Blanchette, Jasmin Christian; Popescu, Andrei; Traytel, Dmitriy

Unified classical logic completeness. A coinductive pearl. (English) [Zbl 1409.68250]


Summary: Codatatypes are absent from many programming and specification languages. We make a case for their importance by revisiting a classical result: the completeness theorem for first-order logic established through a Gentzen system. The core of the proof establishes an abstract property of possibly infinite derivation trees, independently of the concrete syntax or inference rules. This separation of concerns simplifies the presentation. The abstract proof can be instantiated for a wide range of Gentzen and tableau systems as well as various flavors of first-order logic. The corresponding Isabelle/HOL formalization demonstrates the recently introduced support for codatatypes and the Haskell code generator.

For the entire collection see [Zbl 1293.68021].

MSC:

68T15 Theorem proving (deduction, resolution, etc.) (MSC2010)  [Cited in 6 Documents]
03B10 Classical first-order logic
03B35 Mechanization of proofs and logical operations
03F03 Proof theory in general (including proof-theoretic semantics)
68Q65 Abstract data types; algebraic specification

Software:

Archive Formal Proofs; Isabelle/HOL; Abstract Completeness; Completeness theorem; HOL; FOL Fitting

Full Text: DOI