First-Order Logic: Theory and Practice

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Modeling and Working with Systems

Exercises: Modeling & Systems

Example — Philosophisches (Kreuzer/Kühling: Logik für Informatiker, 2006) 1

Platon hatte Recht mit seiner Einschätzung des Sokrates genau dann, wenn Sokrates kein großer Philosoph war. Wenn Sokrates ein großer Philosoph war, dann hatte Aristoteles Recht mit seiner Einschätzung des Platon. Aristoteles hatte nur dann Recht mit seiner Einschätzung des Platon, falls Platon Recht hatte mit seiner Einschätzung des Sokrates.

(Model in TPTP Syntax, play with Systems)

Example — Philosophisches (Kreuzer/Kühling: Logik für Informatiker, 2006) 2

Zusätzlich gelte: Platons Einschätzung des Sokrates gilt.
Gilt nun: Sokrates war kein großer Philosoph?

(Model in TPTP Syntax, play with Systems)

Exercises: Modeling & Systems

Example — Washington 3

A capital is a city. USA is a country. Every city has crime. Washington is the capital of the USA. Every country has a beautiful capital. Therefore, Washington is beautiful but has crime.

Example 4

Every student is enrolled in at least one course. Every professor teaches at least one course. Every course has at least one student enrolled. Every course has at least one professor teaching. The coordinator of a course teaches the course. If a student is enroled in a course then the student is taught by every professor who teaches the course. Michael is enrolled in CSC410. Victor is the coordinator of CSC410. Therefore, Michael is taught by Victor.

Exercises: Modeling & Systems

Example — Bachelor of Science Degree 5

see
http://christoph-benzmueller.de/2012-FOL/exercises-modeling/MiamiDegree.p

Example — Schubert's Steamroller (Pelletier, 1986) 6

Wolves, foxes, birds, caterpillars, and snails are animals, and there are some of each of them. Also there are some grains, and grains are plants. Every animal either likes to eat all plants or all animals much smaller than itself that like to eat some plants. Caterpillars and snails are much smaller than birds, which are much smaller than foxes, which in turn are much smaller than wolves. Wolves do not like to eat foxes or grains, while birds like to eat caterpillars but not snails. Caterpillars and snails like to eat some plants. Therefore there is an animal that likes to eat a grain eating animal.

Example — Agatha's Murderer/Dreadbury Mansion (Pelletier, 1986) 7

Someone who lives in Dreadbury Mansion killed Aunt Agatha. Agatha, the butler, and Charles live in Dreadbury Mansion, and are the only people who live therein. A killer always hates his victim, and is never richer than his victim. Charles hates no one that Aunt Agatha hates. Agatha hates everyone except the butler. The butler hates everyone not richer than Aunt Agatha. The butler hates everyone Aunt Agatha hates. No one hates everyone. Agatha is not the butler. Therefore : Agatha killed herself.

Exercises: Modeling & Systems

Example — Sudoku Puzzles 8

Bring your own Sudoku Puzzle and model the problem wrt.

- Hillenbrand's Axioms: PUZ005+0.ax
- Kosey's Axioms: PUZ006+0.ax

Run different provers. Can you extract a solution from the prover results?

Example — City Distances 9

see

`http://christoph-benzmueller.de/2012-FOL/exercises-modeling/GEG022=1.p`

Example — Student Project 10

- each student team proposes own modeling task
- teams give short presentations
- we will discuss feasibilty
- either this proposal will be accepted or
- default project: model your bachelor or masters degree constraints