Keynote
Emergent Properties in Complex Systems
– A Computer Science Perspective

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Complex systems often exhibit properties that are not easily predictable by analyzing the behavior of their individual, interacting components. These properties, called *emergent properties,* are increasing becoming important as software and systems grow in complexity, interconnectedness and geographic distribution [2, 3]. Examples of emergent properties include connection patterns in data extracted from social network, trends in big data analytics, and power supply variation in smart grids due to provider competition. More malign examples of emergent properties in computer systems include the Ethernet capture effect, router synchronization problems, and load-balancer failures in a multi-tiered distributed system.

This keynote is divided into two main parts. Firstly, we review the state-of-the-art in understanding emergent properties covering a classification of emergence, different perspectives of emergence from philosophy, social sciences to computer science [3]. In the second part, we compare and contrast three main approaches in formalizing emergent properties and we present a computer science approach for semantic validation of emergence in component-based simulation systems [1, 4, 5].

Biography

TEO Yong Meng is an Associate Professor with the Department of Computer Science at the National University of Singapore. He heads the Information Technology Unit and the Computer Systems Research Group. He has been a Visiting Professor at the Shanghai Advanced Research Institute, Chinese Academy of Sciences since 2010. He was a Fellow of the Singapore-Massachusetts Institute of Technology Alliance from 2002-2006. He received his Master and PhD, both in Computer Science, from the University of Manchester in UK. His main research interest is parallel & distributed computing. Current projects include performance analysis of large systems, cloud computing and composability theory and its validation. He has held various visiting positions at MIT (USA), KTH (Sweden), Hitachi Central Research Lab (Japan) among others.

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