Master in Computational Logics & Mestrado em Engenharia Informática
Universidade Nova de Lisboa

Knowledge Representation and Reasoning

Second Test – Closed book – 1h30m

20th December 2012

Group 1

Consider the following information:

Projects are identified by a name. Student projects and research projects are projects. Persons, identified by a name, can be members of projects. Researchers and students are persons. Usually if a project has at least a researcher as member then it is a research project. Usually if a project has at least a student as member then it is a student project. In case of conflict between these two default rules, prefer the former (i.e. prefer the one that states it is a research project).

p_1, p_2 and p_3 are projects, s is a student and r is a researcher. s is a member of p_1 and p_2, and r is a member of p_2 and p_3.

1) Represent the information above with an extended logic program under the well founded model semantics.

2) Determine the well-founded model of the program.

3) Except for the rules that apply by default (the ones with "usually"), and the preference among these, the above knowledge could as well be represented using description logics.

   3.1) Represent those sentences in the Description Logic $\mathcal{ALC}$. Namely, the sentences: *Project are identified by a name. Student projects and research projects are projects. Persons, identified by a name, can be members of projects. Researchers and students are persons.*

   3.2) Represent in $\mathcal{ALC}$ the sentence: *there is at least one project with a student.*

Group 2

Consider the following EVOLP program and sequence of events:

$$P = \left\{ \begin{array}{l} a \leftarrow assert\,(c \leftarrow not\ d.)\,, not\ b. \\ d \leftarrow assert\,(b.)\,. \\ assert\,(c \leftarrow not\ d.) \leftarrow not\ assert\,(b.)\,, b. \\ assert\,(not\ b \leftarrow c.) \leftarrow assert\,(c \leftarrow not\ d.)\,. \end{array} \right\} \qquad \begin{array}{c} E_1 = \{assert\,(b.)\,.\} \\ E_2 = \emptyset \\ E_3 = \emptyset \end{array}$$

1) Show that the evolution interpretation $\langle M_1, M_2, M_3 \rangle$ is an evoluiton stable model of P given $\langle E_1, E_2, E_3 \rangle$, where:

$$\begin{array}{l} M_1 = \{assert\,(b.)\,, d\} \\ M_2 = \{assert\,(c \leftarrow not\ d.)\,, assert\,(not\ b \leftarrow c.)\,, b\} \\ M_3 = \{c\} \end{array}$$