

The VLDB Journal

The International Journal on Very Large Data Bases

Volume 3 Number 2

April 1994

Special Issue on Prototypes of Deductive Database Systems

Foreword by H.-J. Schek

Special Issue Editorial by K. Ramamohanarao

An Introduction to Deductive Database Languages
and Systems

107

K. Ramamohanarao and J. Harland

The Glue-Nail Deductive Database System:
Design, Implementation, and Evaluation

123

M.A. Derr, S. Morishita, and G. Phipps

The CORAL Deductive System

161

R. Ramakrishnan, D. Srivastava, S. Sudarshan,
and P. Seshadri

DECLARE and SDS: Early Efforts to Commercialize
Deductive Database Technology

211

W. Kießling, H. Schmidt, W. Strauß
and G. Dünzinger

The Aditi Deductive Database System

245

J. Vaghani, K. Ramamohanarao, D.B. Kemp, Z. Somogyi,
P.J. Stuckey, T.S. Leask, and J. Harland

Very
Large
Data
Bases

A Publication of the VLDB Endowment

The VLDB Journal

The International Journal on Very Large Data Bases

SCOPE AND PURPOSE

The Journal is a quarterly publication of the VLDB Endowment. As a database systems journal it is dedicated to the international publication of scholarly contributions to the advancement of information system architectures, the impact of emerging technologies on information systems, and the development of novel applications. It presents significant advances in the design, implementation, and evaluation of systems for databases and for other information collections. Its scope ranges from the development of special-purpose hardware, the design of innovative software approaches, integrated system architectures, the design analysis and performance evaluation of systems to new techniques for presenting and capturing information.

Editors-in-Chief

Peter M.G. Apers
Computer Science Department
University of Twente
P.O. Box 217
NL-7500 AE Enschede
The Netherlands
e-mail: apers@cs.utwente.nl
tel: +31-53-89-37-19
(Secretary: +31-53-89-36-90)
fax: +31-53-33-96-05

Hans-J. Schek
(Coordinating Editor-in-Chief)
Dept. of Computer Science
Swiss Federal Institute of Technology, Zürich
ETH Zentrum
CH-8092 Zürich
Switzerland
e-mail: schek@inf.ethz.ch
tel: +41-1-632-7240
fax: +41-1-262-3973

Jim Gray
San Francisco Systems Center
Digital Equipment Corporation
455 Market St. 7th Fl.
San Francisco, CA 94105
USA
e-mail: jimgray@sfbay.enet.dec.com
tel: +1-415-882-3955
fax: +1-415-882-3991

Stanley Y.W. Su
Database Systems Research & Development Center
470 CSE Building, University of Florida
P.O. Box 116125
Gainesville, FL 32611-6125
USA
e-mail: su@pacer.cis.ufl.edu
tel: +1-904-372-2693
(Secretary: +1-904-392-2680)
fax: +1-904-392-1220

Editorial Board

Serge Abiteboul
Wesley Chu
Nathan Goodman
Yahiko Kambayashi
Michel Léonard
C. Mohan
Alain Pirotte
Ron Sacks-Davis
Arne Solvberg

Michel Adiba
Steven A. Demurjian
Georg Gottlob
Roger King
Dave Lomet
John Mylopoulos
F.J. Radermacher
Peter Scheuerman
Yannis Vassiliou

Antonio Albano
Hector Garcia-Molina
Peter Gray
Masaru Kitsuregawa
Dennis McLeod
Antoni Olivé
K. Ramamohanarao
Gunter Schlageter
Hartmut Wedekind

Walter A. Burkhard
Georges Gardarin
Tadao Ichikawa
Tosiyasu L. Kunii
Robert A. Meersman
M. Tamer Özsu
Andreas Reuter
Joachim W. Schmidt
Kyu-Young Whang
Stanley Zdonik

Publication Board

Arie Shoshani (Chairman)
Mail Stop 50B/3238
Lawrence Berkeley Laboratory
Berkeley, CA 94720, USA
e-mail: shoshani@lbl.gov

Peter M.G. Apers, Jim Gray, Hans-J. Schek, Stanley Y.W. Su

Thomas Wu
Department of Computer Science
Naval Postgraduate School

Michael Rys
Institut für Informationssysteme
ETH Zürich

Copyright © 1994 by the VLDB Endowment. Copying without fee is permitted provided that the copies are not made or distributed for direct commercial advantage and credit for the source is given. Abstracting with credit is permitted. For other copying of articles write to the Chairperson of the Publication Board. To copy otherwise, or to republish, requires a fee and/or specific permission.

For submission and subscription information, see inside back cover

The
VLDB Journal

The International Journal on Very Large Data Bases

Volume 3(2) (1994)



THE BOXWOOD PRESS
PACIFIC GROVE, CA, USA

© 1994 BY THE VLDB ENDOWMENT

Copyright reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without the prior permission of the copyright owner.

Submission of a paper to *The VLDB Journal* is understood to imply that it is not being considered for publication elsewhere and that the author's permission to publish his/her article(s) in this journal implies the exclusive authorization of the publisher to deal with all issues concerning the copyright therein.

Submission of multi-authored manuscripts to this journal implies the consent of *each* of the authors. The publisher will assume that the senior or corresponding author has specifically obtained the approval of all other co-authors to submit the manuscript to this journal.

No responsibility is assumed by the Publisher for any injury and/or damage to persons or property as a matter of products liability, negligence or otherwise, or from any use or operation of any methods, products, instructions or ideas contained in the material herein.

Special regulations for authors. Upon acceptance of an article by the journal, the author(s) will be asked to transfer copyright of the article to the publisher. This transfer will ensure the widest possible dissemination of information.

Published quarterly by:

THE BOXWOOD PRESS

183 Ocean View Blvd.

Pacific Grove, CA 93950, USA

Telephone: (408) 375-9110/Fax: (408) 375-0430

Foreword

This is a Special Issue of the *VLDB Journal* dedicated to Prototype Deductive Database Systems. Its main emphasis is on both “prototype” and “system.” As we know, an enormous amount of research on deductive databases and recursive database query processing has been conducted during the past decade. There have been quite a few well-implemented research prototypes which can provide us with some real performance measurements of deductive database systems, based on which we can evaluate their applicability and practicality to solve real-world problems. Some of these implemented prototypes may even be well on their way to becoming real products. Through these implementations, the early enthusiasm and ideas expressed in many conference papers can be supported by demonstrable and evaluated systems.

The above belief and observation served as the starting point for Professor Kotagiri Ramamohanarao, the invited editor of this issue, to initiate a “call for papers” on Prototype Deductive Database Systems. The call was distributed at the end of 1992 and the response indeed met our expectations and justified the idea of a Special Issue; more than 15 papers were submitted. As the invited editor, K. Ramamohanarao coordinated the reviewing process. All submitted papers were reviewed following the regular review rules of the *VLDB Journal*.

This issue contains three selected contributions which deal with the CORAL, the Glue-nail, and the DECLARE and SDS research prototypes, respectively. It also includes an introduction to the Special Issue written by the invited editor with J. Harland as the co-author, and an invited research contribution on the ADITI system, a research prototype developed by K. Ramamohanarao and his team.

We would like to thank Rao for his excellent effort and for his contributions to this issue, without which this issue would not have become a reality.

Hans-J. Schek
Coordinating Editor-in-Chief
March, 1994

Special Issue Editorial

There has been a significant amount of research performed on deductive database systems in recent years, and much progress has been made in areas such as query optimization. More recently, implementations of deductive database systems have begun to appear. Hence, this Special Issue appears at a time when deductive databases are beginning to evolve from a research tool into practical database systems.

This issue contains an overview article, which motivates the need for deductive database systems, and covers issues such as language features and implementation strategies, and briefly describes various prototype systems, including systems not covered elsewhere in this issue. There are four main articles in this issue, describing the systems CORAL, Glue-Nail, DECLARE & SDS, and Aditi.

I would like to thank Professor Hans Schek for giving me the opportunity to be the editor for this Special Issue, all those who submitted papers, and all who refereed papers for this issue.

I hope that this Special Issue stimulates further research in the area of deductive databases and I hope that commercial quality deductive database systems will soon be readily available.

Professor Kotagiri Ramamohanarao
Department of Computer Science
University of Melbourne
Parkville, 3052
Victoria, Australia