The LEO-II Project

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Project Objectives

The LEO-II project develops a resolution-based theorem prover for classical higher-order logic which can cooperate with automated first-order provers. LEO-II predominantly addresses higher-order aspects in its reasoning process in order to quickly transform higher-order clauses into essentially first-order clauses. The subsequently growing set of essentially first-order clauses in the search space can then eventually be efficiently refuted by a first-order prover.

As an external reasoner LEO-II shall support interactive proof assistants such as Isabelle/HOL, HOL, and OMEGA by automating subproblems and thereby reducing the interaction effort (costs). It focuses on (but is not limited to) subproblems as they arise in program verification. LEO-II is implemented in Objective CAML and its problem representation language is HOTPTP.

Research Topics

- Minimize cut-simulation effect [3] by using
  - primitive equality instead of Leibniz equality
  - built-in extensionality rules instead of axioms
  - etc.
- Perfectly shared datastructures and indexing techniques for higher-order logic [5]
- Towards
  - higher-order rewrite- and simplification orderings
  - extensional higher-order superposition
- Prover architectures and search strategies supporting
  - extensional higher-order resolution / superposition
  - cooperation with first-order provers [1]
- Experiments in selected problem domains
  - hardware and software verification
  - mathematics, especially set-theory
  - logical puzzles

Interacting with LEO-II

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Literature on LEO and LEO-II