

EDITOR'S FOREWORD

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PODS'97 was held May 12–14, 1997, in Tucson, Arizona, in conjunction with the ACM SIGMOD International Conference on Management of Data. The conference program consisted of 23 contributed papers (out of 118 submissions), one invited paper, and three invited tutorials. Authors of 10 papers selected by the program committee have been invited to submit full versions of their papers for a special issue of *Journal of Computer and System Sciences (JCSS)*.

The paper “On the Complexity of Database Queries” is co-authored by Christos H. Papadimitrou and Mihalis Yannakakis, which also received the PODS'97 Best Paper Award. In this paper, Papadimitrou and Yannakakis study the complexity of database queries in the light of “parametric complexity” and show that parametric complexity theory is a productive framework for studying the complexity of query languages. Their results suggest that the data complexity of any query evaluation algorithm is exponential in the query size (i.e., number of variables in the query), with the implication becoming stronger as the expressibility of the query language increases. On the positive side, it is shown that acyclic conjunctive queries can be evaluated efficiently.

In “Regular Path Queries with Constraints,” Serge Abiteboul and Victor Vianu consider the evaluation of path expression queries on semistructured data in a distributed asynchronous environment. They focus on the use of local information expressed in the form of path constraints in the optimization of path expression queries. Several decidability and complexity results are established on the implication problem for path constraints.

The paper, “Cut and Paste” by Paola Atzeni and Giansalvatore Mecca, develops a language for manipulating semistructured documents, such as the ones typically available on the web. They study the expressive power and the computational complexity of specific search and restructuring programs in this language. In particular, they show that any computable document restructuring can be expressed in their language (computationally complete). And, for a safe subclass of programs, they showed that it captures exactly the class of polynomial-time restructurings.

In “Complete Geometrical Query Languages,” Marc Gyssens, Jan Van den Bussche, and Dirk Van Gucht extend Chandra and Harel's work on computable queries for spatial databases. They introduce both coordinate-based and point-based query languages and show that they are complete geometric query languages under various geometric interpretations.

The paper “Conjunctive Query Equivalence of Keyed Relational Schemas” by Joseph Albert, Yannis Ioannidis, and Raghu Ramakrishnan extends an earlier result by Hull, who introduced the notion of query equivalence for relational schemas and showed that two relational schemas with no dependencies are equivalent with respect to different notions of equivalence (including the query equivalence) if and only if they are isomorphic. In this paper, the authors show that two relational schemas whose only dependencies are primary keys support the same conjunctive

queries (i.e., equivalent under the notion of conjunctive query equivalence) if and only if they are isomorphic.

The paper, “On the Decidability of Semi-linearity of Semi-algebraic Sets and Its Implications for Spatial Databases” by Freddy Dumortier, Marc Gyssens, Luc Vandeurzen, and Dirk Van Gucht, deals with the polynomial spatial database models in which both geometric objects and query languages are described using polynomial inequalities. Geometric objects of this model are called semi-algebraic sets, and its query language is referred to as $FO + \text{poly}$. Geometric objects described by linear inequalities are called semi-linear sets, and the restriction of $FO + \text{poly}$ to only linear inequalities is called $FO + \text{linear}$. However, not all linear queries expressible in $FO + \text{poly}$ can be described in $FO + \text{linear}$. This paper focuses on decidability issues and proves that semi-linearity of semi-algebraic sets are decidable.

Two papers will follow in a subsequent issue of *JCSS*: The paper “On the Containment and Equivalence of Database Queries with Linear Constraints” by Oscar H. Ibarra and Jianwen Su studies and presents new results on the containment and equivalence of queries with linear constraints. In addition to decidability results for conjunctive queries with linear constraints, they also consider a subclass of SQL-like queries for which better complexity bounds are obtained. The authors use a technique based on counter machines to study the containment and equivalence of conjunctive queries.

The paper “Replication and Consistency in a Distributed Environment” by Yuri Breitbart and Henry F. Korth presents a protocol for replication control that guarantees global serializability yet scales better in a distributed setting than the previously proposed protocols by allowing replicated updates to be propagated lazily. The power of the protocol stems from allowing only local reads and forcing all updates of primary copies to be initiated locally as well.

Putting this special section together was made possible by efforts of many reviewers. I thank members of the PODS'97 program committee (many of them also ended up reviewing the papers for this special section) and all the reviewers for their thorough reviewing of the full versions of the selected papers, hard work, and dedication. I also thank the authors of the papers in this special section for their excellent research contributions.

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Guest Editor