Lecture Notes in Computer Science

Commenced Publication in 1973
Founding and Former Series Editors:
Gerhard Goos, Juris Hartmanis, and Jan van Leeuwen

Editorial Board

David Hutchison
   Lancaster University, UK
Takeo Kanade
   Carnegie Mellon University, Pittsburgh, PA, USA
Josef Kittler
   University of Surrey, Guildford, UK
Jon M. Kleinberg
   Cornell University, Ithaca, NY, USA
Friedemann Mattern
   ETH Zurich, Switzerland
John C. Mitchell
   Stanford University, CA, USA
Moni Naor
   Weizmann Institute of Science, Rehovot, Israel
Oscar Nierstrasz
   University of Bern, Switzerland
C. Pandu Rangan
   Indian Institute of Technology, Madras, India
Bernhard Steffen
   University of Dortmund, Germany
Madhu Sudan
   Massachusetts Institute of Technology, MA, USA
Demetri Terzopoulos
   New York University, NY, USA
Doug Tygar
   University of California, Berkeley, CA, USA
Moshe Y. Vardi
   Rice University, Houston, TX, USA
Gerhard Weikum
   Max-Planck Institute of Computer Science, Saarbruecken, Germany
Preface

This volume collects the papers presented at the 10th International Conference on Database Theory, ICDT 2005, held during January 5–7, 2005, in Edinburgh, UK.


ICDT had a two-stage submission process. First, 103 abstracts were submitted, which were followed a week later by 84 paper submissions. From these 84 submissions, the ICDT Program Committee selected 24 papers for presentation at the conference. Most of these papers were “extended abstracts” and preliminary reports on work in progress. It is anticipated that most of these papers will appear in a more polished form in scientific journals.

The proceedings also contain three invited papers by David Maier, Michael Schwartzbach, and Moshe Vardi. The Best Newcomer Award, for the best submission written solely by authors who had never published in earlier ICDT proceedings, was given by the program committee to Albert Atserias for his paper “Conjunctive Query Evaluation by Search Tree Revisited.”

We would like to thank a number of people who made ICDT 2005 a successful event. First of all, the authors who submitted papers, the members of the program committee for their efforts in reviewing and selecting the papers, the external referees for their help, and, importantly, Andrei Voronkov for supplying his marvelous PC Expert conference submission management system. A great thanks is owed to Peter Buneman and his organizing committee for hosting the conference, and to Marcelo Arenas and Wenfei Fan for running the conference website. Last but not least, we are very grateful to the sponsors, the United Kingdom National e-Science Centre and the Digital Curation Centre, for their support.

January 2005

Thomas Eiter
Leonid Libkin
ICDT 2005 was organized by the School of Informatics, University of Edinburgh and the UK National e-Science Centre.

Organizing Committee

Peter Buneman (University of Edinburgh, UK, chair)
Marcelo Arenas (University of Toronto, Canada, publicity)
Lee Callaghan (UK National e-Science Centre, UK)
Yrsa Roca Fannberg (University of Edinburgh, UK)
Wenfei Fan (Bell Laboratories, USA, publicity)
Dyane Goodchild (University of Edinburgh, UK)
Gill Maddy (UK National e-Science Centre, UK)

Program Co-chairs

Thomas Eiter (Vienna University of Technology, Austria)
Leonid Libkin (University of Toronto, Canada)

Program Committee

Lars Arge (Duke University, USA)
Catriel Beeri (Hebrew University of Jerusalem, Israel)
Michael Benedikt (Bell Laboratories, USA)
Leopoldo Bertossi (Carleton University, Canada)
Nicole Bidoit (Université Paris Sud, France)
Giuseppe De Giacomo (Università di Roma “La Sapienza”, Italy)
Wenfei Fan (Bell Laboratories, USA)
Nicola Leone (Università della Calabria, Italy)
Jerzy Marcinkowski (Wroclaw University, Poland)
Yossi Matias (Tel Aviv University, Israel)
Gultekin Özsoyoglu (Case Western Reserve University, USA)
Rajeev Rastogi (Bell Laboratories, USA)
Ken Ross (Columbia University, USA)
Thomas Schwentick (Marburg University, Germany)
Kyuseok Shim (Seoul National University, South Korea)
Eljas Soisalon-Soininen (Helsinki University, Finland)
Bernhard Thalheim (Kiel University, Germany)
Jan Van den Bussche (Limburg University, Belgium)
Victor Vianu (University of California at San Diego, USA)
Andrei Voronkov (Manchester University, UK)
Peter Widmayer (ETH Zürich, Switzerland)
External Referees

Pankaj Agarwal
Suleyman Fatih Akgul
Marcelo Arenas
Denilson Barbosa
Pablo Barceló
Roy Bartsch
Monica Caniupan
Aleksander Binemann-Zdanowicz
Philip L. Bohannon
Vladimir Braverman
Loreto Bravo
Francesco Buccafurri
Ali Cakmak
Toon Calders
Andrea Cali
Diego Calvanese
Stefano Ceri
Jan Chomicki
Jaehyok Chong
Meir Cohen
Anuj Dawar
Alin Deutsch
Gunar Fiedler
Floris Geerts
Georg Gottlob
Gianluigi Greco
Michael Greenwald
Nadav Grosshaug
Sariel Har-Peled
Jayant Haritsa
Giovambattista Ianni
Mohammed Khazal Jaber
Chulyun Kim
Mustafa Kirac
Hans-Joachim Klein
Christoph Koch
Domenico Lembo
Maurizio Lenzerini
Lipyœw Lim
Jan Lindström
Maarten Marx
Yariv Matia

Vincent Millist
Tova Milo
Alan Nash
Apostol Natsev
Kobbi Nissim
Matthieu Objois
Kenneth Oksanen
Luigi Palopoli
Yannis Papakonstantinou
Hyoungmin Park
Gerald Pfeifer
Kerttu Pollari-Malmi
Nattakarn Ratprasartporn
Riccardo Rosati
Riku Saikkonen
Peter Sanders
Ulrike Sattler
Vladimir Sazonov
Francesco Scarcello
Klaus-Dieter Schewe
Peggy Schmidt
Luc Segoufin
Gabby Shainer
Kyoung Shin
Dan Suciu
Injae Sung
Wieslaw Szwast
Murat Tasan
Lidia Tendera
Giorgio Terracina
Jukka Teuhola
David Toman
Hans Tompits
Tomasz Truderung
Jerz Tyszkiwicz
Daniel Urieli
Jan Vahrenhold
Piotr Wieczorek
Wanhong Xu
Ke Yi
Hai Yu
## Table of Contents

### Invited Papers

Model Checking for Database Theoreticians  
*Moshe Y. Vardi*  
1

The Design Space of Type Checkers for XML Transformation Languages  
*Anders Møller, Michael I. Schwartzbach*  
17

Semantics of Data Streams and Operators  
*David Maier, Jin Li, Peter Tucker, Kristin Tufte, Vassilis Papadimos*  
37

### Regular Papers

Conjunctive Query Evaluation by Search Tree Revisited  
*Albert Atserias*  
53

Which XML Schemas Admit 1-Pass Preorder Typing?  
*Wim Martens, Frank Neven, Thomas Schwentick*  
68

The Pipelined Set Cover Problem  
*Kamesh Munagala, Shivnath Babu, Rajeev Motwani, Jennifer Widom*  
83

### Session: Query Languages and Types

Well-Definedness and Semantic Type Checking in the Nested Relational Calculus and XQuery  
*Jan Van den Bussche, Dirk Van Gucht, Stijn Vansummeren*  
99

First Order Paths in Ordered Trees  
*Maarten Marx*  
114

An Abstract Framework for Generating Maximal Answers to Queries  
*Sara Cohen, Yehoshua Sagiv*  
129

### Session: Multi-dimensional Data Processing

Optimal Distributed Declustering Using Replication  
*Keith B. Frikken*  
144
<table>
<thead>
<tr>
<th>Title</th>
<th>Authors</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>When Is Nearest Neighbors Indexable?</td>
<td>Uri Shaft, Raghu Ramakrishnan</td>
<td>158</td>
</tr>
<tr>
<td>Nonmaterialized Motion Information in Transport Networks</td>
<td>Hu Cao, Ouri Wolfson</td>
<td>173</td>
</tr>
<tr>
<td><strong>Session: Algorithmic Aspects</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Approximately Dominating Representatives</td>
<td>Vladlen Koltun, Christos H. Papadimitriou</td>
<td>204</td>
</tr>
<tr>
<td>On Horn Axiomatizations for Sequential Data</td>
<td>José L. Balcázar, Gemma Casas-Garriga</td>
<td>215</td>
</tr>
<tr>
<td><strong>Session: Privacy and Security</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Privacy in Database Publishing</td>
<td>Alin Deutsch, Yannis Papakonstantinou</td>
<td>230</td>
</tr>
<tr>
<td>Anonymizing Tables</td>
<td>Gagan Aggarwal, Tomás Feder, Krishnaram Kenthapadi, Rajeev Motwani, Rina Panigrahy, Dílís Thomas, An Zhu</td>
<td>246</td>
</tr>
<tr>
<td>Authorization Views and Conditional Query Containment</td>
<td>Zheng Zhang, Alberto O. Mendelzon</td>
<td>259</td>
</tr>
<tr>
<td><strong>Session: Logic and Databases</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PTIME Queries Revisited</td>
<td>Alan Nash, Jeff Remmel, Victor Vianu</td>
<td>274</td>
</tr>
<tr>
<td>Asymptotic Conditional Probabilities for Conjunctive Queries</td>
<td>Nilesh Dalvi, Gerome Miklau, Dan Suciu</td>
<td>289</td>
</tr>
<tr>
<td>Magic Sets and Their Application to Data Integration</td>
<td>Wolfgang Faber, Gianluigi Greco, Nicola Leone</td>
<td>306</td>
</tr>
</tbody>
</table>
Session: Query Rewriting

View-Based Query Processing: On the Relationship Between Rewriting, Answering and Losslessness

Diego Calvanese, Giuseppe De Giacomo, Maurizio Lenzerini, Moshe Y. Vardi .................................................. 321

First-Order Query Rewriting for Inconsistent Databases

Ariel D. Fuxman, Renée J. Miller ........................................ 337

Rewriting Queries Using Views with Access Patterns Under Integrity Constraints

Alin Deutsch, Bertram Ludäscher, Alan Nash .......................... 352

Session: Query Processing, and Data Streams

Optimal Workload-Based Weighted Wavelet Synopses

Yossi Matias, Daniel Urieli .................................................. 368

Selecting and Using Views to Compute Aggregate Queries

Foto Afrati, Rada Chirkova ................................................... 383

Efficient Computation of Frequent and Top-k Elements in Data Streams

Ahmed Metwally, Divyakant Agrawal, Amr El Abbadi ................. 398

Author Index ................................................................. 413