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# Formal Metatheory of Programming Languages in the Matita Interactive Theorem Prover

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**Abstract** This paper is a report about the use of Matita, an interactive theorem prover under development at the University of Bologna, for the solution of the POPLmark Challenge, part 1a. We provide three different formalizations, including two direct solutions using pure de Bruijn and locally nameless encodings of bound variables, and a formalization using named variables, obtained by means of a sound translation to the locally nameless encoding. According to this experience, we also discuss some of the proof principles used in our solutions, which have led to the development of a generalized inversion tactic for Matita.

**Keywords** Matita · Inversion principles · Encoding of variable bindings

## 1 Introduction

The POPLmark challenge [4] is a set of "benchmarks" proposed by an international group of researchers in order to assess the advances of theorem proving for the verification of properties of programming languages and to promote the use and enhancement of proof assistant technology.

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