

Interactive Proof: Hands-on Introduction

Tobias Nipkow
Technische Universität München, Germany

This course introduces interactive theorem proving with the Isabelle/HOL system [1]. It does so in 3 steps:

- Verified functional programming: The logic HOL contains an ML-style functional programming language. It is shown how to verify functional programs in this language by induction and simplification.
- Predicate logic: Formulas of predicate logic and set theory are introduced, together with inductively defined predicates.
- Structured proofs: We introduce the proof language Isar and show how to write structured proofs that are readable by both the machine and the human.

The course assumes basic familiarity with some functional programming language of the ML or Haskell family, in particular with recursive data types and pattern matching. No specific background in logic is necessary beyond the ability to read predicate logic formulas.

Students who want to obtain more than a superficial grasp of the subject are encouraged to bring their own laptops with the Isabelle system already downloaded (<http://isabelle.in.tum.de>). The lectures will be accompanied with exercises, and both Tobias Nipkow and Gerwin Klein will be available to discuss problems and solutions.

References

- [1] T.Nipkow, L.Paulson, M.Wenzel. *Isabelle/HOL – A Proof Assistant for Higher-Order Logic*. LNCS 2283, Springer, 2002.
Download from <http://isabelle.in.tum.de/documentation.html>