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A Higher-Order Logical Framework for Reasoning about Programming Languages

Logical frameworks implementing higher-order abstract syntax (HOAS) may be used to encode and prove properties of object logics while minimizing repetitive computations incidental to the idea of each encoding, such as managing free and bound variables, performing beta-reductions and checking alpha equivalence. This allows the user to concentrate on the essence of the proofs. A variety of logical frameworks based on the proof theory of higher-order logic include an intermediate layer called the specification logic. The object logic is then encoded in the specification logic rather than directly in the HOAS layer and this increases the variety of object logics and their judgments that can be reasoned about inductively. Hybrid is in this class of logical frameworks; it is implemented as a Coq library and so allows easy extensions by the addition of new specification logics. This work presents the progress of the implementation and integration of a new specification logic based on higher-order hereditary Harrop formulas. The addition of a higher-order specification logic further increases the class of object logics that can be reasoned about in Hybrid.