8th International Confluence Competition

Aart Middeldorp  Julian Nagele  Kiraku Shintani
CoCo 2019

- tools try to show confluence and related properties of rewrite systems
- ran live on April 6 powered by StarExec
CoCo 2019

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Categories

• TRS  first-order rewrite systems
• CTRS  conditional rewrite systems
• HRS  higher-order rewrite systems
• SRS  string rewrite systems
• CPF- certified confluence proofs
CoCo 2019

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**Categories**

- **TRS**  first-order rewrite systems
- **CTRS**  conditional rewrite systems
- **HRS**  higher-order rewrite systems
- **SRS**  string rewrite systems
- **CPF-** certified confluence proofs
- **GCR**  ground confluence of many-sorted TRSs
- **NFP/UNC/UNR** unique normalization of TRSs
- **COM**  commutation of TRSs
- **INF**  infeasibility
## Contestants

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| Contestant         | TRS | CTRS | CPF-TRS | CPF-CTRS | HRS | GCR | NFP | UNC | UNR | INF | SRS | COM |
|--------------------|-----|------|---------|----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| ACP                | ✓   | ✓    | ✓       |          |     |     |     |     |     | ✓   | ✓   | ✓   |
| AGCP               | ✓   |      |         |          |     |     |     |     |     | ✓   |     |     |
| CeTA               | ✓   | ✓    |         |          |     |     |     |     |     | ✓   |     |     |
| CO3                | ✓   |      |         |          |     |     |     |     |     | ✓   |     |     |
| CoLL-Saigawa      | ✓   |      |         |          |     |     |     |     |     | ✓   |     |     |
| ConCon             | ✓   |      |         |          |     |     |     |     |     | ✓   |     |     |
| CSI                | ✓   | ✓    |         |          |     |     | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   |
| CSI^ho             | ✓   |      |         |          |     |     |     |     |     |     |     |     |
| FORT               | ✓   | ✓    | ✓       | ✓        |     |     | ✓   | ✓   | ✓   | ✓   |     |     |
| CoLL               |     |      |         |          | ✓   |     |     |     |     |     |     |     |
| noko-leipzig       |     |      |         |          |     |     |     |     |     |     | ✓   |     |
| Moca               |     |      |         |          |     |     |     |     |     | ✓   |     |     |
| nonreach           |     |      |         |          |     |     |     |     |     | ✓   |     |     |
| infChecker         |     |      |         |          |     |     |     |     |     | ✓   |     |     |
| maedmax            |     |      |         |          |     |     |     |     |     | ✓   |     |     |

**new**
## Problems

### Scoring

- 100 randomly selected problems per category
- YES/NO on first line followed by proof
- score is YES + NO

\[
\begin{align*}
\text{c(t(x, y, z))} & \rightarrow \text{c(t(y, x, z))} \\
\text{c(t(x, y, z))} & \rightarrow \text{true}
\end{align*}
\]
## Problems

### Scoring
- 100 randomly selected problems per category
- YES/NO on first line followed by proof
- score is YES + NO

### Secret Problems
- guaranteed to be selected
- at most two per category per tool
- 9 secret problems submitted
Problems

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- YES/NO on first line followed by proof
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\[
\begin{align*}
c(t(x, y, z)) & \rightarrow c(t(y, x, z)) \\
c(t(x, y, z)) & \rightarrow c(t(x, z, y)) \\
c(t(x, x, z)) & \rightarrow \text{true}
\end{align*}
\]
Cops and CoCoWeb

99 problems matched.

1.trs

(VAR x y)

(RULES)

f(x, y) -> x
f(x, y) -> f(x, g(y))
g(x) -> h(x)
F(g(x), x) -> F(x, g(x))
F(h(x), x) -> F(x, h(x))

(COMMENT)

 tội:1007/BK40027006

Example 6

Submitted by: Takahito Aoto, Junichi Yoshida, and Yoshihito Toyama

format: trs +

Cops and CoCoWeb

Enter a rewrite system, upload a file browse... or import a Cop:  

1  (FUN 
2    f : a -> a 
3  ) 

4  (VAR 
5    x : a 
6  ) 

7  (RULES 
8  ) 

9

property:  CR  GCR  NFP  UNC  UNR

timeout: 30  reset  check

submit this problem to  Cops
And the Winners are . . .
And the Winners are . . .

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And the Winners are . . .

SRS

noko-leipzig

CSI

ACP

2

1

3
And the Winners are . . .
And the Winners are . . .

CPF-TRS

ACP + CeTA

CSI + CeTA

2

1

3
And the Winners are . . .

HRS

CSI\textsuperscript{ho}

2

1

3
And the Winners are . . .

CPF-CTRS

ConCon + CeTA

2
1
3
And the Winners are . . .
And the Winners are . . .

GCR

FORT 2

AGCP 1

3
And the Winners are . . .

nonreach 2
infChecker 1
Moca 3
And the Winners are . . .

NFP

FORT  CSI
2     1     3

CoCo SC  CoCo 2019 @ TOOLympics
And the Winners are . . .

- UNC
- CSI: 2
- ACP: 1
- FORT: 3
And the Winners are . . .

UNR

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Thanks

- ETAPS
- TOOLympics Organizers
- Participants
- Panel
  - Hubert Garavel
  - Geoff Sutcliffe
  - Akihisa Yamada