Guest Editorial

Topics in Integrated Management: Selected Papers from IM'2001

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The IEEE/IFIP International Symposium on Integrated Network Management 2001 (IM 2001, *http://www.comsoc.org/confs/im/2001*) took place in Seattle, Washington, USA, May 14–18, 2001. This premier symposium continues the highly regarded series sponsored by the IEEE Communications Society Committee on Network Operations and Management (CNOM), and the International Federation for Information Processing (IFIP) Working Group 6.6 on Management of Networks and Distributed Systems. This was the seventh since the initial one in 1989 in Boston, which was followed by 1991 in Washington D.C.; 1993 in San Francisco; 1995 in Santa Barbara; 1997 in San Diego; and 1999 again in Boston to celebrate its 10 years.

The theme for IM 2001 was "Integrated Management Strategies for the New Millennium," focusing on the central role integrated management plays in worldwide information networking. At the dawn of the new millennium, the ubiquitous explosion of the Internet and the fast proliferation of networked devices create a unique challenge. Innovative solutions are required and new ways of strategic thinking must be incorporated into future management products and services. Management in this new information era should support the integration of data and telecommunication networks, from narrowband to broadband, terrestrial to satellite, fixed to mobile, and uni-media to multimedia.

The IM 2001 Technical Program Committee followed through on this theme by assembling a technical program covering key aspects of integrated management in the new networked era. There were sessions to cover emerging areas such as IP management, cellular network management, active and programmable network management, mobile code, and pricing. At the same time, the program

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accommodated continuing strong interest in popular areas with sessions on event and fault management, service and SLA management, virtual private network management, SNMP, CORBA, etc. A full report on IM 2001 can be found in the *JNSM* Volume 9 Number 3 issue of September 2001, pp. 363–366.

The papers in this special issue are based on publications from the IM 2001 symposium. Out of the 51 papers accepted in IM 2001, the guest editors selected five based on the review rank they received in terms of originality and technical quality, and invited their authors to submit extended versions for this special issue. After an additional round of reviews and revisions, all five papers were accepted for publication in this special issue of *JNSM*.

The first paper by C. Ensel and A. Keller considers the general problem of managing application and service dependencies, which is a necessity in contemporary e-business environments. The outsourcing of services results in a large number of such dependencies, which need to be tracked down for fault management and other reasons. The use of XML-based technologies is considered to model and manage such dependencies, including XPath and RDF. A dependency model is presented based on a resource description framework together with a proof-of-concept implementation.

The second paper by K. Appleby, G. Goldszmidt, and M. Steinder presents a model-based event correlation engine for multi-layer fault diagnosis, called Yemanja. This targets complex propagating fault scenarios and can correlate low-level network events with high-level service and application performance alerts, related to quality-of-service violations. Yemanja has been used to diagnose network problems and violation of contracted Service Level Agreements (SLAs) in a server farm environment. The paper discusses both the correlation model and its applicability to example event correlation scenarios.

The third paper by R. State, O. Festor, and E. Nataf, considers network-level information models that encompass temporal properties in order to capture the statistical behavior of the network over a period of time. Temporal network information models are necessary, for example, to model highly dynamic virtual private networks. The paper presents temporal extensions to a static network information model, formalized through temporal extensions to UML, and making use of design patterns. This temporal model is used to model and manage dynamic multicast trees for TV channel distribution to subscribed residential customers, who can subscribe and unsubscribe fairly dynamically.

The fourth paper by P. Magnusson and J. Oom describes a distributed management system architecture, including algorithms for automatic tuning of cellular networks. Information is collected from the network elements through distributed management agents that encompass monitoring and control tasks for flexibility and scalability. An algorithm for self-tuning was developed that modifies the cell size in order to deal with traffic demand. An evaluation of the algorithm is presented

while the overall architecture has been implemented, deployed and evaluated in a field trial.

Finally, the fifth paper by J. Cabrera, L. Lewis, X. Qin, W. Lee, and R. Mehra bridges the gap between intrusion detection systems and SNMP-based network management by proposing an approach for the early detection of denial-of-service attacks, based on the examination of recoded SNMP MIB variables. Keys for the approach are time series quantization and the application of the statistical Granger causality test for selecting variables that are likely to contain precursors. The proposed approach was validated in a local network testbed with controlled traffic load and can be used for security analysis, for triggering alarms indicating an imminent attack or for reducing false alarm rates of conventional systems.

We hope that these papers offer the readers a view of some important research topics addressed in IM'2001. We also take this opportunity to thank the authors for their contributions in extending their IM'2001 papers and the reviewers for their valuable reviews that contributed through constructive comments to the quality of this issue.

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