

Implementing Reversible Concurrent Process Calculi

Peter Browning, Brett Williams, John Yalch

Dr. Clément Aubert - Assistant Professor in Computer Science

Introduction

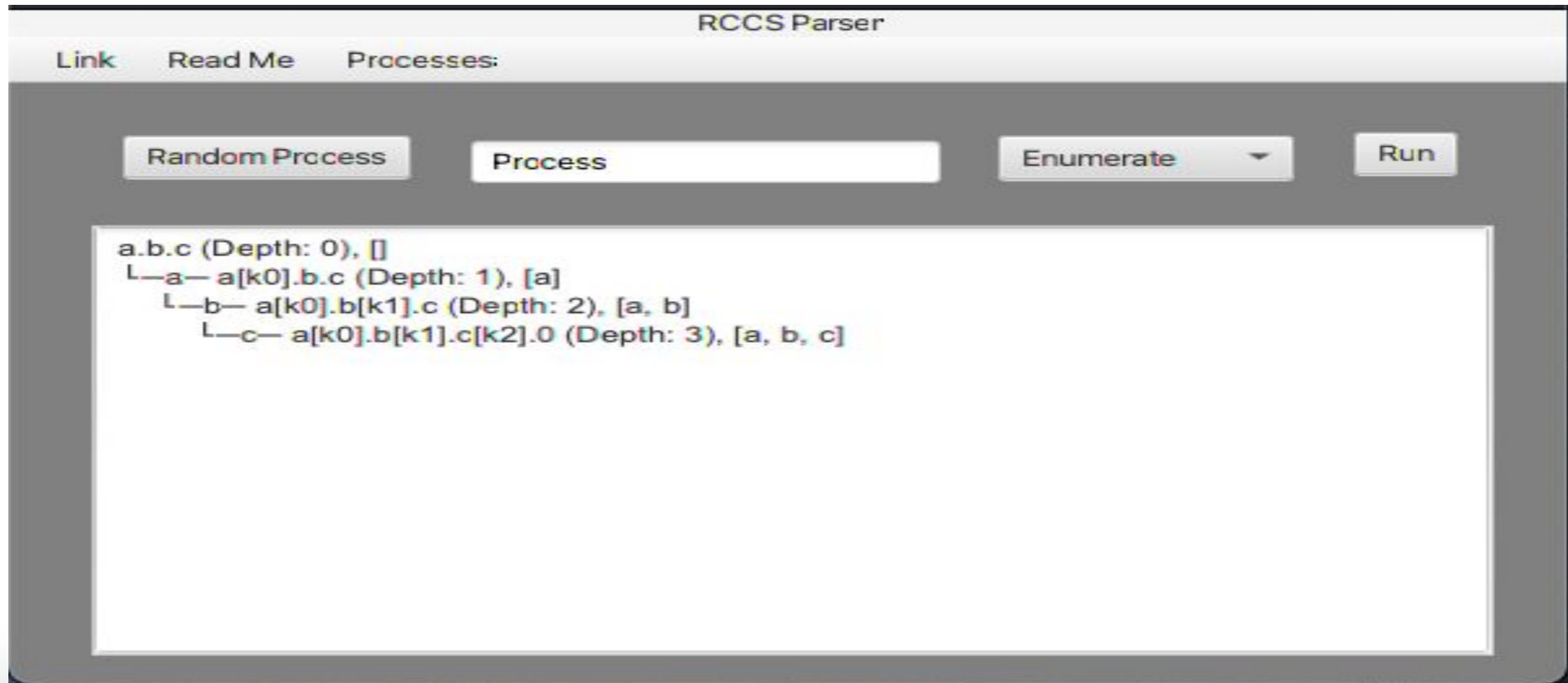
- We were provided a codebase for a CLI-only parser and evaluation tool for Calculus of Communicating Systems with Keys (CCSK).
- The tool could parse, execute, and traverse CCSK processes, but was not user friendly
- Code was lacking good documentation and had lots of bugs
- Due to the complex nature of the tool and its purpose, documentation and UX is paramount

Goals

- Technical comprehension of RCCS and CCSK.
- Implement a GUI.
- Improve usability and overall user experience.
- Add features and fix bugs.
- Exposure to research and higher level academia.

Accomplishments - GUI

```
brettwilliams@Bretts-MacBook-Pro target % java -jar IRDC-4.1.1.1-jar-with-dependencies.jar --enumerate "a.b.c"  
a.b.c (Depth: 0), []  
└─a─ a[k0].b.c (Depth: 1), [a]  
    └─b─ a[k0].b[k1].c (Depth: 2), [a, b]  
        └─c─ a[k0].b[k1].c[k2].0 (Depth: 3), [a, b, c]
```



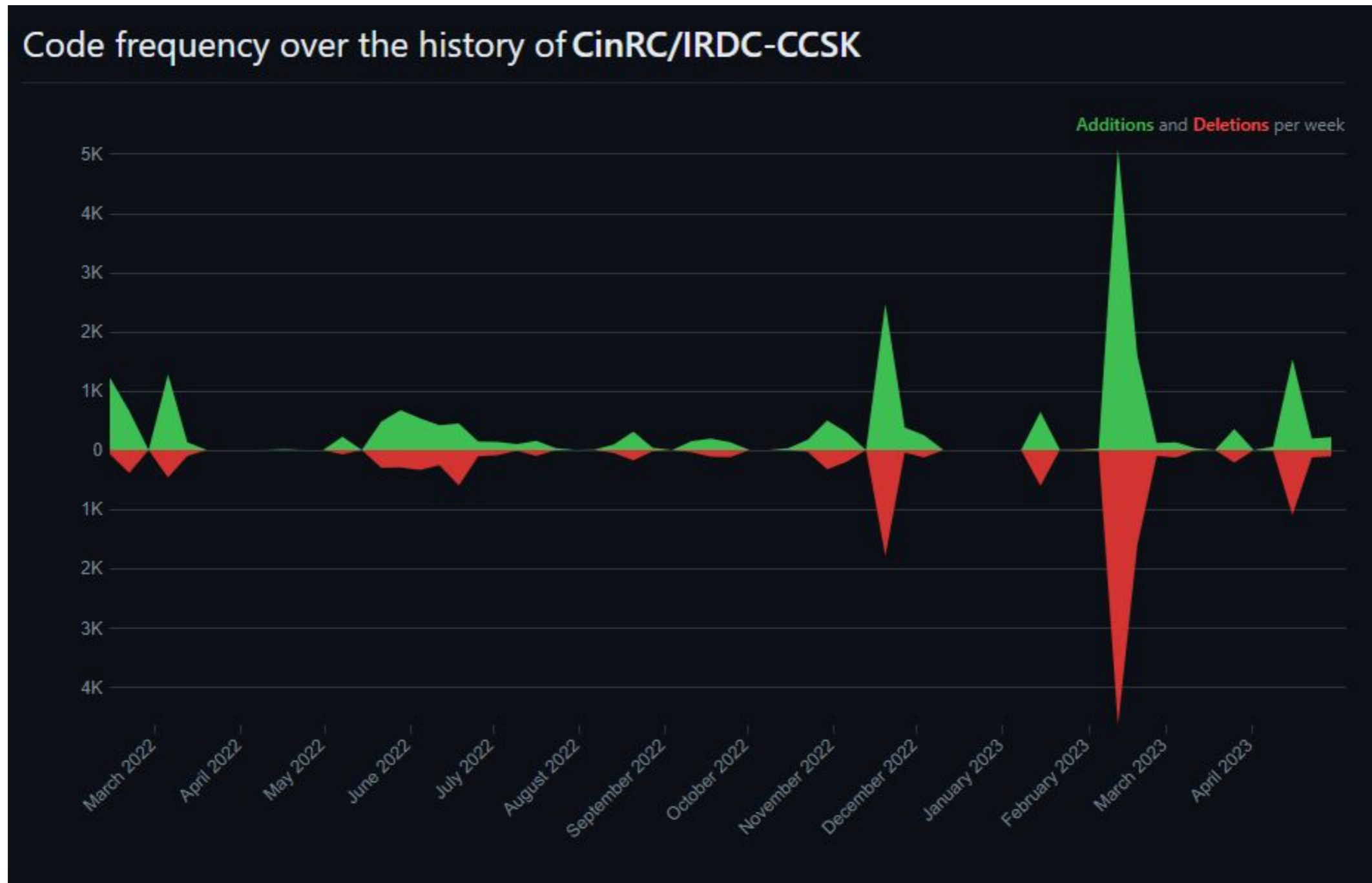
Accomplishments - GUI (cont.)

- Cross platform executable
- Pilot program to collect user feedback
- Intuitive and easy to use
- Examples and project documentation provided in-app

Accomplishments - Features

- 2 Maj. version bumps (2.0.0.0 → 4.3.7.1)
- ~10k lines of code written (Jan '23 - May '23)
- ~40 user reported bugs & issues fixed
- Multiple “big ticket” features added

Code Stats



Demo

- [GUI branch](#)
- [Dev branch](#)

(PR will be merged eventually)

Challenges

- The comprehension of RCCS and CCSK in such a short timeframe
- Learning new tools (Java, IDEs, git, etc)
- Prioritizing user needs
- Fixing issues that had no established solution
- Contributing to Open Source Software (OSS)

Design Decisions

- **GUI design**
 - What is the best way to present high level information to an interdisciplinary audience?
- **GUI functionalities**
 - What does the GUI actually need to do?
 - Scope creep
- **User experience**
 - How do we create an intuitive GUI that flows?

Questions