Joint Post-proceedings of the First and Second International Conference on Microservices

Microservices 2017, October 2017, University of Southern Denmark, Odense, Denmark
Microservices 2019, February 2019, University of Applied Sciences and Arts Dortmund, Dortmund, Germany

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◼ Preface

About the Microservices Community and the Microservices Conference Series. The Microservices Community[1] is one of the largest non-profit organisations purposed at sharing the knowledge and fostering collaborations on microservices. The organisation counts a broad composition of members from research institutions, private companies, universities, and public organisations.

The International Conference on Microservices (shortened, Microservices) is a conference series aimed at bring together industry and academia, to foster discussion on the practice and research of all aspects of microservices: their design, programming, and operations. Microservices is the flagship conference among the many dissemination events supported by the Microservices Community.

Microservices 2017, October 2017, Odense, Denmark. The First International Conference on Microservices[2] took place in Odense, Denmark from October 25–26, 2017, and was organised in collaboration between the University of Southern Denmark and the University of Bologna.

The program committee (PC) consisted of 16 members and the conference received the submission of 18 extended abstracts, of which 16 were accepted for presentation. The program also featured invited keynotes by Steve Ross-Talbot and Claudio Guidi. The conference counted 40+ participants, of which 58% were from industry (e.g., Red Hat Inc., Yoti Ltd., etc.) and 42% from academia.

Microservices 2019, February 2019, Dortmund, Germany. The Second International Conference on Microservices[3] took place in Dortmund, Germany from February 19–21, 2019. It was organised in collaboration between the Dortmund University of Applied Sciences and Arts and the University of Southern Denmark.

Microservices 2019 built upon the success of the previous edition. The PC consisted of 26 members and the conference received the submission of 32 extended abstracts, of which 28 where accepted for presentation. The contributions covered a broad spectrum of topics related to the three main themes around Microservices: design, development, and deployment/operations. Thus, each of the three conference days could be dedicated to one of those themes. The program featured invited keynotes by Olaf Zimmermann, Fabrizio Montesi, Ramón Medrano Llamas, Jörn Esdohr, and Peter Rossbach. The conference counted 70+ participants, of which 36% were from industry (e.g., Google LLC, Siemens AG, NGINX Inc., IBM Inc., etc.) and 64% from academia.

Post-proceedings of Microservices 2017/2019. The present volume compiles contributions from attendees of Microservices 2017 and 2019. The volume received 9 submissions of which 5 were accepted for inclusion after peer review and rebuttal.

In addition to the contributed papers, this volume includes the abstracts of the keynotes presented at the first two editions of Microservices.

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[1] `https://www.microservices.community`

[2] `https://www.conf-micro.services/2017`

[3] `https://www.conf-micro.services/2019`

We thank the authors of all submitted proposals for their work in preparing and presenting their contributions. We hope that they found the feedback from the reviewing process helpful. We also thank the members of the program committees of Microservices 2017, Microservices 2019, and these post-proceedings for their excellent work and enthusiasm.

Finally, we want to thank all the donors that provided financial support to the conference and these proceedings: Adesso AG, InnoQ GmbH, Materna SE, italianaSoftware S.r.l, Vanderlande BV, the Department of Mathematics and Computer Science of the University of Southern Denmark, and the Institute for the Digital Transformation of Application and Living Domains of the University of Applied Sciences and Arts Dortmund.

<div align="right">Let Industry and Academia meet.</div>

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◼ Microservices 2017

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Microservices 2017 Keynote Abstracts

A Linguistic Approach to Microservices, Claudio Guidi, italianaSoftware S.r.l.

Microservices are usually considered the be technology agnostic, thus they are approached in terms of architectures or models to be applied on distributed systems. Nevertheless, their basic mechanisms can be crystallized within a unique programming language by offering a new mindset for developers and engineers, In the past years we dealt with such an objective starting from the theoretical foundations of service oriented computing. In this presentation I'll show our experience and our results in approaching microservices with a specific programming language called Jolie.

The problem with Microservices, Steve Ross-Talbot, Estafet

Are microservices really the next Big Thing? Whilst they currently dominate conferences and the language of product vendors — often linked to APIs, Continuous Delivery, Containers and PaaS — the deluge of information often confuses rather than clarifies. This has led to sub-optimal microservices architectures and some spectacular failures.

In this talk, we will discuss both data-centric and interaction-centric approaches, looking at what happens when people "code-first-and-ask-questions-later". How much up-front thinking do you need?, and how can you exert sufficient control over implementations once

they are live? The future may well include policy-driven microservices architecture, but you need to ask some tough questions now if you are going to deliver to the business on a continued and scaled basis.

◼ Microservices 2019

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Microservices 2019 Keynote Abstracts

Domain-Specific Service Decomposition with Microservices API Patterns, Olaf Zimmermann

Service orientation is a key enabler for cloud-native application development. Microservices have emerged as a state-of-the-art implementation approach for the realization of the Service-Oriented Architecture (SOA) style, promoting modern software engineering and deployment practices such as containerization, continuous delivery, and DevOps. Designing (micro-)services interfaces' to be expressive, responsive, and evolvable is challenging. For instance, deciding for suited granularities is a complex task resolving many conflicting forces; one size does not fit all. Domain-Driven Design (DDD) can be applied to identify and specify service boundaries. However, service designers seek concrete, actionable guidance going beyond high-level advice such as "turn each bounded context into a microservice". Interface signatures and message representations need particular attention as their structures influence the service quality characteristics. This presentation first recapitulates prevalent SOA principles, microservices tenets and DDD patterns. It then reports on the ongoing compilation of complementary Microservices API Patterns (MAP) and proposes a set of pattern-based API refactorings for service decomposition. Finally, the presentation highlights some of the related research and development challenges.

Understandable Microservices, Fabrizio Montesi

Microservices come at a price: they have to be integrated to get a meaningful application. This motivated the creation of tools that make integration easier. Today, we spend more time developing integration than actual applications, so this development could not have come at a better time. Enter Jolie, a microservice-oriented programming language. By offering native linguistic features for composing microservices, Jolie has become a swiss army knife that can be used by integration ninjas and wise software designers that plan for maintanable software. To explore how microservices and Jolie can make us productive with integration, we'll develop microservices for a concrete business idea: a publishing platform for sharing Chuck Norris jokes. Technically, we'll create an API gateway for two different third-party Internet websites, integrate their behaviours, and ultimately get what we want without having to host either of them. Would you write object-oriented software without an object-oriented language? Ask yourself again, but for microservices, after you see this talk.

Engineering Reliability, Ramón Medrano Llamas

How do you scale up a service, so it can serve millions (or billions!) of users around the globe, make it reliable and fast while maintaining development speed and change safety? This talk introduces Site Reliability Engineering (SRE) at Google, explaining its purpose and describing the techniques it uses and the challenges it addresses. SRE teams manage Google's many services and properties, plus all the brand new Cloud infrastructure from our offices worldwide. They draw upon Linux based computing resources that are distributed in several data centres around the globe to deploy, manage, and serve globally available services four billions of users.

Factory of Things - Using Microservices for Data Processing and IoT,
Jörn Esdohr

Industrial devices and machines, ranging from lights over elevators to complete factories, are producing large amounts of data. Some of it is used to grant simple ad-hoc monitoring and control capabilities, but a lot of this valuable resource ends up discarded due to the lack of a comprehensive data processing infrastructure. Microservices provide a reliable and performant architecture for the Internet of Things (IoT) to connect devices on a large scale, which provides a path to collect and analyse the flood of accumulating application data. At com2m, a containerized microservice-based IoT platform was developed leveraging graph and document databases, and modern web technologies. We present the Factory of Things as a showcase that demonstrates the real-world integration of a manufacturing line powered by programmable logic controllers. The IoT platform enables new data processing possibilities to monitor devices and enables the development of rich data-based services.

Build Fashionable Container Systems with Microservices,
Clouds, and Kubernetes, Peter Rossbach

Transform your organization and systems so that they no longer need an end-state. Modern clouds and the container technology help you to build self-healing autonomous scalable systems around the globe. The Cloud Native Computing Foundation ecosystem offers you many features to setup and manage complex cloud-native container systems. Serverless or microservice architectures need a lot of glue infrastructure components. In this talk I will show you some automation practices, such as infrastructure as code, release automation, and container orchestration. We build container systems in conjunction with Kubernetes and Clouds. As a developer you will learn how you can easily control your stage environments, reuse setups, and how to release your complete application stack with cloud-native technologies.

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