SummerSim'11 Keynote Speakers

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Title: Performance of Grids and Clouds – Challenges and Research Directions

Abstract

Computational and data grids and clouds are large-scale distributed systems used for serving demanding jobs. Their performance became more important due to the tremendous increase of users and applications.

Because of the nature of these systems, there are important issues that must be addressed, such as: efficient scheduling, resource management, load balancing, energy efficiency, reliability, security and trust, cost, availability, quality.

Grid scheduling manages the selection of resources for a job, the allocation of jobs to resources and the monitoring of jobs execution. In large-scale heterogeneous distributed systems, such as grids, energy conservation is an important issue and can take place at multiple levels; some examples are server level, cluster level, site level and grid broker level.

Cloud computing evolves from grid computing; it provides users the ability to lease computational resources from its virtually infinite pool for use in HPC. If cloud computing is going to be used for HPC, appropriate methods must be considered for both parallel job scheduling and VM scalability. The scheduling algorithms must seek a way to maintain a good response time to leasing cost ratio. Furthermore, data security and availability are critical issues that have to be considered as well.

The performance evaluation of grids and clouds is often possible only by simulation rather than by analytical techniques, due to the complexity of the systems. Simulation can provide important insights into the efficiency and tradeoffs of scheduling in complex distributed systems, such as grids and clouds.

Biography

Helen Karatza is a Professor in the Department of Informatics at the Aristotle University of Thessaloniki, Greece.

Dr. Karatza's research interests include Computer Systems Modeling and Simulation, Performance Evaluation of Parallel and Distributed Systems, Cluster, Grid and Cloud Computing, Resource Discovery, Resource Allocation and Scheduling and Real-time Distributed Systems.

Dr. Karatza has authored or co-authored over 155 technical papers and book chapters including two papers that earned best paper awards at the 39th Annual Simulation Symposium (ANSS 2006) and the 10th International Symposium on Performance Evaluation of Computer and Telecommunication Systems (SPECTS 2007) respectively.

She is a Member of the Board of Directors of SCS. She is also a Senior member of SCS, ACM and IEEE.

Dr. Karatza has been Editor-in-Chief of SIMULATION: Transactions of SCS – currently she is a member of the Advisory Editorial Board. She also has been Guest Editor of several Special Issues of the SIMULATION journal.

For nine years she was Program Chair of the Annual Simulation Symposium and has also served as member of the Program Committee of numerous SCS Conferences. She is a member of the Steering Committee of SPECTS.

Dr. Karatza has received from SCS a Distinguished Service Award (2009) and an Award for leadership and contributions for the success of the 2008 Spring Simulation Multiconference.

She has given Keynote Talks and Invited Talks about performance of scheduling strategies in distributed systems, grids and clouds in international Conferences.

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Tayfur Altiok
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***Title*: Risk Analysis and Simulation Modeling**

Abstract

Probabilistic risk analysis has been rapidly growing over the past few decades and applied in sectors of nuclear energy, health care, transportation, homeland security, construction, financial systems and computing, among others. Risks exist in these fields due to accidents, natural disasters or terrorist activities, which are the so-called safety and security risks. The ultimate

objective is to manage and mitigate risks due to unintentional or intentional incidents while allocating resources under uncertainty and ensuring compliance.

The term *risk* is used to mean different things in different fields of the society. It is just the probability of occurrence in healthcare, variance in finance, number of fatalities in transportation and loss with some chance in other fields. The basic method of analysis has been to identify scenarios to describe possible pathways to unwanted events. Each scenario has a probability of occurrence and associated consequences such as human fatalities, environmental impact, property damage and others. In a risk analysis, considering potential instigators, situations and incidents, a risk algorithm evaluates all possible risks that are typically dynamic across time and space. This is a numerically demanding process that needs to represent the operation of the system of interest with high degree of accuracy.

Simulation modeling has become the sought-after tool in model-based probabilistic risk analysis since large-scale, high-fidelity models are typically needed to represent systems of interest. A successful model-based risk analysis requires a combined approach of a mathematical risk model working in concert with the simulation model. The simulation model passes spatial and situational information to the risk model to evaluate the associated risks at every so often.

In this talk, we will focus on the maritime domain with risks involved in ports and waterways and the ones in the Strait of Istanbul in Turkey and Delaware River in the U.S, in particular.

A high-fidelity simulation model will be discussed to account for all potential events (e.g., vessel collisions, groundings, ramming, spills, and others in safety related scenarios) along with a range of consequences. Construction of a risk profile over time and space will be presented to discuss ways to mitigate risks.

For example, ports and waterways experience dynamic risks with surges and severe highs and lows in maritime traffic, and water and weather conditions. It is important to develop sound risk-mitigation policies to minimize potential disruptions to the global supply.

It is clear that problems of our times and the requisite decision making are increasingly complex requiring sophisticated approaches and placing high expectations on the tools and modeling capabilities. In view of this, we will finalize the talk with a discussion on the challenges in developing effective large-scale, high fidelity simulation models.

Bios

Dr. Tayfur Altiok has years of experience in practicing and teaching simulation modeling and analysis. He is a Professor of Industrial and Systems Engineering and Director of the Laboratory for Port Security which is part of CAIT and CCICADA centers at Rutgers University. Dr. Altiok's research and teaching activities have included over the years queueing theory, simulation modeling, risk analysis with applications to homeland security, marine ports logistics, safety and security, production lines, supply chain logistics, and computer systems performance analysis. He developed numerous decomposition algorithms to analyze complex queueing networks. His research has been supported by the National Science Foundation, NJ Department of Transportation, NJ Office of Homeland Security and Preparedness, the US Army, Department of Homeland Security and various industries. He is a Fulbright awardee and has numerous publications including two books in the areas of simulation modeling and performance analysis of manufacturing systems. Dr. Altiok has also served as an advisor to government organizations, and consultant to various industries in the fields of capacity planning and performance analysis via large-scale simulation modeling.

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Joachim Fuchs
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Title: Modeling and Simulation for Complex Design and Verification

Abstract
Modeling and simulation is often mentioned together. It is obvious that modeling is required to get to simulation, but there is also modeling which does not necessarily result in simulations, in particular dynamic simulations. Models are in that case an essential part of the design process and the formalization of the engineering information for different purposes.
The presentation will highlight the uses of modeling and simulation in the system development lifecycle for complex space systems, addressing the uses in the design and development process as well as the application for the design and system verification. It will cover aspects such as modeling methodologies (including cross-sectorial issues), simulators and related testbenches, system of system modeling and some related standardization activities in the space domain.

Biographic information:
Joachim Fuchs is presently Head of the System Modeling and Functional Verification Section of the European Space Agency. In this function he is providing support to many European Space projects in the domain of system engineering methods and tools, system verification and associated tasks. He is defining technology and methodology developments in the area of model-based system engineering (MBSE) and System of Systems / Enterprise architecting, linking it also to relevant standardization activities and harmonization of related activities between ESA and European Industry