Deadline: 2016-11-25 23:59
Recitation (øvingsforelesning): 2016-11-15 18:15, S2

Frame-Based Knowledge Representation

In this exercise you will work with frame-based representation using the **frame based** parts of the ontology editor Protégé. You need version 3.5, available on the Protégé website [1], because all later versions do not contain frame modules. Download and install it (in the lab, you have to install it in your own directory) to finish your exercise. A very good tutorial [2] and other documentation are available. We recommend that you work through the tutorial example, this should give you enough insight to be able to solve the assigned tasks.

[1]: `http://protege.stanford.edu/download/protege/3.5/installanywhere/Web_Installers/`
[2]: `http://protegewiki.stanford.edu/images/e/e8/Protege-frames-get-started.pdf`

1 Build the Knowledge Base

Represent the following facts as Protégé classes, slots, and individuals:

All animals have skin. Fish is one kind of animal, birds are another type and mammals are a third type. Normally fish has gills and can swim, while birds have wings and can fly. While birds and fish usually lies eggs, mammals do not. Although sharks are fish, they do not lay eggs - their children are born fully formed. They are very dangerous. Salmon is another fish, and it is considered a delicacy. The canary is a bird and it is yellow. Ostrich is one kind of bird which is very tall but it can't fly, only walk. Mammals usually move by walking - as for instance the cow. Cows give milk but are also used for food. Not all mammals move primarily by walking though, for instance the bat which flies.

2 Reasoning

Use the Protégé queries tab to answer the following questions using the knowledge base set up in Part 1. If some of these queries cannot be answered by your representation or by the query mechanism provided with Protégé explain why.

1. Can canaries fly?
2. What is the color of canaries?
3. Can ostriches fly?
4. Does an ostrich have wings?
5. Are sharks dangerous?
6. Are ostriches dangerous?
7. Which animals lay eggs?
8. Which animals are edible?
9. Which animals move by swimming but do not lay eggs?

10. What does most fish and birds have in common?
11. List all animals in this knowledge base.

Requirements:

- Write the knowledge base in Protégé (classes, slots, and individuals).
- Answer the questions by forming Protégé queries.
- Deliver the knowledge base (the pprj, pins, and pont files).
- Deliver screenshots of the queries according to the questions and the answers provided by Protégé.

3 Multiple Inheritance

Multiple inheritance is when a frame inherits from two other frames that have conflicting information. A classical example referring to the different aspects of the former president of the US, Richard Nixon, is:

1. John is a Republican
2. John is a Quaker
3. Republicans are non-pacifists
4. Quakers are pacifists

Represent this in Protégé. Discuss:

- Can you handle the conflicting evidence in this situation using Protégé?
- If so, how? If not, why not?
- Can you suggest extensions to Protégé or frame based representations in general that could handle it?

Delivery

1. A pdf file with answers to the theoretical questions.
2. Screenshots for exercise 2, either as part of the report or as separate files.
3. A zip-file named YourLastName(s).zip with Protégé files for this exercise.