

Dist-AI in TLA⁺*

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ABSTRACT

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PVLDB Artifact Availability:

The source code, data, and/or other artifacts have been made available at
URL_TO_YOUR_ARTIFACTS.

1 INTRODUCTION

TLA⁺, TLC, and TLAPS.

Automatic invariant inference.

Overview.

- TLA⁺ traces sampling
 - Counter-example Guided
 - Coverage (e.g., minimal spanning)
- invariants space enumeration (exploration)
 - using Apalache: VARIABLES to relations (in Ivy), which are used as items in invariants
- Validation (utilizing Apalache)
 - on finite models; for any steps
- Refinement
 - Counter-example Guided
- Generalization to any models (for any steps)
 - How to validate it? (find some SMT???)

Our Contributions.

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*Corresponding author. Hengfeng Wei is also with Software Institute at Nanjing University.

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2 OVERVIEW

2.1 Sampling TLA⁺ Traces

2.2 Enumerating Invariants

- directed by syntax of TLA⁺
- restricting terms, operations, ...

2.3 Validating Inductive Invariants

- using Apalache (modified for validating fols with quantifiers)
- using [?]

3 CASE STUDY

3.1 Lock Server

3.2 Two-phase Commit

3.3 Paxos

4 RELATED WORK

DistAI

SWISS

Ivy

I4: inductive invariants for finite models (utilizing Averroes), and then generalize them to general models

Apalache

5 CONCLUSION

@inproceedingsProofAutomation:PhDThesis2014, title=Proof automation and type synthesis for set theory in the context of TLA+. (Automatisation de preuves et synthèse de types pour la théorie des ensembles dans le contexte de TLA+), author=Hernán Vanzetto, year=2014