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Preface

The AsiaSim conference is an annual international conference that started in 1999, and has primarily been organized by the three Asian simulation societies: Chinese Association for System Simulation (CASS), Japanese Society for Simulation Technology (JSST), and Korea Society for Simulation (KSS). In 2011, the Federation of Asia Simulation Societies (ASIASIM) was set up to promote the advancement of modelling and simulation in industry, research and development in Asia and beyond. After a full zodiac cycle of 12 years, the AsiaSim series finally left the “Golden Triangle” of China, Japan, and Korea, and was held in Singapore for the first time. We were proud to host AsiaSim 2013, and on behalf of the Organizing Committee of AsiaSim 2013, we welcome you to the proceedings of AsiaSim 2013.

Asiasim 2013 was organized by the Society of Simulation and Gaming of Singapore, the National University of Singapore, and Nanyang Technological University. The Society of Simulation and Gaming of Singapore is a non-profit professional organization set up to contribute to the development of simulation and gaming in Singapore and the region. It is a focused community for researchers, practitioners, and developers who are keen in furthering their professional knowledge through learning and working together and promoting experiential activities in the public.

We received 95 full papers and six short papers. Submissions came from China, Japan, Korea, India, France, UK, Germany, Sweden, Kuwait, Morocco, Malaysia, and of course Singapore. After an intensive review process by a carefully assembled International Program Committee, where each paper was reviewed by no less than three reviewers, we finally accepted 45 full papers and 18 short papers. Six of the 45 papers were shortlisted for the best paper award.

These papers are now consolidated in this volume of the *Communications in Computer and Information Science* series, and are divided into many relevant topics, including Agent-Based Simulation, Simulation Methods and Tools, Visualization, Modeling Methodology, Simulation in Science and Engineering, High-Performance Computing and Simulation, and Parallel and Distributed Simulation. The diversity of topics presented in this conference will certainly make for healthy exchange of research ideas and technical exchanges.

We would like to take this opportunity to thank the ASIASIM Federation for allowing us to host AsiaSim 2013 in Singapore.

We also thank the members of the Program Committee for their valuable effort in the review of the submitted papers. Finally, we would also like to thank

our technical co-sponsors and sponsors. Your contributions and support have helped to make AsiaSim 2013 a reality and a success.

October 2013

Gary Tan
Gee Kin Yeo
Stephen John Turner
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Keynote Speakers

Keynote I: Making Sense of a Complex World



Professor Peter Sloot

Distinguished Research Professor and Professor of Computational Science, University of Amsterdam, The Netherlands

Professor of Advanced Computing, St. Petersburg State University, Russia

Visiting Professor of Complex Systems, Nanyang Technological University, Singapore

Abstract

We live in a complex world and are surrounded by complex systems: from a biological cell, made of thousands of different molecules that seamlessly work together, to millions of computer systems that should work together, to our society, a collection of seven billion individuals that try to work and live together. These complex systems display endless signatures of order, disorder, self-organization, and self-annihilation. Understanding, quantifying, and handling this complexity is one of the biggest scientific challenges of our time. Using examples from our recent research, I will introduce a new paradigm of information processing in natural systems that guide the design and evaluation of models for simulating complex dynamical systems. I will show how this paradigm can bridge the uncomfortable gap between Popperian deductivism and Baconian inductivism.

Biography

Professor Peter Sloot is a Distinguished Research Professor and Professor of Computational Science at the University of Amsterdam, The Netherlands. He received his PhD (Computer Science) in 1988 and MSc (Chemistry) and MSc (Physics) in 1983, all from the University of Amsterdam. Peter writes, “I try to understand how nature processes information. I study this ‘natural information processing’ in complex systems by computational modeling and simulation as well as through formal methods. My work is applied to a large variety of disciplines with a focus on – but not limited to – biomedicine. Recent work is on modeling the virology and epidemiology of infectious diseases, notably HIV, through complex networks, cellular automata and multi-agents. Recently in my work I try to build bridges to socio-dynamics.”

Professor Peter Sloot currently leads two large EU projects: ViroLab and DynaNets and supervises research from various NIH, NSF and NWO and Royal Academy projects. He has supervised over 38 PhD dissertations. He has published over 470 papers, books, chapters and edited volumes. He has given over 20 radio and TV interviews on various scientific topics, including two documentaries on his work. He is Editor in Chief of *Journal of Computational Science* and *Future Generation Computing Systems*, both published by Elsevier. He is General Chair of the ICCS series of Conferences on Computational Science. He has given an average of eight international keynote talks and invited lectures per year over the past 5 years.

Keynote II: Challenges in Three-Level Parallelization-Based Analytic Simulation



Professor Yiping Yao

Vice-Director, Institute of Simulation Engineering
Professor, School of Information Systems, and
Management
National University of Defense Technology, Changsha,
Hunan, China

Abstract

Analytic simulation is an effective approach to study and analyze complex systems. As a peer methodology to experiment and theory, it is used more and more widely in the area of defense and economy. With the in-depth development of the applications of analytic simulation, their scale is becoming larger and the models are becoming more complicated. As a result, much more computing resources are required than ever before. To shorten the execution time of simulation has become an urgent job. Parallel computing is an effective way to solve the problem. In this presentation, we will introduce the characteristics of computing of analytic simulation such as multi-sample, as fast as possible, complex model calculation and synchronization for constraint of causality. According to these characteristics, we present a three-level parallelization solution: multi-sample parallelization, multi-entity parallelization, and complex model calculation parallelization.

Multi-sample parallelization is job-level parallelization: as there are no dependencies among samples, it is relatively easy to implement. Multi-entity parallelization, is MPI task-level parallelization; it is the core issue of parallel simulation. There are several ways to achieve calculation parallelization of complex

models now: multicore CPU, GPGPU, FPGA, DSP and MIC etc. In this presentation, we will discuss the challenges in these three levels and introduce our solutions as well as give a perspective on each of them.

Biography

Dr. Yiping Yao is Professor of the School of Information System and Management and the school of Computer Science at the National University of Defense Technology (NUDT). He is also the Vice-Director of the Institute of Simulation Engineering at NUDT. He received his PhD and MS degrees from NUDT in Computer Science in 2004 and 1987. His research interests include: parallel and distributed simulation, agent-based and component-based modeling and simulation, and hardware-in-the-loop real-time simulation. He has authored or co-authored over 130 technical papers in the above areas. He led the development of parallel/distributed/real-time simulation software systems including YH-SUPE (support environment for parallel discrete event simulation), Starlink (HLA Runtime Infrastructure), and YHSIM (hardware-in-the-loop real-time modeling and simulation platform), all of which have been widely used in China. He won numerous Science and Technology Progress Awards of China: two second prizes at the state level, three first prizes, and seven second prizes at the ministerial level.

Dr. Yao is a member of the IEEE and ACM, and a member of the board of directors of the Chinese Association for System Simulation (CASS). He was the general co-chair of PADS 2012 and CGSS 2011 (the first Sino-German Symposium on “Parallel and Distributed Discrete-event Simulation, Experimental Validation and Multi-Scale Applications in Computational Systems Biology”). He has served as Program Committee member for several international conferences. The most recent ones were: PADS 2013, 2012, DS-RT 2012, 2011, 2010, 2009, SIMUL 2013, 2012, 2011, 2010, 2009, SimTools 2010, SummerSim 2009, SIMULTECH 2013, 2012, 2011, DCIA 2012, 2011, 2010.

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