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Editorial

Topics in system administration

Network and system administration is about the management of human–computer systems, including hardware, software and users. It is about resource management and fault-finding as much as it is about installation and configuration. At Oslo University College, my own group has been involved in this research for about ten years and we have been keen to develop a surprisingly embryonic field into a proper academic discipline. Traditionally one has thought of "network management" in terms of communications protocols for sending commands to devices, and the matter has been considered trivial by many computer scientists. Gradually, developments such as policy based management and constrained configuration have raised the level of discussion about management. To signal its development, our University College in Oslo now offers Masters degrees in this area and we have doctoral students working on the science of human–computer management.

When I was asked to act as guest editor for this special edition, I was pleased that a quality journal had taken an interest in an important yet under-represented field. I was immediately keen to invite contributions on a range of topics and was especially keen to draw upon the USENIX community, which has been very innovative in solving the practical problems of human–computer management. Although telecommunications inspired management protocols, such as SNMP, have dominated the literature for some time, these are little more than communication paradigms and do not help to solve the practical issues of policy decision and optimization, nor elucidate principles of such management. What is needed in the future is a combination of skills and analysis that is beginning to be reflected in published works. The response to the call for papers was meagre; I had hoped to receive rather more submissions to this edition than I did. The community of researchers in this area is admittedly small, but additionally the past two years have shown an unprecedented interest in conferences in the field. This is quite a slim volume, mainly due to the unusual number of conferences in 2003. Several authors whom I approached to write for this edition were already committed to writing for these conferences. Some of the submissions were not appropriate.

What we end up with is five strong papers, based on established work, that span a range of issues from traditional topics such as grammatical analysis to more scientific topics such as statistical analysis and system decomposition based on graphical methods. The paper by Qie and Narain identifies the grammar of the peer interactions of the Border Gateway protocol and suggests enforcing this grammar to avoid contradictory or problematic configurations in a distributed setting. Coordinating system policies between autonomous systems is every bit as complex as coordinating politics amongst neighbouring countries, each with their own styles and priorities. The paper by Wang et al. takes an important step

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in going beyond the boolean “works/does not work” level of description for desktop hosts and employs statistical methods to find anomalous behaviour and identify the cause, while the paper by Steinder and Sethi provides a long overdue review of the generic field of fault localization, using a variety of graphical methods to shed light on the problems. These authors have contributed significantly to this area of research for several years.

Canright and Engø-Monson employ novel methods of graph theoretical analysis to identify hot-spots in a network and take into account something that the traditional telecommunications protocol approach has neglected, namely that networks are socially driven phenomena and require a model for that interaction in addition to merely locating the devices. Which are the important devices or people in the system? How does this load change as the external conditions change? In this work, we see a deep connection between the study of consistency in bounded systems that has long been known for continuous systems in fluid mechanics and electrical systems and the nature of the connections and boundaries in discrete, partially connected networks.

The paper by Couch and Sun begins to address a problem that has only revealed itself as our sophistication in the field has grown: namely, how to formalize the way we talk about configuration management. For many years it has been possible to talk at cross-purposes because no formal methods were being used. My own work has also been in this area. While the committees of the IETF have previously defined a data model based on fixed attributes, Management Information Bases (MIB), using a language of Structure of Management Information (SMI), this describes only a model of static data, not the constraints that are required to translate description into reality. The simply peek–poke (read/write) protocols of the 1980s are no longer adequate to cope with the complexity of desktop systems with the level of user-predictability that we require in the 21st century.

What binds all these papers together is a common realization of the need for a dialogue between observation and theoretically motivated design—a move from the purity of axiom and deduction to an empirical science in which complexity is managed rather than suppressed.

As general conference chair of LISA 2001, I made a rewarding effort to draw together two disparate communities from USENIX and the IFIP/IEEE and get them talking. Once again in this edition, the papers blend contributions from these two previously separate camps, representing both industry and academia; some of the work has appeared in an earlier form at the USENIX and IFIP/IEEE meetings. Here it is collected in a convenient form for the entire community.

Mark Burgess
Oslo University College,
Postboks 4St. Olavs plass,
0130 Oslo, Norway
E-mail address: mark@iu.hio.no

Tel.: +47-22453272; *fax:* +47-22453205

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