

System F in Agda, for fun and profit

James Chapman¹, Roman Kireev¹, Chad Nester², and Philip Wadler²

¹ Input Output HK Ltd, Hong Kong {james.chapman,roman.kireev}@iohk.io

² University of Edinburgh, UK {cnester,wadler}@inf.ed.ac.uk

Abstract. System F , also known as the polymorphic λ -calculus, is a typed λ -calculus independently discovered by the logician Jean-Yves Girard and the computer scientist John Reynolds. We consider $F_{\omega\mu}$, which adds higher-order kinds and iso-recursive types. We present the first complete, intrinsically typed, executable, formalisation of System $F_{\omega\mu}$ that we are aware of. The work is motivated by verifying the core language of a smart contract system based on System $F_{\omega\mu}$. The paper is a literate Agda script [\[15\]](#)