

ALLOY PARAGRAPHS

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GOALS FOR TODAY

- INCREASE OUR UNDERSTANDING OF ALLOY CONSTRAINTS BY LOOKING AT A COUPLE OF EXAMPLES IN DETAIL
- UNDERSTAND WHEN TO USE FACTS, PREDICATES, ASSERTIONS, AND FUNCTIONS

PARAGRAPHS

FACTS, ASSERTIONS,
PREDICATES, FUNCTIONS



FACTS

- ALWAYS ASSUMED TO HOLD

- EXAMPLE...

SIGNATURE FACTS

- CAN GIVE SIMPLE FACTS ABOUT A SIGNATURE AFTER ITS DECLARATION:

- **sig** Host { }

- **sig** Link { from, to: Host } { from != to }

EQUIVALENT

fact { **all this**: Link | **this**.from != **this**.to }

FUNCTIONS & PREDICATES

- **FOR REUSE AND CLARITY:**
 - **FUNCTIONS ARE NAMED EXPRESSIONS**
 - **PREDICATES ARE NAMED CONSTRAINTS**
- **EXAMPLE...**

MORE OO-LIKE NOTATION

- **INSTEAD OF:**

- **fun** redLights[s: LightState]: **set** Light { s.color.Red }
pred mostlyRed[s: LightState, i: Intersection] {
 lone i.lights - redLights[s]
}

- **CAN WRITE:**

- **fun** LightState.redLights[]: **set** Light { **this**.color.Red }
}
pred LightState.mostlyRed[i: Intersection] {
 lone i.lights - **this**.redLights[]
}

FACTS VS. PREDICATES

- **SMALL MODELS:**

- **FAVOR FACTS – MORE SUCCINCT, EASY TO CHANGE INTO PREDICATES IF NEEDED**

- **LARGE MODELS:**

- **USE HELPER PREDICATES TO DEFINE PROPERTIES**
- **USE OTHER PREDICATES OR FACTS TO PACKAGE PROPERTIES TOGETHER**

ASSERTIONS

- CONSTRAINTS THAT ARE INTENDED TO FOLLOW FROM THE FACTS
- ALLOY LOOKS FOR COUNTEREXAMPLES
 - THINK “BUG REPORTS”
- EXAMPLE...

TYPICAL ASSERTIONS...

- ...EXPRESS MUNDANE PROPERTIES
 - USED TO DETECT FLAWS IN OUR THINKING
 - “ELEVATOR HAS ONLY ONE CHOICE OF NEXT MOVE”
- ...OR EXPRESS ESSENTIAL PROPERTIES
 - “ELEVATOR EVENTUALLY SERVICES ALL REQUESTS”

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NEXT TIME

- DISCUSS PROJECT MILESTONE P1
- COMMANDS AND SCOPE
- REUSE IN ALLOY