
Preface

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Biographical notes: Ciprian Dobre received his PhD in Computer Science at the University Politehnica of Bucharest in 2008. He received his MSc in Computer Science in 2004 and Engineering degree in Computer Science in 2003, at the same university. His main research interests are grid computing, monitoring and control of distributed systems, modelling and simulation, advanced networking architectures, parallel and distributed algorithms. He is a member of the RoGrid Consortium and is involved in a number of national and international projects. His research activities were awarded with the Innovations in Networking Award for Experimental Applications in 2008 by the Corporation for Education Network Initiatives (CENIC). He has published in leading international journals and conferences and has served in the organising committees of many conferences and workshops.

Joan Arnedo is a Lecturer at Estudis d'Informàtica, Multimèdia i Telecomunicació in the Open University of Catalonia (UOC) and works as a part-time Assistant at the Universitat Politècnica de Catalunya (UPC). From the latter, he earned his degree in Computer Science in 2002 and his PhD in 2009. He has published several papers in international conferences and journals and has been invited as keynote speaker at several conferences. Both his teaching and research interests are related to the fields of networking and security, more specifically in peer-to-peer systems.

Peer-to-peer (P2P) is a distributed computing paradigm that enables a collection of nodes (peers) to share computer resources in a decentralised manner. P2P computing is an alternative to the traditional centralised and client-server models of computing, where central servers are required for the coordination of sharing and computing activities among client computers.

An important feature that has to be fulfilled by P2P applications is associated with searching files, contents and entities. This is why researchers need to find efficient solutions for P2P systems such as: algorithms to improve the efficiency, scalability, robustness, security of query routing in P2P systems, and services such as indexing and search, dissemination, and rendezvous for applications running on top of these systems.

But P2P is also about the large-scale aggregation and sharing of computation, data and other geographically distributed resources. Therefore, new issues related to such technologies are being investigated in order to enable the design and deployment of large scale distributed systems using P2P technologies. Among such important issues are:

- The impact of P2P traffic is growing fast and encompasses the major part of current internet traffic. However, today, video streaming applications are the most bandwidth-hungry applications and this tendency is envisaged to grow exponentially, even more with P2P streaming applications. Future P2P applications will require to share and distribute high quality multimedia content and services in a flexible, efficient and personalised way through dynamic and heterogeneous environments.
- Investigation of performance models in large scale distributed and parallel systems based on P2P technologies. Owing to the intrinsic nature of P2P, new models are required to formalise and measure the performance of large scale distributed and parallel systems.

These issues are nowadays real challenges to the development of large distributed systems and applications based on P2P technologies and applications.

This special issue comprises six papers carefully selected based on their originality, significance, technical soundness, and clarity of exposition. The first three papers are selected from best papers presented at the 13th International Conference on Network-Based Information Systems (NBiS-2010) (<https://www.ilcc.com/nbis2010/>) held at Takayama, Gifu, Japan in 14–16 September 2010. The last three papers are selected in the special issue theme from regular submissions. The papers are organised as follows.

In the first paper, Aikebaier et al. present a trustworthiness-based broadcast (TBB) algorithm where only the trustworthy peers forward messages. In the agreement protocol, each peer has to deliver values to all the peers in a group. The algorithm takes advantage of the multipoint relaying (MPR) mechanism to efficiently broadcast messages. The authors demonstrate that the transmission fault implied by faulty peers can be reduced. They evaluate the TBB algorithm in terms of the number of messages compared with the pure flooding and MPR algorithms.

Okaie and Nakano, in the second paper, consider a P2P resource market where participating peers provide their own computing resources to earn virtual money called energy, which is used in such a market to buy resources or services provided by others. The authors present a game theoretic framework for understanding the dynamics of resource prices where resource providing peers behave rationally. They determine prices for own resources to maximise their own energy gains. The framework is further used to understand the market dynamics in two specific environments. Analytical and simulation studies are presented to identify conditions for P2P resource markets to achieve long-term price stability.

In the third paper, Sawamura et al. discuss three algorithms designed to calculate the objective trustworthiness on a target acquaintance. In the first algorithm a peer tries to find every acquaintance using a flooding algorithm. In the subsequently proposed algorithms the authors further propose improvements, such that peers send messages only to acquaintances to reduce the number of messages, based on trust for example. Evaluation results are also presented, showing how correct objective trustworthiness can be obtained.

Szekeres et al. in the fourth paper approach the development of keyword-based search algorithms in structured P2P networks. The authors propose a

keyword-based search algorithm and demonstrate that, when implemented on top of a structured P2P overlay, it achieves good results. The experimental results show how the proposed algorithm minimises the number of messages to be sent for finding references to files containing a given set of keywords.

In the fifth paper, Andreica et al. address the problem of efficiently constructing in a fully distributed manner multicast trees which are embedded into P2P overlays using virtual geometric node coordinates. The authors present a solution that minimises the number of messages required for constructing a multicast tree by using the geometric properties of the P2P overlay, and constructs stable multicast trees when the lifetime durations of the peers are known.

In the last paper, Praditong-ngam and Natwichai deal with the efficiency issue of the context-based video indexing over P2P networks. The authors present an improved video index that better suits the P2P computational model. They propose algorithms to perform the video query based on the content similarity in the P2P environment, together with algorithms to handle the node joining, departure, and index entry insertion. They present experiment results that show that the proposed approach outperforms previous approaches, and that the efficiency in terms of the query answering is bounded by linear complexity. Moreover, the authors propose a load balancing approach that is much more efficient than the naive approach in all experiments.

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