university of groningen / faculty of science and engineering

Information System
Lab 4
Reasoning about Ontologies

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1 Introduction

This lab regards the topic of Ontologies and how to reason the logic of ontological statements. This assignment is based on the following ontology provided:

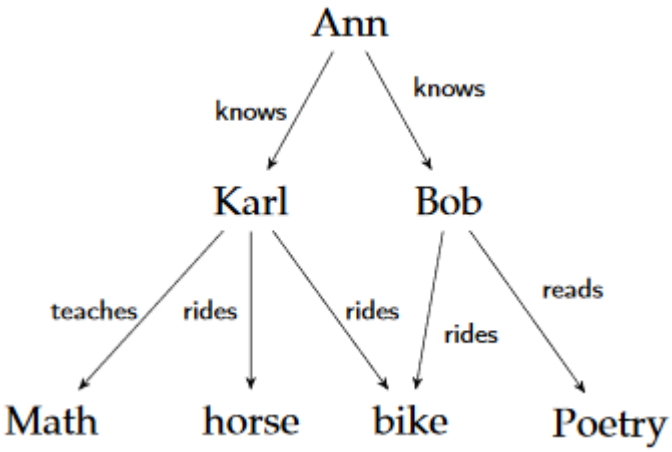

Figure 1: The ontology presented in the assignment

2 Labelled Transition System

For this we converted the ontology presented in the assignment into the following (LTS).

The sets:

{Ann, Karl, Bob, Math, horse, bike, Poetry}

The transitions:

{knows, teaches, rides, reads}

The transition relationships:

$$\{\text{Ann} \xrightarrow{knows} \text{Karl},\ \text{Ann} \xrightarrow{knows} \text{Bob},\ \text{Karl} \xrightarrow{teaches} \text{Math},\ \text{Karl} \xrightarrow{rides} \text{horse},$$
$$\text{Karl} \xrightarrow{rides} \text{bike},\ \text{Bob} \xrightarrow{rides} \text{bike},\ \text{Bob} \xrightarrow{reads} \text{Poetry}\}$$

3 Ontological sets

Before considering the following sets we wished to state an assumption we made when deriving the answers to the following questions. This assumption concerns the necessity relationships e.g. [knows]. We assume that if an entity does not have such a relationship it automatically passes this condition, i.e. Poetry $\in$ [knows]tt. If this is not the case then our answers contain more entities than necessary.

- (a) [knows]⟨rides⟩**tt**
  {Sys} or all entities
- (b) [knows]⟨teaches⟩**tt**
  { Ann' } or all entities except Ann
- (c) ⟨knows⟩⟨teaches⟩**tt**
  { Ann }
- (d) ⟨knows⟩[teaches]**ff**
  { Ann }
- (e) ⟨knows⟩[rides]**ff**
  { $\emptyset$ } or empty set
- (f) [knows]⟨rides⟩**tt** $\wedge$ ⟨knows⟩[teaches]**ff**
  { Ann }
- (g) [knows](⟨teaches⟩**tt** $\vee$ ⟨reads⟩**tt**)
  {Sys} or all entities