The 7th ACM/SPEC International Conference on Performance Engineering (ICPE 2016) takes place in Delft in The Netherlands in March 2016. The conference grew out of the ACM Workshop on Software Performance (WOSP since 1998) and the SPEC International Performance Engineering Workshop (SIPEW since 2008), with the goal of integrating theory and practice in the field of performance engineering. It is a great pleasure for us to offer an outstanding technical program this year, which we believe will allow researchers and practitioners to present their visions and latest innovation, and to exchange ideas within the community.

Overall, we received 89 high quality submissions across all three tracks. The main Research Track attracted 57 submissions with 19 accepted (33% acceptance rate) for presentation at the conference. Among them were 16 full papers and three short papers. Each paper received at least three reviews from experienced program committee members. In the Work-In-Progress and Vision Track, six out of 15 contributions were selected. The Industry and Experience Track received 17 submissions, of which seven were selected for inclusion in the program. The accepted papers were organized into five research track sessions, two industry track sessions, and one WiP and vision track session. Three best paper candidates were also selected: two research papers and one industry paper.

We are proud to have three excellent keynote speakers as part of our technical program:

• Bianca Schroeder from University of Toronto, Canada, presenting "Case studies from the real world: The importance of measurement and analysis in building better systems"

• Wilhelm Hasselbring from Kiel University, Germany, discussing "Microservices for Scalability"

• Angelo Corsaro, Chief Technology Officer at PrismTech, talking about "Cloudy, Foggy and Misty Internet of Things"

In addition, the program includes four tutorials, a doctoral symposium, a poster and demo track, the SPEC Distinguished Dissertation Award, and three interesting workshops, including the International Workshop on Large-Scale Testing (LT), the 2nd International Workshop on Performance Analysis of Big data Systems (PABS), and the 2nd Workshop on Challenges in Performance Methods for Software Development (WOSP-C).
The program covers traditional ICPE topics such as software and systems performance modeling and prediction, analysis and optimization, characterization and profiling, as well as application of performance engineering theory and techniques to several practical fields, including distributed systems, cloud computing, storage, energy, big data, virtualized systems and containers.

We'd like to thank all the authors who submitted their innovative work to ICPE this year. In addition, we thank all the program committee members and subreviewers for volunteering their time for the benefit of the community and their hard work in providing quality reviews for the submitted papers. Finally, we'd like to thank all the participants who will attend ICPE in person this year, since we will rely on you to make this event interactive, engaging, and thought-provoking for everyone involved.

We look forward to meeting all of you in Delft in March 2016!

Steffen Becker
ICPE 2016 Program Co-Chair
Chemnitz University of Technology, Germany

Xiaoyun Zhu
ICPE 2016 Program Co-Chair
Futurewei Technologies, USA

Jerry Rolia
ICPE 2016 Industrial Co-Chair
Hewlett Packard Labs, USA

Manoj Nambiar
ICPE 2016 Industrial Co-Chair
Tata Consultancy Services, India
It is our great pleasure to welcome you to the 7th ACM/SPEC International Conference on Performance Engineering and to the beautiful city of Delft. If one looks at the ancient canals lined with merchants' houses, the old churches, and the splendid town hall, one sees that Delft's rich history is still very much alive. At the same time, though, it is a very modern and vibrant city. Ten percent of its 100,000 inhabitants are students and the university has attracted a large number of technology-oriented companies.

This year’s International Conference on Performance Engineering (ICPE) continues its tradition of being the premier forum for the integration of theory and practice in the field of performance engineering. ICPE is an annual joint meeting that has grown out of the ACM Workshop on Software Performance (WOSP) and the SPEC International Performance Engineering Workshop (SIPEW). It brings together researchers and industry practitioners to share ideas, discuss challenges, and present results of both work-in-progress and state-of-the-art research on performance engineering of software and systems.

Putting together ICPE’16 was a team effort. We first thank the authors for providing the content of the program. We are grateful to the PC Chairs and the program committee who worked very hard in reviewing papers and providing feedback for authors. Finally, we thank our hosting University, Delft University of Technology and our sponsors, ACM SIGMETRICS, and SPEC.

We hope that you will find this program interesting and thought-provoking and that the conference will provide you with a valuable opportunity to share ideas with other researchers and practitioners from institutions around the world and to learn about Delft’s rich history.

Alberto Avritzer  
ICPE 2016 General Chair  
Sonatype, Inc., MD, USA

Alexandru Iosup  
ICPE 2016 General Chair  
Delft University of Technology, The Netherlands
### Program at a Glance

#### Saturday, March 12, 2016

<table>
<thead>
<tr>
<th>Time</th>
<th>LT 2016 Workshop</th>
<th>PABS 2016 Workshop</th>
<th>WOSP-C 2016 Workshop</th>
</tr>
</thead>
<tbody>
<tr>
<td>08:00 - 09:00</td>
<td>Registration @ Committee Room 2</td>
<td>Registration @ Committee Room 2</td>
<td>Registration @ Committee Room 2</td>
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<tr>
<td>09:00 - 10:35</td>
<td>Session 1</td>
<td>Session 1</td>
<td>Session 1</td>
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<tr>
<td>10:35 - 11:00</td>
<td>Coffee Break @ Beatrix</td>
<td>Coffee Break @ Beatrix</td>
<td>Coffee Break @ Beatrix</td>
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<tr>
<td>11:00 - 12:30</td>
<td>Session 2</td>
<td>Session 2</td>
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<tr>
<td>12:30 - 14:00</td>
<td>Lunch @ Frans van Hasselt Hall</td>
<td>Lunch @ Frans van Hasselt Hall</td>
<td>Lunch @ Frans van Hasselt Hall</td>
</tr>
<tr>
<td>14:00 - 15:30</td>
<td>Session 3</td>
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<tr>
<td>15:30 - 16:00</td>
<td>Coffee Break @ Beatrix</td>
<td>Coffee Break @ Beatrix</td>
<td>Coffee Break @ Beatrix</td>
</tr>
<tr>
<td>16:00 - 17:40</td>
<td>Session 4</td>
<td>Session 4</td>
<td>Session 4</td>
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</tbody>
</table>

**Notes:**
- LT 2016 Workshop: Room: Senate Hall
- PABS 2016 Workshop: Room: Committee Room 4
- WOSP-C 2016 Workshop: Room: Committee Room 3
# Program at a Glance

## Sunday, March 13, 2016

<table>
<thead>
<tr>
<th>Time</th>
<th>Tutorials</th>
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</thead>
<tbody>
<tr>
<td>08:00 - 09:00</td>
<td>Registration @ Committee Room 2</td>
</tr>
<tr>
<td>12:30 - 14:00</td>
<td>Lunch @ Frans van Hasselt Hall</td>
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</tbody>
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Morning Coffee Break @ Beatrix **10:30 – 11:00**  
Afternoon Coffee Break @ Beatrix **15:30 – 16:00**
# Program at a Glance

## Monday, March 14, 2016

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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<tbody>
<tr>
<td>08:00 - 09:00</td>
<td>Registration @ Committee Room 2</td>
</tr>
<tr>
<td>08:45 - 09:00</td>
<td>Welcome Message</td>
</tr>
<tr>
<td>09:00 - 10:00</td>
<td>Keynote 1</td>
</tr>
<tr>
<td>10:00 - 10:30</td>
<td>Best Paper Candidate</td>
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<tr>
<td>10:30 - 11:00</td>
<td>Coffee Break @ Beatrix</td>
</tr>
<tr>
<td>11:00 - 12:30</td>
<td>Research Track Session 1: Performance Modeling</td>
</tr>
<tr>
<td>12:30 - 14:00</td>
<td>Lunch @ Frans van Hasselt Hall</td>
</tr>
<tr>
<td>14:00 - 15:15</td>
<td>Industry Track Session 1: Modeling and Prediction</td>
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<tr>
<td>15:15 - 15:30</td>
<td>Research Track</td>
</tr>
<tr>
<td>15:30 - 16:00</td>
<td>Coffee Break @ Beatrix</td>
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<tr>
<td>16:00 - 17:00</td>
<td>Work in Progress Track</td>
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<tr>
<td>17:00 - 18:00</td>
<td>Doctoral Symposium</td>
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<tr>
<td>18:00 - 19:30</td>
<td>Demos and Posters Track</td>
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</table>

## Tuesday, March 15, 2016

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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<tbody>
<tr>
<td>08:30 - 09:00</td>
<td>Registration @ Committee Room 2</td>
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<tr>
<td>09:00 - 10:00</td>
<td>Keynote 2</td>
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<tr>
<td>10:00 - 10:30</td>
<td>Best Paper Candidate</td>
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<tr>
<td>10:30 - 11:00</td>
<td>Coffee Break @ Beatrix</td>
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<tr>
<td>11:00 - 12:15</td>
<td>Industry Track Session 2: Analysis and Optimization</td>
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<tr>
<td>12:15 - 14:00</td>
<td>Lunch @ Frans van Hasselt Hall</td>
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<tr>
<td>14:00 - 15:30</td>
<td>Research Track Session 2: Distributed Systems &amp; Cloud</td>
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<tr>
<td>15:30 - 16:00</td>
<td>Coffee Break @ Beatrix</td>
</tr>
<tr>
<td>16:00 - 16:30</td>
<td>Best Paper Candidate</td>
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<tr>
<td>16:30 - 17:45</td>
<td>Research Track Session 3: Characterization and Profiling</td>
</tr>
<tr>
<td>19:30 - 22:00</td>
<td>Social Dinner (including Best Paper and other awards)</td>
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</tbody>
</table>
### Program at a Glance

#### Wednesday, March 16, 2016

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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</thead>
<tbody>
<tr>
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<tr>
<td>09:00 - 10:00</td>
<td>Keynote 3</td>
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<tr>
<td>10:00 - 10:30</td>
<td>SPEC Distinguished Dissertation Award</td>
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<tr>
<td>10:30 - 11:00</td>
<td>Coffee Break @ Beatrix</td>
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<tr>
<td>11:00 - 12:45</td>
<td>Research Track Session 4: Monitoring and Analysis</td>
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<tr>
<td>12:45 - 14:00</td>
<td>Lunch @ Frans van Hasselt Hall</td>
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<tr>
<td>14:00 - 14:30</td>
<td>Research Track Session 5: Data Intensive Computing</td>
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<tr>
<td>14:30 - 15:10</td>
<td>SPEC Research Group Annual Meeting</td>
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<tr>
<td>15:10 - 15:30</td>
<td>Closing Session</td>
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</table>
International Workshop on Large-Scale Testing

Many large-scale software systems (e.g., e-commerce websites, telecommunication infrastructures and enterprise systems, etc.) must service hundreds, thousands or even millions of concurrent requests. Many field problems of these systems are due to their inability to scale to field workloads, rather than feature bugs. In addition to conventional functional testing, these systems must be tested with large volumes of concurrent requests (called the load) to ensure the quality of these systems. Large-scale testing includes all different objectives and strategies of testing large-scale software systems using load. Examples of large-scale testing are live upgrade testing, load testing, high availability testing, operational profile testing, performance testing, reliability testing, stability testing and stress testing.

Large-scale testing is a difficult task requiring a great understanding of the system under test. Practitioners face many challenges such as tooling (choosing and implementing the testing tools), environments (software and hardware setup) and time (limited time to design, test, and analyze). Yet, little research is done in the software engineering domain concerning this topic. Moreover, prior large-scale testing research have been largely focused on telecommunication applications and web-based e-commerce systems. Industry has been focused primarily on creating tools to automatically drive specified load into the system under test (e.g., LoadRunner or Apache JMeter). Large-scale testing is gaining more importance, as an increasing number of systems (on-premise and/or cloud-based systems) are designed to serve thousands or millions of users.

Program Outline

Session 1:
09:00 - 09:05 Welcome & Introduction

09:05 - 10:05 Keynote I: Automated Analysis of Load Test Results of Systems with Equilibrium or Transient Behaviour, Andrè Bondi (Software Performance and Scalability Consulting LLC)

10:05 - 10:35 Upcoming Challenges in Large Scale Performance Testing, Manoj Karunakaran Nambiar (Tata Consultancy Services)

10:35 - 11:00 Coffee Break
Session 2:

11:00 - 11:30  Recent Experiences and Future Challenges Using Automatic Performance Modelling to Complement Testing,
Paul Brebner (Performance Assurance Pty Ltd)

11:30 - 12:00  How to Load Test a SOA - a Practitioners View,
Daniel Tertilt (Qupe GmbH)

12:00 - 12:30  Monitoring-Based Testing of Elastic Cloud Computing Applications,
Michel Albonico (Universidade Tecnológica Federal do Paraná),
Jean-Marie Mottu (Université de Nantes) and Gerson Sunyé
(Université de Nantes)

12:30 - 14:00  Lunch Break

Session 3:

14:00 - 15:00  Keynote II: Performance Testing in Software Development: Getting the Developers on Board,
Lubomír Bulej (Charles University in Prague)

15:00 - 15:30  Performance Regression Analysis: Challenges and Opportunities,
Cor-Paul Bezemer (Queen's University)

15:30 - 16:00  Coffee Break

Session 4:

16:00 - 17:30  Joint Discussion with WOSP-C

17:30 - 17:40  Closing of LT 2016
Workshop on Performance Analysis of Big Data Systems

Today, big data systems deal with volume, velocity, variety and veracity of the application data which may be deployed on dedicated single high performance systems (such as Netezza), dedicated commodity based clusters or shared architectures such as clouds. We witness an explosive growth in the complexity, diversity, number of deployments and capabilities of big data processing systems such as Map-Reduce, Hbase, Hive, Cassandra, Big Table, Hyracks, Dryad, Pregel and Mongo DB. The big data system may use new operating system designs, advanced data processing algorithms, parallelization of application, high performance computing architectures such as GPUs etc. and clusters to improve the performance. Looking at the volume of data to mine, and complex architectures, one may need to monitor, analyze, identify or predict bottlenecks to optimize the system and improve its performance.

The workshop on performance analysis of big data systems (PABS) aims at providing a platform for scientific researchers, academicians and practitioners to discuss techniques, models, benchmarks, tools and experiences while dealing with performance issues in big data systems. The primary objective is to discuss performance bottlenecks and improvements during big data analysis using different paradigms, architectures and technologies such as Map-Reduce, Hbase, MPP, Big Table, NOSQL, graph based models and any other new upcoming paradigms. We propose to use this platform as an opportunity to discuss systems, architectures, tools, and optimization algorithms that are parallel in nature and hence make use of advancements to improve the system performance. This workshop shall focus on the performance challenges imposed by big data systems and on the different state-of-the-art solutions proposed to overcome these challenges.

Program Outline

Session 1:
09:00 - 09:05  Welcome note by workshop Co-chair
09:05 - 10:20  Keynote - Challenges in Truly Scaling Services
               Manish Gupta, VP and Director, Xerox Research Center, India
10:20 - 10:40  Coffee Break

Session 2:
10:40 - 11:20  Paper Presentation - Towards the Prediction of the Performance and Energy Efficiency of Distributed Data Management Systems
                Raik Niemann, Institute for Information Systems, Germany
11:20 - 12:30  Invited Talk - Big Data Applications Performance Assurance
   Boris Zibitsker, CEO BEZNext

12:30 - 14:00  Lunch Break

**Session 3:**

14:00 - 15:10  Invited Talk - Performance Engineering for In-Memory Databases: Models, Experiments and Optimization
   Giuliano Casale, Sr. Lecturer, Imperial College London, UK

   Adam Gregory et. al., Carleton University, Canada

15:50 - 16:10  Coffee Break

**Session 4:**

16:10 - 17:20  Tutorial - Challenges for Big Data Application Performance Tuning and Prediction
   Rekha Singhal, Sr. Scientist, TCS Innovation Labs, India

17:20 - 17:30  Closing remarks by workshop Co-Chair
Workshop on Challenges in Performance Methods for Software Development

There are new challenges to product performance due to changes in software and in the development process. Faster development means less time for performance planning. The need for scalability and adaptability increases the pressure while introducing new sources of delay in the use of middleware. Model-driven engineering, component engineering and software development tools offer opportunities, but their exploitation requires effort and carries risks.

This second edition of WOSP-C will explore the challenges and seek to identify the most promising lines of attack on them, through a combination of research and experience papers, vision papers describing new initiatives and ideas, and discussion sessions. Papers describing new projects and approaches are particularly welcome. As implied by the title, the workshop focus is on methods usable anywhere across the life cycle, from requirements to design, testing and evolution of the product. The discussions will attempt to map the future of the field.

Program Outline

Session 1: Contributed Papers on Performance-aware Design
09:00 - 09:05 Introduction and Chair’s Welcome

Challenges in Applying Control Theory to Software Performance Engineering for Adaptive Systems
Davide Arcelli and Vittorio Cortellessa (Universita' dell'Aquila)

DiffLQN: Differential Equation Analysis of Layered Queuing Networks
Tabea Waizmann and Mirco Tribastone (IMT Institute for Advanced Studies Lucca)

09:05 - 10:30

Simulation of techniques to improve the utilization of cloud elasticity in workload-aware adaptive software
Diego Pérez Palacin, Raffaela Mirandola, and Marco Scoppetta (Politecnico di Milano)

10:30 - 11:00 Coffee Break
Session 2: Contributed Papers on Performance Measurement

A Reference Architecture for Online Performance Model Extraction in Virtualized Environments
Simon Spinner, Jürgen Walter, and Samuel Kounev (University of Würzburg)

Challenges with Applying Performance Testing Methods for Systems Deployed on Shared Environments with Indeterminate Competing Workloads
Andre Bondi (Software Performance and Scalability Consulting LLC)

Execution Time Compensation for Cloud Applications by Subtracting Steal Time based on Host-Level Sampling
Masao Yamamoto and Kohta Nakashima (Fujitsu Laboratories Ltd.)

Performance Mimicking Benchmarks for Multi-tier Applications
Subhasri Duttagupta, Mukund Kumar, (both Tata Consulting Services), and Varsha Apte (Indian Institute of Technology - Bombay)

11:00 - 12:30

12:30 - 14:00 Lunch Break

Session 3:

14:00 - 15:30
Chair: Andre Bondi (Software Performance and Scalability Consulting LLC)

15:30 - 16:00 Coffee Break

Session 4:

16:00 - 17:30 Session 4: Break-out discussion groups (together with LT workshop)

17:30 - 17:40 Closing and Workshop Summary
Including 5 minute presentation per break-out group
Incorporating Software Performance Engineering Methods Practice into the Software Development Life Cycle

Author: Andre Bondi (Software Performance and Scalability Consulting LLC)
Tutorial date/time: Sunday, March 13, 2016 (3 hours + break, 09:00-12:30)

Abstract: Too often, attention is only paid to performance concerns after functional testing, when it usually too late to remedy disabling performance problems. We describe how early attention to performance concerns and early planning of performance requirements and performance testing can prevent debacles like the early rollout of healthcare.gov while enhancing reliability and scalability, and while addressing other cross-cutting concerns. We show how performance engineering methods may be integrated into all phases of the software lifecycle, from the conception of a system to requirements specification, architecture, testing, and finally to deployment. By reviewing the architecture of a system before design and implementation take place, we reduce the risk of designing and developing a system that contains inherent performance vice. Modeling can be used to justify architectural and scheduling decisions such as the use of scheduling rules. The outputs of performance tests planned with reference to performance models enable us able to identify concurrent programming issues and other issues that would not be apparent in unit testing.

Building Custom, Efficient and Accurate Memory Monitoring Tools for Java Applications

Authors: Verena Bitto (Johannes Kepler University, Linz, Austria), Philipp Lengauer (Johannes Kepler University, Linz, Austria)
Tutorial date/time: Sunday, March 13, 2016 (3 hours + break, 09:00-12:30)

Abstract: Traditional monitoring techniques can distort application behavior significantly. In this tutorial, we will provide an overview about state-of-the-art monitoring techniques and their impact on memory behavior. It will show lightweight techniques that can be used to build a custom but efficient monitoring tool. We will include topics ranging from capturing interesting events, serializing and processing the data offline, dealing with large amounts of data, to visualizing it. AntTracks is a custom memory monitoring tool built into the Hotspot Java Virtual Machine. It achieves very low run-time overhead (4.68%) although capturing all allocations as well as object movements. We will thus use it exemplary throughout the tutorial to demonstrate the discussed techniques.
Application Performance Management in Virtualized Datacenters

Authors: Rean Griffith (VMware, USA), Anne Holler (Independent Researcher) and Xiaoyun Zhu (Futurewei Technologies, Inc., USA).

Tutorial date/time: Sunday, March 13, 2016 (3 hours + break, 14:00-17:30)

Abstract: Virtualized private or public cloud datacenters provide flexible access to computing resources, but their use can present challenges to dynamically meeting application performance goals efficiently. In this tutorial, we will first examine the kinds of resource schedulers currently available for the datacenter, along with their use cases. We will then present techniques for the automatic scaling of applications horizontally and vertically to maintain their Service Level Objectives with right-sized encapsulation. And finally, we will discuss analytics pipelines for the telemetry data of workloads running in the datacenter.

Automated Parameterization of Performance Models from Measurements

Authors: Giuliano Casale (Imperial College London, UK); Simon Spinner (University of Würzburg, Germany); Weikun Wang (Imperial College London, UK)

Tutorial date/time: Sunday, March 13, 2016 (3 hours + break, 14:00-17:30)

Abstract: The goal of this tutorial is to present the problem of estimating parameters of performance models from measurements of real systems and discuss algorithms that can support researchers and practitioners in this task. The focus will be on performance models based on queueing systems, where the estimation of request arrival rates and service demands is a required input to the model. The tutorial will review existing estimation methods for service demands, ranging from regression-based methods to maximum likelihood techniques, and present models to characterize time-varying arrival processes. The tutorial will also demonstrate the use of relevant tools that automate demand estimation, such as LibRede, FG, and M3A.
Welcome Session
08:45 - 09:00 Welcome Message

Keynote 1
Chair: Alexandru Iosup, Delft University of Technology, The Netherlands
Bianca Schroeder (University of Toronto, Canada). Case studies from the real world: The importance of measurement and analysis in building better systems
09:00 - 10:00

Best Paper Candidate
Chair: Steffen Becker, Chemnitz University of Technology, Germany
Weikun Wang, Giuliano Casale, Ajay Kattepur and Manoj Nambiar.
10:00 - 10:30 Maximum Likelihood Estimation of Closed Queueing Network Demands from Queue Length Data
10:30 - 11:00 Coffee Break

Research Track Session 1: Performance Modeling
Chair: Andre Bondi, Software Performance and Scalability Consulting LLC
David Maplesden, Ewan Tempero, John Hosking and John Grundy. A Cost/Benefit Approach to Performance Analysis
11:00 - 12:30
Juan Pablo Sandoval Alcocer, Alexandre Bergel and Marco Tulio Valente. Learning From Source Code History to Identify Performance Failures
Alireza Khoshkbarforoushha and Rajiv Ranjan. Resource and Performance Distribution Prediction for Large Scale Analytics Queries
12:30 - 14:00 Lunch
Main Conference – Monday, March 14

Industry Track Session 1: Modeling and Prediction
Chair: Klaus-Dieter Lange, Hewlett Packard Enterprise, USA

14:00 - 15:15
Paul Brebner. *Automatic Performance Modelling from Application Performance Monitoring (APM) Data: An Experience Report*

Patrick Pegus Li, Benoy Varghese, Tian Guo, David Irwin, Prashant Shenoy, Anirban Mahanti, James Culbert, John Goodhue and Chris Hill. *Analyzing the Efficiency of a Green University Data Center*

Qi Wang, Lucy Cherkasova, Jun Li and Haris Volos. *Interconnect Emulator for Aiding Performance Analysis of Distributed Memory Applications*

Research Track
Chair: Klaus-Dieter Lange, Hewlett Packard Enterprise, USA

15:15 - 15:30
Assaf Eisenman, Ludmila Cherkasova, Guilherme Magalhaes, Qiong Cai, Paolo Faraboschi and Sachin Katti. *Parallel Graph Processing: Prejudice and State of the Art*

15:30 – 16:00
Coffee Break

Work in Progress Track
Chair: Vittorio Cortellessa, Universita' dell'Aquila, Italy

16:00 - 17:00
Jürgen Walter, André van Hoorn, Heiko Koziolek, Dušan Okanović and Samuel Kounev. *Asking "What?", Automating the "How?: The Vision of Declarative Performance Engineering*

Thomas Begin and Alexandre Brandwajn. *Predicting the System Performance by Combining Calibrated Performance Models of its Components - A Preliminary Study*


Dheeraj Chahal, Rupinder Virk and Manoj Nambiar. *Pre-deployment Performance Estimation of IO Intensive Workloads*

Divya Gupta, Lucas Perronne and Sara Bouchenak. *BFT-Bench: A Framework to Evaluate BFT Protocols*
Main Conference – Monday, March 14

Sourav Medya, Ludmila Cherkasova, Guilherme Magalhaes, Kivanch Ozonat, Chaitra Padmanabha, Jiban Sarma and Imran Sheikh. Towards Performance and Scalability Analysis of Distributed Memory Programs on Large-Scale Clusters

17:00 - 18:00 Coffee Break

Doctoral Symposium

Holger Knoche. Sustaining Runtime Performance while Incrementally Modernizing Transactional Monolithic Software towards Microservices

17:00 - 18:00

David Georg Reichelt and Stefan Kühne. Empirical Analysis of Performance Problems at Code Level

Demos and Posters Track

Ji Xue, Evgenia Smirni, Robert Birke and Lydia Y. Chen. PROST: Prediction for Resource Usages with Spatial and Temporal Dependencies

Nick Principe and Vernon Miller. SPEC SFS 2014: Application-Level Storage Performance Evaluation

Christoph Heger, André van Hoorn, Dušan Okanović, Stefan Siegl and Alexander Wert. diagnoseIT: Expert-Guided Automatic Diagnosis of Performance Problems in Enterprise Applications

Vincenzo Ferme and Cesare Pautasso. Integrating Faban with Docker for Performance Benchmarking

18:00 - 19:30

David Schmidt, Lisa Roderick and Andrew Bond. Inspiring Virtualization Innovation - SPECvirt_dc


Yasir Ibrahim and Waleed Ahmed. New Technique Using Multiple Symmetric keys for Multilevel Encryption

Alexandru Iosup, Samuel Kounev and Kai Sachs. SPEC Research Group's Cloud Working Group (poster)
Main Conference – Monday, March 14


Jürgen Walter, André van Hoorn, Heiko Koziolek, Dušan Okanović and Samuel Kounev. *The Vision of Declarative Performance Engineering (poster)*
Main Conference – Tuesday, March 15

Keynote 2
Chair: Murray Woodside, Carleton University, Canada
09:00 - 10:00 Wilhelm Hasselbring (Kiel University, Germany). Microservices for Scalability

Best Paper Candidate
Chair: Manoj Nambiar, Tata Consultancy Services, India
10:00 - 10:30 Michael Steindorfer and Jurgen Vinju. Performance Modeling of Maximal Sharing
10:30 - 11:00 Coffee Break

Industry Track Session 2: Analysis and Optimization
Chair: Manoj Nambiar, Tata Consultancy Services, India
11:00 - 12:15 Jóakim von Kistowski, Hansfried Block, John Beckett, Cloyce Spradling, Klaus-Dieter Lange and Samuel Kounev. Variations in CPU Power Consumption
12:15 - 14:00 Lunch

Research Track Session 2: Distributed Systems & Cloud
Chair: Giuliano Casale, Imperial College London, UK
14:00 - 15:30 Tatsuma Matsuki and Naoki Matsuoka. A Resource Contention Analysis Framework for Diagnosis of Application Performance Anomalies in Consolidated Cloud Environments
14:00 - 15:30 Zhan Qiu, Juan F. Perez and Peter Harrison. Tackling Latency via Replication in Distributed Systems
Mark Grechanik, Qi Luo, Denys Poshyvanyk and Adam Porter. *Enhancing Rules For Cloud Resource Provisioning Via Learned Software Performance Models*

15:30 - 16:00  
Coffee Break

**Best Paper Candidate**  
Chair: Xiaoyun Zhu, Futurewei Technologies, USA

16:00 - 16:30  
Niklas Carlsson. *Optimized eeeBond: Energy Efficiency with non-Proportional Router Network Interfaces*

**Research Track Session 3: Characterization and Profiling**  
Chair: Wilhelm Hasselbring, Kiel University, Germany

16:30 - 17:45  

16:30 - 17:45  
Manjula Peiris and James Hill. Automatically Detecting "Excessive Dynamic Memory Allocations" Software Performance Anti-Pattern

Philipp Lengauer, Verena Bitto and Hanspeter Mössenböck. Efficient and Viable Handling of Large Object Traces

Social Dinner (including Best Paper and other awards)

Start at the Aula at 18:15 for a touristic tour ending at the dinner location De Lindenhof (participants can sign in at the registration desk) or start at the Grote Markt at 19:00 to walk together to the dinner location (for those participants who wants to go to the hotel after the session).
Keynote 3
Chair: Manoj Nambiar, Tata Consultancy Services, India
09:00 - 10:00 Angelo Corsaro (PrismTech). *Cloudy, Foggy and Misty Internet of Things*

SPEC Distinguished Dissertation Award
10:00 - 10:30 SPEC Distinguished Dissertation Award
10:30 - 11:00 Coffee Break

Research Track Session 4: Monitoring and Analysis
Chair: Lubomír Bulej, Charles University, Czech Republic

Peter Hofer, David Gnedt, Andreas Schörgenhummer and Hanspeter Mössenböck. *Efficient Tracing and Versatile Analysis of Lock Contention in Java Applications on the Virtual Machine Level*

Vojtěch Horký, Jaroslav Kotrč, Peter Libič and Petr Tuma. *Analysis of Overhead in Dynamic Java Performance Monitoring*

11:00 - 12:45

Jesun Firoz, Martina Barnas, Marcin Zalewski and Andrew Lumsdaine. *The value of variance*

Sara Fioravanti, Simone Mattolini, Fulvio Patara and Enrico Vicario. *Experimental performance evaluation of different data models for a reflection software architecture over NoSQL persistence layers*

12:45 - 14:00 Lunch

Research Track Session 5: Data Intensive Computing
Chair: Samuel Kounev, University of Würzburg, Germany

Ravjot Singh, Cor-Paul Bezemer, Weiyi Shang and Ahmed E. Hassan. Optimizing the Performance-Related Configurations of Object-Relational Mapping Frameworks Using a Multi-Objective Genetic Algorithm

14:00 - 14:30
SPEC Research Group Annual Meeting
Chair: Samuel Kounev, University of Würzburg, Germany

SPEC Research Group (RG) serves as a platform for collaborative research efforts in the area of quantitative system evaluation and analysis, fostering interaction between industry and academia. The group develops methodologies, techniques and tools for measurement, load testing, profiling, workload characterization, dependability and efficiency evaluation of computing systems. SPEC RG currently has four working groups working in the areas of cloud computing, big data, DEVOPS and security benchmarking. More information can be found at [http://research.spec.org](http://research.spec.org).

Closing Session
Chair: Samuel Kounev, University of Würzburg, Germany

15:10 - 15:30
The ACM/SPEC International Conference on Performance Engineering (ICPE) provides a forum for the integration of theory and practice in the field of performance engineering. ICPE is an annual joint meeting that has grown out of the ACM Workshop on Software Performance (WOSP) and the SPEC International Performance Engineering Workshop (SIPEW). It brings together researchers and industry practitioners to share ideas, discuss challenges, and present results of both work-in-progress and state-of-the-art research on performance engineering of software and systems. ICPE 2017 will be held in L’Aquila (Italy), from 22 through 26 of April.

L’Aquila is the capital city of the Abruzzi region in Italy, and it is located approximately 100 kilometers east from Rome, with which it is connected by a highway through the mountains. Laid out within medieval walls upon a hillside in the middle of a narrow valley, tall snow-capped mountains of the Gran Sasso massif flank the town. A maze of narrow streets, lined with Baroque and Renaissance buildings and churches, open onto elegant piazzas. Home of the University of L’Aquila, it is a lively college town. The Department of Computer Science and Engineering, and Mathematics (DISIM, http://www.disim.univaq.it) is very active in the international research context, and in particular the Software Engineering and Architecture Group includes members that have contributed to the birth and the growth of WOSP first and then ICPE conferences.

The host institution will be the University of L’Aquila. The contact person for ICPE 2017 is Vittorio Cortellessa (http://www.di.univaq.it/cortelle/), who will be General Co-Chair along with Walter Binder from University of Lugano (http://www.inf.usi.ch/faculty/binder/). Anne Koziolek from Karlsruhe Institute of Technology (http://sdq.ipd.kit.edu/people/anne_koziolek/), and Evgenia Smirni from College of William and Mary (http://www.cs.wm.edu/~esmirni/) will be Program Co-Chairs.
About SIGSOFT

The ACM Special Interest Group on Software Engineering (SIGSOFT) focuses on issues related to all aspects of software development and maintenance. Areas of special interest include: requirements, specification and design, software architecture, validation, verification, debugging, software safety, software processes, software management, measurement, user interfaces, configuration management, software engineering environments, and CASE tools. SIGSOFT is run by a volunteer Executive Committee composed of officers elected every three years, and assisted by a professional program director employed by the ACM.

Newsletter

Software Engineering Notes is the bi-monthly ACM SIGSOFT newsletter. For further information, see http://www.acm.org/sigsoft/SEN/.

About SIGMETRICS

SIGMETRICS is the ACM Special Interest Group (SIG) for the computer systems performance evaluation community.

SIGMETRICS promotes research in performance analysis techniques as well as the advanced and innovative use of known methods and tools. It sponsors conferences, such as its own annual conference (SIGMETRICS), publishes a newsletter (Performance Evaluation Review), and operates a mailing list linking researchers, students, and practitioners interested in performance evaluation.

Target areas of performance analysis include file and memory systems, database systems, computer networks, operating systems, architecture, distributed systems, fault tolerant systems, and real-time systems. In addition, members are interested in developing new performance methodologies including mathematical modeling, analysis, instrumentation techniques, model verification and validation, workload characterization, simulation, statistical analysis, stochastic modeling, experimental design, reliability analysis, optimization, and queuing theory.

For further information, please visit http://www.sigmetrics.org/.
The **Standard Performance Evaluation Corporation (SPEC)** was formed in 1988 to establish industry standards for measuring computer performance. Since then, SPEC has become the largest and most influential benchmark consortium in the world. SPEC currently offers more than 20 industry-standard benchmarks and tools for system performance evaluation in a variety of application areas. Thousands of SPEC benchmark licenses have been issued to companies, resource centers, and educational institutions globally. Organizations using these benchmarks have published more than 30,000 peer-reviewed performance reports.

**SPEC Benchmarks**

SPEC offers a range of computer benchmarks and performance evaluation tools. The latest releases include SPECapc for PTC Creo 3.0, SPEC SFS 2014, SPECapc for 3ds Max 2015 and SPEC Accell V1.0

Besides working on updating of many existing SPEC benchmarks and performance evaluation tools, several new projects are in development:

- Service Oriented Architecture (SOA) benchmark suite - measuring performance for typical middleware, database, and hardware deployments.
- A benchmark for measuring compute-intensive performance of handheld devices.
- SPECsip_Application benchmark suite, a system-level benchmark for application servers, HTTP, and SIP load generators.

SPEC welcomes interested conference attendees who would like to attend the co-located SPEC subcommittee meetings as guest **for free**. Please register online <URL: https://www.regonline.com/register/login.aspx?eventID=1657216&MethodID=0&EventSessionID=>. If you have any questions, e-mail info(at)spec(dot)org or contact Mr. Charles McKay or Ms. Dianne Rice on site during the conference.
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