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Databases, Information Systems, and Peer-to-Peer Computing

Second International Workshop, DBISP2P 2004
Toronto, Canada, August 29-30, 2004
Revised Selected Papers

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Preface

Peer-to-peer (P2P) computing promises to offer exciting new possibilities in distributed information processing and database technologies. The realization of this promise lies fundamentally in the availability of enhanced services such as structured ways for classifying and registering shared information, verification and certification of information, content-distributed schemes and quality of content, security features, information discovery and accessibility, interoperation and composition of active information services, and finally market-based mechanisms to allow cooperative and non-cooperative information exchanges. The P2P paradigm lends itself to constructing large-scale complex, adaptive, autonomous and heterogeneous database and information systems, endowed with clearly specified and differential capabilities to negotiate, bargain, coordinate, and self-organize the information exchanges in large-scale networks. This vision will have a radical impact on the structure of complex organizations (business, scientific, or otherwise) and on the emergence and the formation of social communities, and on how the information is organized and processed.

The P2P information paradigm naturally encompasses static and wireless connectivity, and static and mobile architectures. Wireless connectivity combined with the increasingly small and powerful mobile devices and sensors pose new challenges to as well as opportunities for the database community. Information becomes ubiquitous, highly distributed and accessible anywhere and at any time over highly dynamic, unstable networks with very severe constraints on the information management and processing capabilities. What techniques and data models may be appropriate for this environment, and yet guarantee or approach the performance, versatility, and capability that users and developers have come to enjoy in traditional static, centralized, and distributed database environments? Is there a need to define new notions of consistency and durability, and completeness, for example?

This workshop concentrated on exploring the synergies between current database research and P2P computing. It is our belief that database research has much to contribute to the P2P grand challenge through its wealth of techniques for sophisticated semantics-based data models, new indexing algorithms and efficient data placement, query processing techniques, and transaction processing. Database technologies in the new information age will form the crucial components of the first generation of complex adaptive P2P information systems, which will be characterized by their ability to continuously self-organize, adapt to new circumstances, promote emergence as an inherent property, optimize locally but not necessarily globally, and deal with approximation and incompleteness. This workshop examined the impact of complex adaptive information systems on current database technologies and their relation to emerging industrial technologies such as IBM's autonomic computing initiative.

The workshop was collocated with VLDB, the major international database and information systems conference. It offered the opportunity for experts from all over the world working on databases and P2P computing to exchange ideas on the more recent developments in the field. The goal was not only to present these new ideas, but also to explore new challenges as the technology matures. The workshop provided also a forum to interact with researchers in related disciplines. Researchers from other related areas such as distributed systems, networks, multiagent systems, and complex systems were invited.

Broadly, the workshop participants were asked to address the following general questions:

- What are the synergies as well as the dissonances between the P2P computing and current database technologies?
- What are the principles characterizing complex adaptive P2P information systems?
- What specific techniques and models can database research bring to bear on the vision of P2P information systems? How are these techniques and models constrained or enhanced by new wireless, mobile, and sensor technologies?

After undergoing a rigorous review by an international Program Committee of experts, including online discussions to clarify the comments, 14 papers were finally selected. The organizers are grateful for the excellent professional work performed by all the members of the Program Committee. The keynote address was delivered by Ouri Wolfson from the University of Illinois at Chicago. It was entitled “DRIVE: Disseminating Resource Information in Vehicular and Other Mobile Peer-to-Peer Networks.” A panel, chaired by Karl Aberer from EPFL (Ecole Polytechnique Fédérale de Lausanne) in Switzerland, addressed issues on next-generation search engines in a P2P environment. The title of the panel was “Will Google2Google Be the Next-Generation Web Search Engine?”

The organizers would particularly like to thank Wee Siong Ng from the University of Singapore for his excellent work in taking care of the review system and the website. We also thank the VLDB organization for their valuable support and the Steering Committee for their encouragement in setting up this series of workshops and for their continuing support.

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