D0034E Applied AI, Knowledge Management and Reasoning
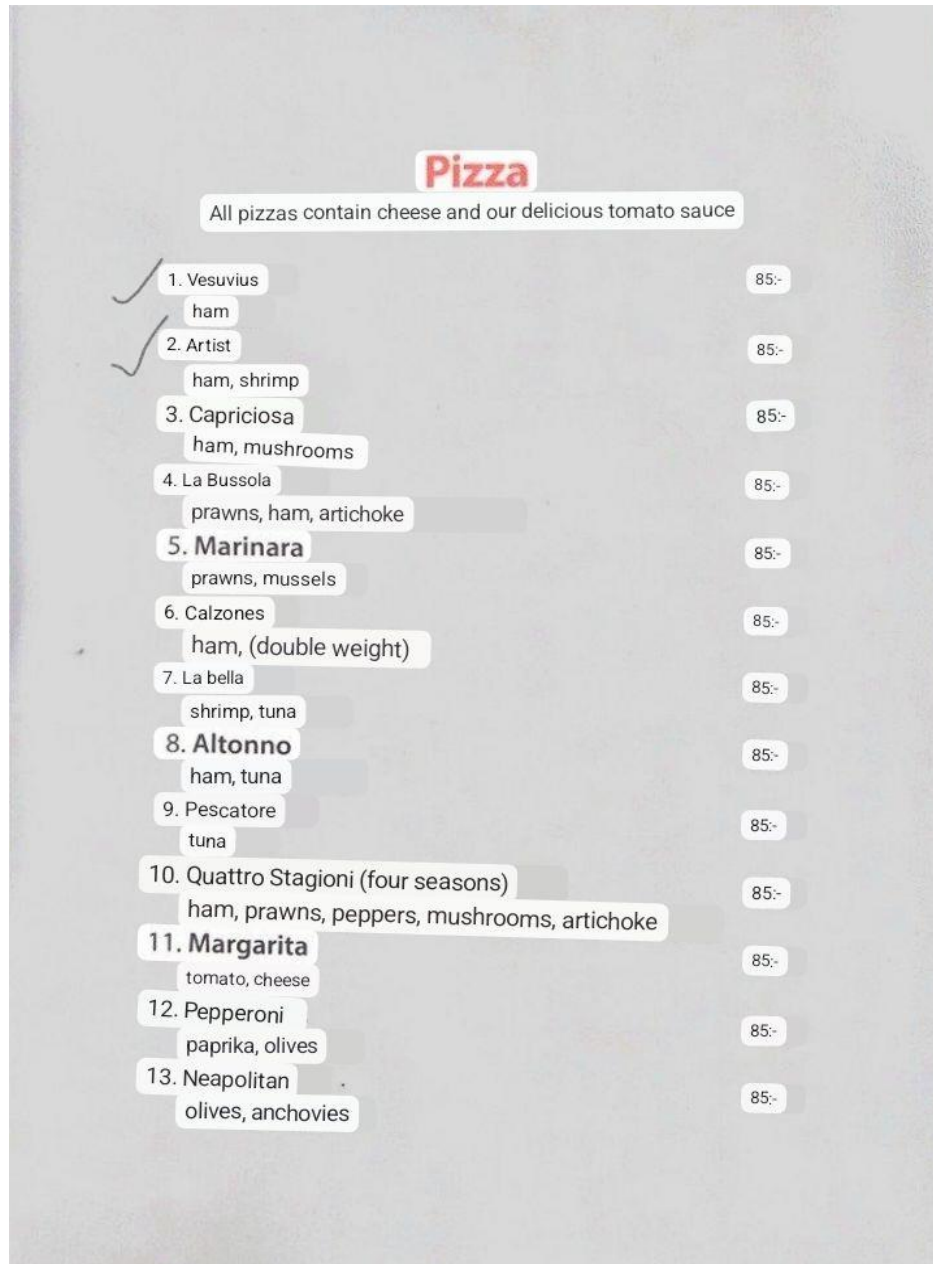
Lab 2: Ontologies by
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Group 1

Since the assigned pizzeria (No. 1 - Restaurant Östergök) does not have a website, I searched for its menu and found it here.

I have chosen the first two pizzas and added them to the base ontology as follows. Please note that I have used Google Lens translator to detect and translate the text in the menu from Swedish to English.

First, I will create a class for the first pizza (Vesuvius). Note that all the pizzas of the pizzeria have cheese and tomato sauce.

Pizza

All pizzas contain cheese and our delicious tomato sauce

1. Vesuvius — ham — 85:-
2. Artist — ham, shrimp — 85:-
3. Capriciosa — ham, mushrooms — 85:-
4. La Bussola — prawns, ham, artichoke — 85:-
5. Marinara — prawns, mussels — 85:-
6. Calzones — ham, (double weight) — 85:-
7. La bella — shrimp, tuna — 85:-
8. Altonno — ham, tuna — 85:-
9. Pescatore — tuna — 85:-
10. Quattro Stagioni (four seasons) — ham, prawns, peppers, mushrooms, artichoke — 85:-
11. Margarita — tomato, cheese — 85:-
12. Pepperoni — paprika, olives — 85:-
13. Neapolitan — olives, anchovies — 85:-

Translated with Google Lens

Select **NamedPizza** which is a subclass of **Pizza** and create a new class called **VesuviusPizza**:

While **VesuviusPizza** class is selected click on Subclass Of plus sign in the description view and add the following restrictions using the class expression editor:

Do the same to create the second pizza class named **ArtistPizza**:

The two newly added classes should be disjoint with the other named pizzas. I do that by editing the disjoint property of one of the previously defined named pizzas. For example I select **AmericanaPizza** and click on the edit button (the button with an 'o' shape) of the disjoint property then by holding the CTRL key I will add the two new named pizzas:
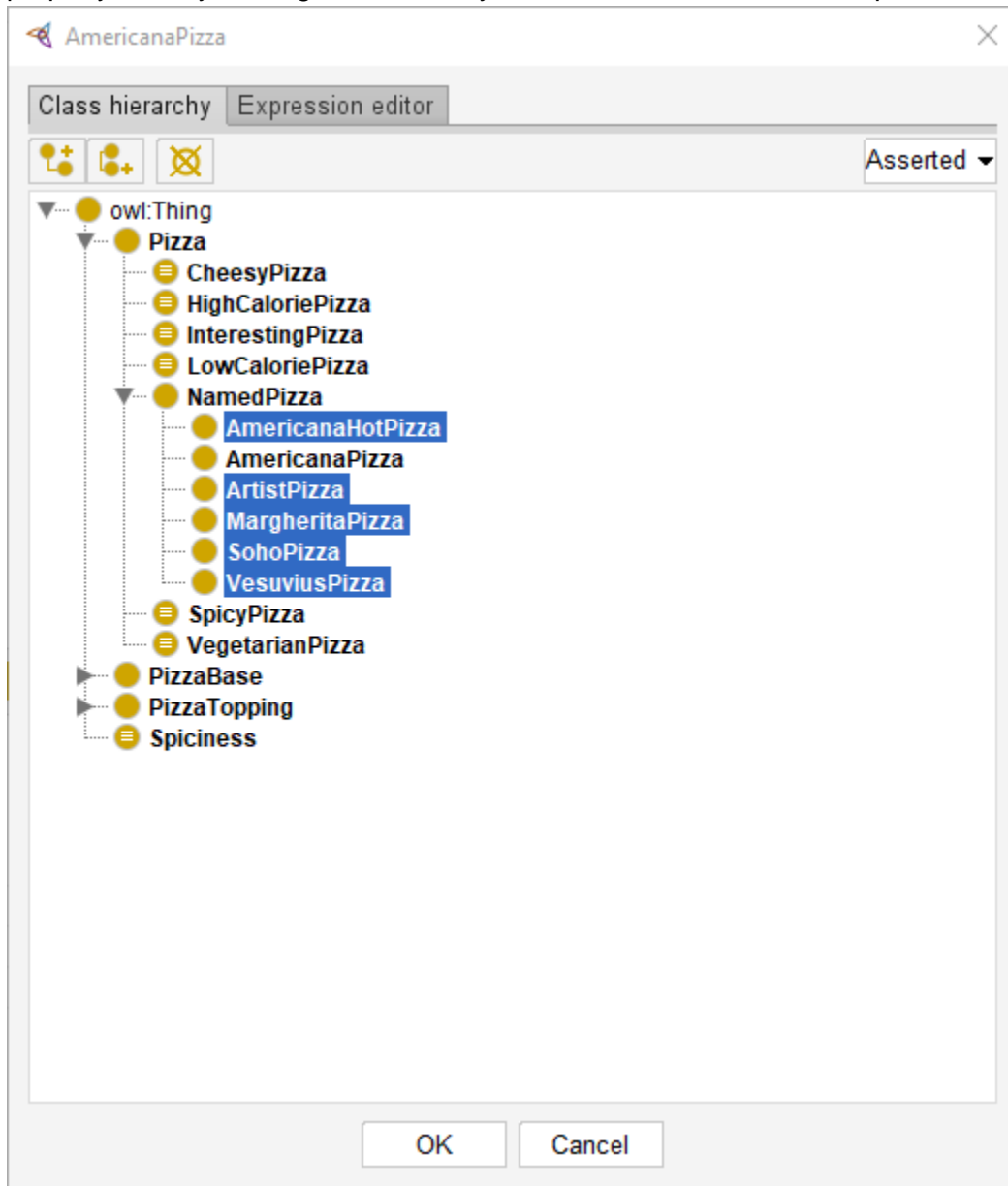
The reasoner will automatically add a disjoint property to the two newly added pizzas.

Description: VesuviusPizza

Equivalent To ⊕

SubClass Of ⊕
- hasTopping some CheeseTopping
- hasTopping some TomatoTopping
- NamedPizza

General class axioms ⊕

SubClass Of (Anonymous Ancestor)
- hasCaloricContent some xsd:integer
- hasBase some PizzaBase

Instances ⊕

Target for Key ⊕

Disjoint With ⊕
- ArtistPizza, AmericanaHotPizza, AmericanaPizza, MargheritaPizza, SohoPizza

Disjoint Union Of ⊕

Since we have already **HamTopping** class in our ontology, we can now make **VesuviusPizza** a subclass of all pizzas that has some kind of ham topping as follows:

Description: VesuviusPizza
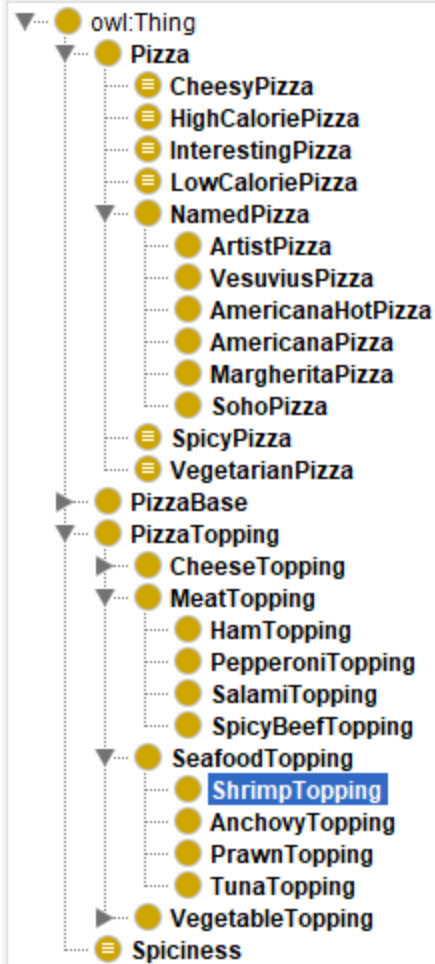
Equivalent To ⊕

SubClass Of ⊕
- hasTopping some CheeseTopping
- hasTopping some HamTopping
- hasTopping some TomatoTopping
- NamedPizza

ArtistPizza has shrimp topping which we need to add to our ontology under **SeaFoodTopping** class and make it disjoint to the other seafood toppings:

Class hierarchy: ShrimpTop [?][I][=][□][x]

[icons] [Asserted ▾]

- ● owl:Thing
  - ● **Pizza**
    - ▤ **CheesyPizza**
    - ▤ **HighCaloriePizza**
    - ▤ **InterestingPizza**
    - ▤ **LowCaloriePizza**
    - ● **NamedPizza**
      - ● **ArtistPizza**
      - ● **VesuviusPizza**
      - ● **AmericanaHotPizza**
      - ● **AmericanaPizza**
      - ● **MargheritaPizza**
      - ● **SohoPizza**
    - ▤ **SpicyPizza**
    - ▤ **VegetarianPizza**
  - ● **PizzaBase**
  - ● **PizzaTopping**
    - ● **CheeseTopping**
    - ● **MeatTopping**
      - ● **HamTopping**
      - ● **PepperoniTopping**
      - ● **SalamiTopping**
      - ● **SpicyBeefTopping**
    - ● **SeafoodTopping**
      - ● **ShrimpTopping**
      - ● **AnchovyTopping**
      - ● **PrawnTopping**
      - ● **TunaTopping**
    - ● **VegetableTopping**
  - ▤ **Spiciness**

Annotations ⊕

Description: ShrimpTopping

Equivalent To ⊕

SubClass Of ⊕
- ● **SeafoodTopping**

General class axioms ⊕

SubClass Of (Anonymous Ancestor)

Instances ⊕

Target for Key ⊕

Disjoint With ⊕
- ● **AnchovyTopping, TunaTopping, PrawnTopping**

Disjoint Union Of ⊕

And finally we will add the following restriction to **ArtistPizza**:

Note that since I have run the reasoner, it is inferred that **ArtistPizza** is a subclass of **CheesyPizza**.

And here are the descriptions of the two newly added pizzas after running the reasoner:

Description: VesuviusPizza

Equivalent To ⊕

SubClass Of ⊕
- hasTopping some CheeseTopping
- hasTopping some HamTopping
- hasTopping some TomatoTopping
- NamedPizza
- CheesyPizza
- InterestingPizza

General class axioms ⊕

SubClass Of (Anonymous Ancestor)
- hasCaloricContent some xsd:integer
- hasBase some PizzaBase
- Pizza
  and (hasTopping some CheeseTopping)
- Pizza
  and (hasTopping min 3 PizzaTopping)

Instances ⊕

Target for Key ⊕

Disjoint With ⊕
- ArtistPizza, AmericanaHotPizza, AmericanaPizza, MargheritaPizza, SohoPizza

Disjoint Union Of ⊕

Description: ArtistPizza

Equivalent To ⊕

SubClass Of ⊕
- 🟡 **hasTopping** some **CheeseTopping**
- 🟡 **hasTopping** some **ShrimpTopping**
- 🟡 **hasTopping** some **TomatoTopping**
- 🟡 **NamedPizza**
- ☰ CheesyPizza
- ☰ InterestingPizza

General class axioms ⊕

SubClass Of (Anonymous Ancestor)
- 🟡 **hasCaloricContent** some **xsd:integer**
- 🟡 **hasBase** some **PizzaBase**
- 🟡 Pizza
  and (hasTopping some CheeseTopping)
- 🟡 Pizza
  and (hasTopping min 3 PizzaTopping)

Instances ⊕

Target for Key ⊕

Disjoint With ⊕
- 🟡 **AmericanaHotPizza, AmericanaPizza, MargheritaPizza, VesuviusPizza, SohoPizza**

Disjoint Union Of ⊕