

Lecture Notes in Computer Science

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

1377

Hans-Jörg Schek Felix Saltor
Isidro Ramos Gustavo Alonso (Eds.)

Advances in Database Technology – EDBT'98

6th International Conference
on Extending Database Technology
Valencia, Spain, March 23-27, 1998
Proceedings



Springer

Series Editors

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

Volume Editors

Hans-Jörg Schek
Gustavo Alonso
ETH Zürich, Institute of Information Systems, ETH Zentrum
CH-8092 Zürich, Switzerland
E-mail: {schek,alonso}@inf.ethz.ch

Felix Saltor
Universitat Politècnica de Catalunya
Departament de Llengües i Sistemes Informàtics
UPC Campus Nord, Dept. LSI, C5/C6
Jordi Girona Salgado, 1-3, E-08034 Barcelona, Catalonia, Spain
E-mail: saltor@lsi.upc.es

Isidro Ramos
Departamento de Sistema Informáticos y Computación
Universidad Politècnica de València
Camino de Vera s/n, Apdo. 22.012, E-46020 València, Spain
E-mail: iramos@dsic.upv.es

Cataloging-in-Publication data applied for

Die Deutsche Bibliothek - CIP-Einheitsaufnahme

Advances in database technology : proceedings / EDBT '98, 6th
International Conference on Extending Database Technology,
Valencia, Spain, March 23 - 27, 1998. Hans-Jörg Schek ... (ed.). -
Berlin ; Heidelberg ; New York ; Barcelona ; Budapest ; Hong Kong
; London ; Milan ; Paris ; Santa Clara ; Singapore ; Tokyo : Springer,
1998
(Lecture notes in computer science ; Vol. 1377)
ISBN 3-540-64264-1

CR Subject Classification (1991): H.2, H.4, H.3, H.5, I.2.5, D.2

ISSN 0302-9743

ISBN 3-540-64264-1 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 1998
Printed in Germany

Typesetting: Camera-ready by author
SPIN 10631950 06/3142 - 5 4 3 2 1 0 Printed on acid-free paper

Foreword

The sixth international conference on Extending Data Base Technology, EDBT 98, took place in Valencia, Spain, between the 23rd and 27th of March 1998. Following a ten-year tradition of excellence, this sixth edition repeated the success of its predecessors: Venice in 1988, Venice again in 1990, Vienna in 1992, Cambridge in 1994, and Avignon in 1996. Firmly established as one of the leading forums in the database community, EDBT 98 has attracted 191 submissions worldwide. Of these, the Program Committee selected 32 papers which largely reflect the main trends in database research: data warehousing and the Internet, with a clear shift in focus from the database itself to the applications and uses of databases in complex environments. Databases seem, thus, to have reached a level of maturity which warrants their use as key building blocks of future information systems. Their functionality and characteristics are no longer the exclusive province of database researchers but a source of ideas, inspiration, and solutions to many in all areas of computer science. This edition of EDBT shows a thriving and fascinating world that, far from being in crisis, has become a crucial component of today's technological endeavors.

The program of the conference was organized around the scientific papers, with sessions ranging from similarity search and indexing to scientific databases, including, of course, the ubiquitous data warehousing, data mining, and Web databases. A keynote talk was given by Gerhard Weikum on issues of quality guarantees in information services. A panel, organized by Keith Jefferey with contributions by Stefano Ceri, Joachim Schmidt, Hans-Jörg Schek, and Andrea Servida, discussed the role of database technology in global information systems and its emphasis within the European Union's 5th Framework Programme for Research. The program was further augmented with six tutorials by F. Matthes (SAP R/3), S. Conrad and G. Saake (heterogeneous databases), F. Leymann (workflow management), C. Mohan (transaction processing), J. Chomicki and D. Toman (temporal databases), and S. Chaudhuri and U. Dayal (data warehousing and mining). In addition, for the first time in EDBT, the conference was complemented with two workshops: the Web and databases, and workflow management systems, organized by Paolo Atzeni and Omran Bukhres respectively.

A conference like EDBT requires the efforts of many people and it would take much more than the space available here to thank all of them. We appreciate the efforts of A. Olive in organizing the tutorials, O. Pastor for the workshops, K. Jefferey for the panel, A. de Miguel for the industrial sessions, and J.H. Canós for the demonstrations. We are also grateful to all the program committee members, and to all additional referees for their help and commitment. Special thanks also to the organization committee and the sponsors. Last but not least, we thank the publisher, Springer-Verlag, represented by Alfred Hofmann, for the smooth cooperation and for their efforts in making the contents of these proceedings available online.

Valencia/Zürich, March 1998

Hans-Jörg Schek, Felix Saltor,
Isidro Ramos, Gustavo Alonso

Sponsorship

Promoted by the EDBT Foundation in cooperation with the VLDB endowment

Sponsored by

Universitat Politecnica de Valencia
 Generalitat Valenciana
 Ajuntament de Valencia
 The EDBT Foundation
 ETH Zurich
 Oracle
 Sybase
 Softlab
 Iberia

Conference Organization

Conference Chairperson: Felix Saltor (Universitat Politecnica de Catalunya)
 Program Committee Chairperson: Hans-Jörg Schek (ETH Zurich)
 Executive Committee Chair: Isidro Ramos (Universitat Politecnica de Valencia)
 Tutorials Chair: Antoni Olive (Universitat Politecnica de Catalunya)
 Panels Chair: Keith Jeffery (Rutherford Appleton Laboratory, CLRC)
 Industrial Program Chair: Adoracion de Miguel (Universidad Carlos III)
 Demonstrations Chair: Jose Hilario Canos (Universitat Politecnica de Valencia)
 Program Committee Coordinator: Gustavo Alonso (ETH Zurich)
 Social Events Chair: Matilde Celma (Universitat Politecnica de Valencia)
 Demo Session Coordinator: Jose Angel Carsi (Universitat Politecnica de Valencia)

Local Organization Committee

M. Angeles Pastor (Spain)	Jose Hilario Canos (Spain)
Laura Mota (Spain)	Oscar Pastor (Spain)
Juan Carlos Casamayor (Spain)	M. Carmen Penades (Spain)

EDBT Foundation Executive Committee

Paolo Atzeni (Italy)	Michele Missikoff (Italy)
Stefano Ceri (Italy)	Joachim W. Schmidt (Germany)
Keith Jeffery (United Kingdom)	

Program Committee

Rakesh Agrawal	(USA)	David B. Lomet	(USA)
Gustavo Alonso	(Switzerland)	Jean-Claude Mamou	(France)
Daniel Barbara	(USA)	Michele Missikoff	(Italy)
Catriel Beeri	(Israel)	Ron Morrison	(United Kingdom)
Anthony J. Bonner	(Canada)	Shojiro Nishio	(Japan)
Marcos Borges	(Brazil)	Antoni Olive	(Spain)
Matilde Celma	(Spain)	Beng Chin Ooi	(Singapore)
Stefano Ceri	(Italy)	Fausto Rabitti	(Italy)
Sophie Cluet	(France)	Erhard Rahm	(Germany)
Oscar Diaz	(Spain)	Raghu Ramakrishnan	(USA)
Klaus R. Dittrich	(Switzerland)	Peter Schäuble	(Switzerland)
Asuman Dogac	(Turkey)	Joachim W. Schmidt	(Germany)
Amr El Abbadi	(USA)	Marc H. Scholl	(Germany)
Christos Faloutsos	(USA)	Michel Scholl	(France)
Dimitrios Georgakopoulos	(USA)	Michael Schrefl	(Austria)
Carole Goble	(United Kingdom)	Timos Sellis	(Greece)
Stephane Grumbach	(France)	Amit Sheth	(USA)
Ralf Hartmut Güting	(Germany)	Eric Simon	(France)
Tomasz Imielinski	(USA)	V. S. Subrahmanian	(USA)
H. V. Jagadish	(USA)	Letizia Tanca	(Italy)
Christian S. Jensen	(Denmark)	Peter Triantafillou	(Greece)
Alfons Kemper	(Germany)	Keith van Rijsbergen	(United Kingdom)
Martin L. Kersten	(The Netherlands)	Gottfried Vossen	(Germany)
Masaru Kitsuregawa	(Japan)	Stanley Zdonik	(USA)
Georg Lausen	(Germany)	Pavel Zezula	(Czech Republic)
Frank Leymann	(Germany)		

Additional Referees

Abiteboul, S.	Geppert, A.	Mueller, R.	Schuster, H.
Amann, B.	Gluche, D.	Märtens, H.	Schwarz, P.
Amato, G.	Goh, C.H.	Müller, R.	Schönhoff, M.
Anyanwu, K.	Gokkoca, E.	Nakano, M.	Sebastiani, F.
Araujo, R.	Gottlob	Nemoto, T.	Sehring, H.W.
Arpinar, S.	Grandi, F.	Nes, N.	Shafer, J.
Arpinar, B.	Grust, T.	Niederee, C.	Shah, K.
Baader, F.	Gunopulos, D.	Norrie, M.	Shibata, H.
Bechhofer, S.	Hagen, C.	Obermair, W.	Shintani, T.
Behm, A.	Han, Y.	Ohmori, T.	Shirai, H.
Berchtold, S.	Hara, T.	Papadopoulos, A.	Siebes, A.
Biskup, J.	Heuer	Paraboschi, S.	Simeon, J.
Boehlen, M.	Holliday, J.	Pastor, M.A.	Spaccapietra, S.
Bonatti, P.A.	Jonscher, D.	Pastor, O.	Spyratos, N.
Bouganim, L.	Kandzia, P.-T.	Patella, M.	Srikant, R.
Budiarto	Karagoz, P.	Paton, N.	Stanoi, I.
Cabibbo, L.	Kemme, B.	Pizzicannella, R.	Strässler, M.
Canós, J.H.	Kirby, G.	Posenato, R.	Tan, K.-L.
Casamayor, J.C.	Kradolfer, M.	Prabhakar, S.	Tatbul, N.
Chan, D.	Lalmas, M.	Preuner, G.	Teniente, E.
Ciaccia, P.	Larson, P.	Prueckler, T.	Theodoratos, D.
Cicekli, N.K.	Laurent, D.	Psaila, G.	Tombros, D.
Cichocki, A.	Lechtenboerger, J.	Quak, W.	Torlone, R.
Cingil, I.	Ligoudistianos, S.	Ramos, I.	Toroslu, I.H.
Comai, S.	Lopistéguy, P.	Riedel, H.	Torp, K.
Damiani, E.	Ludaescher, B.	Rudloff, A.	Ulusoy, O.
Dolin, R.	Luo, Z.	Rump, N.	Urpi, T.
Domenig, R.	Machado, M.L.	Saake, G.	Vassiliadis, P.
Ehmayer, G.	Mainetto, G.	Sampaio, P.	Virmani, A.
Erwig, M.	Manegold, S.	dos Santos, C.S.	Waas, F.
Fabret, F.	Manolopoulos, Y.	Sarawagi, S.	Weske, M.
Fauvet, M.-C.	Manthey, R.	Savino, P.	Wimmers, E.
Fayyad, U.	Meduna, A.	Schlegelmilch	Wu, D.
Formica, A.	Meghini, C.	Schneider, M.	
Fraternali, P.	Mogi, K.	Scholl, P.-C.	
Freitag, B.	Mohania, M.	Schoop, D.	
Geffner, S.	Monro, D.	Schroeder, G.	

Table of Contents

Keynote Talk

On the Ubiquity of Information Services and the Absence of Guaranteed Service Quality

Gerhard Weikum (University of the Saarland, Saarbrücken, Germany) 3

Similarity Search and Indexing

Processing Complex Similarity Queries with Distance-Based Access Methods

P. Ciaccia, M. Patella (Univ. of Bologna, Italy)

P. Zezula (IEI-CNR Pisa, Italy) 9

HySpirit - A Probabilistic Inference Engine for Hypermedia Retrieval in Large Databases

N. Fuhr, T. Rölleke (Univ. of Dortmund, Germany) 24

Towards Optimal Indexing for Segment Databases

E. Bertino, B. Catania (Univ. di Milano, Italy)

B. Shidlovsky (Rank Xerox Research Center, France) 39

Query Optimisation in the Web

Fusion Queries over Internet Databases

R. Yerneni (Stanford University, USA)

Y. Papakonstantinou (Univ. of California, San Diego, USA)

S. Abiteboul (INRIA, France)

H. Garcia-Molina (Stanford University, USA) 57

Efficient Queries over Web Views

G. Mecca (Univ. di Basilicata, Italy)

A. O. Mendelzon (Univ. of Toronto, Canada)

P. Merialdo (Univ. di Roma Tre, Italy) 72

Equal Time for Data on the Internet with WebSemantics

G.A. Mihaila (Univ. Toronto, Canada)

L. Raschid (Univ. Maryland, USA)

A. Tomasic (INRIA, France) 87

Algorithms for Data Mining

- Pincer Search: A New Algorithm for Discovering the Maximum Frequent Set*
D.-I. Lin, Z.M. Kedem (New York University, USA) 105
- Multivariate and Multidimensional OLAP*
S.-C. Shao (Fo-Kuan University, Taiwan) 120
- Incremental Generalization for Mining in a Data Warehousing Environment*
M. Ester, R. Wittmann (Univ. of Munich, Germany) 135

Modelling in OLAP

- Modeling Large Scale OLAP Scenarios*
W. Lehner (Univ. Erlangen-Nürnberg, Germany) 153
- Discovery-Driven Exploration of OLAP Data Cubes*
S. Sarawagi, R. Agrawal, N. Megiddo
(IBM Almaden Research Center, USA) 168
- A Logical Approach to Multidimensional Databases*
L. Cabibbo, R. Torlone (Univ. di Roma Tre, Italy) 183

Query Processing and Storage Management

- Efficient Dynamic Programming Algorithms for Ordering Expensive Joins and Selections*
W. Scheufele, G. Moerkotte (Univ. Mannheim, Germany) 201
- Improving the Query Performance of High-Dimensional Index Structures by Bulk Load Operations*
S. Berchtold (AT&T Labs – Research, USA)
C. Böhm, H.-P. Kriegel (Univ. of Munich, Germany) 216
- An Evaluation of Alternative Disk Scheduling Techniques in Support of Variable Bit Rate Continuous Media*
J.A. Al-Marri, S. Ghandeharizadeh (Univ. of Southern California, USA) 231

<i>Buffer Management in Distributed Database Systems: A Data Mining-Based Approach</i>	
L. Feng (Hong Kong Polytechnic Univ., Hong Kong)	
H. Lu, Y.C. Tay, K.H. Tung (Nat. Univ. of Singapore, Singapore)	246

Aggregation and Summary Data

<i>Complex Aggregation at Multiple Granularities</i>	
K.A. Ross (Columbia Univ., USA)	
D. Srivastava (AT&T Labs – Research, USA)	
D. Chatziantoniou (Stevens Inst. of Technology, Hoboken, USA)	263
<i>Parallel Processing of Multiple Aggregate Queries on Shared-Nothing Multiprocessors</i>	
T. Fukuda, H. Matsuzawa (IBM Tokyo Research Laboratory, Japan)	278
<i>Minimizing Detail Data in Data Warehouses</i>	
M. O. Akinde, O. G. Jensen, M. H. Böhlen (Aalborg University, Denmark)	293

Object-Oriented and Active Databases

<i>Static Management of Integrity in Object-Oriented Databases: Design and Implementation</i>	
V. Benzaken, X. Schaefer (C.R.I., Univ. de Paris I, France)	311
<i>OCB: A Generic Benchmark to Evaluate the Performances of Object-Oriented Database Systems</i>	
J. Darmont, B. Petit, M. Schneider (Univ. Blaise Pascal, Clermont-Ferrand II, France)	326
<i>A Path Removing Technique for Detecting Trigger Termination</i>	
S.-Y. Lee , T.-W. Ling (Nat. Univ. of Singapore, Singapore)	341

View Maintenance and Integrity

<i>The CVS Algorithm for View Synchronization in Evolvable Large-Scale Information Systems</i>	
A. Nica, A.J. Lee (Univ. of Michigan, USA)	
E.A. Rundensteiner (Worcester Polytechnic Institute, USA)	359

Integration of Incremental View Maintenance into Query Optimizers
D. Vista (AT&T Labs – Research, USA) 374

Maintaining Temporal Views Over Non-temporal Information Sources for Data Warehousing
J. Yang, J. Widom (Stanford Univ., USA) 389

Referential Actions: From Logical Semantics to Implementation
B. Ludäscher, W. May (Univ. Freiburg, Germany) 404

Databases and the Web

A Conceptual Model and a Tool Environment for Developing More Scalable, Dynamic, and Customizable Web Applications
P. Fraternali, P. Paolini (Politecnico di Milano, Italy) 421

Design and Maintenance of Data-Intensive Web Sites
P. Atzeni (Univ. di Roma Tre, Italy)
G. Mecca (Univ. della Basilicata, Italy)
P. Merialdo (Univ. di Roma Tre, Italy) 436

Dynamic and Structured Presentation of Database Contents on the Web
M. Toyama, T. Nagafuji (Keio University, Yokohama, Japan) 451

Workflow and Scientific Databases

Mining Process Models from Workflow Logs
R. Agrawal, D. Gunopulos (IBM Almaden Research Center, USA)
F. Leymann (IBM German Software Development Lab, Germany) 469

A Scheme to Specify and Implement Ad-Hoc Recovery in Workflow Systems
J. Tang (Memorial University of Newfoundland, Canada)
S.-Y. Hwang (National Sun Yat-Sen University, Taiwan) 484

Exploring Heterogeneous Biological Databases: Tools and Applications
A.S. Kosky, I-M.A. Chen, V.M. Markowitz, E. Szeto (Gene Logic Inc., USA) 499

Index of Authors 515