Preface

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Tomoya Enokido received his BE and ME in Computers and Systems Engineering from Tokyo Denki University, Japan, in 1997 and 1999, respectively. He worked for NTT Data Corporation until he joined Tokyo Denki University in 2002. He received his DE in Computer Science from Tokyo Denki University in 2003. He worked for Computers and Systems Engineering as a research associate, and joined the Faculty of Business Administration of Rissho University in 2005 as a Lecturer. He won the best paper award of the *18th International Conference on Advanced Information Networking and Applications, 2004*. His research interests include distributed systems, group communication, and distributed objects.

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The ever-growing popularity of the internet, along with the availability of powerful computational capacity, enables the sharing, selection, and aggregation of a wide variety of geographically distributed resources, such as supercomputers, storage systems, data sources, and special classes of devices dynamically at runtime. Performance modelling and measurement of web and grid services, architectures, and applications have been an important research area over the past years and posed challenging problems that require new tools and methods to keep up with the rapid evolution and increasing complexity of such systems.

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high-quality papers presented at the *20th International Conference on Advanced Information Networking (AINA-2006)* and ten workshops in conjunction with AINA-2006, which were successfully held at Vienna University of Technology in Vienna, Austria, 18–20 April, 2006. The special issue covers the various aspects of performance evaluation of architectures, algorithms, communication protocols, and applications of Web and Grid computing systems. The AINA-2006 International Conference is a forum for sharing ideas and research work in the emerging areas of information networking and their applications. The conference received 521 paper submissions and every paper was reviewed carefully by at least three reviewers according to their quality, originality, and significance. Based on the review results, 153 papers were accepted for presentation. Ten workshops were held in conjunction with the conference and a total of 140 papers were accepted. All the authors of AINA-2006 conference and workshops were encouraged to submit their revised manuscripts to this special issue and 11 submissions were received. The papers were reviewed carefully by at least two reviewers based on technical quality and suitability to the special issue as well as the journal. Finally, eight high-quality papers were selected and revised following reviewers' comments.

In the first paper, Li and Song present a new real-time Quality-of-Service (QoS) scheme, called Relaxed (m, k)-firm, for multimedia flow transmission and propose a real-time constraint relaxation scheme that can deterministically guarantee the (m, k)-firm constraint. The simulation results and performance comparison with other schemes reveal that the proposed schemes can increases the resource utilisation by replacing per packet deadline with the delay on the group of packets.

A lot of data mining techniques have high requirements on the cleanness of the input data. Wöhrer et al. present the data service side architecture to gather data statistics on-the-fly and use them in remote data preprocessing methods on query results. Moreover, an approach is proposed to gather exact continuous data statistics for whole tables inside a database on the Grid. The performance results of the prototype framework implementation show low running costs for the continuous data statistics inside the database and also demonstrate the feasibility of the service side data preprocessing functionality.

The ability for a distributed system to detect the process failure is widely recognised as an essential issue for fault-tolerant systems. Hayashibara and Takizawa discuss the issue on the construction of the monitoring network of failure detectors. They further propose an algorithm to construct and manage the monitoring network where each failure detector is monitored by some failure detectors. Notification of failures is propagated along the network. Simulation experiments show that the algorithm is scalable for increasing the number of failure detectors.

Nishino et al. present a framework to constitute a Distributed Virtual Reality (DVR) system in a heterogeneous high-speed network environment. They propose a new DVR architecture to build a scalable system on a long-haul international network. A hybrid approach is used to realise both data consistency and scalability. Experiments are performed using a Korea-Japan high-speed research network test bed to validate the proposed method.

The emergence of the grid provides an opportunity to address the issue of distributed simulation which demands more computational power and thus makes advances in modelling and analysis of large-scale systems by harnessing the power of many computers simultaneously. Jiang et al. present a generic framework and a prototype implementation for specifying and executing distributed simulations over the grid. The main advantage of the framework is that it is able to harness grid resources thanks to the adaptation and integration of a distributed simulation kernel, GTW and the Globus middleware.

Data is one of the domains in grid research that deals with the storage, replication, and management of large data sets in a distributed environment. Mat Deris et al. propose the all-data-to-some-sites scheme called the Neighbour Replication on Triangular Grid (NRTG) technique by considering that only neighbours have the replicated data. The proposed scheme minimises the storage capacity as well as data access time with high update availability. In comparison to the Tree Grid Structure (TGS) structure, NRTG requires significantly lower communication cost for an operation, while providing higher system availability, which is preferred for large systems.

Modern enterprise knowledge management systems typically require distributed approaches and the integration of numerous heterogeneous sources of information. Korthaus et al. present the architecture and a prototypical implementation for a distributed knowledge management system infrastructure that allows a client to query any number of topic maps residing on distributed nodes in a network in a transparent manner, as if the client would locally access one big unified topic map. The architecture uses a clearly structured layered protocol stack in order to facilitate the replacement of parts of the implementation. The prototypical implementation in Java show promising performance results.

In the last paper, Binder et al. develop a novel infrastructure with service invocation triggers that are able to route intermediary results from their origin directly to the sites where they are consumed. This work is motivated by the fact that the traditional and centralised workflow orchestration often leads to inefficient routing of messages. Evaluation results confirm that the

decentralised orchestration scheme allows network traffic to be significantly reduced in comparison with centralised orchestration.

We hope that this special issue will lead to a better understanding on performance evaluation of web and grid based computing systems. We thank all the authors for submitting their papers, and all the reviewers for their great work. In particular, we would like to address our special thanks to Editors-in-Chief of *International Journal of High Performance Computing and Networking*, Professor Laurence T. Yang and Professor Yi Pan, for their strong encouragement and support.