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# Advances in Database Technologies

ER '98 Workshops on  
Data Warehousing and Data Mining,  
Mobile Data Access, and  
Collaborative Work Support and  
Spatio-Temporal Data Management  
Singapore, November 19-20, 1998  
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## Foreword

Advances in Database Technologies (ADT) is a workshop series designed to promote interaction and discussion among researchers and practitioners in specific topics related to advanced data modeling and database technologies. The first ADT workshop was held in conjunction with the 17th International Conference on Conceptual Modeling (ER'98) in Singapore. It consisted of three small workshops, i.e., the "International Workshop on Data Warehousing and Data Mining" organized by Prof. Sham Navathe and Dr. Mukesh Mohania, the "International Workshop on Mobile Data Access" organized by Prof. Dik Lun Lee, and the "International Workshop on New Database Technologies for Collaborative Work Support and Spatio-Temporal Data Management" organized by Prof. Yoshifumi Masunaga. These three small workshops were held simultaneously on 19 and 20 November, and the papers were jointly published in this ADT'98 proceedings.

We would like to thank Prof. Sham Navathe, Dr. Mukesh Mohania, Prof. Dik Lun Lee, Prof. Yoshifumi Masunaga and their program committees for working together to insure an excellent workshop program. The program co-chair of ER'98 Prof. Tok Wang Ling and his organizing committee members gave outstanding support to the workshops with the local arrangements, registration, publicity, and the preparation of the proceedings. Our special thanks go to Prof. Stefano Spaccapietra, Chair of the ER Steering Committee, for his encouragement to make the ADT workshop an annual event to be held in conjunction with the future ER conferences. We would also like to thank Dr. Peter Chen and Dr. Bernhard Thalheim for their efforts in expanding the scope of the ER conference series. We were fortunate to have ACM, ACM SIGMOBILE, the ER Insitute and the Japanese research project on Advanced Databases (supported by the Ministry of Education, Science, Sports and Culture of Japan) as workshop sponsors. Lastly, we would also like to express our sincere thanks to all reviewers of the workshop papers.

We hope that the first ADT workshop was stimulating and enjoyable to all who attended it, and we look forward to more successful ADT workshops in the coming years.

December 1998

Prof. Yahiko Kambayashi  
ER'98 Conference Chair

Dr. Ee-Peng Lim  
ER'98 Workshop Chair

## Workshop Chairs' Messages

Data warehousing and data mining is a recent information technology that allows electronic information to be easily and efficiently accessed for decision making activities and the automated extraction of interesting patterns and trends in the data stored in a data warehouse (called data mining).

The first international workshop on Data Warehousing and Data Mining (DWDM'98) focuses on the physical and the logical design of data warehousing and data mining systems. The scope of the papers covers the most recent and relevant topics in the areas of data and web warehousing, multidimensional databases, knowledge discovery and data mining.

We received more than 30 papers from over 15 countries and the programme committee finally selected 14 papers. A special panel on 'Data Warehousing and Data Mining - Are we working on the right things?' is included in the workshop programme to discuss the current challenges.

We would like to thank the conference general chair, workshop general chair and the organising committee of the 17th International Conference on Conceptual Modelling (ER'98) for recognising the importance of the theme of this workshop. We are very indebted to all programme committee members and the referees who have very carefully and timely reviewed the papers. We would also like to thanks all the authors who submitted their papers to this workshop.

November 1998

Sham Navathe  
Workshop Chair

Mukesh Mohania  
Program Committee Chair

International Workshop on  
Data Warehousing and Data Mining

Wireless communication has added a new dimension of freedom to the Internet. It gives people truly ubiquitous access to information and computational resources, practically at any time and from anywhere in the world. In the past few years, we have witnessed the astonishing progress in both research and technological advancement in wireless communication systems. We expect to see a rapid penetration of the technology into every aspect of life, from global communication to appliance control in households. This workshop was organized with this perspective in mind to provide a forum for this timely topic. To align with the theme of the main conference (Conceptual Modelling, ER '98), this workshop was intended to focus on the data access aspect of mobile systems. I am glad that with the help of the program committee, we were able to put together an interesting program drawing papers from industry and academia around the world, with a panel on the future directions of academic research and industrial development. I am also greatly indebted to Dr. Ee-Peng Lim for his tremendous efforts in handling all the organizational aspect of the workshop and to Dr. Tok Wang Ling for making the publication of the workshop proceedings possible.

I hope this workshop is merely the very first of a continuous sequence of workshops dedicated to the data access aspect of mobile computing.

December 1998

Dik L. Lee  
Chair, International Workshop on  
Mobile Data Access

The International Workshop on New Database Technologies for Collaborative Work Support and Spatio-Temporal Data Management (NewDB'98) was held on November 19-20, 1998 in Singapore. The NewDB'98 was organized in conjunction with the Seventeenth International Conference on Conceptual Modeling (ER'98). These proceedings contain the technical papers accepted for presentation at the workshop.

The NewDB'98 program committee accepted 12 and 6 papers for regular and short presentation, respectively, which were selected from 28 submitted papers from various countries. It is interesting to note that the majority of the 13 accepted papers were from Japan. In Japan there is an on-going project "Research and Development of Advanced Database Systems for Integration of Media and User Environments" funded by the Ministry of Education, Science, Sports and Culture. This is a three year project started in 1996, and is directed by Prof. Yahiko Kambayashi of Kyoto University. In carrying out the project, we have recognized that the support of collaborative work and management of spatio-temporal data has become one of the most interesting and important database applications, which is due to the tremendous progress of database and its surrounding technologies in the last decade.

I believe that the future database systems in the coming twenty first century cannot survive without supporting spatio-temporal virtual database environments which users enter to work together.

Last but no least, I would like to thank you all of the NewDB'98 program committee members, Dr. Ee Peng Lim of ER'98 Workshop Chair, and Prof. Tok Wang Ling of ER'98 Program Co-Chair for their hard work.

December 1998

Yoshifumi Masunaga  
Chair, International Workshop on  
New Database Technologies for  
Collaborative Work Support and  
Spatio-Temporal Data Management



# Workshop Organization

## **International Workshop on Data Warehousing and Data Mining**

Chair: Sham Navathe (Georgia Institute of Technology, USA)

Program Chair: Mukesh Mohania (University of South Australia, Australia)

## **International Workshop on Mobile Data Access**

Chair: Dik L. Lee (Hong Kong University of Science and Technology, Hong Kong)

## **International Workshop on New Database Technologies for Collaborative Work Support and Spatio-Temporal Data Management**

Chair: Yoshifumi Masunaga (University of Library and Information Science, Japan)

## **Conference Chair, ER'98:**

Yahiko Kambayashi (Kyoto University, Japan)

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Sudha Ram (University of Arizona, USA)

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