

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

TU Dortmund University, Germany

Madhu Sudan

Microsoft Research, Cambridge, 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

Moira C. Norrie Michael Grossniklaus (Eds.)

Object Databases

Second International Conference, ICOODB 2009
Zurich, Switzerland, July 1-3, 2009
Revised Papers

Volume Editors

Moira C. Norrie
ETH Zurich
Department of Computer Science
Zurich, Switzerland
E-mail: norrie@inf.ethz.ch

Michael Grossniklaus
Politecnico di Milano
Dipartimento di Elettronica e Informazione
Milano, Italy
E-mail: grossniklaus@elet.polimi.it

Library of Congress Control Number: 2010931175

CR Subject Classification (1998): H.2, H.4, H.3, H.5, I.2, D.2

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

ISSN	0302-9743
ISBN-10	3-642-14680-5 Springer Berlin Heidelberg New York
ISBN-13	978-3-642-14680-0 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.com

© Springer-Verlag Berlin Heidelberg 2010
Printed in Germany

Typesetting: Camera-ready by author, data conversion by Scientific Publishing Services, Chennai, India
Printed on acid-free paper 06/3180

Preface

ICOODB 2009 was the second in a series of international conferences aimed at promoting the exchange of information and ideas between members of the object database community. A key feature of the conference was its goal to bring together developers, users and researchers. The conference had three different tracks offered as a tutorial day, an industry day and a research day. In addition, a demo session with contributions from all three communities enabled participants to see the latest and on-going developments in object database technologies, supporting tools and also applications.

The conference proceedings presented as this volume consist of the papers presented in the research track. By publishing these after the conference, authors were given an opportunity to revise and extend their papers based on feedback and discussions held during the conference. Six of the papers were selected from submissions based on reviews by at least three members of the Program Committee. These papers address a number of classic database issues such as query processing, transaction processing, event models and the coupling of data and services in the context of modern object databases.

In addition, the research track included three invited presentations from researchers who were leaders in the field during what might be called the first generation of object databases back in the 1980s and early 1990s. At this time, research in object data models as well as object-oriented databases and persistent programming languages was very active. Over the years, this research became less fashionable and many researchers moved into other fields. However, some continued and as technologies and markets evolved so did their models and systems. With the revival in interest in object databases, it is important that researchers coming into the field are aware of the large body of previous research in the field. At the same time, it is interesting to look back on this research and lessons learned. How have technologies evolved and what remain as open issues? By addressing this question, we can identify future research directions.

The first of these invited papers is from Al Dearle, Graham Kirby and Ron Morrison of the University of St. Andrews, who worked together with Malcolm Atkinson on some of the first persistent programming languages. The goal was for orthogonal persistence and in their paper they revisit this goal, examining efforts to satisfy it through the ages from the earliest persistent programming languages to contemporary object databases.

The second invited paper by Matthias Jarke, Manfred Jeusfeld, Hans Nissen, Christoph Quix and Martin Staudt is a celebration of the 21st birthday of ConceptBase, a deductive object-oriented database system intended for the management of metadata. ConceptBase has been used in numerous projects and the team led by Matthias Jarke of RWTH Aachen and Manfred Jeusfeld of the University of Tilburg has continued to develop the system and add many

advanced features over the years. The paper provides an overview of the system and also reports on experiences and impact.

The third invited paper is by Elisa Bertino, Elena Camossi and Michela Bertolotto. Elisa Bertino was a leading researcher in the first generation of object databases and has continued to actively support the field, especially with her work on object data models. The paper shows how an object data model can be extended to represent and query spatio-temporal objects with multiple granularities and concludes with a discussion of open research challenges.

We take this opportunity to thank all those who helped to make this conference a success. First, there are the authors and presenters who of course are an essential part of every conference. It is their enthusiasm and professionalism that makes us confident in the future of object databases. We were pleased to see lots of lively discussions taking place within the conference sessions, during the coffee and lunch breaks and also at ICOODB 2009's social events. We believe that the opportunity for young researchers to interact with not only senior academics but also leading figures in the commercial world was something very special and we are pleased to note that in many cases these dialogues have continued beyond the end of the conference.

We also thank all the members of the program committee who did the reviewing work that plays such an important role in ensuring the scientific quality of a conference. Then there are our fellow organizers Anat Gafni, Stefan Edlich and Roberto Zicari who were key in putting together such an exciting conference program. We also acknowledge the support of the members of the ICOODB Steering Committee who provided valuable advice on the general organization of the conference. Thanks are also due to the many individuals who helped with the local organization of the conference. Last but not least, we thank the sponsors SI-DBTA, Versant and Progress for their financial support: All those who have organized conferences know the difference that this makes.

November 2009

Maira C. Norrie
Michael Grossniklaus

Organization

General Chair

Moira C. Norrie	ETH Zurich, Switzerland
-----------------	-------------------------

Program Chairs

Moira C. Norrie	ETH Zurich, Switzerland
Michael Grossniklaus	Politecnico di Milano, Italy

Program Committee

Suad Alagić	University of Southern Maine, USA
Sonia Berman	University of Cape Town, South Africa
Elisa Bertino	Purdue University, USA
Alan Dearle	University of St. Andrews, UK
Giovanna Guerrini	University of Genoa, Italy
Antony Hosking	Purdue University, USA
Geert-Jan Houben	Delft University of Technology, The Netherlands
Matthias Jarke	RWTH Aachen, Germany
Epaminondas Kapetanios	University of Westminster, UK
Gerti Kappel	Vienna University of Technology, Austria
Stefan Keller	University of Applied Sciences Rapperswil, Switzerland
Jessie Kennedy	Napier University, UK
Michele Missikoff	IASI-CNR, Italy
Dennis McLeod	University of Southern California, USA
Oscar Pastor	Valencia University of Technology, Spain
Norman Paton	University of Manchester, UK
Gunter Saake	University of Magdeburg, Germany
Stefano Spaccapietra	EPF Lausanne, Switzerland
Krzysztof J. Stencel	University of Warsaw, Poland
Kazimierz Subieta	Polish-Japanese Institute of Technology, Poland
Bernhard Thalheim	University of Kiel, Germany

Industrial Chairs

Stefan Edlich	TFH Berlin, Germany
Anat Gafni	db4objects, USA

Tutorial Chair

Roberto Zicari

Goethe University, Germany

Local Organization Chairs

Eugenio Lentini

ETH Zurich, Switzerland

Stefania Leone

ETH Zurich, Switzerland

Michael Nebeling

ETH Zurich, Switzerland

Alexandre de Spindler

ETH Zurich, Switzerland

Sponsoring Institutions

SI-DBTA: Special Interest Group on Information Systems, Switzerland

Global Information Systems Research Group, ETH Zurich, Switzerland

Versant Corporation, Redwood City, CA, USA

Progress Software Corporation, Bedford, MA, USA

Table of Contents

Session 1

Orthogonal Persistence Revisited (Invited Paper)	1
<i>Alan Dearle, Graham N.C. Kirby, and Ron Morrison</i>	
Verification Technology for Object-Oriented/XML Transactions	23
<i>Suad Alagić, Mark Royer, and David Briggs</i>	

Session 2

Compiler Plugins Can Handle Nested Languages: AST-Level Expansion of LINQ Queries for Java	41
<i>Miguel Garcia</i>	
Active Components as a Method for Coupling Data and Services – A Database-Driven Application Development Process	59
<i>Beat Signer and Moira C. Norrie</i>	
Optimization of Object-Oriented Queries Involving Weakly Dependent Subqueries	77
<i>Michał Bleja, Tomasz Kowalski, Radosław Adamus, and Kazimierz Subieta</i>	

Session 3

Metamodelling with Datalog and Classes: ConceptBase at the Age of 21 (Invited Paper)	95
<i>Matthias Jarke, Manfred A. Jeusfeld, Hans W. Nissen, Christoph Quix, and Martin Staudt</i>	
Unified Event Model for Object Databases	113
<i>Michael Grossniklaus, Stefania Leone, Alexandre de Spindler, and Moira C. Norrie</i>	

Session 4

Multi-granular Spatio-temporal Object Models: Concepts and Research Directions	132
<i>Elisa Bertino, Elena Camossi, and Michela Bertolotto</i>	
Mapping XSD to OO Schemas	149
<i>Suad Alagić and Philip A. Bernstein</i>	

Author Index	167
---------------------------	-----