

# Lecture Notes in Computer Science

Edited by G. Goos, J. Hartmanis, and J. van Leeuwen

2224

**Springer**

*Berlin*

*Heidelberg*

*New York*

*Barcelona*

*Hong Kong*

*London*

*Milan*

*Paris*

*Tokyo*

Hideko S. Kunii Sushil Jajodia  
Arne Sølvberg (Eds.)

# Conceptual Modeling – ER 2001

20th International Conference  
on Conceptual Modeling  
Yokohama, Japan, November 27-30, 2001  
Proceedings



Springer

## Series Editors

Gerhard Goos, Karlsruhe University, Germany  
Juris Hartmanis, Cornell University, NY, USA  
Jan van Leeuwen, Utrecht University, The Netherlands

## Volume Editors

Hideko S. Kunii  
Ricoh Company, Ltd., Software Research Center  
1-1-17 Koishikawa, Bunkyo-ku, Tokyo 112-0002, Japan  
E-mail: hkunii@src.ricoh.co.jp

Sushil Jajodia  
George Mason University, Center for Secure Information Systems  
Mail Stop 4A4, Fairfax, VA 22030-4444, USA  
E-mail: jajodia@gmu.edu

Arne Sølvberg  
The Norwegian University of Science and Technology  
Department of Computer and Information Science  
7491 Trondheim, Norway  
E-mail: Arne.Soelvberg@idi.ntnu.no

Cataloging-in-Publication Data applied for

Die Deutsche Bibliothek - CIP-Einheitsaufnahme

Conceptual modeling : proceedings / ER 2001, 20th International Conference on Conceptual Modeling, Yokohama, Japan, November 27 - 30, 2001. Hideko S. Kunii ... (ed.). - Berlin ; Heidelberg ; New York ; Barcelona ; Hong Kong ; London ; Milan ; Paris ; Tokyo : Springer, 2001  
(Lecture notes in computer science ; Vol. 2224)  
ISBN 3-540-42866-6

CR Subject Classification (1998): H.2, H.4, F.4.1, I.2.4, H.1, J.1, D.2, C.2

ISSN 0302-9743

ISBN 3-540-42866-6 Springer-Verlag 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-Verlag. Violations are liable for prosecution under the German Copyright Law.

Springer-Verlag Berlin Heidelberg New York  
a member of BertelsmannSpringer Science+Business Media GmbH

<http://www.springer.de>

© Springer-Verlag Berlin Heidelberg 2001  
Printed in Germany

Typesetting: Camera-ready by author, data conversion by Boller Mediendesign  
Printed on acid-free paper SPIN: 10840957 06/3142 5 4 3 2 1 0

## Message from the Conference Chair

The 20th International Conference on Conceptual Modeling (ER 2001) was the first ER conference in the 21st Century as well as the first ER conference held in Japan. It was a great honor and pleasure to host such a memorable conference in Yokohama, an exotic and fashionable seafront city. We were particularly pleased with the high quality of the ER 2001 papers, which were gathered from all over the world.

The technical program of the conference was selected by the Program Committee. Co-chairs were Hideko S. Kunii, Arne Sølvberg, and Sushil Jajodia, and they all did an excellent job. Firstly, I would like to express my appreciation to these PC Co-chairs, and all the staff who worked for H. Kunii at Ricoh as well.

In addition to the research papers, industrial presentations and invited papers, the conference program included four workshops, three short tutorials, and one panel discussion. Workshop Co-chairs, Yahiko Kambayashi and Hiroshi Arisawa, Tutorial Chair, Katsumi Tanaka, and Panel Chair, Sudha Ram all deserve appreciation and recognition.

I would also like to express my special thanks to the other members of the ER 2001 organization team. Steering Committee member Stefano Spaccapietra was in charge of liaison. Hirotaka Sakai, Tok Wang Ling, David Embley, and Mokrane Bouzeghoub assisted us as coordinators. Ryosuke Hotaka made an important contribution to ER 2001 by obtaining support and cooperation from mainly Japanese corporations. Hiroshi Arisawa and Takashi Tomii (Local Arrangement Co-chairs), Kazumasa Yokota (Publicity Chair and Web Master), Michiko Kitagawa (Treasurer and Assistant to the PC Co-chair, H. Kunii), and Mana Nakayama (Registration Chair and Assistant to the Conference Chair, Y. Ishii) all worked hard and contributed to the success of the conference.

Finally, I would like to express my appreciation to Yokohama National University and its President, Dr. Hiroshi Itagaki, for the special support and cooperation.

November 2001

Yoshioki Ishii

## Message from the Program Chairs

In this, the first year of the 21st century, the series of International Conferences on Conceptual Modeling (known in short as ER conferences) reached its 20th edition. Continuing a long tradition, the 20th International Conference on Conceptual Modeling (ER 2001) provided an international forum for presenting and discussing current research and applications with the common interest of conceptual modeling.

Our emphasis this year was on internet-based information modeling and systems. Remarkable progress in computers and networking has changed our way of doing business as well as our personal living environment. Business practices are being forced to dramatically evolve to face challenges from worldwide competition, where information and information services play a key role. Individuals are learning to move in a world of over-abundant information, where everything is available to everyone but difficult to find. In both cases conceptual modeling provides a path to semantically rich and meaningful information exchange and thus plays an essential role, particularly in supporting the internet-based information revolution.

ER 2001 covered a wide spectrum of conceptual modeling, from theoretical foundations to implementation. We invited researchers and practitioners from both computer sciences and management information systems to present and share their advances: new ideas and new approaches as well as fruitful experiences and informative experiments.

Acceptance into the conference proceedings was very competitive this year. We received 197 submissions all together. The program committee selected 39 regular papers out of 182 – an acceptance rate of approximately 21%, and 6 industrial presentations out of 15 – an acceptance rate of 40%.

In addition, we were indeed honored to include three very distinguished Keynote Speakers whose abstracts and papers present trends in emerging technologies. Dennis Tsichritzis, an outstanding leader in the field, spoke to us on “The Role of Research in the New Economy.” Umeshwar Dayal, a distinguished researcher, presented “Conceptual Modeling for Collaborative E-Business Processes.” Our third speaker was the father of i-mode, Kei-ichi Enoki, who jump-started the success of the mobile internet business.

The conference would not have been a success without the help of the many volunteers who worked hard to make this conference a success. First, we thank the members of the Technical Program Committee and the external reviewers for their countless hours reviewing the papers. Katsumi Tanaka and Sudha Ram organized a very interesting tutorial program, and timely panel, respectively. Yahiko Kambayashi and Hiroshi Arisawa did a wonderful job bringing together four outstanding workshops on emerging topics. The next debt of thanks goes to Kohki Ohhira and Ricoh Co., Ltd., for maintaining the online reviewing software and hosting the site that handled the submission, distribution, and review of the papers. The software was originally developed for ER 2000 at Salt Lake City by Stephen Liddle who also provided us with valuable advice. We extend very sincere thanks to the members of the Software Research Center of Ricoh

Co., Ltd., including Masumi Narita, Phyllis Anwyl, and Masayuki Kameda for their assistance with Program Committee activities. Finally, we are extremely indebted to Michiko Kitagawa for her devotion to the administrative support at all stages of the conference.

We hope that you found ER2001 to be stimulating, interesting, and informative.

November 2001

Hideko S. Kunii, Sushil Jajodia, and Arne Sølvberg

## **Tutorials**

### **Modeling B2B Integration**

Christoph Bussler (Oracle Corporation, U.S.A.)

### **Knowledge Management for E-business**

Larry Kerschberg (George Mason University, U.S.A.)

## **Workshops**

### **HUMACS 2001**

International Workshop on Conceptual Modeling of Human/Organizational/Social Aspects of Manufacturing Activities

General Chair: Hiroshi Arisawa

### **DASWIS 2001**

International Workshop on Data Semantics in Web Information Systems

General Chair: Vijay Kumar

### **eCOMO 2001**

Conceptual Modeling Approaches for E-business

General Chair: Heinrich C. Mayr

### **DAMA International Workshop**

Global Data Modeling in the New Millennium

General Chair Committee: Michael Brackett and Ingrid Batiste Hunt



# **ER 2001 Conference Organization**

## **Conference Chair**

Yoshioki Ishii (Beacon IT Inc.)

## **Program Co-chairs**

Hideko S. Kunii (Ricoh Co., Ltd.)

Arne Sølvsberg (Norwegian University of Science and Technology)

Sushil Jajodia (George Mason University)

## **Organization Supporters' Committee Chair**

Ryosuke Hotaka (Tokyo University of Technology)

## **Steering Committee Liaison**

Stefano Spaccapietra (Swiss Federal Institute of Technology, Lausanne)

## **Coordinators**

**Japan:** Hirotaka Sakai (Chuo University)

**Asia:** Tok Wang Ling (National University of Singapore)

**Europe:** Mokrane Bouzeghoub (University of Versailles)

**U.S.A.:** David W. Embley (Brigham Young University)

## **Tutorial Chair**

Katsumi Tanaka (Kyoto University)

## **Workshop Co-chairs**

Yahiko Kambayashi (Kyoto University)

Hiroshi Arisawa (Yokohama National University)

## **Panel Chair**

Sudha Ram (University of Arizona)

## **Publicity Chair/Web Master**

Kazumasa Yokota (Okayama Prefectural University)

## **Local Arrangements Co-chairs**

Hiroshi Arisawa (Yokohama National University)

Takashi Tomii (Yokohama National University)

## **Treasurer**

Michiko Kitagawa (Ricoh Co., Ltd.)

## **Registration Chair**

Mana Nakayama (Beacon IT Inc.)

## Sponsorship

Sponsored by:

- Yokohama National University
- Information Processing Society of Japan (IPSJ)
- ER Institute (ER Steering Committee)

In cooperation with:

- ACM, ACM SIGMOD, and ACM SIGMOD Japan
- The Institute of Electronics, Information and Communication Engineers (IEICE)
- Consortium for Business Object Promotion (CBOP)
- IMS Promotion Center, Manufacturing Science and Technology Center
- DAMA International

Corporate Sponsors:

- Ascential Software K.K.
- Beacon IT Inc.
- Microsoft Company, Ltd.
- Oracle Corporation Japan
- Ricoh Company, Ltd.

## Program Committee

Gail-Joon Ahn, U.S.A.  
Vijay Atluri, U.S.A.  
Claudio Bettini, Italy  
Terje Brasethvik, Norway  
KJ Byeon, Korea  
Sang K. Cha, Korea  
Chin-Chen Chang, Taiwan  
Arbee L.P. Chen, Taiwan  
Roger Chiang, U.S.A.  
Wesley Chu, U.S.A.  
Panos Constantopoulos, Greece  
Umeshwar Dayal, U.S.A.  
Jan Dietz, The Netherlands  
Johann Eder, Austria  
Ramez Elmasri, U.S.A.  
Tetsuya Furukawa, Japan  
Joe Giordano, U.S.A.  
Terry Halpin, U.S.A.  
Shuji Harashima, Japan  
Sumi Helal, U.S.A.  
Teruhisa Hochin, Japan  
Hiroshi Ishikawa, Japan  
Matthias Jarke, Germany  
Christian S. Jensen, Denmark  
Manfred Jeusfeld, The Netherlands  
Paul Johannesson, Sweden  
Yahiko Kambayashi, Japan  
Hannu Kangassalo, Finland  
Hirofumi Katsuno, Japan  
Hiroyuki Kitagawa, Japan  
Yasushi Kiyoki, Japan  
Michiharu Kudo, Japan  
Takeo Kunishima, Japan  
Alberto Laender, Brazil  
Byung Suk Lee, U.S.A.  
Chiang Lee, Taiwan  
Dik Lun Lee, Hong Kong  
Mong Li Lee, Singapore  
Sukho Lee, Korea  
Yoon-Joon Lee, Korea  
Michel Leonard, Switzerland  
Qing Li, China

Stephen Liddle, U.S.A  
Tok Wang Ling, Singapore  
Peng Liu, U.S.A.  
Leszek A. Maciaszek, Australia  
A. K. Majumdar, India  
Luigi Mancini, Italy  
Salvatore March, U.S.A.  
Yoshifumi Masunaga, Japan  
Peter McBrien, UK  
Vojislav B Misic, Hong Kong  
Rokia Missaoui, Canada  
Renate Motschnig, Austria  
Ravi Mukkamala, U.S.A.  
John Mylopoulos, Canada  
Antoni Olive, Spain  
Maria E. Orłowska, Australia  
Brajendra Panda, U.S.A.  
Oscar Pastor, Spain  
Barbara Pernici, Italy  
Sudha Ram, U.S.A.  
Collette Rolland, France  
Pierangela Samarati, Italy  
Sumit Sarkar, U.S.A.  
Gunter Schlageter, Germany  
Peretz Shoval, Israel  
Keng Siau, U.S.A.  
Ken Smith, U.S.A.  
Il-Yeol Song, U.S.A.  
Ju-Won Song, Korea  
Veda Storey, U.S.A.  
Wonhee Sull, Korea  
Keishi Tajima, Japan  
Bernhard Thalheim, Germany  
Ramesh Venkataraman, U.S.A.  
Yair Wand, Canada  
X. Sean Wang, U.S.A.  
Kyu-Young Whang, Korea  
Roel Wieringa, The Netherlands  
Alec Yasinsac, U.S.A.  
Yelena Yesha, U.S.A.  
Masatoshi Yoshikawa, Japan

## External Referees

Toshiyuki Amagasa  
Mordechai Ban-Menachem  
Maria Bergholtz  
Thomas Berkel  
Anke Biedebach  
Birgit Bomsdorf  
Nicolo Cesa-Bianchi  
Shermann Chan  
Chao-Chun Chen  
Sophie Chessa-Dupuy  
Dickson K.W. Chiu  
Vassilis Christophides  
Cecil Chua  
Ajantha Dahanayake  
Pascal van Eck  
Joerg Evermann  
Leonidas Fegaras  
Birgit Feldmann  
C.W. Fung  
Ehud Gudes  
Jon Atle Gulla  
Rakesh Gupta  
Hyoil Han  
Kenji Hatano  
Bart-Jan Hommes  
Jia-Lien Hsu  
Eenjun Hwang  
Atsushi Iizawa  
Satosi Imago  
Marta Indulska  
Hiromu Ishii  
Yoshiharu Ishikawa  
Katsumi Kanasaki  
Kaoru Katayama  
Akinori Kawachi  
Goshima Kazumasa  
Chih-Horng Ke  
Vijay Khatri  
Hyoung Do Kim  
Christian Koncilia  
Yongsik Kwon  
Frank Laskowski  
Dongwon Lee  
Guanling Lee

Jong-Hyun Lee  
Ryong Lee  
Huagang Li  
Xiaobai Li  
Edgar Chia-Han Lin  
Youzhong Liu  
Zhenyu Liu  
Akira Maeda  
Oscar Mangisengi  
Inderjeet Mani  
Wenlei Mao  
Jie Meng  
Bongki Moon  
Atsuyuki Morishima  
Ralf Muhlberger  
Makoto Murata  
Eng Koon Sze  
Dorit Nevo  
Selmin Nurcan  
Ying-Lie O  
Leo Obrst  
Manabu Ohta  
Chang Il Park  
Jangho Park  
Amir Parssian  
Torben Bach Pedersen  
Vicente Pelechano  
Dieter Pfoser  
Dimitris Plexousakis  
Ivan S. Radev  
Young Ryu  
Shazia Sadiq  
Karsten Schulz  
Yipeng Shen  
Michael E. Shin  
Norihide Shinagawa  
Altigran Soares da Silva  
Paulo Pinheiro da Silva  
Giedrius Slivinskas  
Martin Steeg  
Erlend Tosebro  
Pit Koon Teo  
Manos Theodorakis  
Nectaria Tryfona

Yannis Tzitzikas  
Naohiko Uramoto  
Petko Valtchev  
Sabrina De Capitani di Vimercati  
Yi-Hung Wu  
Jianliang Xu  
Yohei Yamamoto

Michiko Yasukawa  
Kuo-Her Yen  
Manen Ying  
Yusuke Yokota  
Baihua Zheng  
Xiaofang Zhou











