PESOS 2013
Principles of Engineering Service-Oriented Systems

Organizers
Domenico Bianculli (University of Luxembourg, Luxembourg)
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ICSE 2013
San Francisco, CA USA
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Welcome

Grace A. Lewis
Carnegie Mellon Software Engineering Institute, USA
Motivation

- Service-Oriented Architecture (SOA) is in the stage of widespread adoption, at least according to Gartner's Hype Cycle of Emerging Technologies
- Some of the standards for service integration have stabilized
- Driven by IT cost savings, organizations are starting to incorporate external software services into their systems, some of which are hosted in the cloud
Special Theme: Service Engineering for the Cloud

- Cloud Computing is shaping the way that organizations acquire and use systems (SaaS) and how they develop and deploy systems (PaaS and IaaS)
- Even though cloud platforms and infrastructures are typically designed to scale on demand, the question is whether this automatic elasticity translates to all services deployed on them
PESOS 2013 Workshop Goals

• Continue to bring together software engineering researchers from academia and industry, as well as practitioners working in the areas of service-oriented systems to discuss
  o Research challenges
  o Recent developments
  o Novel application scenarios
  o Methods, techniques, experiences and tools

• Create the initial set of principles for service engineering for the cloud
Paper Submission and Review

• Every paper was reviewed by at least three program committee members
• Out of the 19 submissions, five were accepted as full papers and two as short papers (37%)
Represented Countries*

Created using Google Maps (http://maps.google.com)

* Includes organizers, paper presenters and keynote
Abstract Tag Cloud

Multiple tags related to system qualities: dynamic, elastic, flexibility, reusability.

For the first time ever, the services tag is larger than SOA tag. We have succeeded!

The size of the predict tag is interesting — could be interpreted in many ways.

Created using TagCrowd (http://tagcrowd.com/)
Workshop Logistics

• One keynote
• Three paper sessions
  o Short paper presentations (20 minutes)
• Breakout Sessions
  o Card sorting to form groups
  o Group meetings
  o Plenary report
• We expect highly interactive sessions
• We will be taking notes throughout the workshop and post a summary on the PESOS 2013 web site:
  http://www.sei.cmu.edu/community/pesos2013/
## Agenda — Morning

<table>
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<td>08:30 – 08:45</td>
<td>Workshop Welcome and Introductions</td>
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| 08:45 – 09:45| Keynote: SOA in the Google Cloud  
Marija Mikić-Rakić, Google, USA |
| 09:45 – 10:15| Open Discussion                                                      |
| 10:15 – 10:30| Card Sorting: Preparation for Afternoon Break-Out Session            |
| 10:30 – 11:00| Coffee Break                                                        |
| 11:00 – 12:15| Paper Session 1: Quality Assurance for Service-Oriented, Cloud-Based Systems  
Facilitator: Domenico Bianculli, University of Luxembourg, Luxembourg  
- The Dark Side of SOA Testing – Towards Testing Contemporary SOAs Based on Criticality Metrics  
- Towards QoS Prediction Based on Composition Structure Analysis and Probabilistic Environment Models  
- Storm Prediction in a Cloud |
| 12:15 – 12:30| Break-Out Sessions: Initial Meeting                                 |
| 12:30 – 14:00| Lunch                                                                |
# Agenda — Afternoon

<table>
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<tr>
<th>Time</th>
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| 14:00 – 14:50 | Paper Session 2: Elasticity in the Cloud  
Facilitator: Grace Lewis, CMU Software Engineering Institute, USA  
- Dynamic Program Code Distribution in Infrastructure-as-a-Service Clouds  
- RESTful Business Process Management in the Cloud |
| 14:50 – 15:40 | Paper Session 3: Components: A Service-Oriented View  
Facilitator: Domenico Bianculli, University of Luxembourg, Luxembourg  
- Building Reliable Dynamic Applications for Ubiquitous Computing  
- Framework for Evaluating Reusability of Component-as-a-Service (CaaS) |
| 15:40 – 16:00 | Break-Out Sessions Continued |
| 16:00 – 16:30 | Coffee Break |
| 16:30 – 17:00 | Break-Out Sessions Continued |
| 17:00 – 18:00 | Report of Break-Out Sessions and Wrap-Up |
Special Thanks to our Program Committee!

Matthias Book, TU Chemnitz, Germany
Antonio Brogi, University of Pisa, Italy
Antinisca Di Marco, University of L’Aquila, Italy
Elisabetta Di Nitto, Politecnico di Milano, Italy
Schahram Dustdar, TU Wien, Austria
Qing Gu, VU University Amsterdam, The Netherlands
Sam Guine, Politecnico di Milano, Italy
Sylvain Hallé, Univ. du Québec à Chicoutimi, Canada
Wilhelm Hasselbring, University of Kiel, Germany
Dragan Ivanovic, Technical University of Madrid (UPM), Spain
Raman Kazhamiakin, SayService srl, Italy
Kostas Kontogiannis, National Technical University of Athens, Greece
Heiko Koziolek, ABB Corporate Research, Germany
Philipp Leitner, TU Wien, Austria
Marian Litoiu, York University, Canada
Hanan Luftiyya, University of Western Ontario, Canada
Marija Mikic-Rakic, Google Los Angeles, USA
Flavio Oquendo, IRISA/University of South Brittany, France
Cesare Pautasso, University of Lugano, Switzerland
Jean-Louis Pazat, IRISA/INSA Rennes, France
Pierluigi Plebani, Politecnico di Milano, Italy
Andrea Polini, ISTI CNR Pisa, Italy
Antonio Ruiz-Cortés, University of Seville, Spain
Antonino Sabetta, SAP Research, France
Benjamin Satzger, TU Wien, Austria
Ladan Tahvildari, University of Waterloo, USA
Ingo Weber, University of New South Wales, Australia
Liming Zhu, NICTA, Australia
Introductions

Briefly state your name, organization, and areas of interest related to service-oriented and cloud-based systems
Keynote: SOA in the Google Cloud

Marija Mikić-Rakić
Google, USA
Marija Mikić-Rakić

- Staff-Level Software Engineering Manager at Google, Santa Monica, where she has been employed since 2004.
- Presently manages several teams working on different projects in the Ads organization.
- Holds a Ph.D. in Computer Science from the University of Southern California.
- Research interests are in the area of large-scale distributed systems, software architectures and self-adaptation.
- Member of ACM, ACM SIGSOFT, and IEEE.
Card Sorting

Facilitator: Grace Lewis
Carnegie Mellon Software Engineering Institute, USA
Process

• On the provided post-it note, write your name and what you believe is the most important principle for service engineering in the cloud
• Place your post-it note either next to a related set of post-it notes or by itself if you see no relationship to existing post-it notes
• Walk around the room and merge or split groups – No hard feelings!
  o The groups will not be defined until right after Paper Session 1, so feel free to change your mind and rearrange groups until then
• The resulting groups will be the breakout groups for the rest of the day
  o If there are too many groups, the organizers will make executive decisions
Paper Session 1: Quality Assurance for Service-Oriented, Cloud-Based Systems

Facilitator: Domenico Bianculli
University of Luxembourg, Luxembourg
Quality Assurance for Service-Oriented, Cloud-Based Systems

• The quality of service-oriented, cloud-based systems depends on the component services involved in the system, their interactions, and their usage profile

• Quality assurance activities deal with both functional and non-functional aspects

• Challenges that will be discussed in this session
  - how to determine criticality metrics of SOA that are useful for building suitable SOA testing strategies
  - how to predict the QoS of a composite service given the QoS profile of each service component and the structure of the composition
  - how to predict resources demand peaks in cloud environments
Papers

• The Dark Side of SOA Testing – Towards Testing Contemporary SOAs Based on Criticality Metrics
  o Philipp Leitner, Stefan Schulte, and Schahram Dustdar (Vienna University of Technology, Austria) and Ingo Pill, Marco Schulz and Franz Wotawa (Graz University of Technology, Austria)

• Towards QoS Prediction Based on Composition Structure Analysis and Probabilistic Environment Models
  o Dragan Ivanovic (Technical University of Madrid (UPM), Spain), Peerachai Kaowichakorn (IMDEA Software Institute, Spain) and Manuel Carro (Technical University of Madrid (UPM) and IMDEA Software Institute, Spain)

• Storm Prediction in a Cloud
  o Ian Davis, Hadi Hemmati, Ric Holt and Mike Godfrey (University of Waterloo, Canada) and Douglas Neuse and Serge Mankovskii (CA Technologies, Canada)
Paper Session 2: Elasticity in the Cloud

Facilitator: Grace Lewis
Carnegie Mellon Software Engineering Institute, USA
Elasticity in the Cloud

• Defined as the ability to shift and pool resources across disparate infrastructure so that resource needs and availability can be kept more in sync, while avoiding over-provisioning

• Two challenges that will be discussed in this session
  o When you shift application code across cloud hosts, how to ensure that all dependent files are also shifted
  o When executing business processes implemented as composite services in the cloud, how to manage state of these services while supporting elasticity via their migration and replication
Papers

• Dynamic Program Code Distribution in Infrastructure-as-a-Service Clouds
  o Rostyslav Zabolotnyi, Philipp Leitner and Schahram Dustdar (Vienna University of Technology, Austria)

• RESTful Business Process Management in the Cloud
  o Alessio Gambi and Cesare Pautasso (University of Lugano, Switzerland)
Paper Session 3: Components: A Service-Oriented View

Facilitator: Domenico Bianculli
University of Luxembourg, Luxembourg
Components: A Service-Oriented View

• Service-orientation principles can be applied also in the context of component-based, modular systems
• Software components can be offered as service: component as a service
• Challenges that will be discussed in this session
  o how to extend a component-based, service platform to support applications running in unpredictable contexts
  o how to the evaluate the reusability of components-as-a-service
Papers

• Building Reliable Dynamic Applications for Ubiquitous Computing
  o Jacky Estublier (Université Joseph Fourier, France) and German Vega
    (Laboratoire Informatique de Grenoble, France)

• Framework for Evaluating Reusability of Component-as-a-Service (CaaS)
  o Hyun Jung La, Jin Sun Her and Soo Dong Kim (Soongsil University, South Korea)
Break-Out Sessions

Facilitator: Grace Lewis
Carnegie Mellon Software Engineering Institute, USA
Process

• Get together with your group
• Give your group a name that represents the theme of your post-it notes
• Come up with 1-3 slides that represent your collective set of principles for service engineering in the cloud related to your theme
• Provide your slides on a USB drive to one of the organizers
• Assign a presenter for the plenary session
Gartner’s Five-Stage Technology Hype Cycle

**Technology Trigger:** A potential technology breakthrough kicks things off. Early proof-of-concept stories and media interest trigger significant publicity. Often no usable products exist and commercial viability is unproven.

**Peak of Inflated Expectations:** Early publicity produces a number of success stories—often accompanied by scores of failures. Some companies take action; many do not.

**Trough of Disillusionment:** Interest wanes as experiments and implementations fail to deliver. Producers of the technology shake out or fail. Investments continue only if the surviving providers improve their products to the satisfaction of early adopters.

**Slope of Enlightenment:** More instances of how the technology can benefit the enterprise start to crystallize and become more widely understood. Second- and third-generation products appear from technology providers. More enterprises fund pilots, conservative companies remain cautious.

**Plateau of Productivity:** Mainstream adoption starts to take off. Criteria for assessing provider viability are more clearly defined. The technology’s broad market applicability and relevance are clearly paying off.

Source: http://www.gartner.com/technology/research/metodologies/hype-cycle.jsp
In 2009, Cloud Computing was at the "Peak of Inflated Expectations"

Source: Gartner, Hype Cycle for Emerging Technologies, 2009
In 2010, the Concept of Private Clouds Started to Appear

Source: Gartner, Hype Cycle for Emerging Technologies, 2010
In 2011, it was about to enter the “Trough of Disillusionment”

Source: Gartner, Hype Cycle for Emerging Technologies, 2011
In 2012, it is heading down to the bottom of the “Trough of Disillusionment”

Source: Gartner, Hype Cycle for Emerging Technologies, 2012
While clearly maturing, cloud computing continues to be the most hyped subject in IT today.
Thanks for a Great Workshop!

- There are definitely huge opportunities for research in software engineering for service-oriented, cloud-based systems
- We will submit a summary of the workshop to ACM Software Engineering Notes
  - We will give you all credit for coming up with the first-ever set of principles for service engineering in the cloud
- Presentations and summaries will be available on the PESOS web site soon
  - If you would like your presentation to be linked from the PESOS web site, please send a 1-up PDF file to Grace Lewis (glewis@sei.cmu.edu)