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Current Trends in Database Technology – EDBT 2006

Springer

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Preface

You are studying the joint proceedings of the scientific workshops that were held just before and after the 10th *International Conference on Extending Database Technology* (EDBT 2006) in the historic Munich Künstlerhaus, Germany, in late March 2006. The workshops contributing to this volume are:

- **The 4th EDBT Ph.D. Workshop**
- **DataX 2006** (DB Technologies for Handling XML Information on the Web)
- **IIDB** (Inconsistency and Incompleteness in Databases)
- **IIHA** (Information Integration in Healthcare Applications)
- **ICSNW 2006** (Semantics of a Networked World)
- **QLQP 2006** (Query Languages and Query Processing)
- **PIM 2006** (Pervasive Information Management)
- **PaRMa 2006** (Pattern Representation and Management)
- **Reactivity on the Web**

If we let the raw numbers speak, then, compared with EDBT 2004, the number of collocated workshops almost doubled (from five in 2004 to nine in 2006). The nine events attracted circa 170 attendees from all over the globe. Approximately one third of the participants exclusively registered for workshops. These numbers indicate that the satellite workshop idea continues to play a significant role and that the orbited core conference clearly benefits as well. As the EDBT 2006 Workshop Chair, I enjoyed the privilege of being able to sneak into almost all workshops, and throughout I found the direct, to-the-point, and thus effective style of presentation and discourse that you may hope for when "birds of a feather" flock together.

In this post-workshop proceedings volume you will find a selection of 70 contributions, grouped by workshop, whose authors were asked to prepare revised and enhanced versions of their original workshop submissions. The present papers reflect program committee comments as well as feedback collected when the work was presented and discussed in Munich.

I am confident that you will appreciate the diligence with which the authors prepared the papers of this volume. My sincere thanks go to all workshop program committees—more than 150 colleagues in total—and, last but not least, the workshop organizers who stepped up and devoted significant effort and time to shape and run the workshops. You can find their individual forewords on the pages that follow.

August 2006   Torsten Grust

EDBT Ph.D. Workshop

Continuing in its tradition, the Ph.D. Workshop brings together Ph.D. students in the field of database technology outside of the EDBT conference series. It offers Ph.D. students the opportunity to present, discuss, and receive feedback on their research in a constructive and international atmosphere.

The Program Committee, comprised of 30 members from 14 countries, evaluated 70 submissions (received from 20 countries). After a careful review process (each paper was evaluated by three committee members followed by an online discussion), 12 papers were selected for presentation at the workshop. After several intensive and fruitful discussions led by the session chairs, all authors were invited to submit a revised and extended version of their paper for these proceedings.

The EDBT 2006 Ph.D. Workshop was made possible through the cooperation of many different organizations and individuals. In particular, we would like to thank the members of the Program Committee, as well as the Local Organization Committee, for their professional work and time commitment. We are very thankful to the three session chairs at the workshop: Klaus R. Dittrich from the University of Zürich (Switzerland), Klaus Meyer-Wegener from the University of Erlangen-Nuremberg (Germany) and Theo Härder from the Technische Universität Kaiserslautern (Germany).

Special thanks goes to the members of the Database Research Group at the University of Erlangen-Nuremberg (Germany) for providing a submission and review system that worked flawlessly and to Torsten Grust, from the Technische Universität München (Germany), for his outstanding support in the preparation and execution of the workshop.

For their gracious help and kind advice during the workshop preparation, we are particularly indebted to the EDBT 2006 General Chair, Marc H. Scholl, from the University of Konstanz (Germany); the Program Committee Chair, Yannis Ioannidis, from the University of Athens (Greece); and the Executive Chair, Florian Matthes, from the Technische Universität München (Germany).

News and updates can be found at the workshop's website: `http://www6.informatik.uni-erlangen.de/edbt06phd`.

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10th International Conference on Extending Database Technology (EDBT 2006)

Second International Workshop on Database Technologies for Handling XML Information on the Web (DataX 2006)

The second EDBT 2006 Workshop on <u>D</u>atabase <u>T</u>echnologies for <u>Ha</u>ndling <u>X</u>ML *Information on the Web* (*DataX 2006*) was held in Munich, Germany, on Sunday, March 26, 2006, and attracted approximately 30 participants from different countries. The first DataX workshop was held in conjunction with EDBT 2004.

XML seems to be one of the main means towards the next generation of database technology. The workshop goal was to give the participants the opportunity to debate new issues and directions for the XML and database community with specific interest in innovative environments.

In response to the call for papers, 35 high quality submissions were received. Each paper was carefully reviewed by at least three members of the program committee and external reviewers. As result of this process, 10 papers were selected for the workshop, covering a large variety of topics. In addition, H.V. Jagadish accepted our invitation to discuss new and interesting topics in XML and database research.

The workshop opened with a session on *Querying XML Documents*, devoted to efficient query processing and to queries on non-valid documents. A section on *Updating XML Documents* followed, discussing update languages, updates through views, and efficient integrity checking. The following section, *XML Biology*, discussed the use of XML for representing and analyzing molecular interactions. The invited talk, advocating the need for an algebra in practical XML query processing, followed. The workshop was concluded by a section devoted to *XML Security*, referring to both confidentiality of outsourced data and security views, and *XML Schema Mapping* for XML data interchange.

This volume contains improved versions of the workshop papers, revised by authors according to the program committee's and workshop participants' comments.

We would like to thank the invited speaker, the program committee members, and the external reviewers for their efforts in the realization of this workshop and in helping authors to revise their papers. All the workshop participants deserve to be thanked for making the workshop very fruitful. Finally, we wish to express our gratitude to the EDBT Organization and the EDBT Workshop Chair, Torsten Grust, for their support in all the phases of the workshop preparation as well as for the preparation of the post-workshop proceedings.

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Inconsistency and Incompleteness in Databases (IIDB)

IIDB 2006, the International Workshop on Inconsistency and Incompleteness in Databases, was held on March 26, 2006, in Munich, Germany, as a collocated event of EDBT 2006, the 10th International Conference on Extending Database Technology. The motivation for this workshop was to bring together database researchers working on inconsistency, incompleteness, and uncertainty to review recent progress and outline future research directions.

In response to the call for papers, ten papers were submitted. Each submission was reviewed by at least three program committee members. Five papers were accepted for regular and three for short, position paper presentation. Additionally, program committee members contributed position papers describing their ongoing research. IIDB 2006 also featured an invited talk by Maurizio Lenzerini on *"Inconsistency Tolerance in P2P Data Integration"* in addition to the technical program.

During the workshop only informal proceedings were distributed. The articles in this volume are revised versions of the five papers accepted for regular presentation at the workshop. The authors were able to make improvements to their papers based on the comments of the reviewers and the discussions during the workshop. The revised articles were subjected to a final check by the program committee.

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Workshop on Information Integration in Healthcare Applications (IIHA)

In the line with the banner theme of the EDBT 2006 conference "From Database Systems to Universal Data Management" this workshop focused on topics concerning information integration in healthcare applications.

Healthcare information systems continuously have to be adapted to meet new requirements, standards, laws, etc. Cost pressure is increasing massively, and at the same time, system complexity is growing. This constantly changing environment is also characterized by highly interdisciplinary processes which depend on the timely provision of patient-related information at the point of care in order to prevent medical errors. In addition, medical knowledge should be provided in a way that enables effective decision support for clinicians. The core challenge is to establish flexible and responsive IT infrastructures that are capable of effectively adapting to changing requirements. Information integration is thus a key factor for healthcare applications, as most medical applications are determined by a huge variety of heterogeneous and independent health care institutions that have to share data. The continuity of medical processes has to be improved, and medical pathways will play an important integrational role within institutions and across institutional borders.

The Program Committee, comprising 10 members from 6 countries, evaluated 18 submissions. After a careful review process (each paper was evaluated by 3 committee members followed by an online discussion), 8 papers were selected for presentation at the workshop, of which one was withdrawn by the authors. After the workshop the authors of 6 papers were finally invited to submit a revised version for these proceedings.

The workshop was a very lively one. There was lot of discussion, and the idea of a continuation workshop arose. One of the highlights of the workshop was Klaus Kuhn's keynote address about the current state of healthcare information systems.

We would like to thank the members of the Program Committee, as well as the local Organization Committee, for their professional work and time commitment. Special thanks goes to the EDBT 2006 workshop chair, Torsten Grust, from the Technische Universität München (Germany) who perfectly supported us during the whole workshop preparation and post processing. Last but not least, we would like to thank Klaus Kuhn from the Technische Universität München (Germany), for giving a superb keynote address at the workshop.

News and updates can be found via the workshop website: `http://www6.informatik.uni-erlangen.de/edbt06-WSIIHA`.

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International Conference on Semantics of a Networked World: Semantics of Sequence and Time Dependent Data (ICSNW 2006)

The explosion in information exchange fostered by the success of the Web has led to the identification of semantics as a critical issue in the development of services providing data and information to users and applications worldwide. A newly designated conference series on "Semantics of a Networked World" promoted by the IFIP WG 2.6 intends to continue the exploration of novel emerging trends that raise challenging research issues related to the understanding and management of semantics. Each conference, in addition to soliciting contributions of generic relevance in the semantics domain, plans to focus on a specific theme that conveys exciting promises of innovation.

The theme for ICSNW 2006 was "Semantics of Sequence and Time Dependent Data". Sequence and time dependent data are distinguished by the important role played by order, in modeling and querying the data. For example, monitoring dynamic phenomena produces data that arrive as a stream of temporal observations, whose querying and analysis make essential use of its temporal or sequential nature. Data warehouses give considerable prominence to the temporal dimension for decision support. Applications in the biological and financial domains naturally model their data using sequences, and the mining of such data makes critical use of this property. The purpose of ICSNW 2006, like its predecessors, was to provide an active forum for researchers and practitioners for the presentation and exchange of research results and the discussion of practical issues in the management of data, in particular applied to sequence and time dependent data.

The conference was held on March 30, 2006 in Munich, Germany. The technical program featured two invited keynote talks, one given by Tamer Ozsu (Sliding Window Query Processing over Data Streams), and another one given by John Mylopoulos (Data Semantics Revisited). Eight papers were accepted for the research track, with an acceptance rate of 1 in 3, and were presented in three sessions: Streams, Ontology Applications and Ontology Semantics.

Finally, the conference chairs would like to thank all the people who worked hard to make this conference a success. This includes the members of the steering committee, the members of the program committee, the invited speakers, the authors of the papers presented at the conference and the people who attended the conference.

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Query Languages and Query Processing (QLQP 2006)

QLQP 2006 was the 11th workshop in the international workshop series on Foundations of Models and Languages for Data and Objects (FoMLaDO), a series initiated and run by the Working Group on Foundations of Information Systems of the German Computer Society (Gesellschaft für Informatik e.V.). QLQP 2006 addressed topics like

– semantics of query languages,
– query languages for XML, RDF, etc,
– query optimization for semistructured data,
– query languages for sensors and data streams,
– query processing in large scale distributed and autonomous systems,
– processing continuous queries,
– adaptive and robust query processors.

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Second International Workshop on Pervasive Information Management (PIM 2006)

The number of mobile devices in use is growing at a tremendous rate. On the one hand, this is true for rather powerful devices like PDAs and smartphones, on the other hand, very lightweight devices like sensors and RFID tags are starting to be deployed in considerable numbers. This development opens the doors for new application areas where information stemming from a multitude of different sources is used to satisfy user demands. However, data management for these applications is a complex task since it has to deal with the mobility of users, devices and data as well as the specifics of wireless connectivity and the resource restrictions many of these devices exhibit. Therefore, new solutions that consider all these dimensions are needed for pervasive data management.

Information is becoming ubiquitous, highly distributed and at the same time accessible from everywhere at any time. However, accessing it takes place in highly dynamic and instable networks often using devices with limited I/O-capabilities and restricted power resources. Information obtained from different sources, among them sensors, needs to be integrated. From the user's point of view, all these difficulties should be invisible. Information access should be as similar to access from the desktop environment as possible.

These post-proceedings contain a selection of the accepted papers of the 2nd International Workshop on Pervasive Information Management, held in conjunction with the 10th International Conference on Extending Database Technology (EDBT 2006) on March 30th, 2006 in Munich, Germany. These papers address a broad range of issues in pervasive information systems. New and existing concepts and techniques are developed in the light of the rapidly increasing mobility of users and the great advances in system infrastructures, mobile devices, and sensor technologies.

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Second International Workshop on Pattern Representation and Management (PaRMa 2006)

PaRMa 2006 was the second international workshop on pattern representation and management, again taking place in conjunction with the International Conference on Extending Database Technology. PaRMa workshops accommodate advances on the management of patterns as database objects with conventional and extended/dedicated database operations.

The vast volumes of data in conventional form, in documents and in multimedia files demand for methods for the discovery of useful patterns from them. Such methods from the domain of knowledge discovery deliver patterns in the form of association rules, classifiers, clusters or time series. Similarly to the need for maintaining, retrieving and updating data, there is the same paramount need to administer patterns: To store them in databases in an efficient way and to provide appropriate query languages for retrieving them; to update them as new data reveal population drifts and to identify such drifts; to design methods for the querying, presentation, evaluation and comparison of patterns.

This year, the PaRMa workshop focussed on systems and query languages. The four papers of the post-workshop proceedings present four systems and underlying conceptual models for pattern management and querying. The system PSYCHO by Catania and Maddalena manages arbitrary types of patterns, working on top of a conventional DBMS architecture. The pattern management model XDM by Meo and Psaila focusses on the integration of data and patterns in an inductive database and builds upon XML as basis for a unifying framework. The system NaviMoz by Christodoulou, Dalamagas and Sellis manages navigation patterns in the Web and shows how portal owners and administrators can gain insights on users' habitual behaviour through pattern querying and inspection. The Précis query framework by Simitsis and Koutrika deals with free-form query answering over databases and delivers query results as multi-relational tables. The PaRMa 2006 workshop also featured an invited talk on PMML by Michael Thess (prudsys). PMML is an obvious candidate for the modeling of data mining patterns, since its emphasis is on pattern specification for exchange among data mining suites. However, PMML evolved independently of database advances. The potential of interplays between database pattern management methods and PMML has been the subject of a vivid panel that followed the invited talk.

The organizers of PaRMa 2006 would like to thank the authors, the reviewers and the invited speaker for their contribution to a successful workshop. Moreover, we would like to express our gratitude to the members of the Organizing Committee of EDBT 2006 for their support.

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Reactivity on the Web

Reactivity on the Web, the ability to detect simple and composite events that occur on the Web and respond to them in a timely manner, has recently emerged as an issue of concern in Web and Semantic Web circles such as the W3C (`http://www.w3.org`) and several international Semantic Web research initiatives such as REWERSE (`http://rewerse.net`). Although a common perception of the Web is that of a distributed information system giving rise to access data in a read only manner, many Web-based systems need to have the capability to update data found at (local or remote) Web resources, to exchange information about events (such as executed updates), and to detect and react not only to simple events but also to complex, real-life situations. The issue of updating data plays an important role, for example, in e-commerce systems receiving and processing buying or reservation orders, and e-learning systems selecting and delivering teaching materials depending on the students' performances on tests. The issues of notifying, detecting, and reacting upon events of interest are now beginning to play an increasingly important role within business strategies on the Web, and event-driven applications are being more widely deployed: Terms such as *zero latency enterprise*, the *real-time enterprise* and *on-demand computing* are being used to describe a vision in which events recognised anywhere within a business, can immediately activate appropriate actions across the entire enterprise and beyond. Businesses that are able to react to events quickly and take appropriate decisions are likely to have a competitive advantage.

The issue of automatic reaction in response to events of interest has its roots in the field of active databases; in particular, the issue of detecting composite events has received considerable attention. However, differences between (generally centralised) active databases and the Web, where a central clock and a central management are missing, give reasons for developing new approaches. Moreover, approaches that cope with existing and upcoming Semantic Web technologies (by gradually evolving together with these technologies) are more likely to leverage the Semantic Web endeavour. Along this line, of crucial importance for the Web and the Semantic Web is the ease of technologies' usage (in particular the languages' usage) that should be approachable also by non-programmers.

The workshop *Reactivity on the Web* was co-located with the 10th International Conference on Extending Database Technology (EDBT 2006) and represents an attempt to establish a more connected research community on Web reactivity. These proceedings contain the research articles accepted for presentation at the workshop. A total of 12 submissions were received and, based on three reviews per paper provided by the Programme Committee members, a 50 percent acceptance rate was decided. For the accepted papers a second round of reviewing was organized so as to provide high-quality workshop postproceedings. These proceedings contain also two invited articles that were the base of the workshop's invited talks given by François Bry (University of Munich) and Alexandra Poulovassilis (University of London): one article on theses

on reactive rules for the Web and one on event-condition-action languages for the Semantic Web.

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Query Languages and Query Processing (QLQP-2006)

Second International Workshop on Pervasive Information Management (PIM 2006)

Second International Workshop on Pattern Representation and Management (PaRMa'06)

Reactivity on the Web