CoCo 2025 Participant: FORT-h 2.1

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The first-order theory of rewriting is a decidable theory for finite left-linear right-ground rewrite systems. The decision procedure goes back to Dauchet and Tison [2]. FORT-h is a reimplementation of the tool FORT [5], but is based on a new variant of the decision procedure, described in [3], for the larger class of linear variable-separated rewrite systems. This variant supports a more expressive theory and is based on anchored ground tree transducers. More importantly, it can produce certificates for the YES/NO answers. These certificates can then be verified by FORTify, an independent Haskell program that is code-generated from the formalization of the decision procedure in the proof assistant Isabelle/HOL.

A command-line version of FORT-h can be downloaded from

http://fortissimo.uibk.ac.at/fort(ify)/

FORT-h participates in the TRS category of CoCo 2025 both as a standalone tool and in combination with FORTify [4] to produce certified YES/NO answers. In 2024 FORT-h tied ACP [1] for the most YES answers in the COM category. Moreover, it won the RELIABILITY[1] category, by producing the most certifiable answers across all categories.

FORT-h 2.1 accepts input problems in ARI[2] format.

References

[1] Takahito Aoto. ACP: System Description for CoCo 2024. In *Proc. 13th International Workshop on Confluence*, page 77, 2024.

[2] Max Dauchet and Sophie Tison. The Theory of Ground Rewrite Systems is Decidable. In *Proc. 5th IEEE Symposium on Logic in Computer Science*, pages 242–248, 1990. doi: 10.1109/LICS.1990.113750.

[3] Aart Middeldorp, Alexander Lochmann, and Fabian Mitterwallner. First-Order Theory of Rewriting for Linear Variable-Separated Rewrite Systems: Automation, Formalization, Certification. *Journal of Automated Reasoning*, 67(14):1–76, 2023. doi: 10.1007/s10817-023-09661-7.

[4] Fabian Mitterwallner and Aart Middeldorp. CoCo 2025 Participant: FORTify 2.0. In *Proc. 14th International Workshop on Confluence*, 2025. This volume.

[5] Franziska Rapp and Aart Middeldorp. FORT 2.0. In *Proc. 9th International Joint Conference on Automated Reasoning*, volume 10900 of *LNCS (LNAI)*, pages 81–88, 2018. doi: 10.1007/978-3-319-94205-6_6.

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[1] https://project-coco.uibk.ac.at/2024/results.php#certification
[2] https://project-coco.uibk.ac.at/ARI/