



**ICSA 2018**  
**Conference Information**  
**and Program**

# Welcome to ICSA 2018

Welcome to Northeastern University Seattle campus, located in the South Lake Union neighborhood of the Emerald City, Seattle. The week long conference program offers a variety of tutorials, workshops, high quality research and industry papers, three keynotes from top tech companies, and social events to promote discussion, networking and fun.

South Lake Union is the epicenter of the burgeoning Seattle tech industry. You will see the amount of new buildings being constructed in the area. In fact in 2006 there were almost no new buildings in South Lake Union. It was a run down, mostly deserted area on the edge of downtown. Then Amazon started moving in, and the rest is history.

The campus is surrounded by buildings populated with Amazon engineers, with Facebook and soon Google within a few minutes walk. That's not to mention a massive collection of smaller companies and startups nearby, and Microsoft and many others across Lake Washington. This is a truly world class environment for software architecture.

Putting on an event like ICSA takes an enormous amount of efforts from many people. The organizing committee, referees, local operations and volunteers have all put in countless hours of work to bring you the conference. You'll find everyone acknowledged on the conference website - this is Seattle so we'll save trees and not repeat their names here :). I'd just like to reiterate my gratitude for everyone's efforts.

I hope you have a fun and professionally productive time in this wonderful part of the world. Let's hope the sun shines. Normally in Seattle in Spring, if you don't like the weather, you just need to wait 15 minutes!

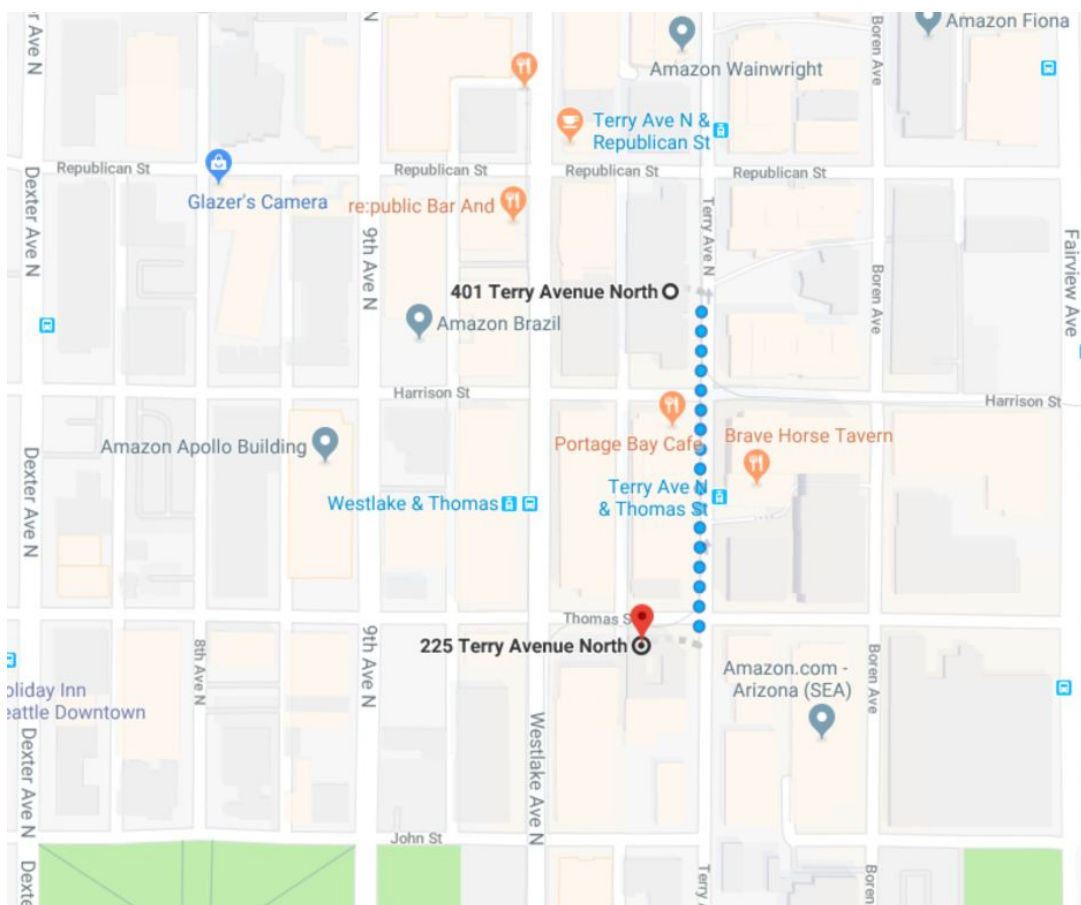
# Location

The conference is being held in two buildings on Northeastern's campus.

Monday and Tuesday will be held in 225 Terry Ave N. Take the elevator to the 3rd floor and wander on in. Maps of the campus and rooms are on the web site and in your registration package. It's small so you won't get lost.

The main conference (Wednesday to Friday) will take place in the campus building at 401 Terry Ave N, 200m north of 225. The maps below should make this pretty clear.

The whole of downtown Seattle is very walkable and safe. As long as you don't wander down a dark alley at 1am, you will be fine. The biggest danger is being attacked by an Amazonian's dog that you accidentally tread on!



# Social Events

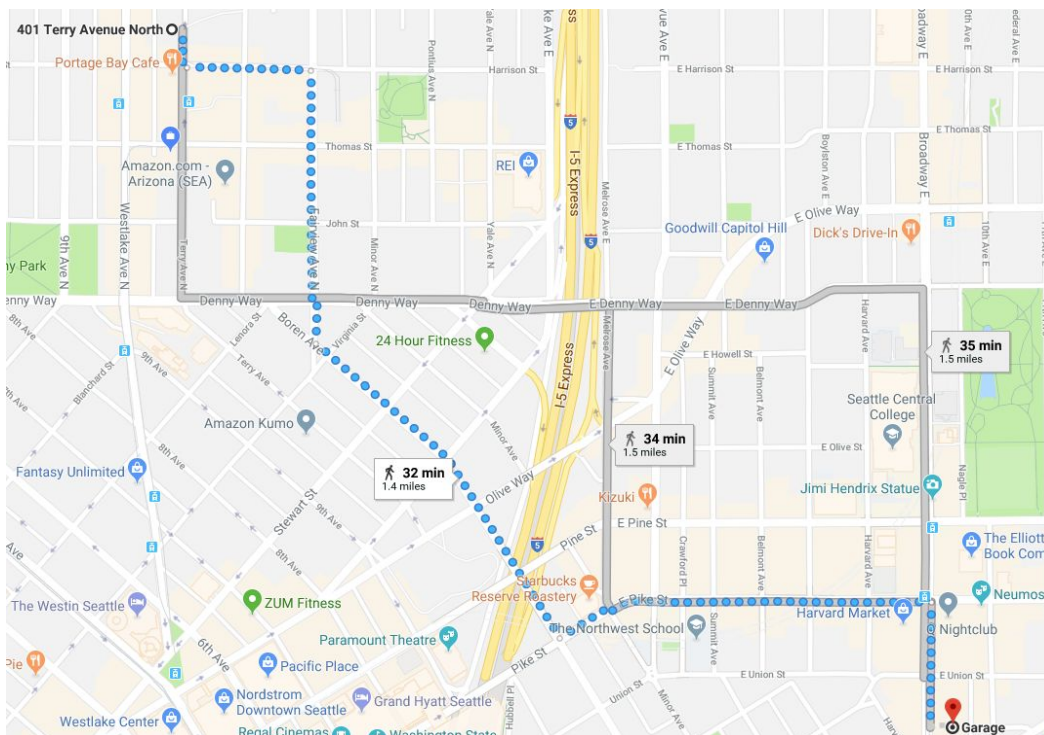
The conference reception will be held on Wednesday evening on campus (401 Terry) from 6pm to 7.30. We'll provide a selection of local beers and wine, and some surprise dishes from a local food truck. Everyone eats from food trucks in Seattle.

The main conference social event will be held on Thursday at [The Garage](#) in Capitol Hill. It'll be a night of fun and games - literally. Get your bowling practise in as there will be prizes.

The Garage is approximately 2km from campus and a pleasant (gradual uphill) stroll through Seattle's most eclectic hipster neighborhood. Lyft and Uber are also great options, and for more than one person will be less than the cost of the bus. If you are old school, taxis exist in Seattle but no one uses them :)

If you are early and like beer, check out [The Brewlab](#) or [Optimism](#) brewing, both excellent local microbreweries that are on the way (and in the case of the latter, next door) to The Garage.

***Please bring your ID (passport or US driving license) to The Garage. They may check even if you obviously look older than 21. This is the USA. It's weird sometimes.***



# Keynotes

## **Streaming Analytics – The Future of Every Application**

**Speaker:** Roger Barga, AMAZON

**Abstract:** Stream data processing is about identifying and responding to events happening in your business, in your service or application, and with your customers in near real-time. Sensors, IoT and mobile devices, and online transactions all generate data that can be monitored constantly to enable a business to detect and then act on events and insights before they lose their value. The need for large scale, real-time stream processing of big data in motion is more evident now than ever before. In this talk I will draw upon our experience with Amazon Kinesis data streaming services to highlight use cases and discuss technical challenges and approaches required to operate these services at massive scale. I will close with a look ahead to the future of stream data processing and role of machine learning over streaming data.

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## **Mining personal, dense, dynamic data clouds to enhance health and drive discovery**

**Speaker:** Nathan Price, Institute of Systems Biology

**Abstract:** Healthcare is becoming more proactive and data-rich than anything before possible – and will increasingly focus on maintaining and enhancing wellness more than just reacting to disease. Lee Hood and I have recently launched a data-rich wellness project that integrates genomics, proteomics, metabolomics, microbiomes, clinical chemistries and wearable devices of the quantified self to monitor wellness and disease. The resulting personal, dense, dynamic data (PD3) clouds enable the creation of a field we term "scientific wellness" that aims to help individuals take informed actions to enhance their wellness and help reduce their risk for disease — informed by PD3 clouds. In essence, scientific wellness becomes a key to understanding disease because it provides a framework in which to detect the earliest transition states. Analyses of these data — individually and in aggregate — will enable us to identify scientifically-validated metrics for wellness, see early warning signs of disease, and develop approaches to reverse disease in its early stages. I will present results from our proof-of-concept pilot study in a set of 108 individuals (the Pioneer 100 study) as well as data from thousands of subsequent individuals that have been profiled to date. I will show how the interpretation of these data led to actionable findings for individuals to improve health and reduce risk drivers of

disease, and how they are giving us insights into human biology. I will also give big picture views of how this endeavor relates to the future of health.

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## Software Engineering at Google Scale

**Speaker:** Marija Mikic, GOOGLE

**Abstract:** Developing software systems at Google scale requires simultaneously balancing many properties, both functional and non-functional. This talk will discuss a range of challenges commonly faced by software engineers at Google. The talk will present some of Google's infrastructure and services aimed at addressing those challenges, the tradeoffs these services make, and the manner in which they enable architecture, design, implementation, testing, deployment and monitoring of Google's systems.

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## Q# and the Microsoft Quantum Development Kit

**Speaker:** Martin Roetteler, MICROSOFT RESEARCH

**Website:** <http://research.microsoft.com/en-us/people/martinro/>

**Abstract:** Quantum computing promises to utterly transform our ability to solve today's most challenging problems. We give a gentle introduction to quantum computing and explain why a framework such as the Microsoft Quantum Development Kit (QDK) is essential for harnessing the power of scalable quantum computers. The QDK features Q# as a high-level domain-specific language for programming quantum algorithms. We demonstrate how Q# enables easy programming, compilation, and simulation of quantum algorithms, and highlight the existing rich set of libraries and samples. The QDK is available at <https://www.microsoft.com/en-us/quantum/development-kit>.

## Program: Monday

225 Terry Ave N, 3rd Floor	Orcas	Whidbey
08:30-09:00	Registration	Registration
09:00-10:30	T2: Qinghua Lu Designing Blockchain-based Applications	WS2: Second International Workshop on Engineering IoT Systems: Architectures, Services, Applications, and Platforms (IoT-ASAP)
10:30-11.00	Coffee	

<b>11.00-12:30</b>	<b>T2:</b> Qinghua Lu Designing Blockchain-based Applications	<b>WS2:</b> Second International Workshop on Engineering IoT Systems: Architectures, Services, Applications, and Platforms (IoT-ASAP)
<b>12:30-13.30</b>	<b>Lunch</b>	
<b>13:30-15:00</b>	<b>T3:</b> Davide Arcelli, Vittorio Cortellessa and Daniele Di Pompeo Performance-Driven Software Architecture Refactoring	<b>WS2:</b> Second International Workshop on Engineering IoT Systems: Architectures, Services, Applications, and Platforms (IoT-ASAP)
<b>15:00-15:30</b>	<b>Coffee</b>	
15:30-17:00	<b>T3:</b> Davide Arcelli, Vittorio Cortellessa and Daniele Di Pompeo Performance-Driven Software Architecture Refactoring	<b>WS2:</b> Second International Workshop on Engineering IoT Systems: Architectures, Services, Applications, and Platforms (IoT-ASAP)

## Program: Tuesday

225 Terry	Orcas	Whidbey	Vashon	Bainbridge
<b>08:30-09:00</b>	<b>Registration</b>			
<b>09:00-10:30</b>	<b>T5:</b> Flavio Oquendo, Jair Leite, Thais Batista Modeling and Executing Software Architecture using SysADL	<b>T1:</b> Matthias Naab and Dominik Rost How to Evaluate Software Architectures	Early Career Researchers Forum	<b>WS5:</b> The Fourth International Workshop on Automotive System/Software Architectures (WASA)
10:30-11:00	<b>Coffee</b>			
<b>11:00-12:30</b>	<b>T5:</b> Flavio Oquendo, Jair Leite Thais Batista Modeling and Executing Software Architecture using SysADL	<b>T1:</b> Matthias Naab and Dominik Rost How to Evaluate Software Architectures	Early Career Researchers Forum	<b>WS5:</b> The Fourth International Workshop on Automotive System/Software Architectures (WASA)
<b>12:30-13:30</b>	<b>Lunch</b>			
<b>13:30-15:00</b>	<b>T4:</b> Ipek Ozkaya and Philippe Kruchten Strategic Management of Technical Debt	<b>T1:</b> Matthias Naab and Dominik Rost How to Evaluate Software Architectures	Early Career Researchers Forum	<b>WS5:</b> The Fourth International Workshop on Automotive System/Software Architectures (WASA)
<b>15:00-15:30</b>	<b>Coffee</b>			
<b>15:30-17:00</b>	<b>T4:</b> Ipek Ozkaya and Philippe Kruchten Strategic Management of Technical Debt	<b>T1:</b> Matthias Naab and Dominik Rost How to Evaluate Software Architectures	Early Career Researchers Forum	<b>WS5:</b> The Fourth International Workshop on Automotive System/Software Architectures (WASA)



## Program: Wednesday

Time	Room 106 (401 Terry)	Pearl (401 Terry)
08:15-09:00	<b>Registration and Breakfast</b>	
08:45-10:00	Opening (15 min) + Keynote: Dr Roger Barga, Amazon	
10:00-10:30	<b>Coffee</b>	
10:30-12:00	Technical Track: Highly Distributed Ecosystems	New and Emerging Ideas Track
12:00-13:00	<b>Lunch Room 106</b>	
13:00-14:00	Keynote: Dr. Nathan Price, Institute of Systems Biology	
14:00-15:30	Technical Track: Microservices	New and Emerging Ideas Track
15:30-16:00	<b>Coffee 225 Terry</b>	
	<b>Orcas (225 Terry)</b>	<b>Whidby (225 Terry)</b>
16:00-17:30	Technical Track: Automotive and Robotics Architecture	New and Emerging Ideas Track
18:00-19:30	<b>Opening Reception - Room 106</b>	

### TECHNICAL TRACK PAPER SESSIONS

10:30- **HIGHLY DISTRIBUTED ECOSYSTEMS - Geoffrey Phipps**

12:00

- The Anatomy of a Large-Scale Online Experimentation Platform (*Somit Gupta, Sumit Bhardwaj, Pavel Dmitriev, Lucy Ulanova, Aleksander Fabijan and Paul Raff*)
- A Blockchain-Based Micro Economy Platform for Distributed Infrastructure Initiatives (*Jan Kramer, Jan Martijn Van Der Werf, Johan Stokking and Marcela Ruiz*)
- Reducing Development Overheads with a Generic and Model Centric Architecture for Online Games (*Sebastian Apel*)
- Discussion (30 mins)

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14:00 - **MICROSERVICES - Grace Lewis**

15:30

- Migrating towards Microservice Architectures: an Industrial Survey (*Paolo Di Francesco, Patricia Lago and Ivano Malavolta*)
- Microservices: Architecting for Continuous Delivery and DevOp (*Lianping Chen*)
- Towards Micro Service Architecture Recovery: An Empirical Study (*Nuha Alshuqayran, Nour Ali and Roger Evans*)
- Discussion (30 mins)

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16:00 - **AUTOMOTIVE AND ROBOTICS ARCHITECTURE - Vittorio Cortellessa**

17:30

- Architecting a Software-Based Ecosystem for the Automotive Aftermarket: An Experience Report (*Matthias Naab, Dominik Rost and Jens Knodel*)
- Data-Centric Communication and Containerization for Future Automotive Software Architectures (**Stefan Kugele, David Hettler and Jan Peter**)
- An Architecture for Decentralized, Collaborative, and Autonomous Robots (*Sergio García, Claudio Menghi, Patrizio Pelliccione, Thorsten Berger and Rebekka Wohlrab*)
- Discussion (30 mins)

**NEW AND EMERGING IDEAS TRACK PAPER SESSIONS**

**Wednesday (Pearl - 401)**

10:30 - **Paper Session: Architecture Rationale**

12:00

- Towards a Dual Processing Perspective of Software Design Decision Making (*Carianne Pretorius, Maryam Razavian, Katrin Eling and Fred Langerak*)
- Decision making and cognitive biases in designing software architectures (*Akash Manjunath, Manoj Bhat, Florian Matthes, Klym Shumaiev and Andreas Biesdorf*)
- Perspectives for Selecting Cloud Microservices (*Marcelo França and Claudia Werner*)

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14:00 - **Paper Session: Software Design Analytics**

15:30

- The Vision of Self-Aware Performance Models (*Johannes Grohmann, Simon Eismann and Samuel Kounev*)
- Can Network Analysis Techniques help to Predict Design Dependencies? An Initial Study (*J. Andres Diaz-Pace, Antonela Tommasel and Daniela Godoy*)

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- Online and Offline Analysis of Streaming Data (*Sheik Hoque and Andriy Miransky*)
  - Cost-Aware Stage-Based Experimentation: Challenges and Emerging Results (*Ilias Gerostathopoulos, Christian Prehofer, Lubomir Bulej, Tomas Bures, Vojtech Horky and Petr Tuma*)

## Program: Thursday

Time	Room 106 (401 Terry)	Pearl (401 Terry)
08:30-09:00	<b>Breakfast</b>	
09:00-10:00	Keynote: Dr Marija Mikic, Google	
10:00-10:30	<b>Coffee</b>	
10:30-12:00	Technical Track: Architecture Decision Making	Engineering Track
12:00-13:30	<b>Lunch</b>	
13:30-15:00	Technical Track: Models and Model-based Approaches	Engineering Track
15:00-15:30	<b>Coffee</b>	
15:30-17:30	Technical Track: Data Intensive Architecture	Engineering Track
19:00-22:00	<b>Conference Main Event: The Garage, Capitol Hill</b>	

### TECHNICAL TRACK

10:30 - **ARCHITECTURE DECISION MAKING - Heiko Koziolk**

12:00

- An expert recommendation system for design decision making Who should be involved in making a design decision? (*Manoj Bhat, Klym Shumaiev, Kevin Koch, Uwe Hohenstein, Andreas Biesdorf and Florian Matthes*)
- Recovering Architectural Design Decisions (*Arman Shahbazian, Youn Kyu Lee, Duc Minh Le, Yuriy Brun and Nenad Medvidovic*)
- EASIER: an Evolutionary Approach for multi-objective Software architecture Refactoring (*Davide Arcelli, Vittorio Cortellessa, Mattia D'Emidio and Daniele Di Pompeo*)
- Discussion (30 mins)

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13:30 - **MODELS AND MODEL-BASED APPROACHES - Patrizio Pelliccione**

15:00

- Architectural Design Decisions for Systems Supporting Model-Based Analysis of Runtime Events: A Qualitative Multi-Method Study (*Michael Szvetits and Uwe Zdun*)
- Availability-driven Architectural Change Propagation through Bidirectional Model Transformations (*Vittorio Cortellessa, Romina Eramo and Michele Tucci*)
- Modeling of Parametric Dependencies for Performance Prediction of Component-based Software Systems at Run-time (*Simon Eismann, Jürgen Walter, JÓakim von Kistowski and Samuel Kounev*)
- Discussion (30 mins)

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15:30 - **DATA-INTENSIVE ARCHITECTURE - Jean-Guy Schneider**

17:00

- A Generic and Highly Scalable Framework for the Automation and Execution of Scientific Data Processing and Simulation Workflows (*Jianlei Liu, Eric Braun, Clemens Döpmeier, Patrick Kuckertz, Severin Ryberg, Martin Robinius, Detlef Stolten and Veit Hagenmeyer*)
- **Infrastructure-as-Code for Data-Intensive Architectures: A Model-Driven Development Approach** (*Matej Artač, Tadej Borovšak, Elisabetta Di Nitto, Michele Guerriero, Diego Perez-Palacin and Damian Andrew Tamburri*) **\*BEST PAPER AWARD\***
- Predicting the Performance of Privacy-Preserving Data Analytics Using Architecture Modelling and Simulation (*Rajitha Yasaweerasinghelage, Mark Staples, Ingo Weber and Hye-Young Paik*)
- Discussion (30 mins)

## ENGINEERING TRACK

10:30 - **Paper Session 1**

12:00

- Bridging the Gap between Architecture Specifications and Simulation Models (*Pablo Oliveira Antonino, Benno Kallweit, Jasmin Jahic, Andreas Morgenstern and Thomas Kuhn*) - *Tool Demonstration*
  - Designing and Executing Software Architectures Models using SysADL Studio (*Eduardo Silva, Lidiane Santos, Thais Batista, Jair Leite, Flavio Oquendo and Victor Cortez*) - *Tool Demonstration*
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- A Virtual Playground for Testing Smart Cyber-Physical Systems (*Danylo Khalyeyev, Petr Hnetynka and Tomas Bures*) - *Tool Demonstration*
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13:30 - **Paper Session 2**

15:00

- SPARTA: Security & Privacy Architecture through Risk-driven Threat Assessment (*Laurens Sion, Dimitri Van Landuyt, Koen Yskout and Wouter Joosen*) - *Tool Demonstration*
  - Model Driven Deployment of Auto-scaling Services on Multiple Clouds (*Hanieh Alipour and Yan Liu*) - *Tool Demonstration*
  - An Efficient Mobile-based Middleware Architecture for Building Robust, High-performance Apps (*Oscar J. Romero and Sushma Anand Akoju*) - *Artefact*
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15:30 - **Paper Session 3**

17:00

- Tool for Traceable Evolution of Process Architectures (*Vrinda Yadav, Rushikesh Joshi and Chris Ling*) - *Tool Demonstration*
- Traceability Tool for Architecture Artifacts and ATAM (*Shrikant Palkar and Hemali Kamani*) - *Tool Demonstration*
- Using Microservices for Rapid Creation of Remote Sensing Products (*Bo Xiang, Zheng Li, He Zhang and Yan Liu*) - *Case Study*

## Program: Friday

Time	Room 106 (401 Terry)	Pearl (401 Terry)
08:30-09:00	Breakfast	
09:00-10:00	Keynote: Dr Martin Roetteler, Microsoft	
10:00-10:30	Coffee	
10:30-12:00	Technical Track: Architectural Knowledge and Quality	Technical Track: IoT and Cyber-Physical Systems
12:00-13:30	Lunch	
13:30-15:00	Closing and Awards	

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### 10:30 - ARCHITECTURE KNOWLEDGE AND QUALITY - Roshanak Roshandel

12:00

- **An Empirical Study of Architectural Decay in Open-Source Software** (Duc Le, Daniel Link, Arman Shahbazian and Nenad Medvidovic) \***BEST PAPER AWARD**\*
- Improving the Search for Architecture Knowledge in Online Developer Communities (Mohamed Soliman, Amr Rekaby Salama, Matthias Galster, Olaf Zimmermann and Matthias Riebisch)
- Discussion (30 mins)

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### 10:30 - IoT AND CYBER-PHYSICAL SYSTEMS - Yan Liu

12:00

- Self-commissioning Industrial IoT-Systems in Process Automation: a Reference Architecture (*Heiko Koziolk, Andreas Burger and Jens Doppelhamer*)
- View-Centric Context Modeling to Foster the Engineering of Cyber-Physical System Network (*Bastian Tenbergen, Marian Daun, Patricia Aluko Obe and Jennifer Brings*)
- Discussion (30 mins)

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