Finite State Modeling in Alloy: Hotel Locking

Sections 6.2—6.3
Example: Hotel locking

Recodable locks

- New guest gets a new key
- Lock is “recoded” to new key
- Last guest can no longer enter
- Locks are standalone, not wired
Recodable locks

- Front desk and lock synchronize at the start, agreeing on an initial key combination
- Hardware device generates a sequence of pseudorandom keys for each lock
- Lock is opened either by the current key combination or its successor, with the later resetting the combination
Overview of FSM in Alloy

- Signatures model objects with local state
- Operations
  - Idiom 1: modeled as 2-state predicates
  - Idiom 2: modeled explicitly as “events”
- Frame conditions
  - Indicate what an operation does not change
- Traces
  - Require operations to execute sequentially
  - Starting from an initial state
Visualization using 2-state predicates

Guest0 checks in: given Key1 for Room

Guest0 checks out
CSE 814

Visualization using 2-state predicates

Guest1 checks in: given Key1 for Room

Guest0 enters Room using Key0

Problem: old key works until lock is rekeyed
Visualization using explicit operations
Visualization using explicit operations
Visualization using explicit operations