Guest Editorial: Special Section on Middleware Infrastructures

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THIS special section of *Transactions on Parallel and Distributed Systems* is devoted to middleware infrastructures and gathered nine papers.

The first paper is about refactoring middleware with aspects and is authored by C. Zhang and H. Jacobson. The paper is a case for the introduction of aspect-oriented programming techniques within object request brokers.

The second paper describes an energy-efficient object discovery protocol for context-sensitive middleware for ubiquitous computing, and is authored by S. Yau and F. Karim. The paper introduces a technique for discovering objects in a distributed environment that is efficient in terms of energy consumption.

The third paper describes a middleware platform called OBIWAN, and is authored by P. Ferreira, L. Veiga, and C. Ribeiro. The platform performs automatic creation of object replicas (e.g., incremental on-demand replication) as well as garbage collection of useless objects.

The fourth paper presents a middleware infrastructure for parallel and distributed programming models on heterogeneous systems, and is authored by J. Al-Jaroodi, N. Mohamed, H. Jiang, and D. Swanson. The infrastructure handles class loading and distributed deployment in a transparent manner.

The fifth paper is about an adaptive quality-of-service aware middleware for replicated services, and is authored by S. Krishnamurthy, W. Sanders, and M. Cukier. The idea is to provide the clients of a replicated service the ability to specify temporal and consistency requirements and have the server adjust its replication strategy according to these requirements.

The sixth paper describes an OCI-based group communication support for CORBA, and is authored by D. Lee, D. Nam, H. Youn, and C. Yu. The paper presents a way to transparently enhance CORBA with group communication and object group management primitives.

The seventh paper introduces a cluster programming middleware for stream oriented applications, and is authored by U. Ramachandra, R. Nikhil, J. Rehg, Y. Angelov, A. Paul, S. Adhikari, K. MacKenzie, N. Harel, and K. Knobe. The paper presents a middleware infrastructure with adequate support for data abstractions, dynamic cluster-wide threads, data parallelism, and multiple address spaces.

The eighth paper focuses on the design and performance of real-time Java middleware and is authored by A. Corsaro and D. Schmidt. The paper describes an open-source implementation of the real-time specification for Java middleware and corresponding performance measures.

The ninth paper describes clustering support and replication management for scalable network services, and is authored by K. Shen, T. Yang, and L. Chu. The presented middleware infrastructure, named Neptune, employs a loosely connected and functionally symmetric clustering to achieve scalability and robustness.

We are extremely grateful to all the reviewers who provided very useful feedback to select the papers and improve their presentation, as well as to all of the authors of the submitted papers for their interest in this special section.

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Guest Editors

Rachid Guerraoui received the PhD degree in 1992 from the University of Orsay. He has been a professor of computer science since 1999, at EPFL (Ecole Polytechnique Federale de Lausanne) in Switzerland, where he founded the distributed programming laboratory. Prior to that, he was with HP Labs in Palo Alto, the Center of Atomic Energy (CEA) in Saclay (France), and the Centre de Recherche de l'Ecole des Mines de Paris. His research interests include distributed algorithms and distributed programming languages. In these areas, he has been a principal investigator of a number of research grants and has published papers in several journals (including *ACM TOCS*, *ACM CS*, *Distributed Computing*, *IEEE Transactions on Computers*, *IEEE Transactions on Software Engineering*, *IEEE Transactions on Parallel and Distributed Systems*, *IEEE Computer*, *IEEE Software*, *IPL*, and *Theoretical Computer Science*) and conferences (including ACM PODC, ACM OOPSLA, ECOOP, IEEE ICDCS, IEEE DSN, DISC, Europar, IEEE SRDS, IFIP TCS, etc.). He has served in program committees for various conferences (including ACM PODC, ACM OOPSLA, ECOOP, DISC, IEEE ICDCS, IEEE DSN, and IEEE SRDS) and has chaired the program committees of ECOOP 1999, Middleware 2001, and SRDS 2002.

Willy Zwaenepoel received the BS degree from the University of Gent, Belgium in 1979, and the MS and PhD degrees from Stanford University in 1980 and 1984, respectively. In September 2002, he was nominated full professor and Dean of the School of Computer and Communications Sciences of the EPFL. Before joining the EPFL, he was on the faculty at Rice University, where he was the Karl F. Hasselmann Professor of Computer Science, and the electrical and computer engineering and director of the Computer Systems Laboratory, a joint effort between the Computer Science and the Electrical and Computer Engineering Departments. He was also an associate editor of the *IEEE Transactions on Parallel and Distributed Systems*. His interests are in all aspects of distributed computing. While at Stanford, he was involved in the design and implementation of the V-System. At Rice University, he has worked on two distributed shared memory systems, Munin and TreadMarks, on checkpoint/restart through coordinated checkpointing, and message logging in the Manetho system. He has also worked with Alejandro Schaffer on FASTLINK, a project to provide fast sequential and parallel genetic linkage analysis software. His most recent projects, ScalaServer and Puppeteer, focus on system support for scalable network servers and adaptation of component-based applications for mobile computing. He was elected fellow of the IEEE in 1998, and fellow of the ACM in 2000. In 2000, he also received the Rice Graduate Student Association Teaching and Mentoring Award.

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