Analisi di conformità dei requisiti

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Context and Motivation

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The **assessment** of requirements is an important yet costly and complex task, still largely carried out manually.

Requirements Engineering

The **Requirements Engineering (RE)** research field aims at developing tools and techniques to analyze and handle requirements in a more efficient and automatic way.

Tasks

The RE practice deals with many different tasks:

- Elicitation
- Modeling and Analysis
- Requirements Management
- Validation and Verification
- Etc.

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Example:
R1: When the button is pressed, the red light should be turned on.
R2: When the button is pressed, the red light should be turned off.

Inconsistency Explanation

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Given a set of inconsistent requirements R, finds a minimal subset $R' \subseteq R$ that is still inconsistent.

Logic and Formalization

- We started our investigation with Linear Temporal Logic (LTL)
  - It allows to express properties in a rigorous mathematical notation
  - Good expressiveness and reasoning power
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Narizzano, M., Pulina, L., Tacchella, A., Vuotto, S. (2018, April). Consistency of property specification patterns with boolean and constrained numerical signals. In NASA Formal Methods Symposium (pp. 383-398). Springer, Cham.

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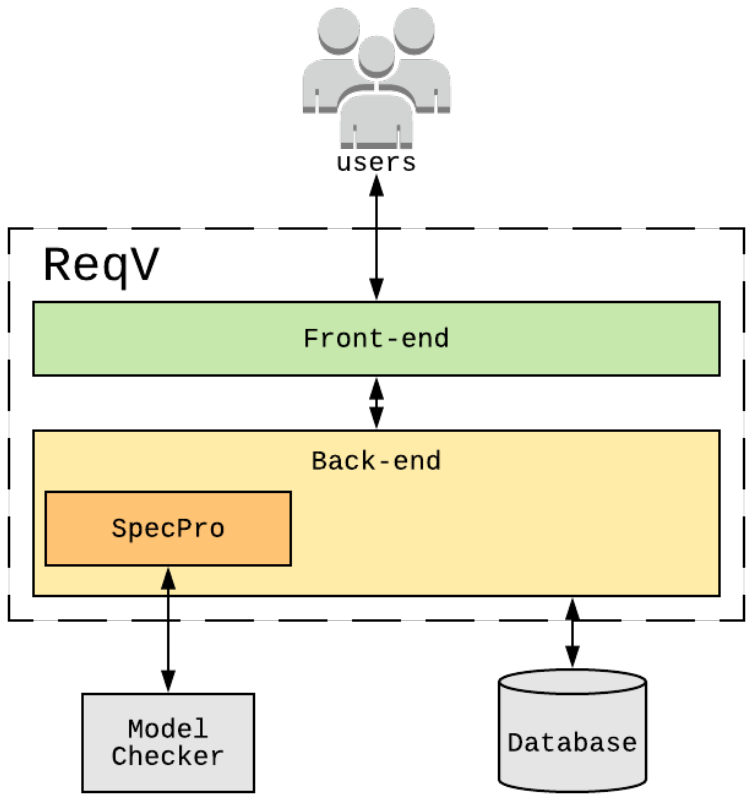
Globally, it is always the case that if proximity_sensor < 20 *holds, then arm_idle eventually holds.*

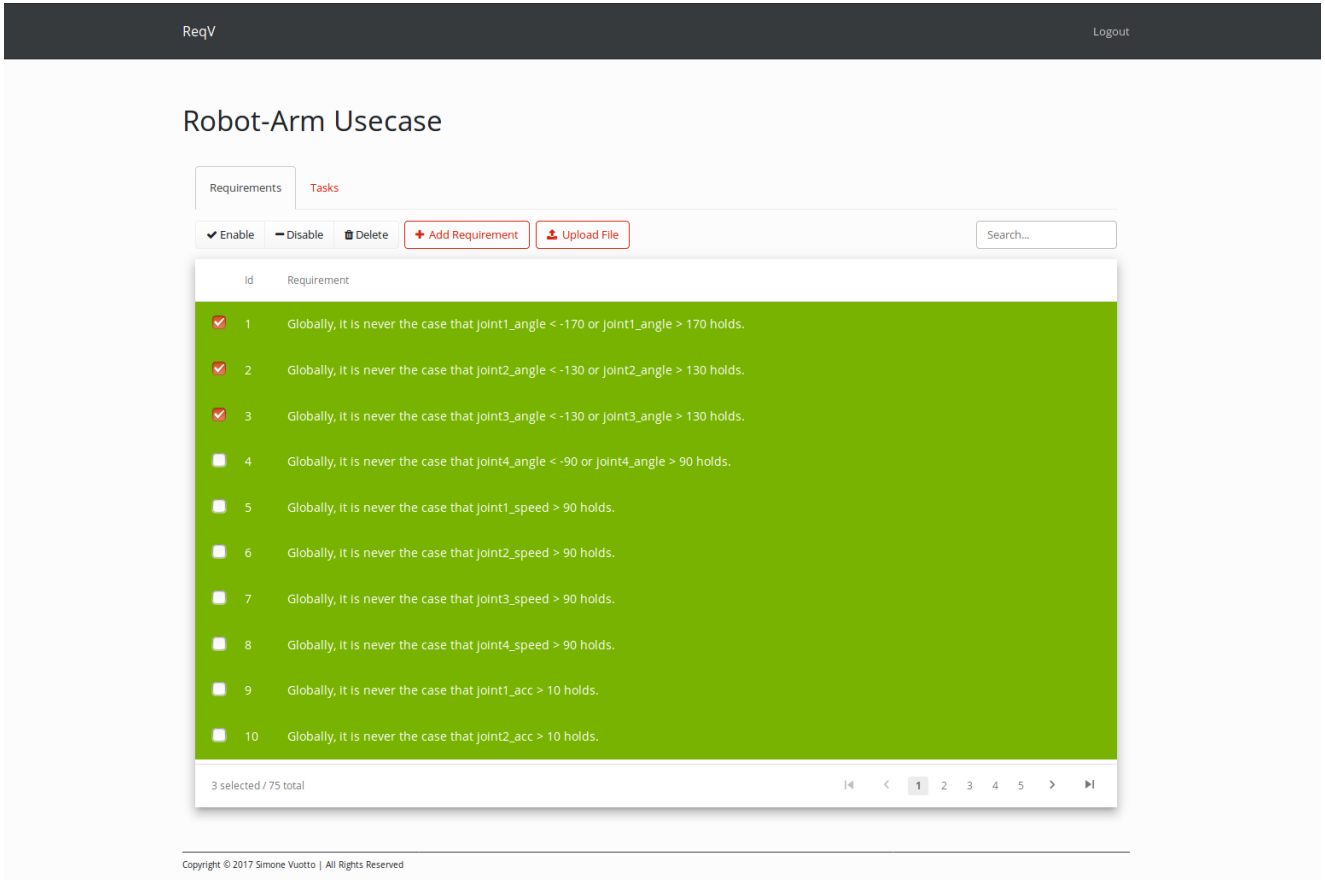
Comparison: LTL vs PSPs

	LTL	PSP
Formal		
Easy to Read		
Easy to Write		
Tools Support		

ReqV


users
ReqV
Front-end
Back-end
SpecPro
Model Checker
Database

ReqV 1/2


ReqV
Logout
Robot-Arm Usecase
Requirements
Tasks
Enable
Disable
Delete
Add Requirement
Upload File
Search...
Id
Requirement
1 Globally, it is never the case that joint1_angle < -170 or joint1_angle > 170 holds.
2 Globally, it is never the case that joint2_angle < -130 or joint2_angle > 130 holds.
3 Globally, it is never the case that joint3_angle < -130 or joint3_angle > 130 holds.
4 Globally, it is never the case that joint4_angle < -90 or joint4_angle > 90 holds.
5 Globally, it is never the case that joint1_speed > 90 holds.
6 Globally, it is never the case that joint2_speed > 90 holds.
7 Globally, it is never the case that joint3_speed > 90 holds.
8 Globally, it is never the case that joint4_speed > 90 holds.
9 Globally, it is never the case that joint1_acc > 10 holds.
10 Globally, it is never the case that joint2_acc > 10 holds.
3 selected / 75 total
1 2 3 4 5
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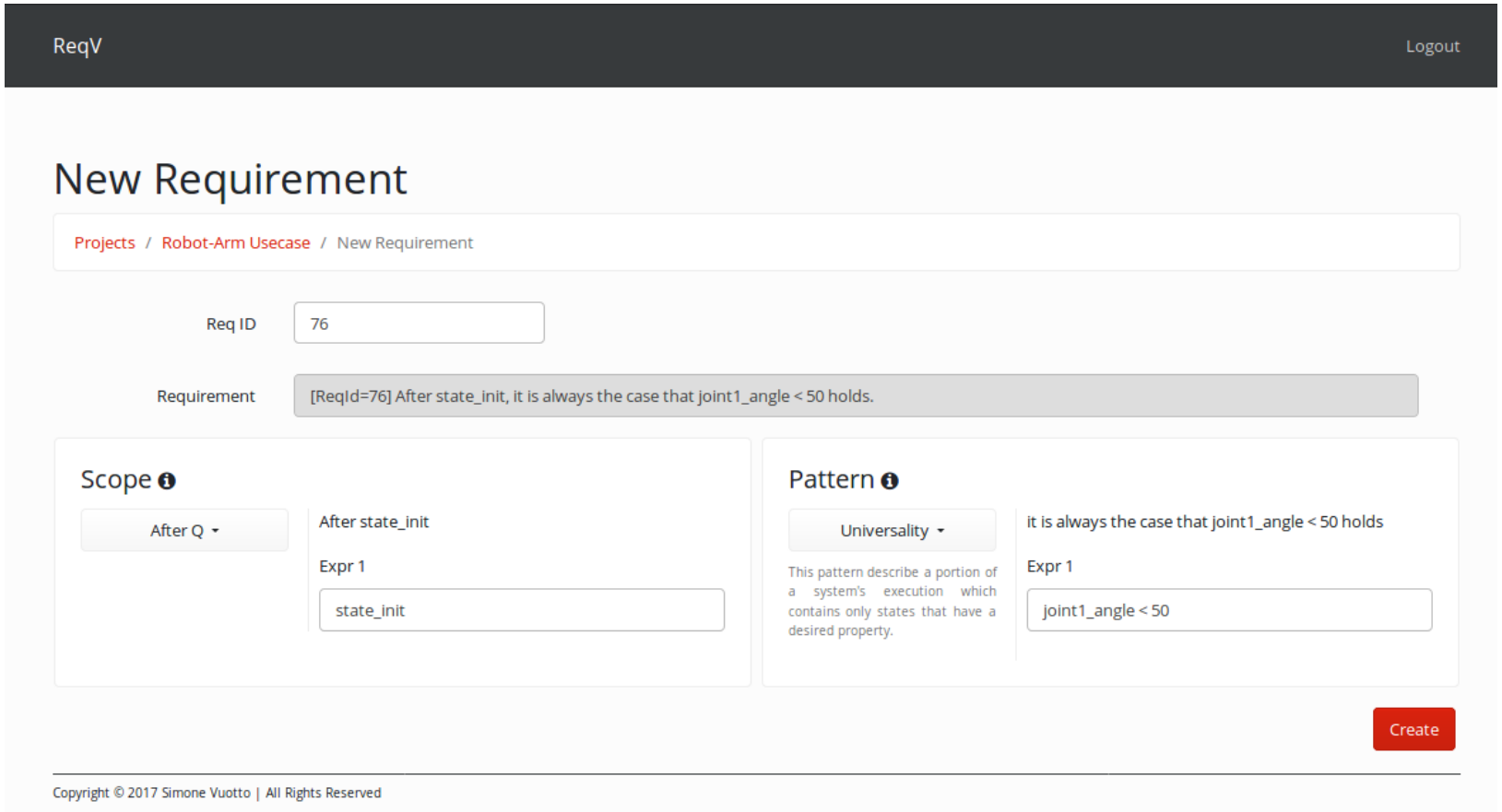
ReqV 2/2


ReqV
Logout
New Requirement
Projects / Robot-Arm Usecase / New Requirement
Req ID
76
Requirement
[ReqId=76] After state_init, it is always the case that joint1_angle < 50 holds.
Scope
After Q
After state_init
Expr 1
state_init
Pattern
Universality
This pattern describe a portion of a system's execution which contains only states that have a desired property.
it is always the case that joint1_angle < 50 holds
Expr 1
joint1_angle < 50
Create
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Links & References

- Documentation: http://www.sagelab.it/reqv/
- Source Code: https://gitlab.sagelab.it/sage/ReqV
- Video Tutorial: https://youtu.be/2WKSxh64Z2k
- Narizzano, M., Pulina, L., Tacchella, A., Vuotto, S. (2018, April). Consistency of property specification patterns with boolean and constrained numerical signals. In NASA Formal Methods Symposium (pp. 383-398). Springer, Cham.
- Narizzano, M., Pulina, L., Tacchella, A., & Vuotto, S. (2019). Property specification patterns at work: verification and inconsistency explanation. Innovations in Systems and Software Engineering, 1-17.
- Narizzano, M., Pulina, L., Tacchella, A., & Vuotto, S. ReqV: A Tool for Requirements Formal Consistency Checking.
- Vuotto, S. Narizzano, M., Pulina, L., & Tacchella (2019) A. Poster: Automatic Consistency Checking of Requirements with ReqV. In International Conference on Software Testing, Verification and Validation.

Thank you!
Questions?