
**Proposal for a tutorial to be held at the
29th IEEE International Symposium on Software Reliability Engineering (ISSRE 2018)**

Title: Exploiting Operational Profile Data for Continuous Dependability Assessment in DevOps

Name and affiliation of the main proposer/organizer:

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- Vincenzo Ferme, University of Stuttgart, Germany and University of Lugano, Switzerland
- Andrea Janes, Free University of Bozen-Bolzano, Italy
- Barbara Russo, Free University of Bozen-Bolzano, Italy
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Length of Tutorial: Half Day

Goal and Abstract:

DevOps is an emerging software engineering paradigm that aims for fast feedback cycles between software changes in development and bringing these changes into production. Apart from cultural and organizational changes, DevOps employs a high degree of automation, cloud technologies, and tailored architectural styles such as microservices. The increased development speed and complexity impose various challenges to dependability assessment. However, this context also provides great opportunities, such as, enabling access to extensive operational data obtained from continuous monitoring in production, which is a core DevOps principle.

The goal of this tutorial is to provide an overview of challenges and approaches for dependability assessment in the context of DevOps and microservices. Specifically, we present dependability assessment approaches that employ operational data obtained from production-level application performance management (APM) tools, giving access to operational workload profiles, architectural information, failure models, and security intrusions. We use this data to automatically create and configure dependability assessments based on models, load tests, and resilience benchmarks. The focus of this tutorial is on approaches that employ production usage, because these approaches provide more accurate recommendations for microservice architecture dependability assessment than approaches that do not consider production usage.

We present an overview of (1) the state-of-the-art approaches for obtaining operational data from production systems using APM tools, (2) the challenges of dependability for DevOps and microservices, (3) selected approaches based on operational data to assess dependability. The dependability focus of this tutorial is on scalability, resilience, survivability, and security. Particularly, we present a demo of the automated approach for the evaluation of a domain-based scalability and security metric assessment that is based on the microservice architecture ability to satisfy the performance requirement under load

and/or intrusions. We illustrate the approach by presenting experimental results using a benchmark microservice architecture.

Track records/bios of organizer and additional instructor:

Alberto Avritzer received a Ph.D. in Computer Science from the University of California, Los Angeles, an M.Sc. in Computer Science for the Federal University of Minas Gerais, Brazil, and the B.Sc. in Computer Engineering from the Technion, Israel Institute of Technology. He is the founder and CEO of Esulabsolutions, Inc., which specializes in software scalability, security and survivability assessment of large industrial systems. He served as Lead Performance Engineer at Sonatype. He held a Senior Member of the Technical Staff in the Software Engineering Department position at Siemens Corporate Research, Princeton, New Jersey for 11 years, where he published extensively on monitoring and management of mission-critical systems for survivability. Before moving to Siemens Corporate Research, he spent 13 years at AT&T Bell Laboratories, where he developed tools and techniques for performance testing and analysis. He spent the summer of 1987 at IBM Research, at Yorktown Heights. His research interests are in software engineering, particularly software testing, monitoring and rejuvenation of smoothly degrading systems, and metrics to assess software architecture, and he has published over 70 papers in journals and refereed conference proceedings in those areas (<http://dblp.dagstuhl.de/pers/hd/a/Avritzer:Alberto>). He is a Senior Member of ACM.

André van Hoorn is a researcher with the Institute of Software Technology at the University of Stuttgart, Germany, where he was an interim professor for reliable software systems from 2015 to 2017. He received his Ph.D. degree (with distinction) from Kiel University, Germany (2014) and his Master's degree (Dipl.-Inform.) from the University of Oldenburg, Germany (2007). André's research focuses on novel methods, techniques, and tools for designing, operating, and evolving trustworthy distributed software systems. Of particular interest are quality attributes such as performance, reliability, and resilience—and how they can be assessed and optimized using a smart combination of model-based and measurement-based approaches. Currently, André investigates challenges and opportunities to apply such approaches in the context of continuous software engineering and DevOps. Andre has published over 50 paper in journals and refereed conferences in those areas (<http://dblp.dagstuhl.de/pers/hd/h/Hoorn:Andr=eacute= van>). He is the principal investigator of several research projects and is actively involved in community activities, e.g., in the scope of the Research Group of the Standard Performance Evaluation Corporation (SPEC). Recently, André served as a PC co-chair of the 9th ACM/SPEC International Conference on Performance Engineering (ICPE 2018).

Outline with approximate timings:

- Part 1 (90 minutes): (a) obtaining operational profiles using APM tools and (b) challenges of continuous dependability assessment in microservice architectures
- Part 2 (90 minutes): selected approaches for continuous dependability assessment using operational profiles and survivability modeling

Target audience: The tutorial is self-contained and accessible to Software Reliability Engineers (SRE). No specific background is required, in addition to SRE background. Dependability assessment and operational profiles are a very important topic to the software reliability community, and have been an ISSRE topic for several years.

Takeaways: Tutorial attendees will learn how to exploit operational data for continuous dependability assessment of the microservice architectures they work on.

History of the tutorial: The current tutorial format is new and will be presented, if approved, for the first time at ISSRE 2018. However, related/shorter versions of the tutorial, keynotes, and related papers were presented in several venues, among them: ICPE 2013, ISSRE 2014, ICPE 2017, ITC 2017, ISSRE 2017, ICPE 2018, ECSA 2018.