Verification Using Contracts

Bentley James Oakes

University of Antwerp/Flanders Make

October 22, 2018

Overview

Outline

Motivation

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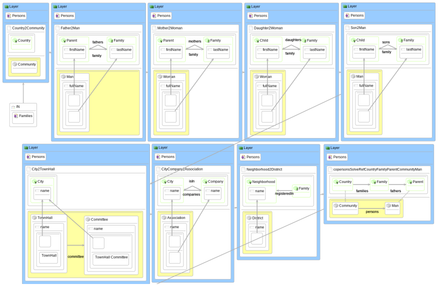

Layer
Persons
Country2Community
Country
Community
IN
Families
Father2Man
Parent
firstName
fathers
family
Family
lastName
Man
fullName
Mother2Woman
mothers
Woman
Daughter2Woman
Child
daughters
Son2Man
sons
City2TownHall
City
name
TownHall
Committee
committee
TownHall Committee
CityCompany2Association
isIn
companies
Company
Association
Neighborhood2District
Neighborhood
registeredIn
District
copersonsSolveRefCountryFamilyParentCommunityMan
families
persons

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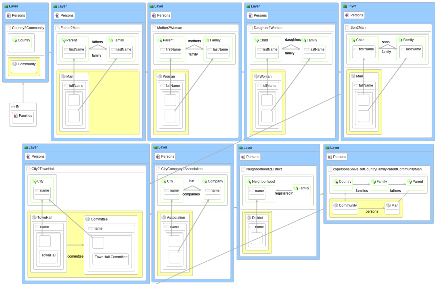

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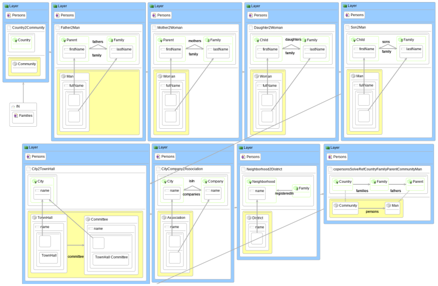

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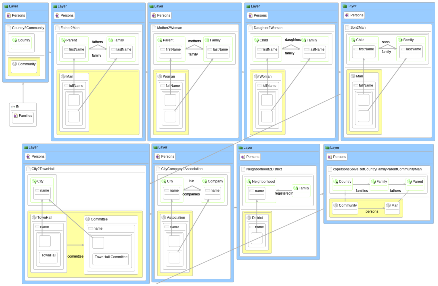

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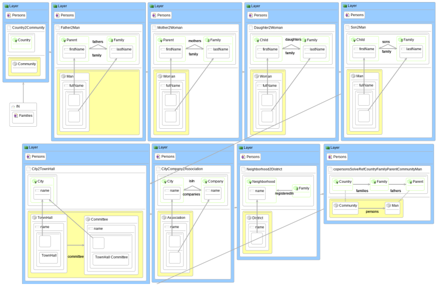

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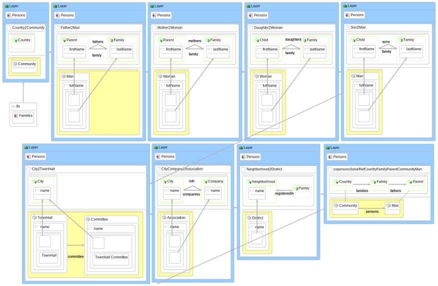

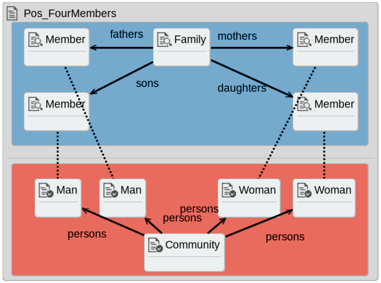

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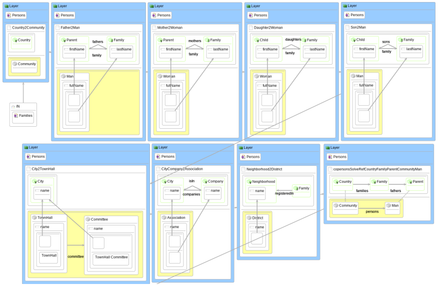

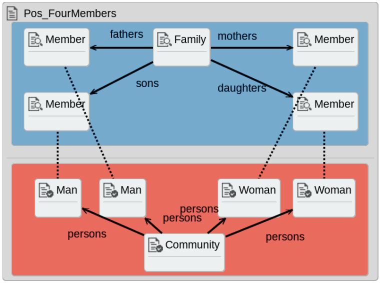

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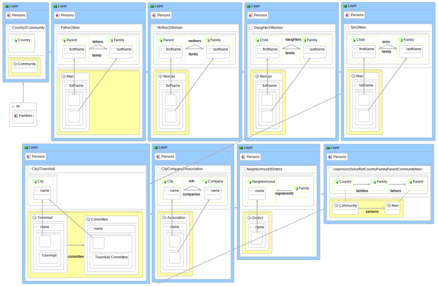

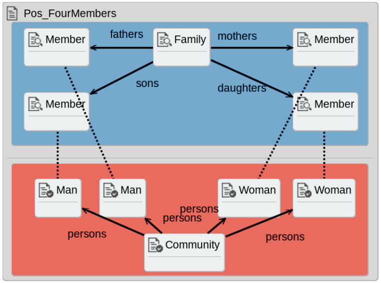

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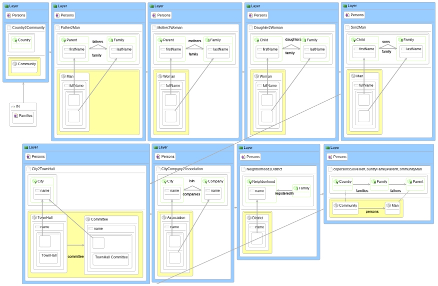

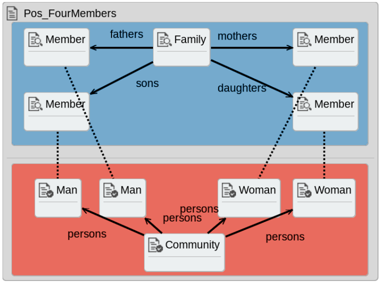

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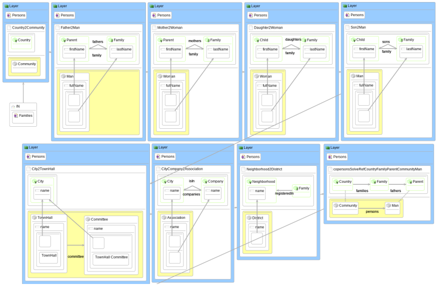

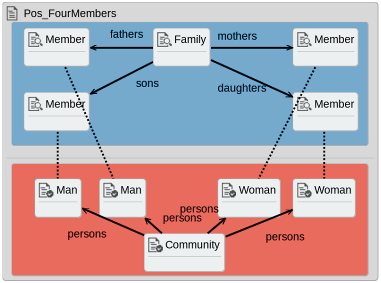

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Bentley Oakes. 2018. *A Symbolic Execution-Based Approach to Model Transformation Verification Using Structural Contracts*. Ph.D. Dissertation. McGill University.

SyVOLT

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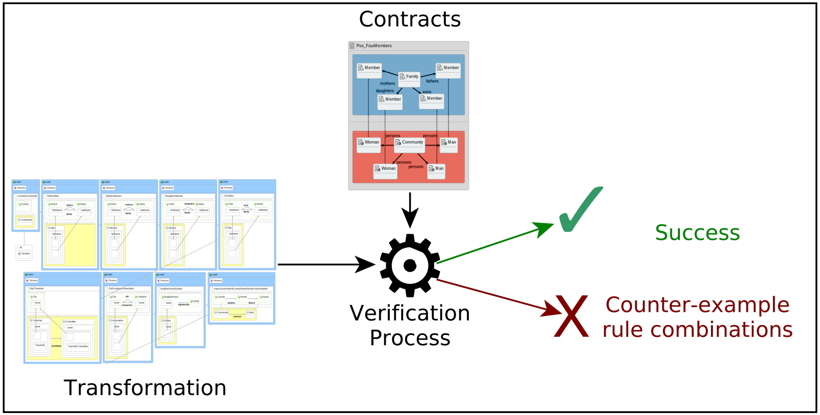
SyVOLT Tool



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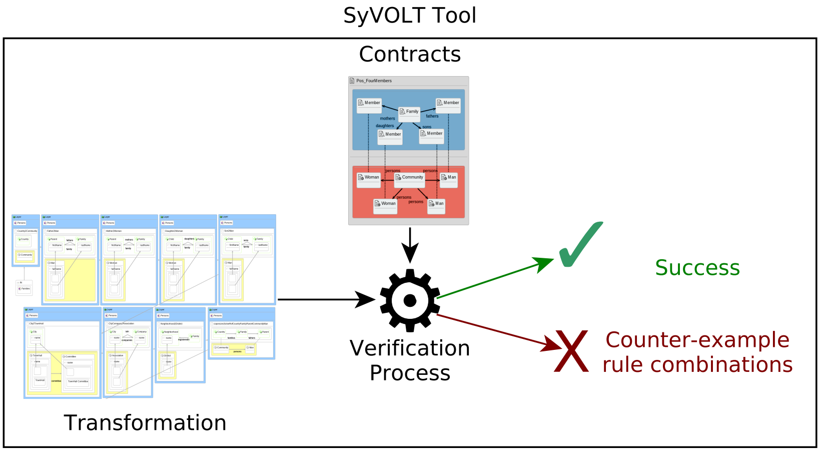

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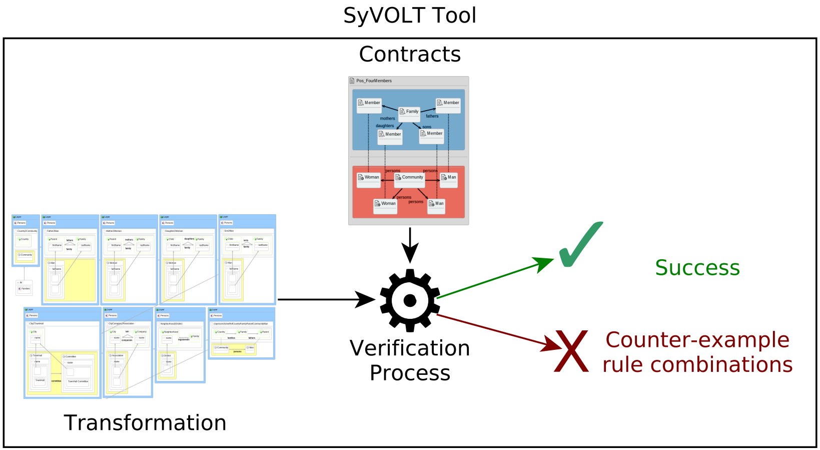

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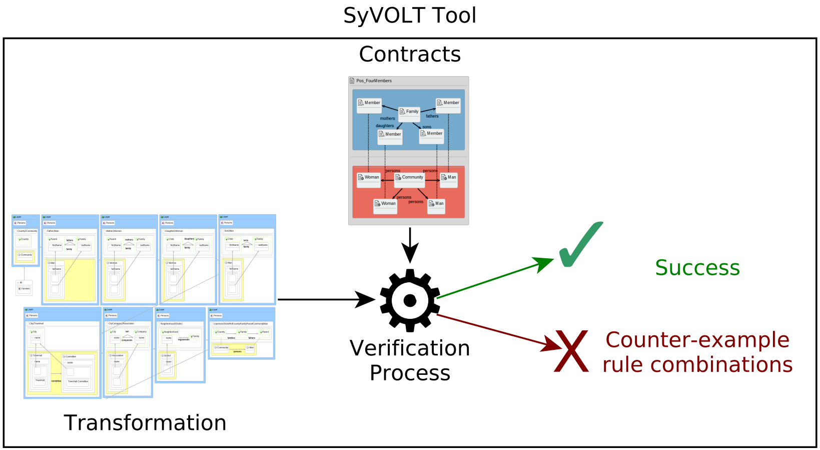

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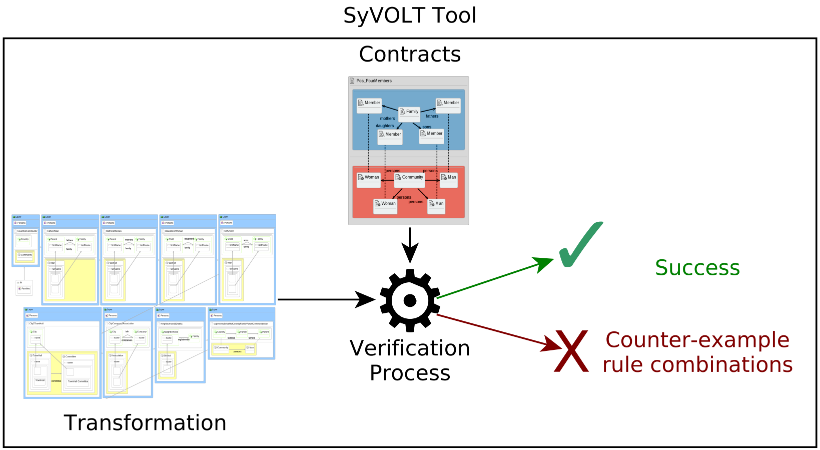

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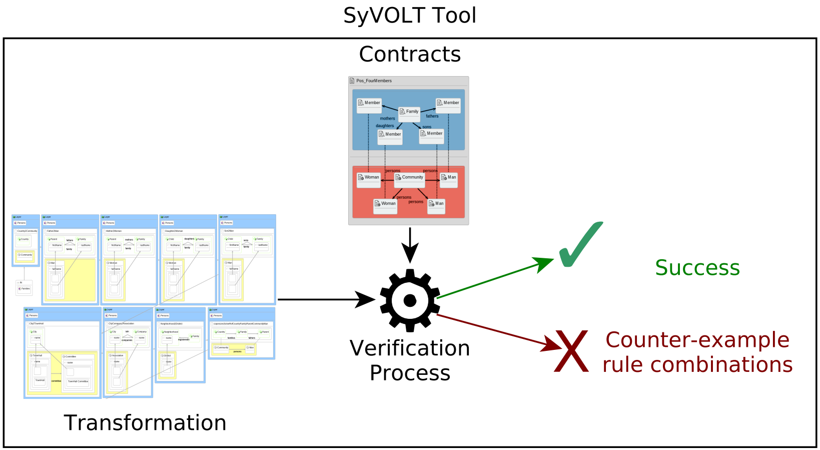

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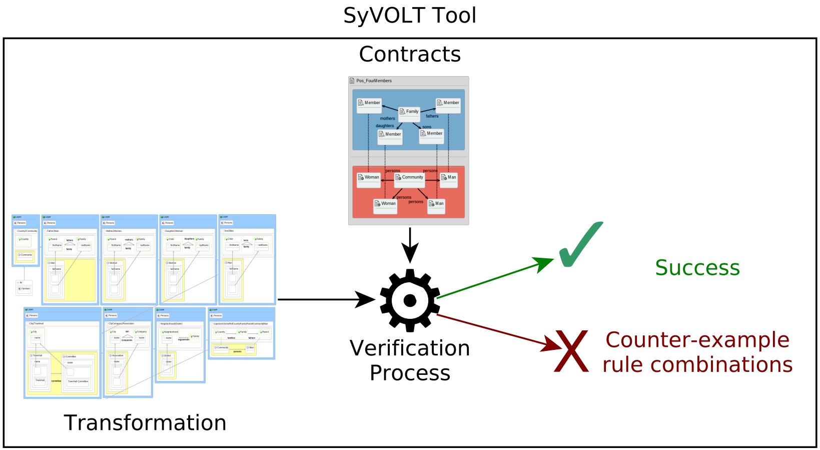

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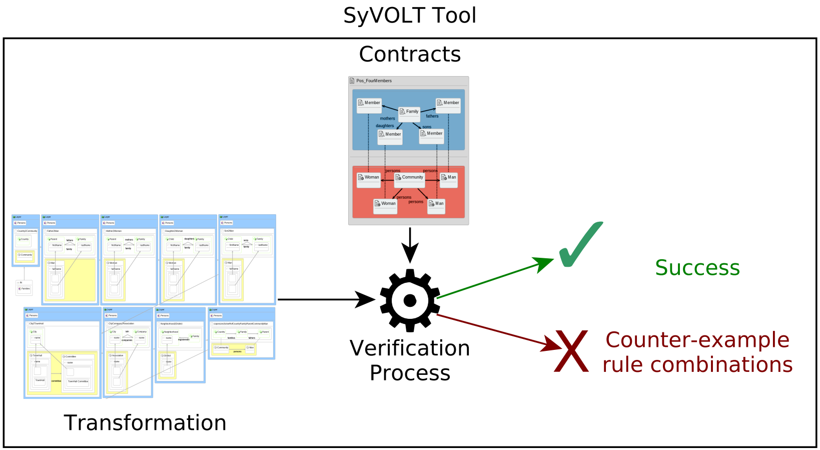

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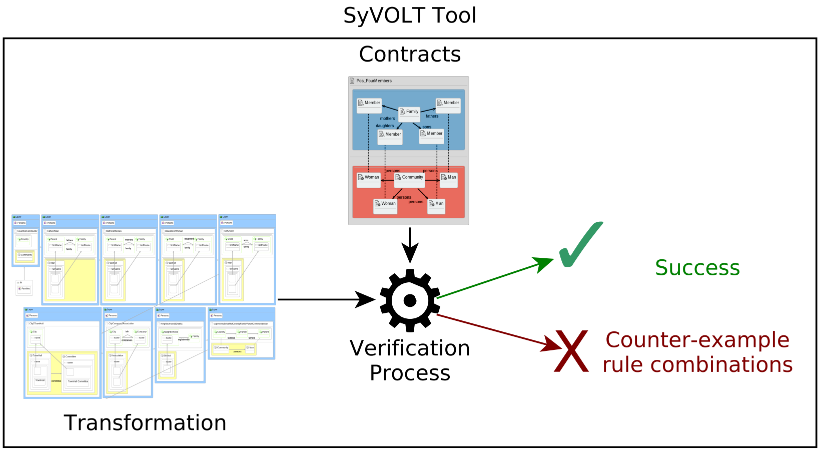

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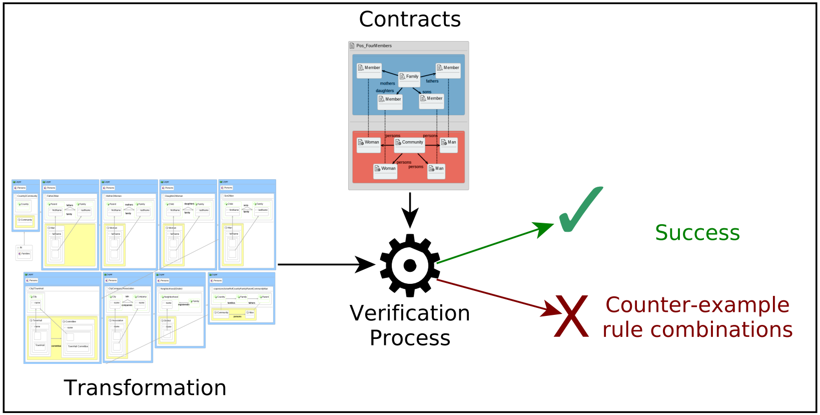

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- Promote "contract-based design" of model transformations, with continuous verification
- Tooling: Integrate transformation verification into the ModelVerse

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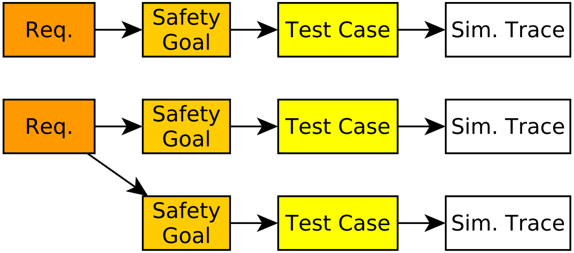

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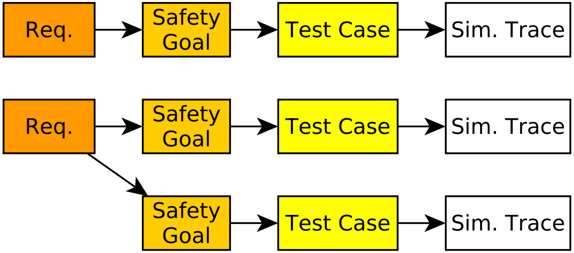

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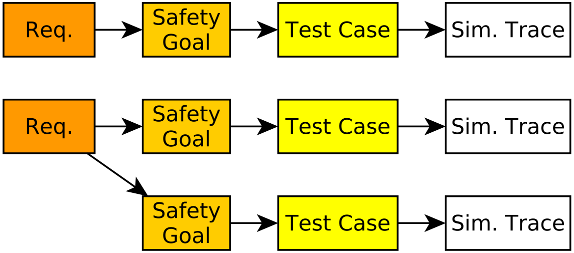

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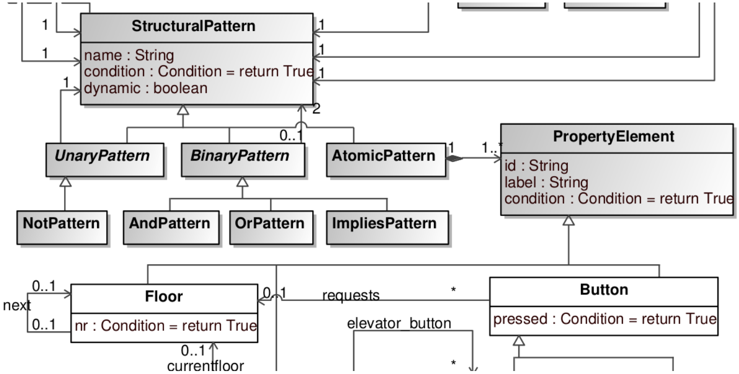

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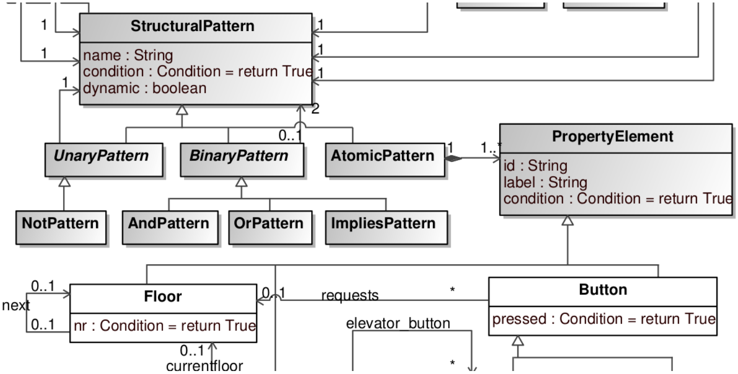

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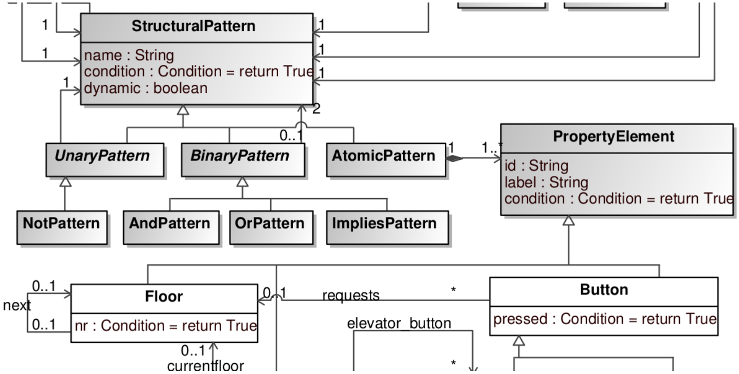

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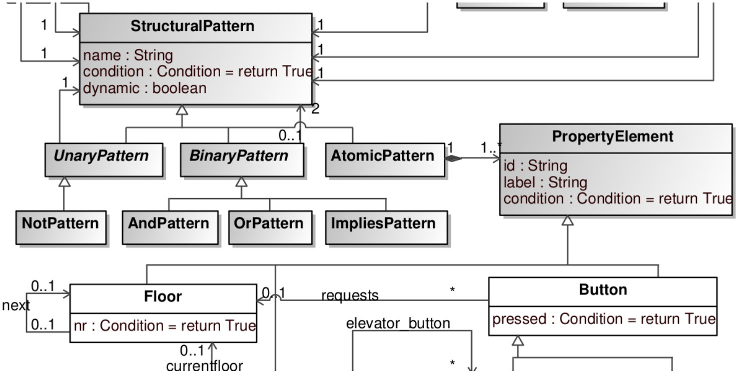

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  - "When req. is edited, mark connected safety goals as needing manual check"

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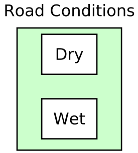

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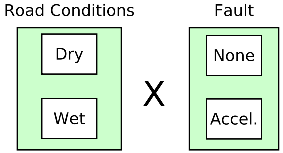

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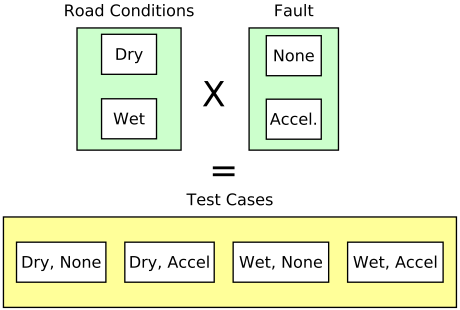

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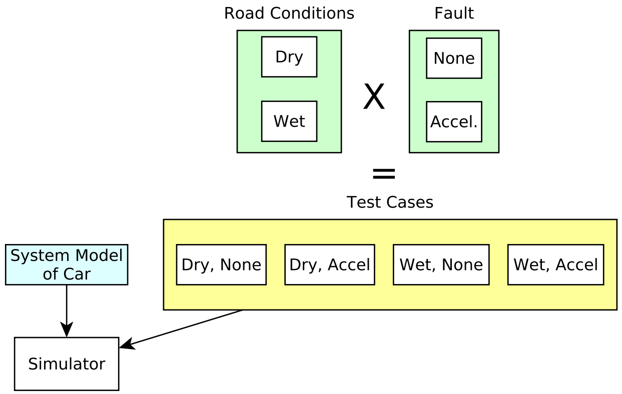

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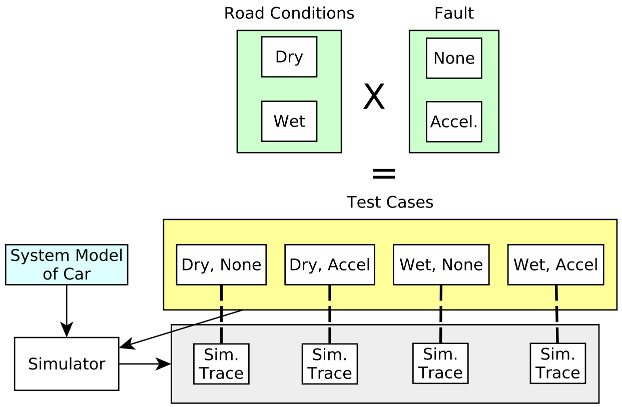

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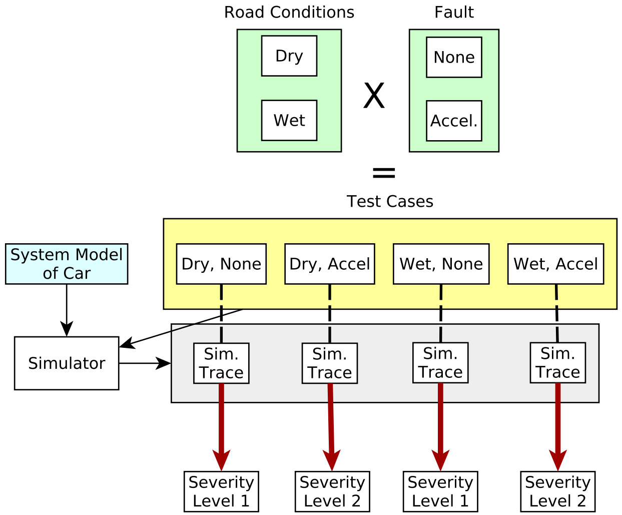

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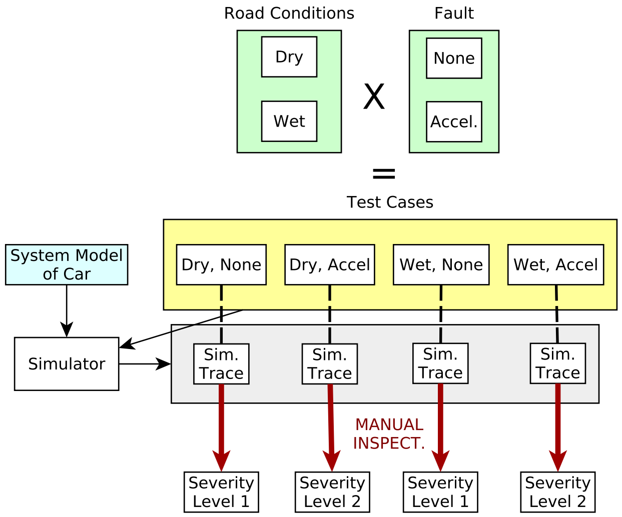

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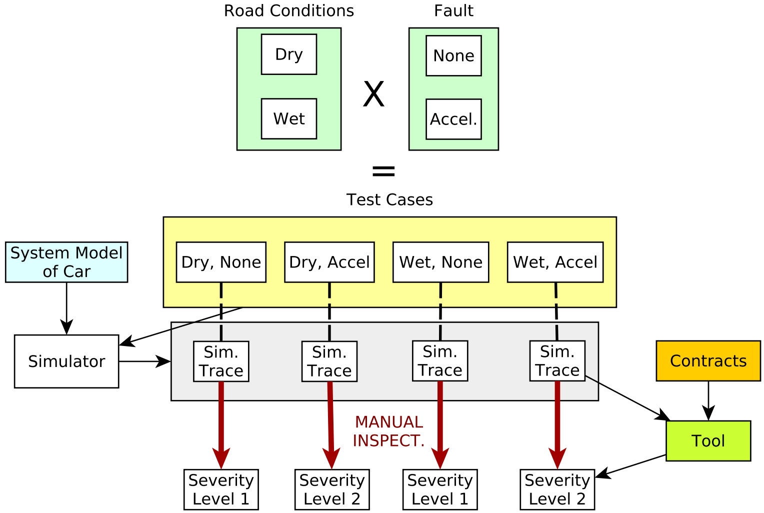

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Natural Language Contract:
IF accel >= 3 G && accel <= 4 G for duration < 5 sec THEN severity = S2

$$\rightarrow$$

Signal Temporal Logic (STL):

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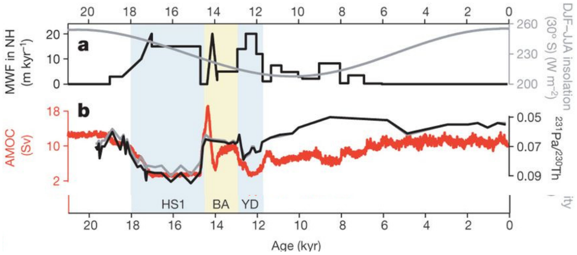

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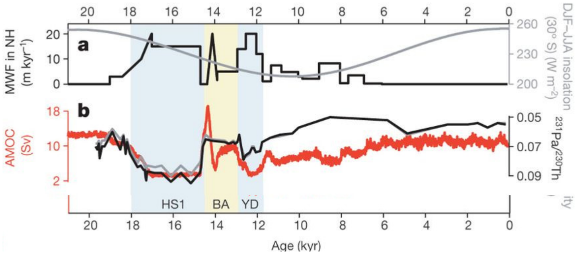

Tool for checking:

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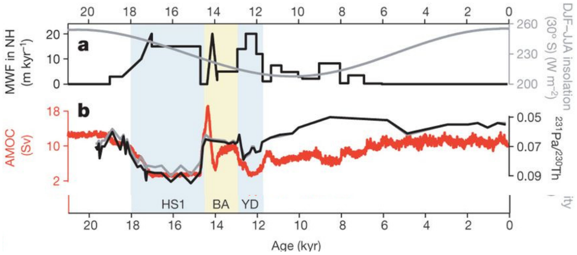

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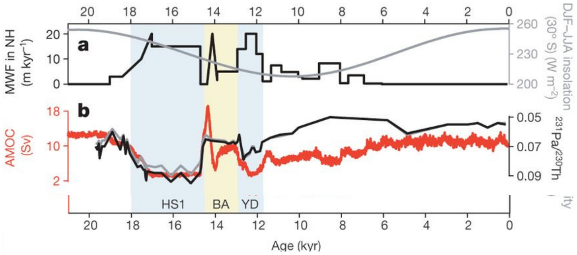

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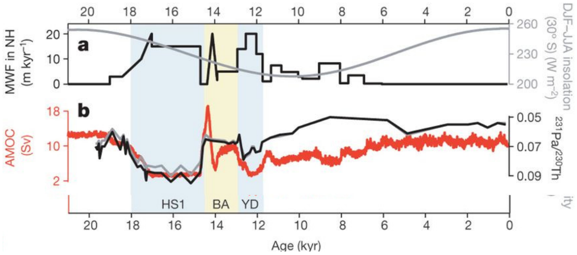

Tool for checking:
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Reporting:
Robustness? Visualization?