Protégé Short Course: Modeling Exercise

Goal

To give a course attendee the chance to model a relatively constrained ontology that brings out issues discussed in the class.

Scenario

You are planning to host a dinner. You have invited your friends Mary, Ashok, and Amara to come. Mary likes to have a meat main dish at the dinner. Ashok only eats vegetarian food. As a thoughtful host, you want to serve a dinner where both Mary and Ashok have good selections of dishes to eat. You decide that you will serve a soup and/or a salad, some main dishes, and a dessert. For the Mary, you will serve at least one meat main dish, and for Ashok, you will serve dishes that include at least a vegetarian dessert, a vegetarian soup or salad, and a vegetarian main dish.

You decide to use recipes from the book *Essentials of Classic Italian Cooking* by Marcella Hazan. The ingredients of the dishes enumerated in this handout are based on recipes in the book.

Competency Questions

1. Which dishes have meat as an ingredient?
2. Which dishes are "vegetarian dishes" and "meat dishes"?
3. What are some combinations of dishes
       that are all vegetarian?
       that have the right combination of meat and vegetarian dishes for your party?

Bonus

4. Which recipe gives direction for a particular dish, say, the Garlic-Scented Tomato Salad dish?
5. Based on the recipes, what ingredients do you have to get for your dinner?

Tasks

Wednesday

- Conceptualize your domain. Draw diagrams on paper (or your favorite diagramming tool) to illustrate the entities and relationships in the domain.
  - Start with Dinner, Person, FoodDish and FoodStuff (like Apple and Salt)
  - Would you represent the "Garlic-Scented Tomato Salad dish" as a class or as an individual?
  - How would you represent ingredients of the Garlic-Scented Tomato Salad dish?
  - Start diagramming the high-level classes and a sample of lower-level classes and individuals in your ontology. Show relationships among the classes. In your diagramming notation, distinguish between class and individual, class/subclass relationship, instance-of relationship, and relationships that may exist between individuals of the classes. Include concepts like Dinner, FoodDish, FoodStuff, Person, Garlic-Scented Tomato Salad, and the dinner on Saturday.
- Open the `dinner-start.owl` ontology in Protégé

- Create the classes and properties you have conceptualized for your domain
- Specify a few dishes in terms of their ingredients
- Organize the food stuff into a class hierarchy
- Create a food dish hierarchy
- Use the DL Query tab to query for
  - FoodDish that has tomato as an ingredient
  - FoodDish that has meat as an ingredient
  Populate enough of your ontology so that you get some results for these queries
- Specify a dinner in terms of the dishes that will be served in the dinner
- Write a query for dinners that have dishes that contain meat

Bonus
- Consider a recipe for making Garlic-Scented Tomato Salad dishes. Is the recipe a class or an individual?
- Are the "ingredients" listed in a recipe the same kind of things as the "ingredients" of the dish for which the recipe gives cooking directions? If they are different, how would you model the relationship between them? Diagram Recipe, a particular recipe, the ingredients specified in the recipe, and the relationships between a recipe, the ingredients in the recipe, and the associated dish.
- Suppose you want to add the specified quantity for the ingredients in a recipe. How does this requirement change your representation of a recipe?

Thursday
- Define "Meat Dish" as a dish that contains any meat
- Classify your ontology to show that some of the dishes are "Meat Dish"
- Define some subclasses of Dinner in terms of the kinds of dishes that they contain
- Demonstrate that one of the Dinner classes has a meat dish as a "main dish."
- Define "Vegetarian Dish." Why dishes you expect to be vegetarian may not be classified appropriately? What may be missing? Add appropriate axioms.
- Define your dinner party and demonstrate that your combination of dishes satisfies the dinner requirements (at least one meat main dish, at least one vegetarian main dish, a vegetarian dessert, and either a vegetarian soup or salad)

Bonus
- Model the recipes for a few dishes
- Query for ingredients specified in a recipe
- Query for ingredients you need to get based on a collection of recipes (e.g., those for your dinner)

Data: Ingredients of Dishes

A stub ontology with all of the ingredients named in the description of dishes is available as `dinner-start.owl` among the course materials.

Ingredients of Dishes

Soups

Spinach Soup
For 5 or 6 servings
> 2 pounds fresh spinach
> Salt to taste
> 4 tablespoons (½ stick) butter
> 2 tablespoons chopped onion
> 2 cups meat broth
> 2 cups milk
> Whole nutmeg
> 5 tablespoons freshly grated parmigiano-reggiano cheese

Vegetarian Potato Soup with Smothered Onion
For 4 or 6 servings
> 2 pounds boiling potatoes
> 3 tablespoons butter
> 3 tablespoons vegetable oil
> 1½ pounds onions, sliced very thin
> Salt to taste
> 3½ cups vegetarian broth
> 3 tablespoons freshly grated Parmigiano-Reggiano cheese
> 1 tablespoon chopped parsley

Salads

Garlic-Scented Tomato Salad
For 4 or 6 servings
> 4 to 5 garlic cloves
> Salt
> Pine nuts
> Choice quality red wine vinegar
> 2 pounds fresh, ripe, firm, round or plum tomatoes
> 1 dozen fresh basil leaves
> Extra virgin olive oil

Shredded Carrot Salad with Arugula

For 4 servings

> 5 to 6 medium carrots, washed, trimmed, peeled, and shredded
> Salt
> Extra virgin olive oil
> 1 tablespoon freshly squeezed lemon juice
> 1/2 pound fresh arugula

Vegetables

Braised Artichokes and Peas

For 4 to 6 servings

> 2 large globe artichokes
> ½ lemon
> 2 tablespoons chopped onion
> 3 tablespoons extra virgin olive oil
> ½ teaspoon garlic chopped very fine
> 2 pounds fresh unshelled peas
> 1 tablespoon chopped parsley
> Salt
> Black pepper, ground fresh from the mill

Beef

Grilled T-Bone Steak, Florentine Style

For 2 servings

> Black peppercorns, ground very coarse or crushed with a pestle in a mortar
> 1 T-bone beef steak, 1½ inches thick, brought to room temperature
> Salt
> OPTIONAL: a lightly crushed and peeled garlic clove
> Extra virgin olive oil

Dessert

Strawberry Gelato

For 4 servings

> ½ pound fresh strawberries
> ¾ cup granulated sugar
> ¼ cup cold heavy whipping cream

Fresh Fruit Whips

For 2 servings

> 1 banana OR an equivalent amount of fresh peaches OR strawberries OR raspberries
> ⅔ cup milk
> 1½ teaspoons sugar
> 3 tablespoons crushed ice
> 2 tablespoons Maraschino liqueur