Preface

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Biographical notes: Fatos Xhafa received his PhD in Computer Science from the Technical University of Catalonia (UPC), Spain, in 1998. He is currently Associate Professor and member of the ALBCOM Research Group of the Department of Languages and Informatic Systems (UPC). His current research interests include parallel algorithms, combinatorial optimisation, meta-heuristics, distributed programming, Grid and P2P computing. He has served as Organising Chair of ARES-2008, PC Chair of CISIS-2008 and General Co-Chair of HIS-2008 conferences held in Barcelona. Presently, he is PC Co-Chair of AINA-2010 and General Co-Chair of CISIS-2010. He is also member of the editorial boards of several international journals.

Leonard Barolli received his BE and PhD from Tirana University and Yamagata University in 1989 and 1997, respectively. Presently he is a Full Professor at Fukuoka Institute of Technology. He has published more than 250 papers in refereed journals, books and international conference proceedings. He has served as a Guest Editor for many international journals. He has chaired several international conferences and workshops. He is the Steering Committee Chair of CISIS International Conference. His research interests include network traffic control, ad-hoc networks, sensor networks, web-based applications and P2P systems. He is a member of SOFT, IPSJ and IEEE.

Grid and P2P computing systems are new large-scale distributed paradigms. These paradigms are about the large-scale aggregation and sharing of computational, 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 Grid and P2P technologies. Among such important issues there are:

- Investigation of semantic models for efficient and transparent access to data. Indeed, Grid and P2P systems usually have to access large amounts of data and information repositories belonging to different institutions or administrative domains. The disparity in data formats used requires efficient, secure and transparent access to data from Grid and P2P applications.

- Investigation of performance models in large-scale distributed and parallel systems based on Grid and P2P technologies. Owing to the intrinsic nature of Grid and P2P systems (high heterogeneity of resources, interconnection by heterogeneous networks, etc.), 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 Grid and P2P technologies.

This special issue follows the Second Workshop on P2P, Parallel, Grid and Internet Computing (3PGIC-2008) held at the Technical University of Catalonia in Barcelona (Spain) on 4–7 March 2008. It comprises six papers carefully selected based on their originality, significance, technical soundness and clarity of exposition.

In the first paper, Wang et al. present a semantic metadata framework using ontology for large-scale scientific datasets in a Data Grid setting. The authors deal with the issues of data integration and semantic reasoning for data. The framework is aimed at enabling data interoperability between semantically incompatible data sources, cross-domain query capabilities and multi-source knowledge extraction; the basic system architecture for this framework, as well as an initial implementation is presented.

Baert et al., in the second paper, consider the data replication problem for the case of a distributed video on demand system, which is, on turn, based on Grid delivery network – a hybrid architecture based on P2P network and Grid computing. The authors propose a probabilistic model to optimise the average download time of requests for a

document. The resulting optimisation problem is shown to be solvable by Lagrangian optimisation; approximation algorithms and their validation through simulations are therefore given.

In the third paper, Tudor et al. address the shared data programming on the grid as an alternative to message passing widely used in current Grid computing. The shared data programming is handled by making use of both relaxed consistency models and user-specified type consistency in an object-oriented model. A prototype architecture and replication related experimental results are also presented.

Gutierrez-Carreon et al. in the fourth paper approach the development of collaborative and personalised learning frameworks based on the distributed learning services and resources available in a learning Grid environment. The authors show how to use and integrate low-level learning services to compose more complex high-level services or tools that can be useful to both tutors and learners. The benefits and limitations of the Business Process Execution Language for web services and web service modelling ontology are analysed in terms of the composition of learning portals based on Grid learning services.

In the fifth paper, Pllana et al. propose a novel approach for hybrid performance modelling and prediction of large-scale parallel and distributed computing systems by combining mathematical modelling and discrete-event simulation.

A high-level performance model is thus obtained, which combines the evaluation speed of mathematical models with the structure awareness and fidelity of the simulation model. The approach is evaluated empirically by applying it to large real-world material science programme.

In the last paper, Xuan et al. deal with the queries in spatial and mobile database. The authors consider the range search and *k*-nearest neighbour queries. The continuous range search query processing is an important issue in such context. Existing approach to continuous range search has an acceptable performance but is impractical because the query path needs to be segmented. The authors propose a new approach based on network Voronoi diagram for range search, where the query path does not need to be segmented.

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