



Preface to the Special Issue on Automated Reasoning Systems

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On March 8, 2018, Tobias Nipkow celebrated his sixtieth birthday. In anticipation of the occasion, after some discussion in early 2016 among all the editors of the *Journal of Automated Reasoning* except Tobias, it was decided to create two special issues to honor Tobias contributions to automated reasoning and their influence on the field.

The first issue, which has already appeared in Volume 61 under the title *Introduction to Milestones in Interactive Theorem Proving*, includes a synopsis on Tobias's scientific life. In addition to his influence on interactive theorem proving, which was the focus of the first special issue, this special issue honors his influence on automated reasoning as well.

Interactive theorem proving, and in particular the Isabelle proof assistant co-developed by Tobias's research group, have turned out to be a major success story for automatic reasoning itself. The need to improve automatic reasoning procedures to be used by interactive theorem provers to increase their own level of automation has led to an essential and vibrant new research direction in which Tobias and his close collaborators have played a crucial role so far. To honor that role this special issue is dedicated specifically to automated reasoning systems, as stated in its call for papers.

Call for papers for Special Issue on Automated Reasoning Systems of the Journal of Automated Reasoning

The past few decades have seen major developments and practical achievements in automated reasoning systems. For example, SAT solving has become an inherent part of the standard hardware production process; SMT solvers are now the backbone of most software verification techniques; first-order theorem provers have pushed the productivity of interactive theorem proving to a new level; computer algebra systems have solved difficult problems in mathematics and biology; knowledge representation

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systems have become indispensable for reasoning in the world wide web; automatic termination checkers routinely prove the termination of complex programs. This special issue is dedicated to automated reasoning systems in their full variety.

The preparation of this special issue involved the same rigorous reviewing and selection process that is applied to regular submission to this journal. In the end, five papers out of 21 submissions were selected for publication. Two papers, focus on formalizing aspects of automatic theorem proving procedures in an interactive theorem prover;

A Verified Implementation of Algebraic Numbers in Isabelle/HOL by
Sebastian Joosten, René Thiemann and Akihisa Yamada,

Limited Second-Order Functionality in a First-Order Setting by
Matt Kaufmann and J Strother Moore.

In one case, the goal is to generate code automatically for a correct-by-construction automatic reasoning procedure. In the other case, the higher-order formulation enables more powerful automatic reasoning later.

The remaining three papers discuss automatic reasoning systems:

OptiMathSAT: A Tool for Optimization Modulo Theories by
Roberto Sebastiani and Patrick Trentin,

K_SP A Resolution-Based Theorem Prover for K_n: Architecture, Refinements, Strategies and Experiments by
Cláudia Nalon, Ullrich Hustadt and Clare Dixon,

Scalable Fine-Grained Proofs for Formula Processing by
Haniel Barbosa, Jasmin Christian Blanchette and Pascal Fontaine.

The first two provide results on the overall development of such systems for specific logics whereas the third paper addresses the problem of proof representation, pushing the integration of automatic and interactive theorem proving.

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