Theta: Portfolio of CEGAR-based analyses with dynamic algorithm selection (Competition Contribution)

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- A **generic**, **modular** and **configurable** model checking framework

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- **Abstraction refinement**-based algorithms *(CEGAR)*

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- A **generic**, **modular** and **configurable** model checking framework
- **Abstraction refinement**-based algorithms *(CEGAR)*
- Supporting different frontends for **C programs,** Statecharts, Petri nets, PLC, AIGER, Timed Automata

Theta – C frontend module

- ANTLR for parsing
- C to **XCFA**
  - eXtended CFA – with processes and procedures

- **Direct** transformation
  - **Simplification passes** on XCFA,
  - instead of using a robust framework, like LLVM
    (see FormaliSE'22 paper „C for yourself")

Theta – New features of the analysis

CEGAR – highly configurable

- Abstract domains,
- Refinements,
- Initial precisions,
- etc.

Analysis of **multithreaded** programs

SMT-LIB support

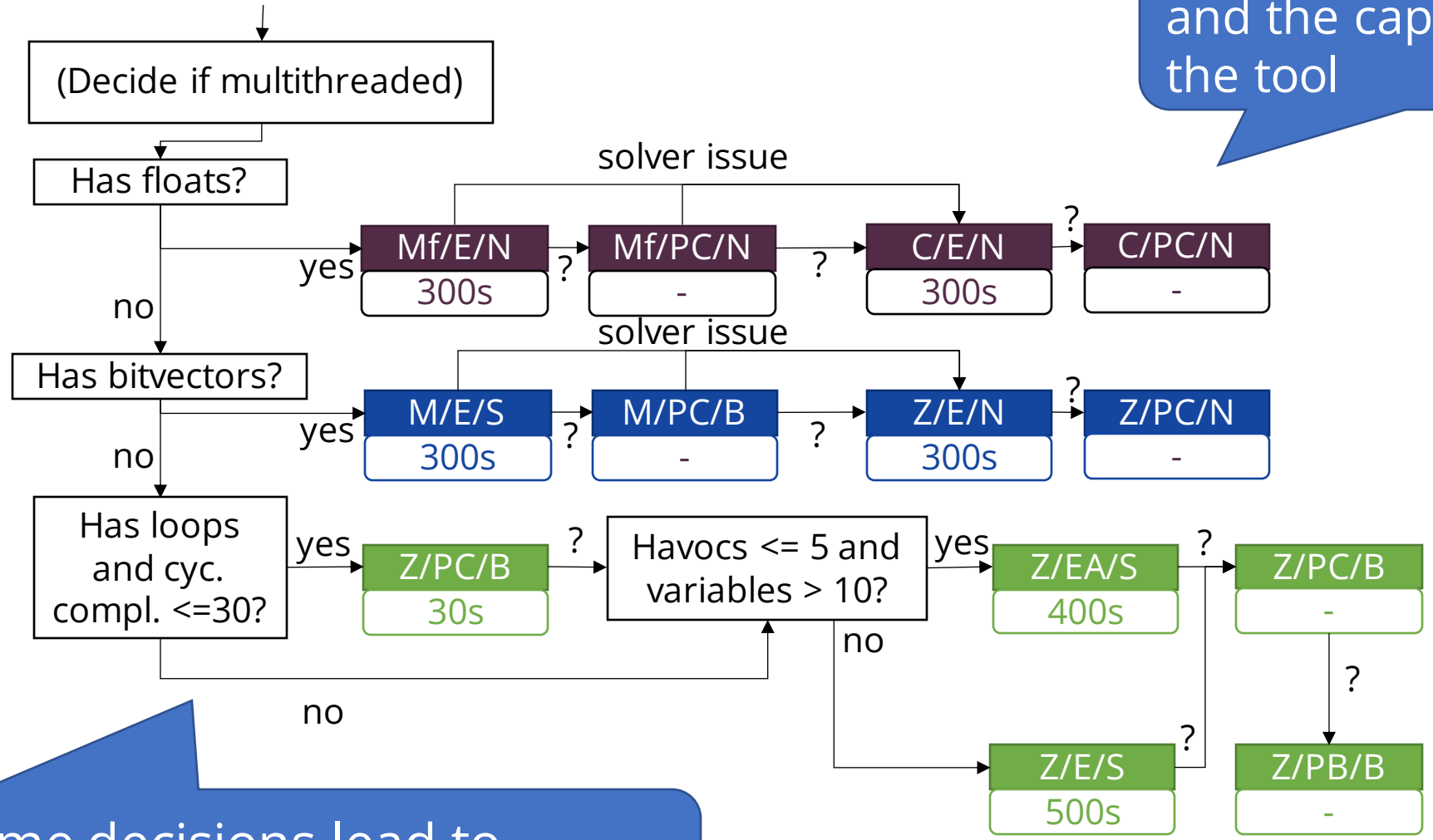
Runtime monitoring, if there is **refinement progress**

Utilizing these features:

Portfolio with algorithm selection and different strategies

Theta - Portfolio

Utilizing configurability and the capabilities of the tool



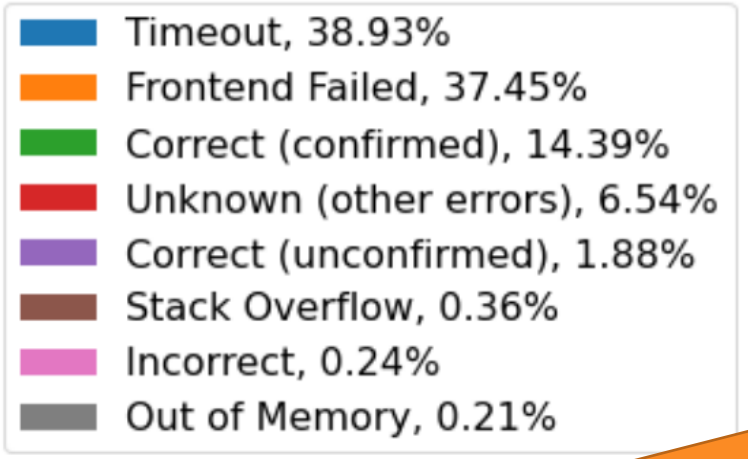
Runtime decisions lead to different configurations

Based on prior experience and earlier benchmarks

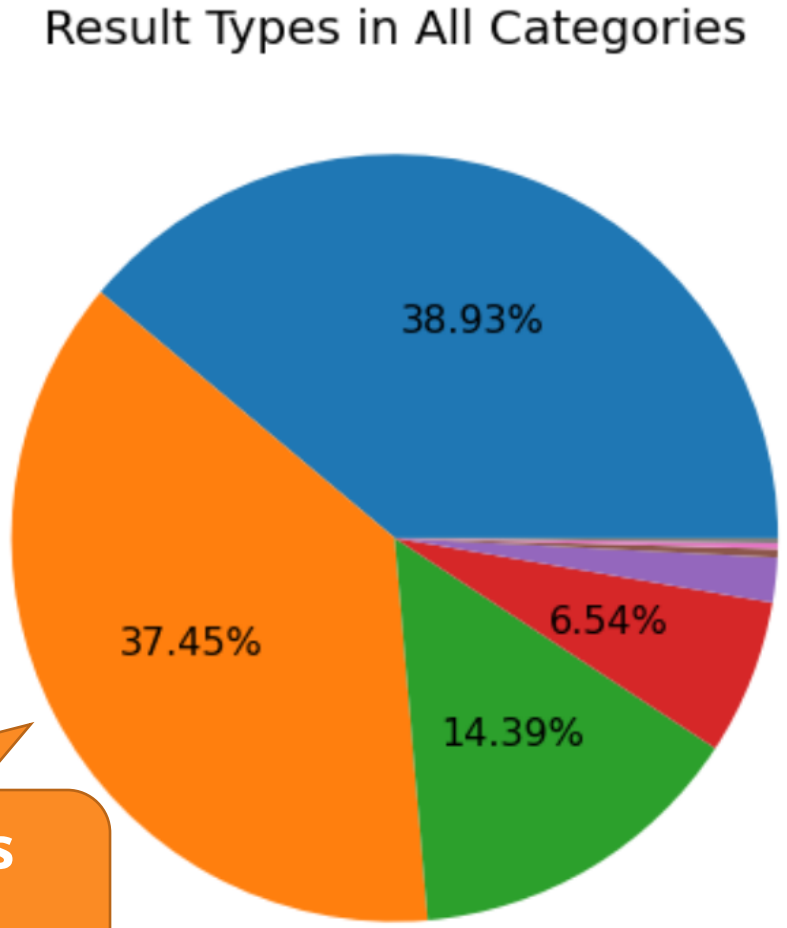
Results on SV-COMP'22

- ReachSafety and ConcurrencySafety
- Whole sub-categories **unsupported** (for now),
- Many **timeouts**,
- Over **14%** of tasks were solved correctly

14.39% Confirmed Correct
1.88% Unconfirmed Correct
0.24% Incorrect



37.45% Frontend Issues
38.93% Timeouts
7.11% Other Issues



Thank you for your attention!

Check out our poster as well!

Theta

https://github.com/ftsrg/theta/

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