

REMINDS: Requirements Monitoring for Systems of Systems

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Many software-intensive systems today are very-large-scale software systems with systems of systems (SoS) architectures comprising interrelated and heterogeneous systems developed by diverse teams over many years. Due to their scale, complexity, heterogeneity, and variability engineers face significant challenges when determining the compliance of SoS with their requirements. In particular, certain behavior only emerges at runtime due to complex interactions between the involved systems and their environment. Monitoring the behavior of SoS at runtime is thus essential. However, existing requirements monitoring approaches are often limited to particular architectural styles or technologies and are thus hard to apply in SoS architectures. They do not adequately consider the characteristics of SoS: requirements exist at different levels, across different systems, and are owned by diverse stakeholders. This talk provides an overview of the research on requirements monitoring for systems of systems conducted at the Christian Doppler Laboratory MEVSS at the Johannes Kepler University Linz, Austria. More specifically, in cooperation with the company Primetals Technologies, we have been developing REMINDS, a flexible framework for runtime monitoring of system-of-systems architectures, which is based on a requirements monitoring model defining the key elements to be monitored and their relations: requirements in SoS can have different scopes and have to be refined and formalized as constraints – written in a custom DSL – to allow checking them at runtime. The SoS is instrumented using probes, which provide events and event data at runtime to a unified event model. Constraints operate on this model and check events and event data. Examples include behavioral constraints such as event occurrence, event sequences and timing, as well as checks performed on the data associated to monitored events. The separation of concerns between the actual systems and a higher-level instance for constraint definition and evaluation allows the definition of cross-cutting and global constraints, which require data aggregated from various systems. The talk provides a summary of the work we have done from 2013 until today and includes an overview of ongoing work and a tool we have been developing for industrial users.

Key References:

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Short Biography Rick Rabiser

Dr. Rick Rabiser is a senior researcher at the Christian Doppler Laboratory for Monitoring and Evolution of Very-Large-Scale Software Systems at Johannes Kepler University Linz, Austria. In this lab he heads the research module on requirements-based monitoring and diagnosis in VLSS evolution. He holds a Ph.D. in Business Informatics as well as the *venia docendi* (habilitation) in Practical Computer Science from Johannes Kepler University Linz. His research interests include but are not limited to variability management, software maintenance and evolution, software product lines, automated software engineering, requirements engineering, requirements monitoring, and usability and user interface design. Dr. Rabiser has published about 100 peer-reviewed papers; served in more than 60 program committees and diverse conference and workshop organization committees; and frequently reviews articles for several international journals like IEEE Transactions on Software Engineering, Empirical Software Engineering (Springer), and Information and Software Technology (Elsevier). He is also a member of the steering committee of the Euromicro SEAA conference series. Refer to <http://mevss.jku.at/rabiser> for more information.