Höfner, Peter; Struth, Georg
Automated reasoning in Kleene algebra. (English) Zbl 1184.68462

Summary: It has often been claimed that model checking, special purpose automated deduction or inter-
active theorem proving are needed for formal program development. We demonstrate that off-the-shelf
automated proof and counterexample search is an interesting alternative if combined with the right do-
main model. We implement variants of Kleene algebras axiomatically in Prover9/Mace4 and perform
proof experiments about Hoare, dynamic, temporal logics, concurrency control and termination analy-
sis. They confirm that a simple automated analysis of some important program properties is possible.
Particular benefits of this approach include “soft” model checking in a first-order setting, cross-theory
reasoning between standard formalisms and full automation of some (co)inductive arguments. Kleene
algebras might therefore provide light-weight formal methods with heavy-weight automation.

For the entire collection see [Zbl 1122.68008].

MSC:
68T15 Theorem proving (deduction, resolution, etc.) (MSC2010)  Cited in 24 Documents
03G25 Other algebras related to logic
68Q60 Specification and verification (program logics, model checking, etc.)

Software:
Mace4; Prover9

Full Text: DOI