

Master's Thesis

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Constraint Checker for the Monitoring Framework

REMINDS (<http://mevss.jku.at/reminds>) [1] is a tool-supported framework for monitoring systems of systems at runtime. It comprises a flexible runtime monitoring infrastructure providing support for different roles and a requirements monitoring model covering the requirements to be monitored, the constraints checking adherence of a system's behavior to its requirements, the events and data produced by systems at runtime, and the probes instrumenting systems to intercept events and data at runtime.

```
trigger = if event "Cooling.prepareStartCast"  
occurs from source("caster.l2.cooling")  
condition = events  
"Cooling.setGrade",  
"Cooling.setPractice",  
"Cooling.startCast",  
"Cooling.tailoutInitiated",  
"Cooling.tailoutCompleted"  
from source("caster.l2.cooling") occur consecutively
```

Currently we use a self-implemented constraint DSL (see figure above) and a self-implemented checker [2] to specify and check constraints at runtime. However, we have developed REMINDS to allow exchanging checker and/or DSL.

The goals of the master thesis are:

- Demonstrate that it is possible to replace the existing constraint checker in REMINDS.
- Review the landscape of constraint checkers useful for event-based runtime monitoring, e.g., from the field of complex event processing: Esper (<http://www.espertech.com/products/esper.php>), Drools Fusion (<http://docs.jboss.org/drools/release/6.2.0.CR1/drools-docs/html/DroolsComplexEventProcessingChapter.html>), etc.
- Select one technology
- Implement a checker based on this technology that can be integrated in REMINDS.
 - The checker must run as a separate server that can communicate with REMINDS (e.g., constraints are sent for checking, the checker has to send/provide results of checks, ...).
- Implement an automatic translation from our DSL to the target language used by this checker to allow checking the constraints we have already defined in our constraint DSL.
- Evaluate the new checker and compare it with our existing. See [2] for example evaluations.

[1] M. Vierhauser, R. Rabiser, P. Grünbacher, K. Seyerlehner, S. Wallner, and H. Zeisel, "ReMinds: A Flexible Runtime Monitoring Framework for Systems of Systems," Journal of Systems and Software, 2015 (<http://dx.doi.org/10.1016/j.jss.2015.07.008>).

[2] M. Vierhauser, R. Rabiser, P. Grünbacher, and A. Egyed, "Developing a DSL-Based Approach for Event-Based Monitoring of Systems of Systems: Experiences and Lessons Learned," Proc. of the 30th IEEE/ACM International Conference on Automated Software Engineering, 2015 (<http://dx.doi.org/10.1109/ASE.2015.25>).