Paolo Atzeni (Ed.)

# LOGIDATA+: Deductive Databases with Complex Objects

Springer-Verlag

Berlin Heidelberg New York London Paris Tokyo Hong Kong Barcelona Budapest Series Editors

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CR Subject Classification (1991): H.2.1, H.2.3

ISBN 3-540-56974-X Springer-Verlag Berlin Heidelberg New York ISBN 0-387-56974-X Springer-Verlag New York Berlin Heidelberg

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Typesetting: Camera ready by author 45/3140-543210 - Printed on acid-free paper

## Preface

This book presents a collection of coordinated scientific papers describing the work conducted and the results achieved within the LOGIDATA+ project, a research action funded by CNR (Consiglio Nazionale delle Ricerche — the Italian National Research Council), within "Progetto Finalizzato Sistemi Informatici e Calcolo Parallelo."

The aim of the LOGIDATA+ project is the definition of advanced database systems that significantly extend the functionalities of the current systems, with specific reference to the application areas for which relational systems are not considered satisfactory. These new systems will allow the definition of data with complex structures, the representation of semantic relationships between objects, and the use of powerful query and update languages. They will be based on a combination of techniques originating from relational databases and logic programming, with contributions from object-oriented programming. Attention will be devoted to the representation of isa-hierarchies and to taxonomic reasoning. The specific goal of the project is the definition, design, and prototype implementation of a database management system with complex structures and a class hierarchy, to be accessed through a rule-based language.

The project is now at the conclusion of the first phase, with significant research work done on the definition of the features of the systems and their theoretical foundations. The second phase will be mainly concerned with the implementation of prototypes. This book presents a homogeneous, integrated view of the scientific results of the project, with respect to all the features of the system.

The LOGIDATA+ group involves teams from the following institutions:

- CNR, Centro per l'Interazione Operatore-Calcolatore, Bologna
- CNR, Istituto di Analisi dei Sistemi ed Informatica, Roma
- CRAI, Rende (Cosenza)
- Politecnico di Milano, Dipartimento di Elettronica e Informazione
- Sintesi S.r.l., Modena
- Systems & Management S.p.A., Torino
- Università dell'Aquila, Dipartimento di Matematica Pura e Applicata
- Università della Calabria, Cosenza, Dipartimento di Elettronica, Informatica e Sistemistica
- Università di Firenze, Dipartimento di Sistemi e Informatica
- Università di Modena, Dipartimento di Matematica
- Università di Roma La Sapienza, Dipartimento di Informatica e Sistemistica

The book is organized in four parts. Part I contains two papers, the first giving an overview of the LOGIDATA+ project and the second presenting a general discussion on the combination of deductive and object-oriented features in the database field. Part II is concerned with the description of the LOGIDATA+ model and language: the first and second papers present the data model and the rule-based language, respectively; the third paper illustrates the concepts by means of the detailed description of an application. Parts III and IV report on research results about a number of issues that can lead to significant extensions of the LOGIDATA+ system. Each of them concentrates on some features of the model and language. Specifically, Part III contains results on problems related to structural issues (updates over classes, taxonomic reasoning, and integrity constraints in object-oriented databases) and Part IV deals with deductive issues, essentially extensions of logic programming. Finally, Part V presents the experimental results of the project, with the existing prototypes.

I would like to thank all those who have made this book possible. Bruno Fadini, Director of "Progetto Finalizzato Sistemi Informatici e Calcolo Parallelo," and Domenico Saccà, Coordinator of "Sottoprogetto 5: Sistemi evoluti per basi di dati," have encouraged the LOGIDATA+ action since its inception. The authors of all the papers deserve my gratitude for their timely cooperation in the preparation of the volume and for their help in the revision process. My graduate students Giovanni Barone, Luca Cabibbo, and Gianni Mecca helped in the reviewing process and in the organization of the material. Alfred Hofmann at Springer-Verlag was very efficient in the management of our project.

May 1993

Paolo Atzeni

# **Table of Contents**

#### Part I: The Framework

LOGIDATA+: Overview	
Paolo Atzeni1	
Bridging Objects with Logical Rules:	
Towards Object-Oriented Deductive Databases	
Stefano Ceri and Letizia Tanca7	

#### Part II: The Model and the Language

The LOGIDATA+ Model Paolo Atzeni, Filippo Cacace, Stefano Ceri, and Letizia Tanca20
The LOGIDATA+ Language and Semantics Paolo Atzeni, Luca Cabibbo, Giansalvatore Mecca, and Letizia Tanca 30
Travel Agency: A LOGIDATA+ Application Luca Cabibbo and Giansalvatore Mecca

#### Part III: Complex Objects

Management of Extended Update Operations Luigi Palopoli and Riccardo Torlone
Taxonomic Reasoning in LOGIDATA+ Domenico Beneventano, Sonia Bergamaschi, Claudio Sartori, Alessandro Artale, Francesca Césarini, and Giovanni Soda
Introducing Taxonomic Reasoning in LOGIDATA+ Alessandro Artale, Francesca Cesarini, and Giovanni Soda
Taxonomic Reasoning with Cycles in LOGIDATA+ Domenico Beneventano, Sonia Bergamaschi, and Claudio Sartori105
Modeling Semantic Integrity Constraints in Object-Oriented
Database Schemas
Anna Formica and Michele Missikoff

### Part IV: Deductive Databases

Evaluation of Negative Logic Programs   Sergio Greco, Massimo Romeo, and Domenico Saccà   148
Effective Implementation of Negation in Database Logic Query Languages Nicola Leone, Massimo Romeo, Pasquale Rullo, and Domenico Saccà159
Modules in Logic Programming: A Framework for Knowledge Management Annalina Fabrizio, Maurizio Capaccioli, and Sandra Valeri
Part V: Prototypes
LOA: The LOGIDATA+ Object Algebra Umberto Nanni, Silvio Salza, and Mario Terranova195
The LOGIDATA+ Prototype System Umberto Nanni, Silvio Salza, and Mario Terranova211
MOOD*: An Architecture for Object-Oriented Access to a Relational Database Marco Lugli, Luca Nini, and Stefano Ceri
Prototypes in the LOGIDATA+ Project Alessandro Artale, Jean-Pierre Ballerini, Sonia Bergamaschi, Filippo Cacace, Stefano Ceri, Francesca Cesarini, Anna Formica, Herman Lam, Sergio Greco, Giorgio Marrella, Michele Missikoff, Luigi Palopoli, Luigi Pichetti, Domenico Saccà, Silvio Salza, Claudio Sartori, Giovanni Soda, Letizia Tanca, and Marco Toiati