Lecture Notes in Computer Science 4880

Commenced Publication in 1973
Founding and Former Series Editors:
Gerhard Goos, Juris Hartmanis, and Jan van Leeuwen

Editorial Board

Sven Overhage   Clemens A. Szyperski
Ralf Reussner   Judith A. Stafford (Eds.)

Software Architectures, Components, and Applications

Third International Conference
on Quality of Software Architectures, QoSA 2007
Medford, MA, USA, July 11-13, 2007
Revised Selected Papers

Springer

Volume Editors

Sven Overhage
Augsburg University
Business Informatics and Systems Engineering
Universitätsstraße 16, 86159 Augsburg, Germany
E-mail: sven.overhage@wiwi.uni-augsburg.de

Clemens A. Szyperski
Microsoft Research
One Microsoft Way, Redmond, WA 98052, USA
E-mail: clemens.szyperski@microsoft.com

Ralf Reussner
University of Karlsruhe (TH)
Am Fasanengarten 5, 76131 Karlsruhe, Germany
E-mail: reussner@ipd.uka.de

Judith A. Stafford
Tufts University
Computer Science, 161 College Avenue, Medford, MA 02155, USA
E-mail: jas@cs.tufts.edu

Preface

At the beginning of the 21st century, both software engineering and business application development are facing a variety of challenges. On the one hand, there is significant pressure to streamline the development process and reduce the costs to create, deploy, and maintain software applications. On the other hand, software applications have to fulfill constantly growing demands, in particular as they are being recognized as integral parts of an organization's competitive advantage and as their significant impact on the corporate (e-) business strategy becomes obvious.

Nowadays, software applications have to satisfy rapidly evolving functional and extra-functional requirements. Similarly, the importance of software in technical applications is also constantly growing, as more and more software contributes to the value of various products and technical processes. In both domains, the enterprise and the technical product, software becomes more and more critical, as its failures can have dramatic impact on enterprises, users, and the environment. Cross-cutting these demands, managing the application complexity, flexibly adapting applications to changes in the business environment, and reducing the development time are of primary concern in today's development projects.

In order to better comply with these challenges, designing software architectures of good quality becomes a critical success factor. A software application is organized by its architecture that partitions it into elements and defines relationships among them. For this, we usually use multiple views, each with a different organizing principle. In addition, a software architecture supports reasoning about properties that are emergent and cannot be ascribed to particular elements. These properties are described using a language of quality attributes. Often, quality attributes, such as the system's performance or reliability, have a pervasive impact, are difficult to reverse, and preclude or constrain other properties. For these reasons, they have to be taken into account already during the design phase.

The conference on the Quality of Software Architectures (QoSA) is concerned with all of these topics. It brings together researchers and practicioners from a variety of disciplines to promote a better understanding of how to develop software architectures of good quality. This year's conference combined presentations of carefully reviewed papers, industrial experiences, keynotes, and discussion sessions that delved into topics of interest. In particular, it addressed:

- Architecture design principles and design decisions based on architectural knowledge
- Defining, measuring, and evaluating architecture quality
- Managing architecture quality, tracing architectural decisions upstream to requirements and downstream to implementation

– Preserving architecture quality throughout the lifetime of a software system
– Reasoning about emergent architecture properties such as performance and reliability

According to QoSA's tradition, the themes addressed in the call for papers were broad. The papers selected for QoSA 2007 present recent research and experiences on the topics listed above. From 42 submitted papers, 13 were selected as papers for this conference proceedings volume (for an acceptance rate of 31%). Each paper received at least three reviews and was discussed in depth during special mini-panel sessions at the conference. The selected papers are complemented by a written version of Murray Woodside's keynote on "Resource Architecture and Continuous Performance Engineering."

The conference, held in Medford, MA, featured an additional "Industrial Day" event with inspiring presentations from invited speakers, a variety of tutorials, and a panel discussion. As in 2006, this year's QoSA was organized in conjunction with the International ACM SIGSOFT Symposium on Component-Based Software Engineering (CBSE 2007). Together with the Workshop on the Role of Software Architecture for Testing and Analysis (ROSATEA 2007), they formed the week-long conference and workshop series as Federated Events on Component-Based Software Engineering and Software Architecture (COMP-ARCH 2007).

We thank the members of the Program Committee and the additional reviewers for their thoughtful and timely reviews that helped us in selecting the best papers. We are indebted to Judith Stafford and George Heineman for their invaluable work that made the COMPARCH vision come true. For their support and their work as QoSA Steering Committee, we thank Steffen Becker, Christine Hofmeister, and Ralf Reussner. We thank the generous sponsors of QoSA 2007: Tufts University and University of Karlsruhe (TH). Finally, we are grateful for the support of our COMPARCH sponsors Siemens, Addison-Wesley, and The MIT Press. Without the commitment of all the above people and sponsors, this conference would not have been possible.

August 2007   Sven Overhage
                                                          Clemens Szyperski

Organization

Organization Chair

Judith A. Stafford, Tufts University, USA

Program Chairs

Sven Overhage, University of Augsburg, Germany
Clemens Szyperski, Microsoft, Redmond, USA

Steering Committee

Ralf Reussner, University of Karlsruhe, Germany
Judith A. Stafford, Tufts University, USA
Christine Hofmeister, Lehigh University, USA
Steffen Becker, University of Karlsruhe, Germany

Program Committee

Antonia Albani, Delft University of Technology, The Netherlands
Colin Atkinson, University of Mannheim, Germany
Len Bass, Software Engineering Institute, Pittsburgh, PA, USA
Don Batory, University of Texas at Austin, USA
Jan Bosch, Intuit, Mountain View, USA
Alexander Brändle, Microsoft Research, UK
Michel Chaudron, Technische Universiteit Eindhoven, The Netherlands
Ivica Crnkovic, Mälardalen University, Sweden
Ian Gorton, Pacific North West National Laboratory, USA
Hassan Gomaa, George Mason University, USA
Volker Gruhn, University of Leipzig, Germany
Wilhelm Hasselbring, University of Oldenburg / OFFIS, Germany
Jean-Marc Jezequel, University of Rennes / INRIA, France
Philippe Kruchten, University of British Columbia, Canada
Patricia Lago, Vrije Universiteit, The Netherlands
Nicole Levy, University of Versailles, France
Tomi Mannisto, Helsinki University of Technology, Finland
Nenad Medvidovic, University of Southern California, Los Angeles, USA
Raffaela Mirandola, Politecnico di Milano, Italy
Robert Nord, Software Engineering Institute, Pittsburgh, USA
Frantisek Plasil, Charles University, Czech Republic

Iman Poernomo, King's College, UK
Sasikumar Punnekkat, Mälardalen University, Sweden
Andreas Rausch, University of Kaiserslautern, Germany
Matthias Riebisch, Technical University of Ilmenau, Germany
Bernhard Rumpe, University of Technology Braunschweig, Germany
Christian Salzmann, BMW, Germany
Jean-Guy Schneider, Swinburne University, Australia
Johannes Siedersleben, T-Systems, Germany
Michael Stal, Siemens, Germany
Hans van Vliet, Vrije Universiteit, The Netherlands
Kurt Wallnau, Software Engineering Institute, Pittsburgh, USA
Wolfgang Weck, Independent Software Architect, Switzerland

Cooperating and Supporting Partners

Tufts University, Medford, MA, USA
University of Karlsruhe (TH), Germany
Siemens AG
Addision-Wesley
The MIT Press

Table of Contents

Architecture Evolution

Architecting Process and Architectural Knowledge