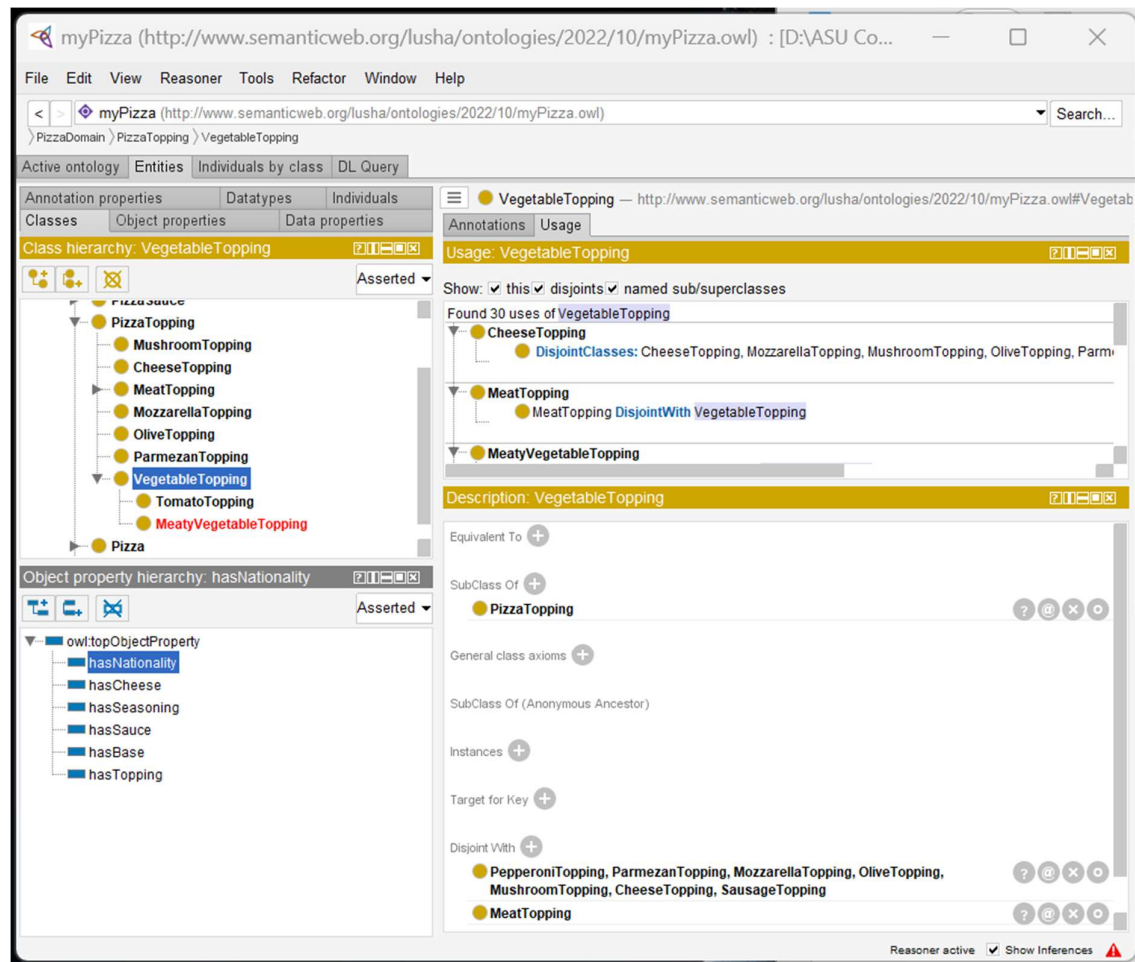


Programming Assignment 3 - Building an OWL Ontology

Ques 1: Do any of your classes come out as inconsistent?

Yes, I could find the inconsistencies in MeatyVegetableTopping as it was the one that was glowed in red.



The MeatVegetableTopping was unable to be added on both Vegetable and Meat Toppings initially, but they could be added in its description directly. Then we have added some disjoints in the Toppings Class. These Topping Classes were disjoint of one another. That raised an issue while running Reasoner and shown in the picture above.

One of the ways to overcome this type of inconsistency is to remove the disjoint between meat and vegetable toppings, that overlap with one another. Another way is to remove the MeatVegetableTopping altogether but add them conditionally on the pizza it is supposed to be present as both meat and vegetable should be present in subclasses function.

Ques 6 and 7: Execute at least two (non-trivial) DL queries of your own choice.

1. The first DL query is –

hasTopping some MeatTopping

This will check from the 'hasTopping' object and linked that with the class 'MeatTopping' that can or cannot have (at least could have) some Meat as their toppings on their Pizza.

The results we have found are shown below. The MeatyPizza is a direct subclass of the expression mentioned above which has the exact expression mentioned above. But the AmericanPizza and ClassicMeatPizza are just subclasses because it doesn't directly involve MeatTopping but involve it's subparts like PepperoniTopping and SausageTopping.

The screenshot shows the myPizza ontology editor interface. The left pane displays a class hierarchy for the 'myPizza' ontology. The hierarchy starts with 'owl:Thing' at the root, followed by 'PizzaDomain', 'Nationality', and 'Pizza'. Under 'Pizza', there are several subclasses: 'MeatyPizza', 'AmericanPizza', 'ClassicMeatPizza', 'NamedPizza', 'PizzaBase', 'PizzaSauce', and 'PizzaTopping'. 'MeatyPizza' is highlighted in blue. The right pane shows a DL query editor with the query 'hasTopping some MeatTopping'. Below the query editor, the 'Query results' section displays the following information:

- Equivalent classes (0 of 0)
- Superclasses (0 of 1)
- Direct superclasses (0 of 1)
- Direct subclasses (1 of 1):
 - MeatyPizza
- Subclasses (3 of 4):
 - AmericanPizza
 - ClassicMeatPizza
 - MeatyPizza
- Instances (1 of 1):
 - ThisPizza

The right pane also includes a 'Query for' section with checkboxes for 'Direct superclasses', 'Superclasses', 'Equivalent classes', 'Direct subclasses', 'Subclasses', and 'Instances'. Below this is a 'Result filters' section with a 'Name contains' input field and checkboxes for 'Display owl:Thing (in superclass results)' and 'Display owl:Nothing (in subclass results)'. The bottom status bar indicates 'Reasoner active' and 'Show Inferences'.

2. The second DL query is –

hasSauce some PestoSauce

This will check from the 'hasSauce' object and linked that with the class 'PestoSauce' that can or cannot have (at least could have) some Pesto as their sauce on their Pizza.

Here, the direct subclasses and the subclasses has the same values, because both the AmericanPizza and VeganPizza directly have this condition and they could have them or not if they chose to.

The screenshot shows the myPizza ontology editor interface. The browser address bar displays the URL: <http://www.semanticweb.org/lusha/ontologies/2022/10/myPizza.owl>. The interface includes a menu bar (File, Edit, View, Reasoner, Tools, Refactor, Window, Help) and a toolbar. The main area is divided into several panels:

- Class hierarchy: MeatyPizza**: A tree view showing the ontology structure. The hierarchy is: `owl:Thing` (parent) → `PizzaDomain` (child) → `Nationality` (child) → `Pizza` (child) → `MeatyPizza` (child). Other children of `Pizza` include `NamedPizza`, `PizzaBase`, `PizzaSauce`, and `PizzaTopping`.
- DL query**: A text input field containing the query: `hasSauce some PestoSauce`. Below the input are buttons for `Execute` and `Add to ontology`.
- Query results**: A panel displaying the results of the query. It shows:
 - Equivalent classes (0 of 0)
 - Superclasses (0 of 1)
 - Direct superclasses (0 of 1)
 - Direct subclasses (2 of 2): `AmericanPizza` and `VeganPizza`.
 - Subclasses (2 of 3): `AmericanPizza` and `VeganPizza`.
 - Instances (1 of 1): `ThisPizza`.
- Query for**: A section with checkboxes for `Direct superclasses`, `Superclasses`, `Equivalent classes`, `Direct subclasses`, `Subclasses`, and `Instances`. All are checked.
- Result filters**: A section with a text input for "Name contains" and two checkboxes: `Display owl:Thing` (in superclass results) and `Display owl:Nothing` (in subclass results). Both are unchecked.

At the bottom right, the status bar indicates "Reasoner active" and "Show Inferences" is checked.

3. The third DL query is –

hasNationality only American

This expression would check for the 'hasNationality' object property and specifically checks if they are all American origin, so having 'America' Nationality.

Here, the direct subclasses and the subclasses has the same values, because both the AmericanPizza, SohoPizza and VeganPizza directly have this condition and they should all be having them.

The screenshot shows the myPizza ontology editor interface. The top menu bar includes File, Edit, View, Reasoner, Tools, Refactor, Window, and Help. The address bar shows the URL: <http://www.semanticweb.org/lusha/ontologies/2022/10/myPizza.owl>. The breadcrumb navigation shows the path: PizzaDomain > Pizza > MeatyPizza > AmericanPizza. The active ontology is myPizza. The interface is divided into several panels:

- Class hierarchy: AmericanPizza**: A tree view showing the hierarchy of classes. The root is owl:Thing, which has a child PizzaDomain. PizzaDomain has a child Nationality, which has a child Pizza. Pizza has a child MeatyPizza, which has a child AmericanPizza. AmericanPizza has three children: ClassicMeatPizza, NamedPizza, and MargheritaPizza. NamedPizza has two children: SohoPizza and VeganPizza. There are also PizzaBase, Pizza Sauce, and PizzaTopping classes.
- DL query**: A text area containing the query: `hasNationality only America`. Below the text area are buttons for "Execute" and "Add to ontology".
- Query results**: A section showing the results of the query. It includes sections for Equivalent classes (0 of 0), Superclasses (0 of 1), Direct superclasses (0 of 1), Direct subclasses (3 of 3), Subclasses (3 of 4), and Instances (1 of 1). The Direct subclasses and Subclasses sections list AmericanPizza, SohoPizza, and VeganPizza. The Instances section lists ThisPizza.
- Query for**: A section with checkboxes for "Direct superclasses", "Superclasses", "Equivalent classes", "Direct subclasses", "Subclasses", and "Instances".
- Result filters**: A section with a "Name contains" text input and checkboxes for "Display owl:Thing (in superclass results)" and "Display owl:Nothing (in subclass results)".

The Reasoner is active, and the "Show Inferences" checkbox is checked.