

Commenced Publication in 1973

Founding and Former Series Editors:

Gerhard Goos, Juris Hartmanis, and Jan van Leeuwen

Editorial Board

David Hutchison

Lancaster University, UK

Takeo Kanade

Carnegie Mellon University, Pittsburgh, PA, USA

Josef Kittler

University of Surrey, Guildford, UK

Jon M. Kleinberg

Cornell University, Ithaca, NY, USA

Alfred Kobsa

University of California, Irvine, CA, USA

Friedemann Mattern

ETH Zurich, Switzerland

John C. Mitchell

Stanford University, CA, USA

Moni Naor

Weizmann Institute of Science, Rehovot, Israel

Oscar Nierstrasz

University of Bern, Switzerland

C. Pandu Rangan

Indian Institute of Technology, Madras, India

Bernhard Steffen

University of Dortmund, Germany

Madhu Sudan

Massachusetts Institute of Technology, MA, USA

Demetri Terzopoulos

University of California, Los Angeles, CA, USA

Doug Tygar

University of California, Berkeley, CA, USA

Gerhard Weikum

Max-Planck Institute of Computer Science, Saarbruecken, Germany

Petri Mähönen Klaus Pohl
Thierry Priol (Eds.)

Towards a Service-Based Internet

First European Conference, ServiceWave 2008
Madrid, Spain, December 10-13, 2008
Proceedings

Volume Editors

Petri Mähönen

RWTH Aachen University, Department of Wireless Networks

Kackertstrasse 9, 52072 Aachen, Germany

E-mail: pma@mobnets.rwth-aachen.de

Klaus Pohl

University Duisburg-Essen, Software Systems Engineering

Schützenbahn 70, 45117, Essen, Germany

E-mail: pohl@sse.uni-due.de

Thierry Priol

INRIA Rennes - Bretagne Atlantique

Campus de Beaulieu, 35042 Rennes Cedex, France

E-mail: thierry.priol@inria.fr

Library of Congress Control Number: 2008940580

CR Subject Classification (1998): K.6, K.8, K.4.4, H.4, H.3.5

LNCS Sublibrary: SL 3 – Information Systems and Application, incl. Internet/Web and HCI

ISSN 0302-9743

ISBN-10 3-540-89896-4 Springer Berlin Heidelberg New York

ISBN-13 978-3-540-89896-2 Springer Berlin Heidelberg New York

This work is subject to copyright. All rights are reserved, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, re-use of illustrations, recitation, broadcasting, reproduction on microfilms or in any other way, and storage in data banks. Duplication of this publication or parts thereof is permitted only under the provisions of the German Copyright Law of September 9, 1965, in its current version, and permission for use must always be obtained from Springer. Violations are liable to prosecution under the German Copyright Law.

Springer is a part of Springer Science+Business Media

springer.com

© Springer-Verlag Berlin Heidelberg 2008

Printed in Germany

Typesetting: Camera-ready by author, data conversion by Scientific Publishing Services, Chennai, India

Printed on acid-free paper SPIN: 12581429 06/3180 5 4 3 2 1 0

Foreword

Today it is almost impossible to remember what life was like with no computer, no mobile phone, and no Internet for accessing information, performing transactions or exchanging emails and data. New technology is bringing wave after wave of new benefits to daily life: organisations are doing business with each other via the Internet; people are filling in tax declarations online and booking their next vacation through the Internet. In general we are all progressively using (and dependent on) software and services running on computers, connecting mobile phones and other devices, and exchanging information on the Internet.

People like to shop around and exercise choice. So do businesses and public administrations. Today they can buy a complete software package that best suits their needs, even though they may never use some of the tools it offers, or other desirable tools are not available. In the future they may no longer have to compromise on choice. Alternative approaches like “Software as a Service” and “Computing Resources as a Service” are emerging. Software is provided on-line as a service when and where it is needed, and the same for computing resources needed to run software. Such an approach allows individuals and organisations to tap into and effectively harness the immense wealth of information, knowledge and analytical resources when they need them, paying only for what they use. Customers are bound to benefit when there is a sufficiently rich choice of services.

But what does this mean when seen from the supply side? Although it may not yet be so evident to the outside world, the software industry is rapidly restructuring and changing patterns of competition and business. Relatively new internet companies are successfully providing software and computing resources as a service. They are seriously competing with established industries delivering traditional packaged software, forcing the latter to adapt their business models.

I believe that the restructuring of the market and the industry represents a tremendous opportunity for Europe and for the European software industry.

The number of companies and researchers involved in the European Technology Platforms eMobility, EPoSS, ISI, NEM and NESSI, shows that industry is also taking this opportunity seriously. These Technology Platforms are collaborating to define a strategy for addressing the challenges in delivering software and computing resources as a service, and in developing new attractive context-based, device-independent services addressing the precise needs of the user that exploit the possibilities offered by the convergence of the media, telecom and IT industries.

ServiceWave 2008 presents the main results of European industrial and academic collaboration in this field. It reflects the great potential and the continued strength of European expertise in many fields of service development. The

challenge now is to bring these advancements to the market and to ensure the European leadership in the new Internet economy.

Viviane Reding
Commissioner for Information Society and Media

Preface

The Internet is becoming a critical infrastructure for the growth of the modern economy and society by allowing anyone to access information in a transparent way, independent of the location or computing device used. While today, users' main interactions with the Internet remain web browsing or exchange of e-mails, a revolution is on-going through the availability of software services.

The convergence of smarter networks, resource virtualization and collaborative and intelligent services will pave the way to the Future Internet with new software services which will be as revolutionary as the e-mail and the Web were when they appeared initially.

The Future Internet will enable new and unforeseen collaborative applications based on dynamic adaptation to the context and to the available services and resources. The technological and architectural advances in the Internet domain will also take economic and service-oriented facts into account.

Furthermore, the Future Internet will reinforce the need for interdisciplinary collaboration between domains such as computer science, electrical engineering and social sciences - disciplines that have already moved forward in working together but whose level of collaboration will have to increase considerably. However, before this revolution can be completed, several research challenges must be addressed and a tighter collaboration between industry and academia is of utmost importance.

The ServiceWave conference series aims to establish the premier European forum for researchers, educators and industrial practitioners to present and discuss the most recent innovations, trends, experiences and concerns in software services (or the "Future of the Internet of Services") and related underlying network technologies. ServiceWave fosters the creation of cross-community scientific excellence by gathering together industrial and academic experts from various disciplines such as business process management, distributed systems, computer networks, wireless and mobile communication networks, grid computing, embedded and smart systems, networking, service science and software engineering.

ServiceWave 2008 was organized along four tracks designed to foster the collaboration and lively exchange of ideas between industry and academia:

- ETPs Future Internet Track: dedicated to presentations on the common vision of the Future of the Internet elaborated and shared by the major European Technology Platforms active in the ICT domain—namely, eMobility, EPoSS, ISI, NEM and NESSI
- Industrial Panels Track: multidisciplinary open debate panels focusing on topics which, starting from traditional service-based systems engineering, brought the discussions toward the ambitious target of Future Internet

- Scientific Track: presentation of the papers, selected by the ServiceWave 2008 Program Committee, from research and industry, covering the state of practice and real-world experiences in service engineering
- Workshop Track: meetings organized by Working Groups active within the Future Internet activities, the intra-ETP activities or within an ETP as well as research and industrial communities wishing to present their work

These proceedings cover the peer-reviewed Scientific Track of ServiceWave 2008 for which we received 102 submissions. In an extensive and careful review process, the Scientific Program Committee of ServiceWave 2008 accepted 28 papers—an acceptance rate of 27%.

We offer our sincere thanks to the members of the ServiceWave 2008 Program Committee for devoting their time and knowledge to reviewing and discussing the submitted papers. We would especially like to thank the members of the Program Committee who attended the two-day Program Committee meeting held in Essen, Germany on September 1 and 2, 2008. Special thanks go to Andreas Gehlert and Julia Hilscher for their responsive and helpful support during the paper evaluation and selection process, as well as during the preparation of the proceedings.

We would also like to thank David Kennedy for organizing the ETP Track, Stefano De Panfilis and Wolfgang Gerteis for the Industrial Track and Frédéric Gittler for the Workshop Track.

In addition, ServiceWave 2008 would not have been possible without the efforts and expertise of a number of people who selflessly offered their time and energy to help to make this conference a success. We would like to thank Universidad Politécnica de Madrid, host of the 2008 edition of ServiceWave, for their continuous support.

We would like to thank all the people on the Organizing Committee, especially Federico Alvarez, Nuria Sánchez Almodóvar, Usua Iriberry Zubiola, Bruno François-Marsal, Véronique Pevtschin and Barbara Pirillo.

Finally, we thank the main conference sponsors and supporters: Alcatel-Lucent, Atos Origin, Engineering, Siemens, Telefónica, Thales, IBBT, HP and IBM as well as INRIA, RWTH Aachen, and University of Duisburg-Essen.

December 2008

Reinhold Achatz
Guillermo Cisneros
Petri Mähönen
Klaus Pohl
Thierry Priol

Organization

ServiceWave 2008 was organized by NESSI and hosted in Madrid by UPM in cooperation with:

- The European Technology Platforms eMobility, EPoSS, ISI and NEM
- Spanish Technology Platform INES
- Networks of Excellence CoreGrid and S-Cube
- Support actions Eiffel, 4NEM and NESSI 2010
- ICSOC, the International Conference on Service-Oriented Computing

General Chairs

Reinhold Achatz
Guillermo Cisneros

Siemens, Germany
Universidad Politécnica de Madrid, Spain

Program Chairs

Petri Mähönnen,
Coordinator of EIFFEL

RWTH Aachen University, Germany

Klaus Pohl,
Coordinator of S-Cube

University Duisburg-Essen, Germany

Thierry Priol,
Coordinator of CoreGRID

INRIA, France

Program Committee

Federico Alvarez

Universidad Politécnica Madrid, Spain

Mike Boniface

University of Southampton, UK

Vincent Boutroux

France Telecom, France

Jose Maria Cavanillas

ATOS Origin SA, Spain

Costas Courcoubetis

Athens University of Economics and Business,
Greece

Marco Danelutto

University of Pisa, Italy

Stefano De Panfilis

Engineering I.I., Italy

Eric Dubois

CRP Henri Tudor, Luxembourg

Serge Druais

Thales, France

Schahram Dustdar

Vienna University of Technology, Austria

Frank Fitzek

University of Aalborg, Denmark

Paraskevi Fragopoulou

FORTH, Greece

Vladimir Getov

University of Westminster, UK

Carlo Ghezzi

Politecnico di Milano, Italy

Sergei Gorlatch	University of Muenster, Germany
Pierre Guisset	CETIC, Belgium
Andrei Gurtov	HIIT, Finlande
Mohand-Said Hacid	University of Lyon, France
Stephen Hailes	University College London, UK
Manuel Hermenegildo	Universidad Politécnica Madrid, Spain
Paola Inverardi	University of L'Aquila, Italy
Borka Jerman-Blazic	Jozef Stefan Institute, Slovenia
Peter Kacsuk	MTA SZTAKI, Hungary
Roger Kilian-Kehr	SAP, Germany
Domenico Laforenza	ISTI-CNR, Italy
Frank Leymann	University of Stuttgart, Germany
Neil Maiden	City University London, UK
Katharina Mehner	Siemens AG, Germany
Andreas Metzger	University of Duisburg-Essen, Germany
Norbert Meyer	Supercomputing Center, Poland
Werner Mohr	Nokia Siemens Networks, Germany
Christos Nikolaou	University of Crete, Greece
Evgeny Osipov	LTU, Sweden
Jörg Ott	TKK Helsinki, Finland
Dimitri Papadimitriou	Alcatel-Lucent, Belgium
Mike Papazoglou	Tilburg University, The Netherlands
Jean-Louis Pazat	INSA-Rennes, France
Ron Perrott	Queen's University of Belfast, UK
George Polyzos	AUEB, Greece
Janne Riihijärvi	RWTH Aachen University, Germany
Santi Ristol	Chairman of INES, Spain
Ita Ritchardson	Lero, University of Limerick, Ireland
Colette Rolland	University Paris 1, France
Ian Sommerville	St. Andrews University, UK
Domenico Talia	Università della Calabria, Italy
Paolo Traverso	FBK, Trento, Italy
Dirk Trossen	British Telecom, UK
Klaus Wehrle	RWTH Aachen, Germany
Ramin Yahyapour	University of Dortmund, Germany
Wolfgang Ziegler	Fraunhofer SCAI, Germany

Referees

I. Aktas	M. Carro	O. Danylevych
M. Autili	J.-M. Cavanillas	P. Dazzi
A. Basukoski	A. Charfi	J. Duennweber
E. Bertin	C. Comito	H. Eberle
D. Bianculli	M. Coppola	C. Ghezzi
C. Cordier	C. Cunningham	R. Giaffreda

F. Glinka	R. Lichwala	S. Ramel
M.-C. Gomes	J.A. Bitsch Link	M. Reiter
K. Görlach	P. Lopez-Garcia	D. Di Ruscio
E. Grandry	K. Loughran	R. Sasnauskas
A. Gurtov	D. Malandrino	D. Schumm
T. Harmer	C. Mastroianni	L. Serafini
J. Hawkins	W. Mohr	A. Spriestersbach
T. Heer	G. Monakova	Y. Taher
P. Inverardi	J. Navas	M. Tivoli
D. Ivanovic	E. Di Nitto	G. Tolomei
G. Jankowski	S. Nurcan	I. Trajkovska
M.C. Jäger	M. Owsiak	P. Trunfio
B. Jerman-Blazic	P. Pelliccione	T. Unger
R. Krishnaswamy	G. Peter	K. Voigt
P. Kegel	E. Pfeuffer	E. Weingaertner
J. Koskela	G. Pirrò	S. Wieczorek
S. Kubicki	M. Plociennik	P. Wright
G. Kunz	A. Ploss	E. Zumpano
O. Landsiedel	A. Raed	
H. Li	F. Raimondi	

Table of Contents

I Adaptation/Monitoring (1)

An Integrated Approach for the Run-Time Monitoring of BPEL Orchestrations	1
<i>Luciano Baresi, Sam Guinea, Raman Kazhamiakin, and Marco Pistore</i>	
Towards Goal-Driven Self Optimisation of Service Based Applications	13
<i>Andreas Gehlert and André Heuer</i>	
Towards Correctness Assurance in Adaptive Service-Based Applications	25
<i>Raman Kazhamiakin, Andreas Metzger, and Marco Pistore</i>	

II Model Driven Architecture

A Service Based Development Environment on Web 2.0 Platforms	38
<i>Xabier Larrucea, Rafael Fernandez, Javier Soriano, Andrés Leonardo Martínez, and Jesus M. Gonzalez-Barahona</i>	
Using MDE to Build a Schizophrenic Middleware for Home/Building Automation	49
<i>Grégory Nain, Erwan Daubert, Olivier Barais, and Jean-Marc Jézéquel</i>	
Model-Driven Integration and Management of Data Access Objects in Process-Driven SOAs	62
<i>Christine Mayr, Uwe Zdun, and Schahram Dustdar</i>	

III Network Services

WIMS 2.0: Enabling Telecom Networks Assets in the Future Internet of Services	74
<i>David Moro, David Lozano, and Manuel Macias</i>	
Describing Next Generation Communication Services: A Usage Perspective	86
<i>Emmanuel Bertin and Noel Crespi</i>	

IV Adaptation/Monitoring (2)

Monitoring Web Services: A Database Approach	98
<i>Mohamed Amine Baazizi, Samir Sebahi, Mohand-Said Hacid, Salima Benbernou, and Mike Papazoglou</i>	
Milestones: Mythical Signals in UML to Analyze and Monitor Progress	110
<i>Richard Torbjørn Sanders and Øystein Haugen</i>	
A Framework for Proactive Self-adaptation of Service-Based Applications Based on Online Testing	122
<i>Julia Hielscher, Raman Kazhamiakin, Andreas Metzger, and Marco Pistore</i>	

V Service Oriented Architecture

The inContext Pervasive Collaboration Services Architecture	134
<i>Stephan Reiff-Marganiec, Hong-Linh Truong, Giovanni Casella, Christoph Dorn, Shahram Dustdar, and Sarit Moretzky</i>	
Leveraging the Upcoming Internet of Services through an Open User-Service Front-End Framework	147
<i>David Lizcano, Miguel Jiménez, Javier Soriano, José M. Cantera, Marcos Reyes, Juan J. Hierro, Francisco Garijo, and Nikolaos Tsouroulas</i>	
Domain-Specific Languages for Service-Oriented Architectures: An Explorative Study	159
<i>Ernst Oberortner, Uwe Zdun, and Shahram Dustdar</i>	

VI Business Process Management

Managing the Alignment between Business and Software Services Requirements from a Capability Model Perspective	171
<i>Eric Grandry, Eric Dubois, Michel Picard, and André Rifaut</i>	
Active Energy-Aware Management of Business-Process Based Applications (Position Paper)	183
<i>Danilo Ardagna, Cinzia Cappiello, Marco Lovera, Barbara Pernici, and Mara Tanelli</i>	

An Architecture for Managing the Lifecycle of Business Goals for Partners in a Service Network	196
<i>Marina Bitsaki, Ohla Danylevych, Willem-Jan van den Heuvel, George Koutras, Frank Leymann, Michele Mancioppi, Christos Nikolaou, and Mike Papazoglou</i>	

VII Deployment/Invocation

Ad-Hoc Usage of Web Services with Dynvoker	208
<i>Josef Spillner, Marius Feldmann, Iris Braun, Thomas Springer, and Alexander Schill</i>	
A Web Services Gateway for the H2O Lightweight Grid Computing Framework	220
<i>Mauro Migliardi</i>	
A Flexible and Extensible Architecture for Device-Level Service Deployment	230
<i>Thomas Frenken, Patrik Spiess, and Jürgen Anke</i>	

VIII Security

Fine-Grained Continuous Usage Control of Service Based Grids – The GridTrust Approach	242
<i>Syed Naqvi, Philippe Massonet, Benjamin Aziz, Alvaro Arenas, Fabio Martinelli, Paolo Mori, Lorenzo Blasi, and Giovanni Cortese</i>	
An Approach to Identity Management for Service Centric Systems	254
<i>Laurent Bussard, Elisabetta Di Nitto, Anna Nano, Olivier Nano, and Gianluca Ripa</i>	

IX Workflow

A Dynamic Orchestration Model for Future Internet Applications	266
<i>Giuseppe Avellino, Mike Boniface, Barbara Cantalupo, Justin Ferris, Nikolaos Matskanis, Bill Mitchell, and Mike Surridge</i>	
Defining the Behaviour of BPEL ^{light} Interaction Activities Using Message Exchange Patterns	275
<i>Jörg Nitzsche, Benjamin Höhensteiger, Frank Leymann, Mirko Sonntag, and Markus Tost</i>	
Managing Technical Processes Using Smart Workflows	287
<i>Matthias Wieland, Daniela Nicklas, and Frank Leymann</i>	

X SLA/QoS

Model Driven QoS Analyses of Composed Web Services	299
<i>Danilo Ardagna, Carlo Ghezzi, and Raffaella Mirandola</i>	
Semantic-Aware Service Quality Negotiation	312
<i>Marco Comuzzi, Kyriakos Kritikos, and Pierluigi Plebani</i>	
Multi-level SLA Management for Service-Oriented Infrastructures	324
<i>Wolfgang Theilmann, Ramin Yahyapour, and Joe Butler</i>	
Author Index	337