

*Proceedings*

13<sup>th</sup> International Conference on  
Data Engineering

April 7 – 11, 1997  
University of Birmingham  
Birmingham, U.K.

*Sponsored by*  
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# *ICD97*

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IEEE Computer Society  
13, Avenue de l'Aquilon  
B-1200 Brussels  
BELGIUM  
Tel: + 32-2-770-2198  
Fax: + 32-2-770-8505  
euro.ofc@computer.org

IEEE Computer Society  
Ooshima Building  
2-19-1 Minami-Aoyama  
Minato-ku, Tokyo 107  
JAPAN  
Tel: + 81-3-3408-3118  
Fax: + 81-3-3408-3553  
tokyo.ofc@computer.org

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## *General Chairs' Message*



**WELCOME TO THE** Thirteenth International Conference on Data Engineering (ICDE) in Birmingham, United Kingdom! The conference has an established tradition of excellence and we trust that you will find that the sessions put together by the program committee for the Birmingham conference continue this tradition. This is the second time that the ICDE has visited Europe and we hope that it will enable both cultural and intellectual interchange to take place.

Birmingham is located in the centre of England. It was also central to the development of Britain's industrial economy. One of the immediate consequences of industrialisation was the growth of the city of Birmingham as a centre of engineering excellence. As the end of the twentieth century engineering has become increasingly diverse and our own field of data engineering, far from dealing with heavyweight artifacts has to deal with bits of information. By hosting this conference on Data Engineering, the city of Birmingham continues its two hundred year tradition in engineering innovation.

We hope you will enjoy your stay in Birmingham and while you are here enjoy some of the things the city has to offer. You might like to visit the Science Museum where you can see a base 10 computer. Or else attend a concert at the Symphony hall where the acoustics are said to be amongst the best in the world. Or perhaps visit one of the city's famous Balti restaurants.

The effort in staging an event of the size of ICDE is considerable and the conference could not take place without the collaboration of many individuals. As ICDE is international, this means that many people from different type of organisations and different time zones must find ways of working together. We would like to take this opportunity to thank the program committee members, and especially the program committee chairs and vice-chairs, for their tireless work and difficult labors. We also thank the panel chair, the tutorial co-chairs, and the industrial program chair for completing the conference program with substantial contributions. We are grateful to the publicity chairs for disseminating widely the ICDE information, and the work behind the scenes of the exhibits chair, the financial co-chairs, and local arrangements chair. In addition, we thank the publication co-chairs who put the proceedings together, and the steering committee that chose Birmingham for this ICDE. Finally, we thank you, the conference delegate who is attending this ICDE. Enjoy the conference!

Mike Jackson  
University of Wolverhampton, UK

Calton Pu  
Oregon Graduate Institute, USA

## *Program Chairs' Message*

THESE PROCEEDINGS CONTAIN the papers presented at the Thirteenth International Conference on Data Engineering (ICDE'97) held in Birmingham, UK, April 7-11, 1997. This year we received 240 submissions to the regular technical track. The program committee selected 45 papers for presentation. The proceedings also contain brief descriptions of software systems demonstrated at the conference. In addition to regular papers, the technical program of the conference includes industrial presentations, panel discussions and keynote addresses by William Baker and Malcolm Atkinson.

It is our pleasant duty to extend our sincere thanks to all who contributed to the creation of an interesting and varied technical program. We would like to thank, in particular,

- Authors of all papers submitted to ICDE'97, without whom there would be no conference;
- The program committee vice-chairs: Peter Apers, Malcolm Atkinson, David Bell, Surajit Chaudhuri, Christos Faloutsos, Christoph Freytag, Alfons Kemper, Norman Paton and Ken Salem, who made our task much easier by handling a large part of the reviewing and selection process;
- All members of the program committee, as well as all additional reviewers;
- Jose Blakeley, who pulled together the Industrial Program;
- Sophie Cluet, who was responsible for the Exhibits Program;
- Wolfgang Klas, who put together the Panel Sessions;
- Elke Rundensteiner and Keith Jeffrey who edited these proceedings; and
- Michael Jackson and Calton Pu, the general co-chairs of the conference, for giving us a free hand in putting together the technical program.

It was a honor and pleasure to work with a team of such outstanding and dedicated people. We hope that all attendees will find the program stimulating and enjoyable and that the papers in these proceedings will prove to be technically interesting and relevant.

Alex Gray and Per-Åke (Paul) Larson  
Program Committee Co-Chairs

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 Kyuseok Shim, Bell Labs, USA  
 V.S. Subrahmanian, Univ. of Maryland, USA  
 Y.C. Tay, National University of Singapore, Singapore  
 Joy Thomas, IBM Watson, USA  
 Jeff Ullman, Stanford University, USA  
 Susan Urban, Arizona State University, USA  
 Gerhard Weikum, University of the Saarland, Germany  
 Howard Williams, Heriot-Watt University, Scotland  
 Annita Wilschut, University of Twente, the Netherlands  
 Longxiang Zhou, Academia Sinica, China



# *External Reviewers*

Mohamed Abdel-Mottaleb

Reda Alhadj

Sena Arpinar

Budak Arpinar

Michael Barton

Michael Boehlen

Peter Boncz

Sergey Brin

Omran Bukhres

K.S. Candan

Paul Castro

Ed Chan

Yuhlin Chang

Nauman A. Chaudhry

Arbee L.P. Chen

Bobbie Cochrane

Viviane Crestana

Michael D. Soo

Anindya Datta

Stephen Davis

Grit Denker

Prasad Deshpande

Nevenka Dimitrova

Andrew Dinn

Donko Donjerkovic

Curtis Dyreson

Max J. Egenhofer

Suzanne Embury

Claudio Esperanca

Susan J. Even

Beatrice Finance

Guntram Flach

Myron Flickner

Staffan Flodin

Walid G. Aref

Venkatesh Ganti

Georges Gardarin

Johannes Gehrke

Dieter Gluche

Al Goerner

Tim Griffin

Torsten Grust

Peter Hartel

Ralf Hartmut Gueting

Klaus Heumann

Cao Hua

Yun-Wu Huang

E. Hwang

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Ulrike Jaeger

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Mogi Kazuhiko

Graham Kemp

Jia-Ling Koh

Pinar Koksal

Michael Kozuch

Achim Kraiss

Natalija Krivokapic

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Amy Lee

Brian Lent

John Z. Li

Hong Lin

Ling Liu

David Lomet

Astrid Lubinski

Stefan Manegold

Don McFaul

Rajeev Motwani

Peter Muth

Miyuki Nakano

Guido Nerjes

Svetlozar Nestorov

Karl Neumann

Anisoara Nica

Sena Nural

Johann K. Obermaier

Yongzhen Ou

Thomas Padron-McCarthy

Stefano Paraboschi

Dragutin Petkovic

Darrell Raymond

Angelika Reiser

Holger Riedel

Juergen Schlegelmilch

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Mary Shapcott

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Martin Skold

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David Spelt

Jaideep Srivastava

Michael Stillger

H.M. Veenhof

Pavel Vogel

Kaladhar Voruganti

Arjen P. de Vries

Florian Waas

Mathias Weske

Clement Yu

Gang Zhou

Lei Zhou