The Leo-III Project

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Abstract: We introduce the recently started Leo-III project — a Higher-Order Logic Theorem Prover and successor to LEO-II.

1 Summary

We report on the recently started Leo-III project, in which we design and implement a state-of-the-art Higher-Order Logic Theorem Prover, the successor of the well known LEO-II prover \cite{2}. Leo-III will be based on ordered paramodulation/superposition.

In constrast to LEO-II, we replace the internal term rep-resentation (the commonly used simply typed lambda calculus) by a more expressive system supporting type polymorphism. In the course of the project, we plan to further enhance the type system with type classes and type constructors similar to System F\textsuperscript{ω}.

In order to achieve a substantial performance speed-up, the architecture of Leo-III will be based on massive parallelism (e.g. And/Or-Parallelism, Multisearch) \cite{3}. The current design is a multi-agent blackboard architecture \cite{10} that will allow to independently run agents with our proof calculus as well as agents for external (specialized) provers.

Leo-III will focus right from the start on compatibility to the widely used TPTP infrastructure \cite{8}. Moreover, it will offer built-in support for specialized external prover agents and provide external interfaces to interactive provers such as Isabelle/HOL \cite{5}. The implementation will exces-sively use term sharing \cite{6,7} and several indexing tech-niques \cite{4,9}. Leo-III will also offer special support for reasoning in various quantified non-classical logics by explo-iting a semantic embedding \cite{1} approach.

References

\begin{thebibliography}{10}
\bibitem{2} Christoph Benzmüller, Lawrence C. Paulson, and Frank Theiss. Leo-ii a cooperative automatic theorem prover for higher-order logic. In \textit{In Fourth International Joint Conference on Automated Reasoning (IJCAR08)}, volume 5195 of LNAI. Springer, 2008.
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