

FLoC Olympic Games 2014

Citius, Maius, Potentius – Faster, Bigger, More Powerful

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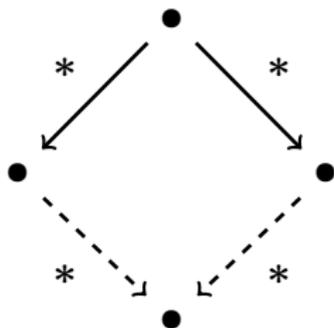
Confluence Competition 2014



Confluence Competition: Description



- ▶ **Term rewriting** is a model of computation.
- ▶ A **term rewriting system (TRS)** is a set of **directed equations**.
- ▶ A TRS specifies **computations in term rewriting** (as **rules**) and **equational reasoning** (as **axioms**).
- ▶ Non-deterministic computation in term rewriting is a basis of **automated theorem proving in equational logic**.
- ▶ **Confluence** guarantees **unique results of computations**.



Confluence

$$\left\{ \begin{array}{ll} 1^{-1} & \rightarrow 1 \\ 1 \times x & \rightarrow x \\ x \times 1 & \rightarrow x \\ (x^{-1})^{-1} & \rightarrow x \\ x^{-1} \times x & \rightarrow 1 \\ x \times x^{-1} & \rightarrow 1 \\ (x \times y)^{-1} & \rightarrow y^{-1} \times x^{-1} \\ (x \times y) \times z & \rightarrow x \times (y \times z) \\ x^{-1} \times (x \times y) & \rightarrow y \\ x \times (x^{-1} \times y) & \rightarrow y \end{array} \right\}$$

Example: confluent TRS for groups

Confluence Competition: Example



109.trs

```

1 (VAR x y z)
2 (RULES
3   join(x,meet(x,y)) -> x
4   meet(x,join(y,z)) -> join(meet(x,y),meet(x,z))
5   meet(x,x) -> x
6   join(x,x) -> x
7   meet(meet(x,y),z) -> meet(x,meet(y,z))
8   meet(x,y) -> meet(y,x)
9   join(join(x,y),z) -> join(x,join(y,z))
10  join(x,y) -> join(y,x)
11 )
12 (COMMENT Theory of Distributive Lattice from [PS81])
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Confluence Competition: Example



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- ▶ **3rd competition** (1st in 2012, 2nd in 2013)
- ▶ The competition ran **live** during **the 3rd International Workshop on Confluence (IWC 2014)**.
- ▶ **Three categories**
 - ▶ **TRS Category**
Entrants: ACP, CoLL, CSI, Saigawa
 - ▶ **Conditional TRS Category** (**new from 2014**)
Entrants: CO3, ConCon
 - ▶ **Certification Category**
Entrants: CeTA
- ▶ The score is computed in percent of solved vs. supported problems. 60 sec. timeout for each problem.
- ▶ **StarExec** was used as the execution platform.¹



¹Thanks are due to StarExec team for preparing an excellent platform.



Confluence Competition 2014: Results



- ▶ TRS Category
- ▶ Conditional TRS Category
- ▶ Certification Category



- ▶ TRS Category



- ▶ Conditional TRS Category

- ▶ Certification Category



▶ TRS Category



▶ Conditional TRS Category



▶ Certification Category



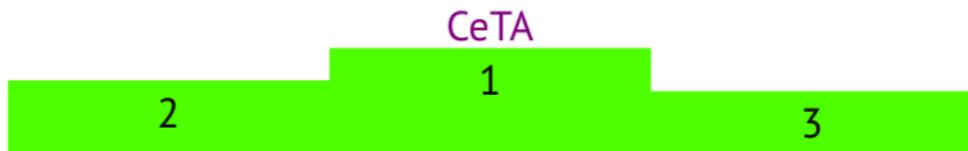
► TRS Category



► Conditional TRS Category



► Certification Category





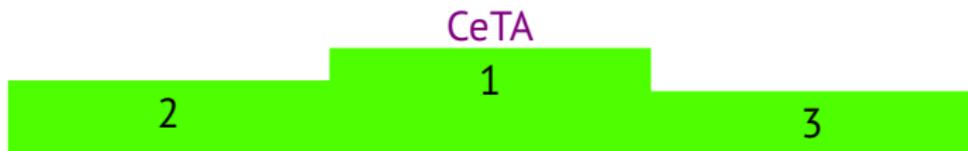
► TRS Category



► Conditional TRS Category



► Certification Category



Detailed result can be seen at

<http://coco.nue.riec.tohoku.ac.jp/2014/>



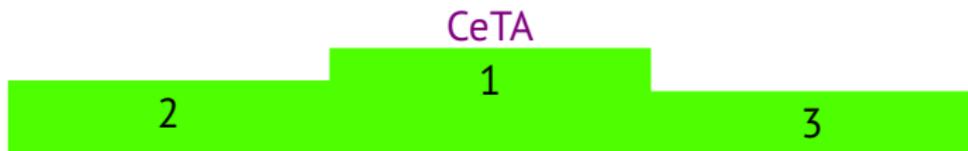
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Thank you very much!