Preface

The Database and Expert Systems Applications (DEXA) conference is thought as a platform for the exchange of ideas, experiences, and opinions among theoreticians and practitioners and for defining requirements for future systems in the areas of database and AI-technologies.

The scope of the papers covers the most recent and relevant topics in the field of database and AI-systems. The sessions are primarily devoted to object-oriented databases, object-oriented modelling, parallel and distributed systems, information retrieval, extended relational databases, expert and knowledge based systems, physical aspects, theoretical aspects, and advanced applications. This volume contains 77 papers selected by the programme committee from a total of nearly 200 submissions.

DEXA 96 is the 7th annual scientific platform on Database and Expert Systems Applications following those in Vienna, Berlin, Valencia, Prague, Athens, and London. This year DEXA takes place at the University of Zurich in Switzerland.

We would like to express our thanks to all institutions actively supporting this event, namely to:
- University of Zurich
- DEXA-Association
- Swiss Informaticians Society
- Austrian Computer Society
- GI (German Computer Society)
- Research Institute for Applied Knowledge Processing (FAW)

Several people spent numerous hours organizing DEXA. The names of most of them will appear on the following pages.

Special thanks to T. Barothy, T. Gaugler, L. Kündig, S. Teufel (University of Zurich), M. Neubauer (University of Linz), R. Löw (Technical University of Vienna), I. Tjoa (FAW Linz), and G. Wagner (FAW Linz). Many thanks to all members of the programme committee and others who have reviewed very carefully the submitted papers. Our special thanks are dedicated to Prof. Dr. Kurt Bauknecht for his continuous help and expertise as general chairperson of DEXA 96.

July 1996

Roland R. Wagner (PC-Chair)
FAW, University of Linz, Austria

Helmut Thoma (PC-Chair)
CIBA Geigy, Switzerland
Conference Committee

General Chairperson:
K. Bauknecht, University of Zurich, Switzerland

Programme Chairpersons:
R.R. Wagner, FAW, University of Linz, Austria
C.H. Thoma, SI, Switzerland

Panel Chairperson:
A M. Tjoa, Technical University of Vienna, Austria

Programme Committee Members:
H. Afsarmanesh, University of Amsterdam, The Netherlands
H.J. Appelrath, University of Oldenburg, Germany
T. Bench-Capon, University of Liverpool, UK
B. Bhargava, Purdue University, USA
J. Bing, NRCCL Oslo, Norway
W.S. Cellary, Technical University of Poznan, Poland
S. Christodoulakis, University of Crete, Greece
B. Croft, University of Massachusetts, USA
J. Debenham, University of Technology, Sydney, Australia
S.M. Deen, Keele University, UK
P. Drazan, RIKS Maastricht, The Netherlands
E. Deder, University of Klagenfurt, Austria
T. Eiter, Technical University of Vienna, Austria
A.L. Furtado, University of Rio de Janeiro, Brazil
G. Gardarin, INRIA, France
C.A. Goble, University of Manchester, UK
F. Golshani, Arizona State University, USA
G. Gottlob, Technical University of Vienna, Austria
A. Hameurlain, University of Toulouse, France
I. Hawryszkiewycz, University of Technology, Sydney, Australia
D. Hsiao, Naval Postgraduate School, USA
M. Jarke, University of Aachen, Germany
K.G. Jeffrey, Rutherford Appleton Laboratories, UK
Y. Kambayashi, IMEEL, Japan
M. Kamel, Naval Postgraduate School, USA
N. Kamel, City University of Hong Kong, Hong Kong
G. Kappel, University of Linz, Austria
D. Karagiannis, University of Vienna, Austria
M.A. Ketabchi, Santa Clara University, USA
E.P. Klement, University of Linz, Austria
P. Kroha, Technical University of Chemnitz, Germany
J. Lazansky, Czech Technical University, Czech Republic
T.W. Ling, University of Singapore, Singapore
V. Lum, Chinese University of Hong Kong, Hong Kong
V. Marik, Czech Technical University, Czech Republic
G. Müller, University of Freiburg, Germany
M. Murphy, San Francisco State University, USA
M.-A. Neimat, HP Laboratories, USA
E. Neuhold, GMD-IPSI, Germany
G. Ozsoyoglu, University Case Western Research, USA
G. Pangalos, University of Thessaloniki, Greece
M. Papazoglou, Queensland University of Technology, Australia
G. Quirchmayr, University of Vienna, Austria
I. Ramos, Technical University of Valencia, Spain
N. Revell, Middlesex University, UK
C. Rolland, University Paris I, France
N. Roussopoulos, University of Maryland, USA
A. Sernadas, University of Lisbon, Portugal
J.C. Smith, University of British Columbia, Canada
H. Sonnberger, European University, Italy
D. Specht, University of Cottbus, Germany
R. Studer, University of Karlsruhe, Germany
M. Takizawa, Tokyo Denki University, Japan
K. Tanaka, Kobe University, Japan
S. Teufel, University of Zurich, Switzerland
C. Thanos, IEI-CNR, Italy
H.W. Thimbleby, Middlesex University, UK
A M. Tjoa, Technical University of Vienna, Austria
R. Traunmüller, University of Linz
K. Vidyasankar, Memorial Univ. of Newfoundland, Canada
V. Wietrzyk, Macquarie University, Australia

Organizing Committee:

T. Barothy, University of Zurich, Switzerland
T. Gaugler, University of Zurich, Switzerland
L. Kündig, University of Zurich, Switzerland
S. Teufel, University of Zurich, Switzerland
G. Wagner, FAW, University of Linz, Austria
Table of Contents

Object-Oriented Databases 1

Using Multiversion Object-Oriented Databases in CAD/CIM Systems
Rykowski J., Cellary W.; Poland ................................................................. 1

Building Inheritance Graphs in Object Database Design
Yahia A., Lakhal L., Cicchetti R.; France .................................................... 11

An Object Oriented Methodological Approach for Making Automated
Prototyping Feasible
Pastor O., Pelechano V., Bonet B., Ramos I.; Spain ..................................... 29

Advanced Database and Information Systems Methods 1

A Color-Based Technique for Measuring Visible Loss for Use in Image Data
Communication
Annamalai M., Sundaram A., Bhargava B.; USA ......................................... 39

Establishing Arc Consistency for Multiple Database Views
Battle S.; United Kingdom ........................................................................... 49

Using a Query Language to State Consistency Constraints for Repositories
Henrich A., Düberitz D.; Germany ............................................................. 59

Active and Temporal Aspects 1

Case Studies on Active Database Applications
Appelrath H.-J., Behrends H., Jasper H., Zukunft O.; Germany ...................... 69

Temporal Support for Geo-Data in Object-Oriented Databases
Becker L., Voigtmann A., Hinrichs K.H.; Germany ..................................... 79

Deriving Active Rules for Workflow Enactment
Casati F., Ceri S., Pernici B., Pozzi G.; Italy ............................................... 94

Transactions and Concurrency Concepts

Employing Object-Based LSNs in a Recovery Strategy
de Ferreira Rezende F., Baier T.; Germany ............................................... 116

Scheduling Adaptive Transactions in Real-Time Databases
Doğdu E.; USA ...................................................................................... 130
Applying Similarity in Concurrency Control for Real-Time Database Application
Lam K.-Y., Yau W.-C., Lee V.C.S.; Hong Kong ...................................................... 143

Object-Oriented Databases 2
View Maintenance in Object-Oriented Databases
Alhajj R., Polat F.; Turkey ...................................................................................... 153

Object-Orientation Based on Semantic Transformations
Bakker J.A.; The Netherlands ................................................................................. 163

Multimedia Scenes in a Database System
Djeraba C., Hadouda K.; France ........................................................................... 177

Advanced Database and Information Systems Methods 2
An Intelligent System for Integrating Autonomous Nomenclature Databases in Semantic Heterogeneity
Kitakami H., Mori Y., Arikawa M.; Japan .............................................................. 187

A Graph-Oriented Data Model
Lucarella D., Zanzi A.; Italy ................................................................................... 197

Controlled Decomposition Strategy for Complex Spatial Objects
Lee Y.-J., Lee D.-M., Ryu S.-J., Chung C.-W.; South Korea ................................... 207

Active and Temporal Aspects 2
The Complexity of Weak Unification of Bounded Simple Set Terms
Greco S., Mateis C., Spadafora E.; Italy ............................................................... 224

A Formal Approach for Horizontal Fragmentation in Distributed Deductive Database Design
Lim S.J., Ng Y.-K.; USA .......................................................................................... 234

Composite Events in NAOS
Collet C., Coupaye T.; France ................................................................................ 244

GENREG: A Historical Data Model Based on Event Graphs
Eaglestone B., Holton R., Rold L.; United Kingdom, Denmark .............................. 254

Relational and Extended Relational Approaches
Binary Integrity Constraints Against Confidentiality
Delannoy X.C., Del Vigna C.; France ................................................................. 264
Building Hypertext Interfaces to Existing Relational Databases
Papadopoulos A., Vaitis M., Christodoulakis D.; Greece .................................276

An Efficient Join for Nested Relational Databases
Liu H.-C., Chirathamjaree C.; Australia ......................................................289

Invited Talk
Parallel Relational Database Systems: Why, How and Beyond
Hameurlain A., Morvan F.; France .............................................................302

Object-Oriented Databases 3
Experiences in Object-Oriented Modeling of a Real Database Application
Görs J., Lisson K.-P., Linde-Görs H.-G.; Germany .................................313

Signatures of Complex Objects for Query Processing in OODB
Shin H., Chang J.; Korea ........................................................................323

Formal Specification, Object Oriented Design, and Implementation of an
Ephemeral Logger for Database Systems
Hennessey P., Ibrahim M.T., Fedorec A.M.; United Kingdom .................333

Advanced Database and Information System Methods 3
Cooperative Agents in DISCIM Environment
Mařík V., Štěpánková O., Flek O., Kout J.; Czech Republic ................356

Mining Type Schemes in Databases
Miura T., Shioya I.; Japan .......................................................................369

A Query Processing Method for Integrated Access to Multiple Databases
Nishizawa I., Takasu A., Adachi J.; Japan .................................................385

Active and Temporal Aspects 3
Situation Diagrams
Lang P., Obermair W., Schrefl M.; Austria .................................................400

Design, Implementation and Management of Rules in an Active Database System
Zimmermann J., Branding H., Buchmann A.P., Deutsch A., Geppert A.;
Germany, Switzerland ............................................................................422

OLAF: The GOAD Active Database Event/Rule Tracer
Thomas I.S., Jones A.C.; United Kingdom ..............................................436
CSCW and Work Flow Systems

Co-working and Management of Federated Information-Clusters
Wiedijk M., Afsarmanesh H., Hertzberger L.O.; The Netherlands ....................................446

Transaction-Based Application Integration in Workflow Management Systems
Giinthör R., Jablonski S.; Germany ..............................................................................456

Coping with Mismatched Semantics of Dependencies in Workflow Systems
Tang J., Hwang S.-Y.; Canada, Taiwan ......................................................................467

Object-Oriented Databases 4

The Design of an Integrated Information System
Wang B.; United Kingdom ..........................................................................................479

Query Optimization in the CROQUE Project
Heuer A., Kröger J.; Germany ......................................................................................489

A Process of Fuzzy Query on New Fuzzy Object Oriented Data Model
Na S., Park S.; Korea ....................................................................................................500

Advanced Database and Information System Methods 4

A Replication Schema to Support Weak Connectivity in Mobile Information Systems
Pitoura E.; Greece ........................................................................................................510

Constraints and Composite Objects
Puig V., Oussalah C.; France ......................................................................................521

A System for the Management of Aggregate Data
Tininini L., Bezenchek A., Rafanelli M.; Italy ..............................................................531

Database Access in Mobile Environments
Heuer A., Lubinski A.; Germany ..................................................................................544

Theoretical Aspects 1

Counting-Based Normalization for Multiple Linear Recursions
Du X., Liu Z., Ishii N.; Japan ......................................................................................554

Partial Semantics for Disjunctive Deductive Databases
Eiter T., Leone N., Saccà D.; Austria, Italy .................................................................564

Optimizing Path Expressions Using Navigational Algebraic Operators
Tang Z.-H., Gardarin G., Smahi V.; France ..................................................................574
Object-Oriented Databases 5

Modeling Object Behavior: To Use Methods or Rules or Both?
Kappel G., Schrefl M.; Austria .......................................................... 584

The Object-Oriented Design of KROSS: An Object-Oriented Spatial Database System
Kim Y.H., Kim M.S., Kwon S.-H., Jeong C.-S.; Korea ......................... 603

Advanced Database and Information System Methods 5

Applying Language Engineering Techniques to the Question Support Facilities in VIENA Classroom
Winiwarter W., Kagawa O., Kambayashi Y.; Japan ............................. 613

Model of Mobile Objects
Yoshida T., Takizawa M.; Japan ......................................................... 623

Real-Time Transaction Scheduling in Database Systems
Wietrzyk V.I., Ramaswamy Y.; Australia ............................................ 633

Performance Evaluation of New Clustering Algorithm in Object-Oriented Database Systems
Wietrzyk V.I.; Australia ................................................................. 644

Theoretical Aspects 2

On the Computation of Disjunctive Stable Models
Leone N., Rullo P., Scarcello F.; Austria, Italy ................................. 654

An Algebra for a Temporal Object Data Model
Wang L., Wing M., Davis C., Revell N.; United Kingdom ................... 667

Parallel and Distributed Systems

Significant Checkpoint in Distributed System
Tanaka K., Higaki H., Takizawa M.; Japan ...................................... 678

An Architecture for Interoperation of Distributed Heterogeneous Database Systems
Wu X.; Germany ............................................................................ 688

Scheduling Queries for Parallel Execution on Multicomputer Database Management Systems
Lo Y.-L., Hua K.A., Tavanapong W.; USA ........................................ 698

Data Replication in a Distributed System: A Performance Study
Hwang S.-Y., Lee K.K.S., Chin Y.H.; Taiwan ................................. 708
Expert and Knowledge Based Systems 1

An Ontology for Linear Spatial Reasoning
Coenen F., Beattie B., Bench-Capon T.J.M., Shave M.J.R., Diaz B.M.; United Kingdom ................................................................. 718

Designing Knowledge-Based Systems for Optimal Performance
Debenham J., Devedžić V.; Australia, Yugoslavia ............................. 728

Match Algorithm for a Real Time Expert System
Tolety S.P., Garimella U., Bandreddi Middle P.E., Rana S.P.; USA, India ...... 738

Physical Aspects 1

On-line Reorganization of Data in Scalable Continuous Media Servers
Ghandeharizadeh S., Kim D.; USA ............................................................. 751

Recovery in Main Memory Database Systems
Kumar V.; USA ..................................................................................... 769

M-IVTT: An Index for Bitemporal Databases
Nascimento M.A., Dunham M.H., Elmasri R.; USA ................................. 779

Information Retrieval 1

Dictionary Methods for Cross-Lingual Information Retrieval
Ballesteros L., Croft B.; USA ................................................................. 791

Personalized Search Support for Networked Document Retrieval Using Link Inference
Berger F.C., van Bommel P.; The Netherlands .................................... 802

Using Conceptual Graphs in a Multifaceted Logical Model for Information Retrieval
Ounis I., Chevallet J.-P.; France .............................................................. 812

Expert and Knowledge Based Systems 2

Automatic Classification of Semantic Concepts in View Specifications
Ellmer E., Huemer C., Merkl D., Pernul G.; Austria, Germany ............... 824

A Generic Subsumption Testing Toolkit for Knowledge Base Queries
Staudt M., von Thadden K.; Germany .................................................. 834
Physical Aspects 2

Performance Evaluation of Tree-Based Structures
Tran N., Le D.P., Srinivasan B., Sier B.; Australia ................................................. 845

Global Page Replacement in Spatial Databases
Papadopoulos A., Manolopoulos Y.; Greece .......................................................... 855

On the Optimality of Degree of Declustering
Sheu S., Hua K.A., Cai Y.; USA .............................................................................. 865

Information Retrieval 2

Design and Evaluation of Signature File Organization Incorporating Vertical and
Horizontal Decomposition Schemes
Kitagawa H., Watanabe N., Ishikawa Y.; Japan ..................................................... 875

The Automatic Generation of Hypertext Links in Legal Documents
Schweighofer E., Scheithauer D.; Austria............................................................. 889

Query Processing and Optimization for Broadcast Database
Si A., Leong H.V.; Hong Kong ................................................................................ 899

Summary of the Development of DEXA

Developments in the Database and Expert Systems Applications Domain
Tjoa A. M., Wagner R.R.; Austria........................................................................... 915

Author Index ........................................................................................................ 919