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**
  - **convert invariants in terms of relations back to those in terms of TLA^{+} variables**
- **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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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

We use Two-Phase Commit as an example here. First, we extracted the main variables of this protocol as follows.

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

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5 CONCLUSION

@inproceedingsProofAutomation:PhDThesis2014, title=Proof automation and type synthesis for set theory in the context of TLA+, author=Hernán Vanzetto, year=2014