Alloy: Language & Tool

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Overview

- Modeling language
- Automated analyzer

- Web: http://alloy.mit.edu/alloy/

- Features
  - Assertions about models (systems)
  - Generating solutions (instances)
  - Visualization of counterexamples
Modeling language

- Fully declarative

- Syntax
  - First-order logic, sets, relations
  - Object-oriented programming

- Behind the scenes: relations & join
Alloy IDE

- Text editor
- Messages
- Visualizations of instances
- Custom themes (style)
Syntax & Example

- Entities: signatures, relations, sets

- Properties: facts, assertions
  - Under-constraining
  - Over-constraining

- Commands: run, check
  - Finite scope (small scope hypothesis)
Dynamic behavior

- Multiple versions of the system

- Specifying operations
  - Predicates
  - Functions

- Generating execution traces
  - Linear ordering of states
Final notes

- Limitations: integers, sequences

- Additional examples

- Further reading