Department of Computer Science
Research Focus
"Intelligent Formal Systems"

TECHNISCHE
UNIVERSITÄT
DRESDEN

Colloquium

Within the seminar of the Research Focus, the Ph.D. programme "Specification of discrete processes and systems of processes by operational models and logics" presents a talk by

Prof. Franz Baader
Institute for Theoretical Computer Science
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Germany

about

**"A new n-ary existential quantifier in Description Logic,
or how syntactic sugar can speed up reasoning"**

Abstract: Motivated by a chemical process engineering application, we look at a new concept constructor in Description Logics (DLs), an n-ary variant of the existential restriction operator, which generalizes both existential restrictions and so-called qualified number restrictions. To give an intuitive explanation of what this new operator can express, consider the sentence "*I have a child that is a professor and a child that is a medical doctor.*" One would usually interpret this sentence as saying that the person in fact has two children having the respective professions. However, if one expresses it in DL employing the usual existential restriction operator, then this conclusion does not hold: there might be just one child being a professor of medicine. In order to be able to express the existence of *different* children, one needs a new type of constructor.

We will show the following:

1. The new constructor can be expressed using disjunction and qualified number restrictions. However, this results in an exponential blow-up of the concept description. Consequently, applying (even highly optimized) DL reasoners to the translated concepts does not result in an acceptable performance.
2. By designing algorithms directly for this new constructor, we can show that the complexity of reasoning does not increase when adding the new constructor to standard DLs.
3. Moreover, when restricting to a DL that provides only the new constructor together with conjunction, then reasoning becomes polynomial. This restricted DL is actually sufficient for the chemical process engineering application mentioned above.

(This is joint work with Manfred Theißen (LPT, RWTH Aachen) and Carsten Lutz and Eldar Karabaev (TU Dresden).)

Date:	19.10.2004
Place and time:	Department of Computer Science, Room: 151, 1.15 pm

All interested persons are invited to attend!

Prof. Dr.-Ing. habil. Heiko Vogler