INFORMATIK-KOLLOQUIUM
AB Programmiersprachen und Übersetzer
Institut für Computersprachen

computer
languages

Einladung

zum Informatik-Kolloquium des

AB Programmiersprachen und Übersetzer am

Mittwoch, den 4. Feber 2009, um 14:00 Uhr s.t.

in der Bibliothek E185.1, Argentinierstr. 8, 4. Stock (Mitte)

Es spricht

Dr. Nikolaj Popov

RISC-Linz, Johannes Kepler University, Linz, Austria

über

Functional Program Verification in *Theorema.* Recent Achievements and Perspectives

Abstract: We present an environment designed for proving total correctness of recursive functional programs. As usual, correctness is transformed into a set of first-order predicate logic formulae – verification conditions. As a distinctive feature of our method, these formulae are not only sufficient, but also necessary for the correctness. We demonstrate our method on several examples and show how correctness of those may be proven fully automatically. In fact, even if a small part of the specification is missing – in the literature this is often a case – the correctness cannot be proven. Furthermore, a relevant counterexample may be constructed automatically. A specialized strategy for proving termination of recursive functional programs is developed. The detailed termination proofs may in many cases be skipped, because the termination conditions are reusable and thus collected in specialized libraries. Enlargement of the libraries is possible by proving termination of each candidate, but also by taking new elements directly from existing libraries.

During the talk, we emphasize on the most recent achievements we have made, and in particular verification of functions defined by mutual recursion and functions containing nested recursion. Our work is performed in the frame of the *Theorema* system, which is a mathematical computer assistant aiming at supporting all the phases of mathematical activity: construction and exploration of mathematical theories, definition of algorithms for problem solving, as well as experimentation and rigorous verification of them. Moreover, the logical verification conditions can be passed to the automatic provers of the system. *Theorema* includes a collection of general as well as specific provers for various interesting domains (e.g., integers, sets, reals, tuples, etc.).

This is joint work with Tudor Jebelean.

Biography: Nikolaj Popov is a postdoctoral researcher in the Theorema group of Prof. Bruno Buchberger and Prof. Tudor Jebelean, at the Research Institute for Symbolic Computation, University of Linz, Austria. His research deals with the development of a relevant theory for proving correctness of recursive programs in an automatic manner. His particular focus is on the automatic generation of a necessary and sufficient set of verification conditions in order for the program to be correct. He holds an MSc from Sofia University, Bulgaria, and a PhD degree from the Research Institute for Symbolic Computation of the Johannes Kepler University, Linz, Austria. (`http://www.risc.uni-linz.ac.at/home/npopov`)

Zu diesem Vortrag lädt der *Arbeitsbereich für Programmiersprachen und Übersetzer am Institut für Computersprachen* herzlich ein.
Tee: 13:45 Uhr in der Bibliothek E185.1, Argentinierstr. 8, 4. Stock (Mitte).