

IN3060/IN4060 – MANDATORY EXERCISE 5

Tiago Lubiana Alves N USP 8945857 São Paulo, 11/11/2020

Delivery files: 3 files: 2 OWL files, 1 pdf file containing answers to questions.

1.1 Manchester Syntax

Express the statements 3, 4, 5, 13, 14, 15, 19, 21; and the three statements about individuals in Manchester syntax, e.g., no. 6: "Every warmblooded horse is a horse" can be written as (WarmbloodedHorse \sqsubseteq Horse):

Class: WarmbloodedHorse SubClassOf: Horse

3. Every horse is an animal.

Class: Horse SubClassOf: Animal

4. Every animal is a male or a female.

Class Animal: EquivalentTo: Male or Female

5. Nothing is both a male and a female.

DisjointClasses: Male, Female

13. Every monté horse is a racehorse that has only competed in monté races.

Class: MonteHorse EquivalentTo: RaceHorse and (hasCompeted only MonteRace)

14. A superhorse is by definition a racehorse that has won more than 100 horse races.

Class: SuperHorse EquivalentTo: RaceHorse and (hasWon min 100 HorseRace)

15. You must compete in a race to win a race.

ObjectProperty: hasWon SubPropertyOf: hasCompeted

19. Every racehorse has at least one trainer which is a person.

Class: RaceHorse: SubClassOf: Horse and (hasTrainer some Person)

21. If a horse has a trainer, then this trainer trains the horse.

ObjectProperty:hasTrainer InverseOf: trains

1.2 Questions

Answer the following questions with "Yes", "No" or "Unknown", and a sentence or two to back up the claim, referring to the axioms you have created in your ontology as arguments.

1. Is Rex Rodney a male or a female animal?

Yes. A SuperHorse is a Horse, which is an Animal, which is Male or Female.

2. Does Kjell Håkonsen have an interest in Elitloppet 1986?

Yes. he trains a horse that competed on that race.

3. Is Rex Rodney a warmblooded horse?

Unknown. No assertions or inferences that allow such conclusion.

4. Is Steady, Ready, Go a warmblooded horse?

No. Every warm-blooded horse which has competed in a monté race must be between 4–12 years old. Every monté horse is a racehorse that has only competed in monté races. The horse called "Steady, Ready, Go" is a filly and monté horse.

5. Is Steady, Ready, Go a coldblooded horse?

Unknown. The ColdBloodedHorse class is disjoint with WarmBloodedHorse, but we do not know if every horse is either ColdBloodedHorse or WarmBloodedHorse.

6. Did Steady, Ready, Go compete in Elitloppet 1986?

No. Every monté horse is a racehorse that has only competed in monté races. Elitloppet1986 is not a monté race.

2 Exercise: Mapping DBpedia to your ontology

The task of this exercise is to create a mapping of parts of the DBpedia vocabulary about horses and racehorses to your ontology from the exercise above.

Your mapping ontology should be a separate file and it should import the ontology at the above address from this address and additionally the ontology you have made in the first exercise.

Notes: In the properties dbpprop:m, dbpprop:fm, dbpprop:mm, and so on, m means "mother" and f "father", so two letters means a grand-parent, e.g., dbpprop:fm is the mother to the father (norwegian: farmor) to the horse.

In the excerpt dbpedia:Stallion is an individual (and not a class).

If the intended meaning of the properties or other resources in the excerpt is not clear, use a reasonable interpretation you find fit.

Since you will be working with resources from different ontologies, keeping them apart is smart. To display names in Protégé using qualified names enable the setting found in Protégé under the File -> Preferences -> Renderer -> "Render by qualified name".

2.1 Questions

Apply reasoning to your ontology and answer the following questions:

1. List all stallions.

"In the Wings", "Northern Dancer" (that we know of)

2. List all male horses.

"In the Wings", "Northern Dancer" (that we know of)

3. Since "Northern Dancer" is an ancestor of "In the Wings", the ancestors of "Northern Dancer" should also be the ancestors of "In the Wings". Why is this not the case?

Protege and the reasoners I tried were not able to handle that complexity.

The father of the father of "In the Wings" has the name 'Northern Dancer', and this is stated via a blank node.

Names are keys for RaceHorses. We do not know, however, if the horse named "Northern Dancer" that is the ancestor of "In the Wings" is a race horse.

If it were, then we would infer they are the same.

What we know by the ontology does not allow that inference.

So we only know that a "Northern Dancer" is the ancestor, not the exactly the dbpedia:Northern_Dancer, thus we cannot infer the other ancestors.

3.2 Annotation properties

In OWL, `rdfs:label` is a predefined annotation property, see <http://www.w3.org/TR/owl-ref/#Annotations>. Explain what an annotation property is and why they are useful.

Annotation properties are properties that serve to add extra information to parts of the ontology. According to the OWL 2 syntax descriptor (https://www.w3.org/TR/owl2-syntax/#Annotation_Properties), "Annotation properties can be used to provide an annotation for an ontology, axiom, or an IRI."

They have many use cases. "`rdfs:label`" can provide human readable labels, and "`rdfs:comment`" can provide human readable comments. More generally, they guide human readers in understanding the details of the design choices and ontological commitments, and help to clarify concepts. As they are a structured part of the ontology (in contrast with code comments) they can be read and dealt with by user interfaces like Protege.