Lecture Notes in Computer Science **9306**

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

Editorial Board

David Hutchison
Lancaster University, Lancaster, UK
Takeo Kanade
Carnegie Mellon University, Pittsburgh, PA, USA
Josef Kittler
University of Surrey, Guildford, UK
Jon M. Kleinberg
Cornell University, Ithaca, NY, USA
Friedemann Mattern
ETH Zurich, Zürich, Switzerland
John C. Mitchell
Stanford University, Stanford, CA, USA
Moni Naor
Weizmann Institute of Science, Rehovot, Israel
C. Pandu Rangan
Indian Institute of Technology, Madras, India
Bernhard Steffen
TU Dortmund University, Dortmund, Germany
Demetri Terzopoulos
University of California, Los Angeles, CA, USA
Doug Tygar
University of California, Berkeley, CA, USA
Gerhard Weikum
Max Planck Institute for Informatics, Saarbrücken, Germany

More information about this series at http://www.springer.com/series/7408

Schahram Dustdar · Frank Leymann
Massimo Villari (Eds.)

Service Oriented and Cloud Computing

4th European Conference, ESOCC 2015
Taormina, Italy, September 15–17, 2015
Proceedings

Springer

Editors
Schahram Dustdar
Distributed Systems Group
TU Wien
Austria

Frank Leymann
Institute of Architecture of Application Systems
University of Stuttgart
Baden-Württemberg
Germany

Massimo Villari
Faculty of Engineering
University of Messina
Messina
Italy

ISSN 0302-9743 ISSN 1611-3349 (electronic)
Lecture Notes in Computer Science
ISBN 978-3-319-24071-8 ISBN 978-3-319-24072-5 (eBook)
DOI 10.1007/978-3-319-24072-5

Library of Congress Control Number: 2015948156

LNCS Sublibrary: SL2 - Programming and Software Engineering

Springer Cham Heidelberg New York Dordrecht London
© IFIP International Federation for Information Processing 2015
This work is subject to copyright. All rights are reserved by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.
The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.
The publisher, the authors and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publisher nor the authors or the editors give a warranty, express or implied, with respect to the material contained herein or for any errors or omissions that may have been made.

Printed on acid-free paper

Springer International Publishing AG Switzerland is part of Springer Science+Business Media (www.springer.com)

Preface

Service-oriented computing – together with web services as its major implementation platform – has become the most important paradigm for distributed software development and application for a number of years now. The former ECOWS (European Conference on Web Services) conference series addressed key issues of service-oriented computing, in particular web services, in nine successful conferences until 2011. In the meantime, as services are increasingly used remotely, i.e., in the "cloud", the focus of the conference series has shifted slightly. Accordingly, ECOWS was re-launched in 2012 as the "European Conference on Service-Oriented and Cloud Computing" (ESOCC) in Bertinoro, Italy, addressing the state of the art and practice of service-oriented computing and cloud computing. The second European Conference on Service-Oriented and Cloud Computing, ESOCC 2013, was held in Málaga, Spain, in September 2013. Following the third conference of the series in Manchester, UK, on September 2–4, 2014, this fourth iteration took place in Taormina (Messina), Italy, on September 15–17, 2015.

This volume contains the technical papers presented at the conference. The conference consisted of multiple tracks: Research Track, Industrial Track, and Work-in-Progress (WIP) Track. There were a total of 48 submissions from which 13 papers were selected for the research track (yielding an acceptance rate of 27 %), together with 2 short papers for the WIP track, and 3 papers accepted for the industrial track. The review and selection process was performed rigorously, with each paper being reviewed by at least three PC members (sometimes with the help of additional reviewers).

There were 2 excellent invited talks at the conference, given by Marco Aiello (Professor of Distributed Systems at the University of Groningen) and Eliot Salant (Manager, Virtualization and Systems Management at IBM Haifa Research).

Six workshops were co-located with the conference: the 3rd International Workshop on CLoud for IoT (CLIoT 2015), the 5th International Workshop on Adaptive Services for the Future Internet (WAS4FI 2015), the 2nd Workshop on Seamless Adaptive Multi-cloud Management of Service-based Applications (SeaClouds), the 1st International Workshop on Cloud Adoption and Migration (CloudWay 2015), the 1st Workshop on Federated Cloud Networking (FedCloudNet), and the 1st International Workshop on Digital Enterprise Architecture and Engineering (IDEA). A PhD symposium was held on the same day as the workshops.

All in all, ESOCC 2015 was a successful conference, and we owe its success to many people: all the authors who submitted papers, and those who presented papers at the conference; all the PC members who took part in the review and selection process, as well as the additional reviewers they called on for help; all the invited speakers; the members of the Organizing Committee who chaired the industrial track, work-in-progress track, EU-projects track, workshops, and the PhD symposium, as well as the

people who helped organize these events. Last but not least, we are grateful to the Local Organizing Committee for their efficient organization and warm hospitality. To all of you: we say a heart-felt ‘Thank you’!

July 2015

Schahram Dustdar
Frank Leymann
Massimo Villari

Organization

ESOCC 2015 was organized by the MDSLab of the University of Messina.

Organizing Committee

General Chair

Massimo Villari	University of Messina, Italy

Program Chairs

Schahram Dustdar	TU Wien, Austria
Frank Leymann	University of Stuttgart, Germany

Industrial Track Chairs

Andreas Roth	SAP, Germany
Stefano De Panfilis	Engineering Ingegneria Informatica S.p.A., Italy

Work-in-Progress Track Chair

Orazio Tomarchio	University of Catania, Italy

EU-Project Track Chairs

Antonio Brogi	University of Pisa, Italy
Silvana Muscella	CloudWATCH Coordinator, Italy

Workshop Chairs

Antonio Celesti	University of Messina, Italy
Philipp Leitner	University of Zurich, Switzerland

Publicity Chair

Cesare Pautasso	University of Lugano, Switzerland

PhD Symposium Chairs

Gianluigi Zavattaro	University of Bologna, Italy
Wolf Zimmermann	University of Halle, Germany

Program Committee

Marco Aiello	University of Groningen, The Netherlands
Farhad Arbab	CWI, The Netherlands
Luciano Baresi	Politecnico di Milano, Italy
Mario Bravetti	University of Bologna, Italy

Antonio Brogi	University of Pisa, Italy
Christoph Bussler	Xtime, Inc., USA
Antonio Celesti	University of Messina, Italy
Javier Cubo	University of Malaga, Spain
Stefano De Panfilis	Engineering Ingegneria Informatica S.p.A., Italy
Flavio De Paoli	University of Milano-Bicocca, Italy
Eric Dubois	CRP Henri Tudor Service Science and Innovation (SSI), Luxembourg
Juergen Dunkel	FH Hannover, Germany
Schahram Dustdar	TU Wien, Austria
Rik Eshuis	Eindhoven Univ. of Technology, The Netherlands
David Eyers	University of Otago, New Zealand
Maria Fazio	University of Messina, Italy
George Feuerlicht	Prague University of Economics, Czech Republic
Claude Godart	Université de Lorraine, France
Michael Goedicke	University of Duisburg-Essen, Germany
Paul Grefen	Eindhoven University of Technology, The Netherlands
Thomas Gschwind	IBM Zurich Research Lab, Switzerland
Martin Henkel	Stockholm University, Sweden
Dionisis Kehagias	CERTH-ITI, Greece
Friederike Klan	Friedrich-Schiller-University Jena, Germany
Ernö Kovacs	NEC Europe Network Labs, Germany
Akhil Kumar	Pennsylvania State University, USA
Birgitta König-Ries	Universität Jena, Germany
Peep Küngas	University of Tartu, Estonia
Patricia Lago	VU University Amsterdam, The Netherlands
Winfried Lamersdorf	University of Hamburg, Germany
Kung-Kiu Lau	University of Manchester, UK
Philipp Leitner	University of Zurich, Switzerland
Frank Leymann	Institute of Architecture of Application Systems, Germany
Heiko Ludwig	IBM Research, USA
Welf Löwe	Linnaeus University, Sweden
Ingo Melzer	DaimlerChrysler Research, Germany
Silvana Muscella	CloudWATCH Coordinator, Italy
Roy Oberhauser	Aalen University, Germany
Guadalupe Ortiz	University of Cádiz, Spain
Claus Pahl	Dublin City University, Ireland
George Papadopoulos	University of Cyprus, Cyprus
Cesare Pautasso	University of Lugano, Switzerland
Willy Picard	Poznań University of Economics, Poland
Ernesto Pimentel	University of Malaga, Spain
Wolfgang Reisig	Humboldt-Universität zu Berlin, Germany
Andreas Roth	SAP, Germany
Ulf Schreier	University of Applied Sciences Furtwangen, Germany
Orazio Tomarchio	University of Catania, Italy

Emilio Tuosto	University of Leicester, UK
Rainer Unland	University of Duisburg-Essen, Germany
Massimo Villari	University of Messina, Italy
Erik Wilde	UC Berkeley, USA
Gianluigi Zavattaro	University of Bologna, Italy
Olaf Zimmermann	HSR FHO Rapperswil, Switzerland
Wolf Zimmermann	University of Halle, Germany
Christian Zirpins	KIT/Seeburger AG, Germany

Local Organization Committee

Dario Bruneo	University of Messina, Italy
Maria Fazio	University of Messina, Italy
Antonio Puliafito	University of Messina, Italy
Marco Scarpa	University of Messina, Italy

Additional Reviewers

Achilleos, Achlleas
Alizadeh Moghaddam, Fahimeh
Arshad, Rehman
Cavallo, Marco
Damiani, Ferruccio
Di Cola, Simone
Di Modica, Giuseppe
Fahmideh, Mehdi
Georgievski, Ilche
Haubeck, Christopher
Ibrahim, Ahmad
Kalinowski, Julian
Me, Gianantonio
Moelle, Andre
Nizamic, Faris
Orsini, Gabriel
Pallis, George
Panarello, Alfonso
Polito, Carmelo
Pourmirza, Shaya
Prüfer, Robert
Qian, Chen
Razavian, Maryam
Soldani, Jacopo
Sürmeli, Jan

Abstracts of Invited Talks

Coordinating the Internet of Things by Service Composition

Marco Aiello

Abstract. Since its emergence, one of the most advertised opportunities offered by service oriented computing has been the possibility of composing loosely coupled services on a per need basis. Services, like Lego pieces, act as modular building blocks which are assembled when a given articulated user request comes and are ready to be reused for other requests. Over the years, the promise has been of reducing recoding and refactoring efforts while achieving scalability, run-time adaptability, and infinite reuse. After reviewing 12 years of personal experiences and research in dynamic service composition, going from initial work on composing trips based on a number of independent travel service operations to the more recent research in home and building automation where services often represent interconnected things in a defined physical space, I will introduce our current efforts in building dynamic service composition frameworks. In particular, I will present the RuG-planner which is able to defer composition decisions to run-time and to seamlessly make revisions in response to a constantly evolving execution environments.

Challenges in Developing an Efficient Cloud Management Framework

Eliot Salant

Abstract. Cloud Computing has developed rapidly over the last ten years with world-wide spending on public and private cloud hosting passing the $32bn. mark this year, and savings to businesses using the cloud are typically stated as better than 30 % due to the clouds ability to better take advantage of economies of scale. Yet, in actuality, in commercial data centres the utilization of resources still remain low. In this talk we will introduce the challenges in managing both the cloud infrastructure and the application more effectively to obtain better utilization of cloud ecosystem, including the challenges involved in multi-tenancy issues in placement of an application, sizing an application, adaptation of the infrastructure to improve workload performance and monitoring analytics of the ecosystem.

Contents

Research Track

Decentralized Stream Processing Over Web-Enabled Devices 3
Masiar Babazadeh, Andrea Gallidabino, and Cesare Pautasso

Modelling and Analysing Cloud Application Management 19
Antonio Brogi, Andrea Canciani, and Jacopo Soldani

A Decentralized Approach to Network-Aware Service Composition 34
Valeria Cardellini, Mirko D'Angelo, Vincenzo Grassi, Moreno Marzolla, and Raffaela Mirandola

On the Integration of Automatic Deployment into the ABS Modeling Language 49
Stijn de Gouw, Michael Lienhardt, Jacopo Mauro, Behrooz Nobakht, and Gianluigi Zavattaro

A Heterogeneous Approach for Developing Applications with FIWARE GEs 65
Simone Di Cola, Cuong Tran, Kung-Kiu Lau, Antonio Celesti, and Maria Fazio

Elastic Application-Level Monitoring for Large Software Landscapes in the Cloud 80
Florian Fittkau and Wilhelm Hasselbring

Evaluation of the Employment of Machine Learning Approaches and Strategies for Service Recommendation 95
Jens Kirchner, Andreas Heberle, and Welf Löwe

Business Process Adaptability Metrics for QoS-Based Service Compositions 110
Raffaela Mirandola, Diego Perez-Palacin, Patrizia Scandurra, Michele Brignoli, and Andrea Zonca

Formal Verification of Service Level Agreements Through Distributed Monitoring 125
Behrooz Nobakht, Stijn de Gouw, and Frank S. de Boer

Dynamic Strategies for Query Constructing and Rank Merging from Multiple Search Engines 141
Kobkaew Opasjumruskit, Birgitta König-Ries, and Jesús Expósito

Highly Customizable Service Composition and Orchestration 156
Luca Sabatucci, Carmelo Lodato, Salvatore Lopes, and Massimo Cossentino

Service Repository for Cloud Service Consumer Life Cycle Management . . . 171
Hong Thai Tran and George Feuerlicht

Cloud Detours: A Non-intrusive Approach for Automatic Software Adaptation to the Cloud. 181
Michel Vasconcelos, Nabor C. Mendonça, and Paulo Henrique M. Maia

Industry Track

Cloud Integration Patterns 199
Danny Merkel, Filippos Santas, Andreas Heberle, and Tarmo Ploom

Remote Collaboration, Decision Support, and On-demand Medical Image Analysis for Acute Stroke Care. 214
Renan Sales Barros, Jordi Borst, Steven Kleynenberg, Céline Badr, Rama-Rao Ganji, Hubrecht de Bliek, Landry-Stéphane Zeng-Eyindanga, Henk van den Brink, Charles Majoie, Henk Marquering, and Sílvia Delgado Olabarriaga

Hybrid Service Compositions: When BPM Meets Dynamic Case Management. 226
Konstantinos Traganos and Paul Grefen

Work-In-Progress Track

Data Movement in the Internet of Things Domain. 243
Francesco D'Andria, Daniel Field, Aliki Kopaneli, George Kousiouris, David Garcia-Perez, Barbara Pernici, and Pierluigi Plebani

Formal Verification of Virtual Network Function Graphs in an SP-DevOps Context 253
Serena Spinoso, Matteo Virgilio, Wolfgang John, Antonio Manzalini, Guido Marchetto, and Riccardo Sisto

Author Index 263