In component-based model development, shared models are reused in various combinations to meet different user requirements so as to reduce the time and cost of developing more complex simulations. Recent advances in Internet-based resource sharing infrastructure and technology such as peer-to-peer computing, cloud computing and web services provides a fertile environment for simulation component sharing and reuse on an even larger scale. This talk is divided into three main parts: review of state-of-the-art, a new approach called CoDES (COMposable Discrete-Event scalable Simulation) [6] and validation of semantic composability [2-5].

In reviewing the current state-of-the-art, we will introduce the various levels of composability and highlight key cross-cutting issues in the life-cycle of component-based modeling and simulation (CMS) [6]. We focus on two key composability issues: syntactic composability verification [6, 7] and semantic composability validation [2-5]. Key to model composability is a new meta-component abstraction of entities, and a component-oriented ontology called COSMO for model discovery and selection. In CoDES, components in a composed model interact through well-defined connectors. This allows us to formally represent a component-based model using EBNF-based composition grammar and to automate syntactic composability verification and model discovery and selection. A composed model is semantically composable if the model produces behavior that meets the desired user objectives. Validation of semantic composability is a challenging problem and a two steps approach with increasing accuracy and complexity is proposed. Firstly, a composed model is validated for model properties such as safety and liveness. Secondly, validation is formalized by representing model behavior using a new time-based formalism. In conclusion, we discuss the limitations of our semantic validation approach and a number of open CMS problems [1].
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.

References