CoCo 2022 Participant: FORTify 2.0*

Alexander Lochmann, Fabian Mitterwallner, and Aart Middeldorp

Department of Computer Science, University of Innsbruck, Austria

The first-order theory of rewriting is a decidable theory for linear variable-separated rewrite systems. The decision procedure goes back to Dauchet and Tison [1]. In this theory confluence-related properties on ground terms are easily expressible. An extension of the theory to multiple rewrite systems, as well as the decision procedure, has recently been formalized [2,3] in Isabelle/HOL. The code generation facilities of Isabelle then give rise to the certifier FORTify [4] which checks certificate constructed by FORT-h [6]. FORTify takes as input an answer (YES/NO), a formula, a list of TRSs, and a certificate proving that the formula holds (does not hold) for the given TRSs. It then checks the integrity and validity of the certificate. A command-line version of the tool can be downloaded from

`https://fortissimo.uibk.ac.at/fort(ify)/`

Compared to last year, the formalization on which FORTify is based contains more and improved signature extension results, as described in [5]. Importantly for this competition, it contains new results related to the *normal form property* making it possible for FORTify to compete in the NFP category. Furthermore, it adds fewer constants for ground rewrite systems and for rewrite systems contain only unary function symbols and constants (monadic systems). This leads to smaller automata in the procedure and in turn to shorter run times in some cases. Other performance improvements are also included.

This year FORTify participates, together with FORT-h, in the following CoCo 2022 categories: CPF-TRS, COM, GCR, NFP, UNC, and UNR.

References

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[5] Alexander Lochmann, Fabian Mitterwallner, and Aart Middeldorp. Formalized Signature Extension Results for Equivalence In *Proc. 11th International Workshop on Confluence*, 2022. This volume.

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