

# CoCo 2015 Participant: ConCon\*

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ConCon is a fully automatic confluence checker for *oriented* first-order conditional term rewrite systems (CTRSs). The tool implements three known confluence criteria:

- (A) A quasi-decreasing strongly irreducible deterministic 3-CTRS  $\mathcal{R}$  is confluent if and only if all critical pairs of  $\mathcal{R}$  are joinable [1].
- (B) Almost orthogonal properly oriented right-stable 3-CTRSs are confluent [6].
- (C) A weakly left-linear deterministic CTRS  $\mathcal{R}$  is confluent if  $\mathbb{U}(\mathcal{R})$  is confluent [2].

We refer to [4] for a more detailed description of the above results. ConCon is written in Scala 2.11 and available under the LGPL license. It can be downloaded from:

<http://cl-informatik.uibk.ac.at/software/concon/>

A web interface can also be found there. For some of the methods ConCon issues calls to the external unconditional confluence and termination checkers CSI and  $\mathbb{T}\mathbb{T}_2$  as well as the theorem prover Waldmeister.

To make criteria (A) and (B) more useful, we implemented a variety of methods to check for infeasibility of conditional critical pairs, ranging from a simple technique based on the `tcap` function, via different implementations of tree automata completion, to equational reasoning. These are described in [5]. Another recent extension is certifiable output for method (C),<sup>1</sup> which is made possible due the formalization efforts described in [7] as well as certifiable output for method (B) due to the formalization described in [3]. Future extensions will include support for *join* and *semi-equational* CTRSs.

## References

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