Static Analysis: Automated Bug Hunting and Beyond

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Writing programs is hard.
Writing correct programs is very hard.
Demo
Abstract Interpretation

- Widely used both in Academia & Industry
- Can scale to huge industry-scale codebases
- The technique covered in Program Optimization Course (IN2053)
- Analysis of **multi-threaded**, real-world C
- Efficient solvers for computation of fixpoints
- Winner of **race-detection category** at *Software Verification Competition 2023*
- [https://goblint.in.tum.de](https://goblint.in.tum.de)
Static Analysis: Automated Bug Hunting and Beyond
Topics

- **Termination analysis**
  - Loops & recursion as sources of non-termination
  - Loops: Introduce ghost variables (c.f. ranking functions)
  - Recursion: Check abstract call graph for cycles
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- Analyzing **C11** code: C11 finally gaining traction
  - How can the analysis profit from new features such as `thread_local` variables?
  - New threading library with support for different weak memory models
Benefits

- Prevent the next starship from exploding (maybe)
- Deepen your understanding of
  - The Semantics of C and typical programming errors
  - Static Analysis by Abstract Interpretation
- Level up your functional programming skills
- Become connected to the research we do day-to-day
- Program Optimization Course (IN2053)
- Knowledge of a functional programming language (we use OCaml)
- Be in your Master’s (Advanced Bachelor’s students welcome)
Questions?
github/goblint/analyzer