

A UML-based Method for the Development of Policies to Support Trust Management

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IFIPTM, Trondheim, June 18, 2008

Overview

- The challenge
- Method overview
 1. Modeling of system
 2. Analysis of system
 3. Capturing a policy to optimize behavior of system
- Presentation of method on bank example
- Conclusion

The Challenge

- Trust is the subjective probability by which an actor (the trustor) expects that another entity (the trustee) performs a given action on which the welfare of the trustor depends
- We consider systems in which actors make trust-based decisions
- How does such decisions determine system behavior?
- What are the involved risks and opportunities for the system?
- How can trust-based decisions be optimized?

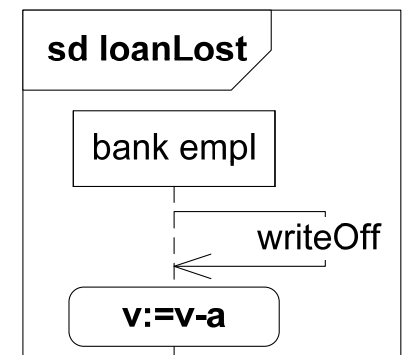
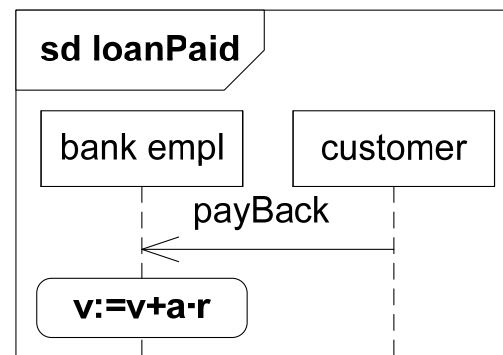
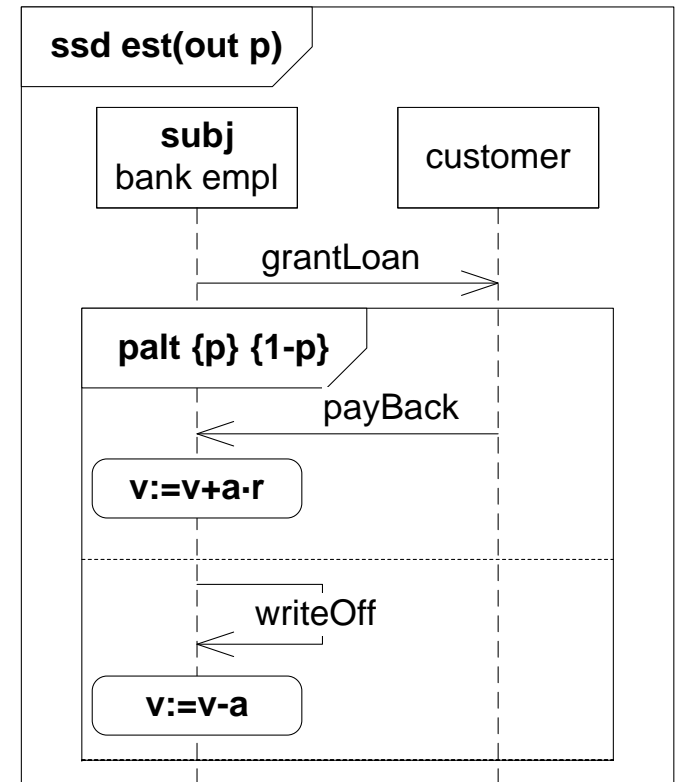
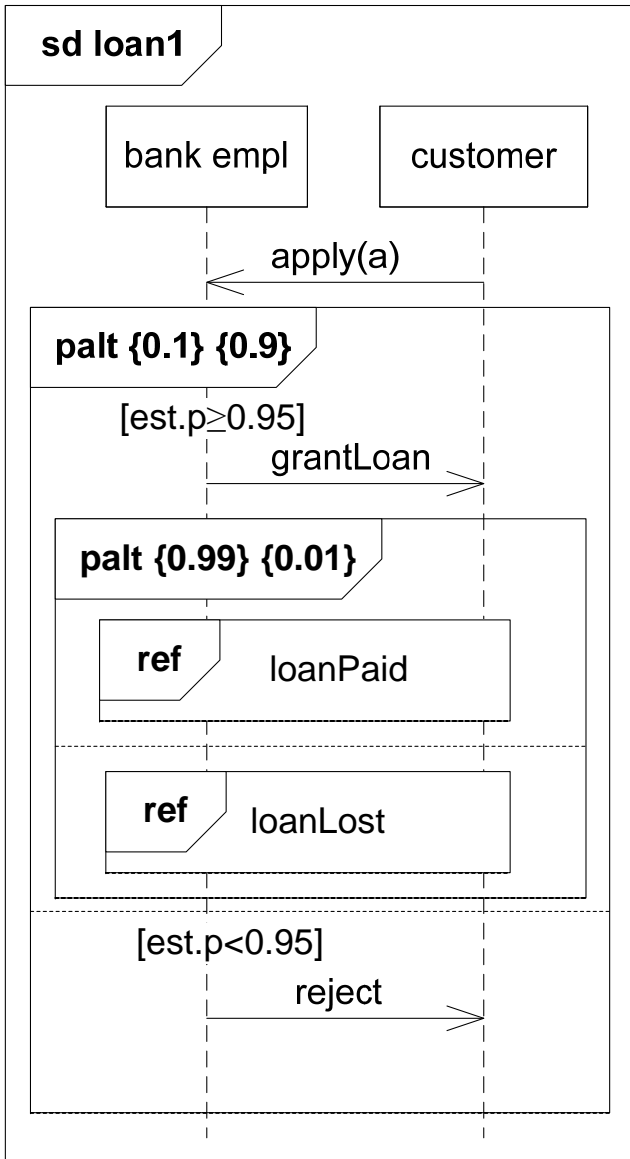
Method Overview

- Phase 1: System modeling
 - Describe the current behavior and trust-based decisions
- Phase 2: Trust analysis
 - 2.1 Identify critical decision points
 - 2.2 Evaluate well-foundedness of trust
 - 2.3 Estimate impact of alternative behaviors
 - 2.4 Evaluate and compare alternative behaviors
- Phase 3: Capturing a policy to optimize trust-based decisions

Phase 1 – Modeling of Target

- What is the actual system behavior?
- How does system behavior depend on choices of system actors?
- Why are the choices made?
- How does trust and beliefs influence choices of behavior?
- In this phase we model the actual current behavior, trust relations and trust-based decisions of an existing system

Modeling the Bank System



Phase 2 – Analysis of Target

- Are the trust assessments well-founded?
- What are the alternatives to the current system behavior?
- Which alternative behaviors yield the most optimal risk and opportunity levels?

Analyzing the Bank System

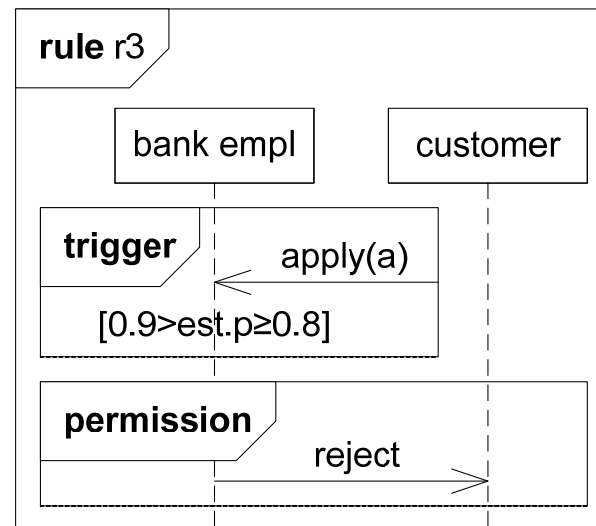
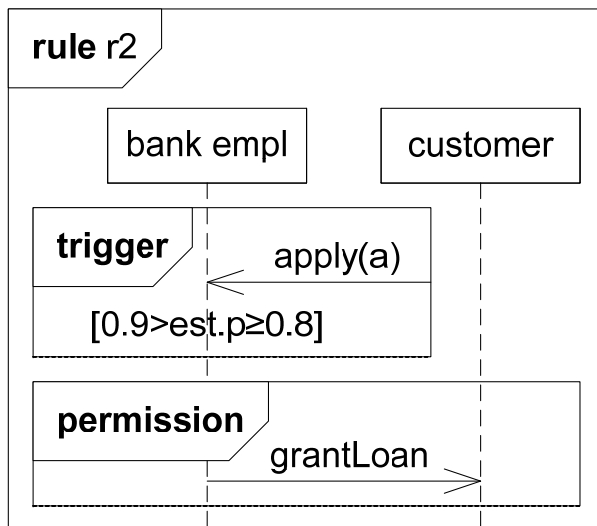
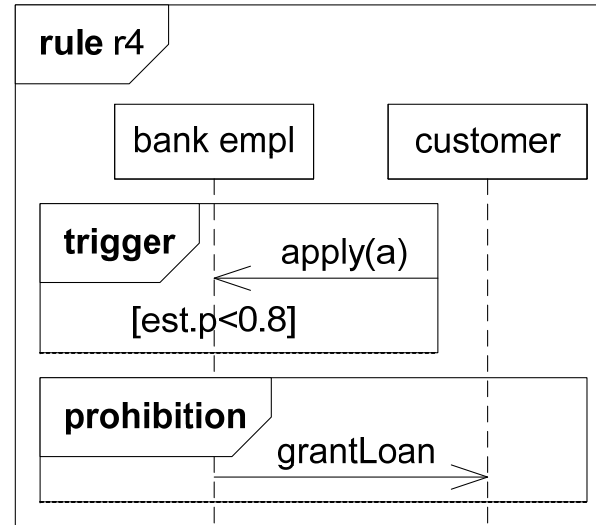
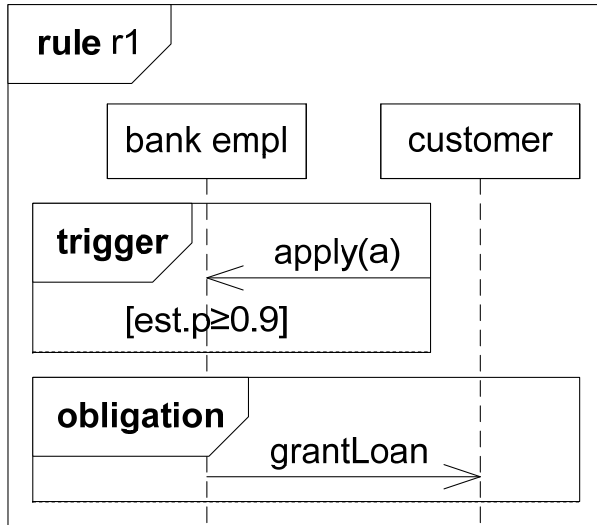
Table 1 The result of using alternative decision thresholds

Threshold	Granted	Paid back	Opp.	Risk	Opp. – Risk
≥ 0.95	10%	99%	0.0086	0.001	0.0076
≥ 0.9	30%	97%	0.025	0.009	0.016
≥ 0.8	70%	94%	0.057	0.041	0.016
≥ 0	100%	84%	0.073	0.16	-0.087

Phase 3 – Capturing a Policy to Optimize Target

- A policy is a set of rules that determine choices of behavior in a system
- Specify a policy the enforcement of which ensures the optimal choices of behavior
- Each rule specifies an obligation, prohibition or permission
- A given trust level is the decisive factor for each rule

Policy to Optimize the Bank System



Conclusions

- We have presented a method for trust analysis and trust policy capturing
- Take into account the subjective aspect of trust
- Consider the impact of trust on the system as a whole
- Focus both on risk and the dual notion of opportunity
- Support the method with appropriate modeling languages