Keynote I

Computing and Communications Resilience: The Keystone of Modern Global Applications

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Universidade de Lisboa & LaSIGE, Portugal

Abstract
Computing and communications have become commodities which societies largely depend on. However, security and dependability are often neglected, and partial fixes have been the usual way to mend specific problems and situations. The large-scale systems composing today’s internet-cloud complex must be able to cope as well with performance crises, as with cascading failures, massive attacks, or persistent stealth threats. Yet, the society has been incurring ever larger cyber risks, without an effective protection, which can no longer be assured by classical paradigms.

In consequence, some researchers have been arguing for the need of a paradigm shift that may result in a comprehensive approach to all those threats, from first principles. Architecting and designing for resilience is just the concept of simultaneously coping with accidental and malicious faults, providing protection in an incremental way, and automatically adapting to a dynamic range of severity and persistence of threats, some of which maybe a priori unknown. This talk illustrates the problem and some avenues for solutions, suggesting that, with the adequate techniques, automatic and adaptive security and dependability can be achieved, against a varying range of threats.

Speaker’s Bio
Dr. Paulo Veríssimo is a Professor of the Department of Computer Science and Engineering, U. of Lisbon Faculty of Sciences (FCUL-http://www.di.fc.ul.pt/~pjv), adjunct Professor of the ECE Dept., Carnegie Mellon University, elected member of the Board of the U. of Lisbon and of the Scientific Council of the FCUL, and Director of LaSIGE (http://lasige.di.fc.ul.pt). He is currently Chair of the IFIP WG 10.4 on Dependable Computing and Fault-Tolerance and vice-Chair of the Steering Committee of the IEEE/IFIP DSN conference. PJV is Fellow of the IEEE and Fellow of the ACM. He is associate editor of the Elsevier Int’l Journal on Critical Infrastructure Protection. Veríssimo leads the Navigators group of LaSIGE, and is currently interested in distributed architectures, middleware and algorithms for: adaptability and safety of real-time networked embedded systems; and resilience of secure and dependable large-scale systems. He is author of over 170 peer-refereed publications and co-author of 5 books. Google Scholar Citations profile: http://scholar.google.com/citations?user=aMHx8aUAAAAJ
Abstract
In recent years, we have seen dramatic improvements in parallel machine learning, large-scale knowledge mining, and big computing infrastructure, which are boosting the capacity to process and understand data at an unprecedented scale. With the ability to build big models and big graphs from big data, I believe we are a step closer to tackling the challenge of machine comprehension of text. In this talk, I will introduce an initiative at Microsoft Research to develop a scalable system that integrates the power of different representations (structured, continuous, and discrete) of meanings and provides real time serving and search capabilities that will allow machines to comprehend natural language for question answering and task completion.

Speaker’s Bio
Dr. Wei-Ying Ma is an Assistant Managing Director at Microsoft Research Asia, where he oversees multiple research groups, including Web Search and Data Management, Natural Language Computing, Knowledge Mining, Machine Learning, and Internet Economics and Computational Advertising. He and his team of researchers have developed many key technologies that have been transferred to Microsoft’s Applications and Services Group, including Bing Search Engine and Microsoft Advertising. He has published more than 250 papers at international conferences and in journals. He is a Fellow of the IEEE and a Distinguished Scientist of the ACM. He served on the editorial boards of ACM Transactions on Information System (TOIS) and is a member of the International World Wide Web (WWW) Conferences Steering Committee. In recent years, he has served as program co-chair of WWW 2008 and as general co-chair of ACM SIGIR 2011. More information about him can be found at http://research.microsoft.com/en-us/people/wyma/.
Humanware: A Biologically Inspired Approach for Innovation in Information Technology

Shojiro Nishio
Osaka University, Japan

Abstract
Information technology has been developing remarkably in both hardware and software. People are now closely interconnected through information networks which together form a complex and dynamic supra-network. We need to adopt new approaches to innovation that are aligned with our rapidly changing social environment. In order to do so, it is more important than ever before to promote research toward the construction of systems that are complex, but at the same time flexible, robust and sustainable. One urgent challenge in information technology is the development of an entirely new concept: "humanware," which incorporates the same principles as a biological system. Our concept of humanware is considered the third ware complementing hardware and software technologies, and it addresses the flows of information linking humans and the resulting transformation of human relationships. To acquire skills related to humanware, it is essential to understand the "information dynamics" required to construct an information society attuned to both humans and the environment. It is also necessary to understand "cognitive dynamics," the dynamics of higher brain functions for receiving, understanding, and generating information, as well as "biological dynamics," the dynamics of biological systems to adapt to people and the environment. In this talk, we first discuss the importance of humanware for creating innovation in information technology, and then introduce our ongoing Humanware Innovation Program supported by the Program for Leading Graduate School of the MEXT (the Ministry of Education, Culture, Sports, Science and Technology in Japan). This program aims at fostering leaders to construct flexible, robust, and sustainable systems that support an ever-changing social environment based on the concept of humanware.

Speaker’s Bio
Dr. Shojiro Nishio received his B.E., M.E., and Ph.D. degrees from Kyoto University in Japan, in 1975, 1977, and 1980, respectively. He has been a full professor at Osaka University since August 1992, and was bestowed the prestigious title "Distinguished Professor of Osaka University" in July 2013. He served as a Vice President and Trustee of Osaka University from August 2007 to August 2011. Dr. Nishio has authored or co-authored more than 600 refereed journal and conference papers. He served as the Program Committee Co-Chairs for several international conferences including DOOD 1989, VLDB 1995, and IEEE ICDE 2005. He has also served as an editor of several renowned journals including IEEE Trans. on
Knowledge and Data Engineering, VLDB Journal, ACM Trans. on Internet Technology, and Data & Knowledge Engineering. Dr. Nishio has received numerous awards for his research contributions, including the Medal with Purple Ribbon from the Government of Japan in 2011. He is also a Fellow of IEEE, IEICE and IPSJ, and is a member of four learned societies, including ACM.