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Computational Science – ICCS 2009

9th International Conference
Baton Rouge, LA, USA, May 25-27, 2009
Proceedings, Part I

Springer

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Preface

"There is something fascinating about science.
One gets such wholesale returns of conjecture
out of such a trifling investment of fact."

Mark Twain, *Life on the Mississippi*

The challenges in succeeding with computational science are numerous and deeply affect all disciplines. NSF's 2006 Blue Ribbon Panel of Simulation-Based Engineering Science (SBES)[1] states 'researchers and educators [agree]: computational and simulation engineering sciences are fundamental to the security and welfare of the United States...We must overcome difficulties inherent in multiscale modeling, the development of next-generation algorithms, and the design...of dynamic data-driven application systems...We must determine better ways to integrate data-intensive computing, visualization, and simulation. Importantly, we must overhaul our educational system to foster the interdisciplinary study...The payoffs for meeting these challenges are profound.' The International Conference on Computational Science 2009 (ICCS 2009) explored how computational sciences are not only advancing the traditional hard science disciplines, but also stretching beyond, with applications in the arts, humanities, media and all aspects of research. This interdisciplinary conference drew academic and industry leaders from a variety of fields, including physics, astronomy, mathematics, music, digital media, biology and engineering. The conference also hosted computer and computational scientists who are designing and building the cyber infrastructure necessary for next-generation computing. Discussions focused on innovative ways to collaborate and how computational science is changing the future of research. ICCS 2009: 'Compute. Discover. Innovate.' was hosted by the Center for Computation and Technology at Louisiana State University in Baton Rouge. Talks and presentations at this conference focused on new applications for high-performance computing, including petascale algorithms, tools and applications, high-speed optical networks such as the Louisiana Optical Network Initiative, or LONI, distributed data management and sharing, and new software programs for biomedical, science and humanities research. The conference included tutorials, a main track session with 5 keynote speakers and 60 accepted, peer-reviewed papers as well as 13 workshops with 138 accepted peer-reviewed papers. Advancing computational science would not be possible without engaging students and young scholars. Through participation in tutorials, workshop and general session paper presentations, the students learned about recent advances and developments in computational science. This year ICCS 2009

[1] Blue Ribbon Panel Report: `www.nsf.gov/pubs/reports/sbes_final_report.pdf`

co-funded with the National Science Foundation a conference student scholarship for around 50 students, mostly from the state of Louisiana. ICCS is committed to helping students and young researchers enhance their professional development through participation in ICCS. During this year's conference two different tutorials were offered to participants: (i) Parallel Performance Evaluation Tools for HPC Systems by Allen D. Malony, University of Oregon, Markus Geimer, FZ Jülich, Andreas Knüpfer, TU Dresden, and Rick Kufrin, NCSA/University of Illinois and (ii) Developing HPC Applications with the Cactus Framework by Erik Schnetter, Frank Loeffler, Eloisa Bentivegna, CCT-LSU. The general main track of ICSS 2009 was organized in about 20 parallel sessions addressing the following topics:

- e-Science Applications and Systems
- Scheduling
- Software Services and Tools
- New Hardware and Its Applications
- Computer Networks
- Simulation of Complex Systems
- Image Processing
- Optimization Techniques
- Numerical Methods

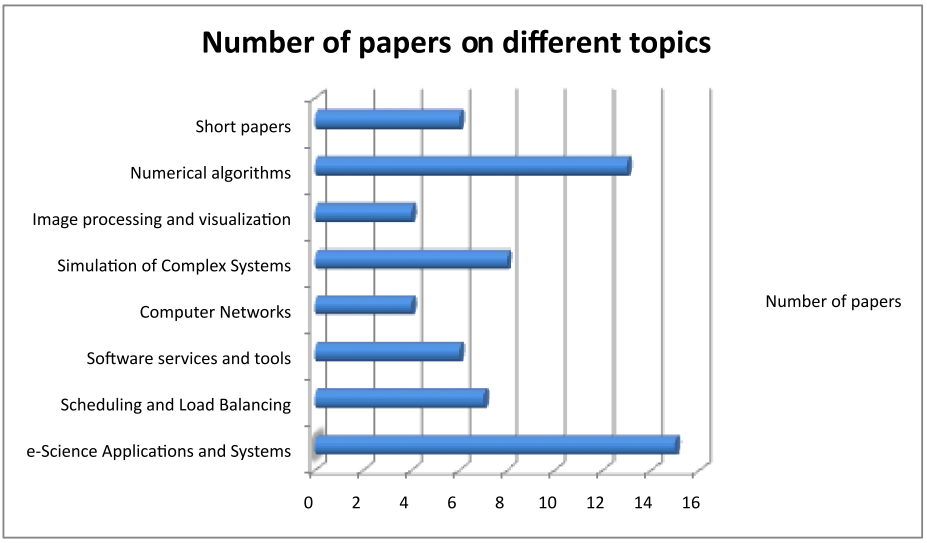

Fig. 1. Number of papers in the general track by topic

Figure 1 presents the number of papers on different topics.

Keynote lectures were delivered by:

- Marian Bubak: *Environments for collaborative applications: An answer to computational science challenges?*

- Janice Coen: *Computational modeling of wildland fire behavior and weather for research and forecasting,*
- Vittoria Colizza: *Computational epidemiology: a new paradigm in the fight against infectious diseases,*
- Peter Coveney: *Grid computing at the petascale,*
- Mark Jarrell: *Massively parallel and multi-scale simulations of strongly correlated electronic systems*

We would like to thank all keynote speakers for their interesting and inspiring talks and for submitting the abstracts and papers for this proceedings volume.

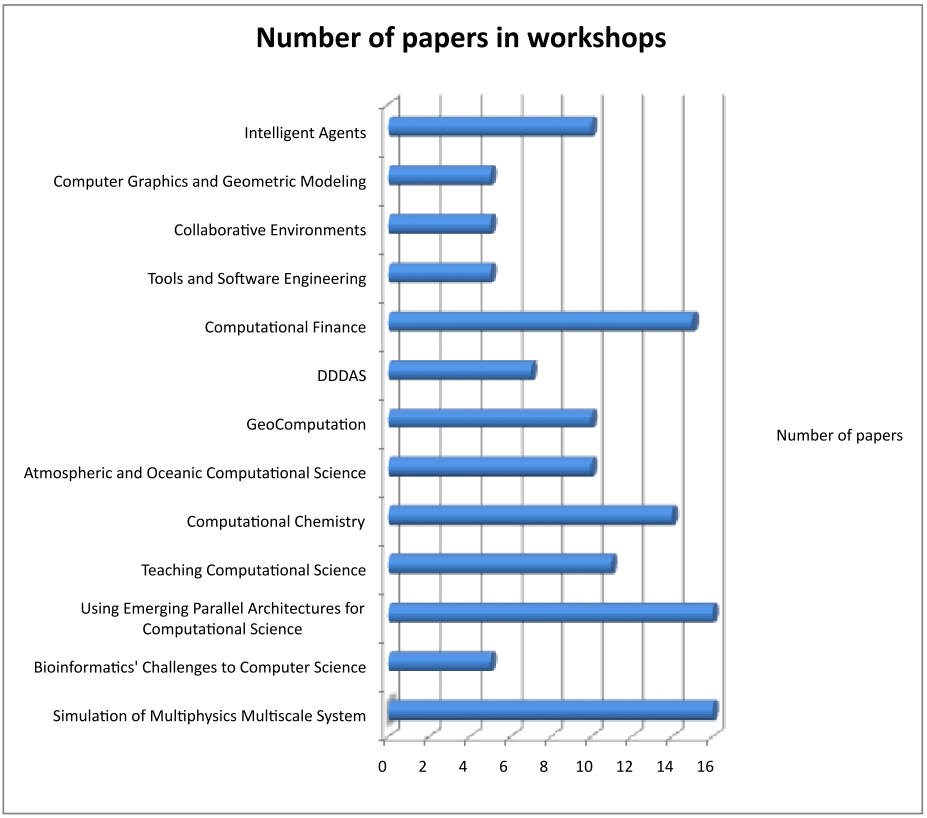

Fig. 2. Number of papers in workshops

The conference also offered 13 workshops:

- Teaching Computational Science
- Computational Chemistry and Its Applications
- Dynamic Data-Driven Application Systems
- Tools for Program Development and Analysis in Computational Science and Software Engineering for Large-Scale Computing

- Simulation of Multiphysics Multiscale Systems
- Workshop on Computational Finance and Business Intelligence
- Bioinformatics' Challenges to Computer Science
- Using Emerging Parallel Architectures for Computational Science
- Collaborative and Cooperative Environments
- Computer Graphics and Geometric Modeling
- Intelligent Agents in Simulation and Evolvable Systems
- Atmospheric and Oceanic Computational Science
- Geo Computation

Figure 2 presents the number of papers in the workshops.

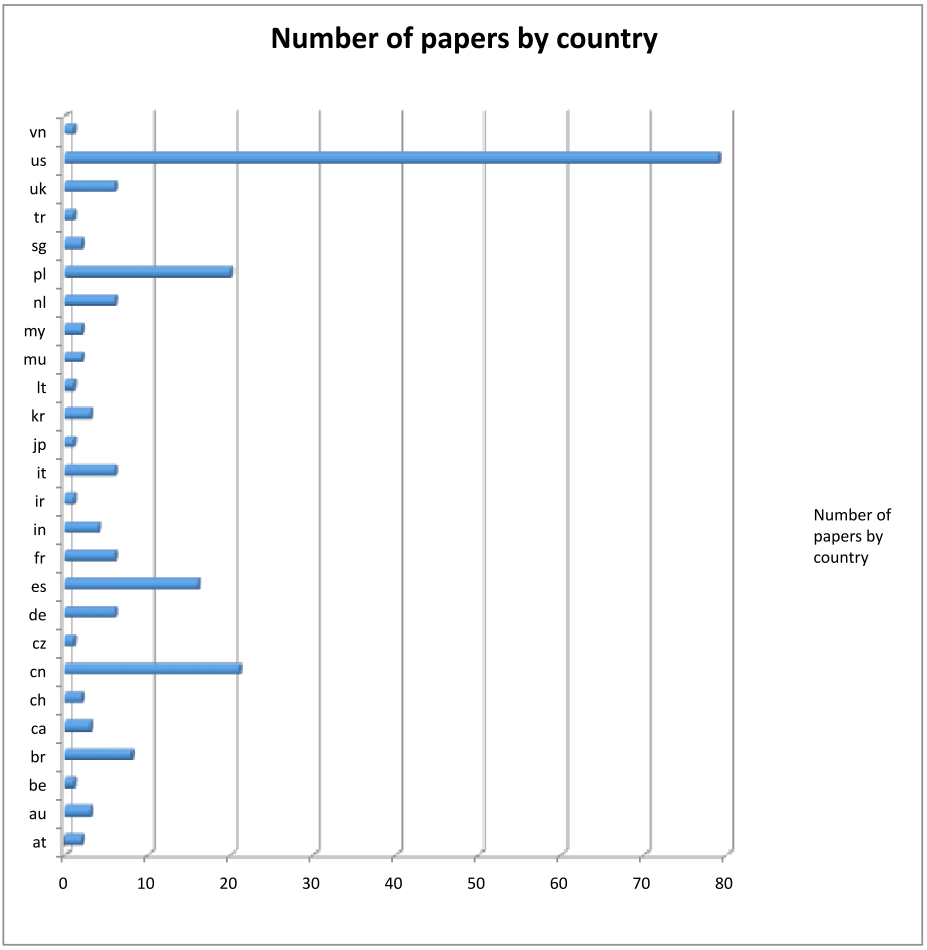

Fig. 3. Number of accepted papers by country

The selection of papers for the conference was possible thanks to the hard work of the Program Committee members and about 390 reviewers; papers submitted to ICCS 2009 received three reviews each. ICCS is a truly international conference, and papers were accepted from 26 countries. The international distribution of papers accepted for the conference is presented in Fig. 3. The ICCS 2009 participants equally represent all continents.

The ICCS 2009 proceedings consist of two volumes; the first one, LNCS 5544, contains the contributions presented in the general track and workshops 5, 7 and 12, while volume LNCS 5545 contains papers accepted for the other workshops. We hope that the ICCS 2009 proceedings will serve as an important intellectual resource for computational and computer science researchers, pushing forward the boundaries of these two fields and enabling better collaboration and exchange of ideas. We would like to thank Springer for a very fruitful collaboration during the preparation of the proceedings.

At the conference the best papers from the general track and workshops were nominated and presented on the ICCS 2009 website; the awards were funded by Elsevier. A number of papers will also be published as special issues of selected journals.

We owe thanks to all workshop organizers and members of the Program Committee for their diligent work, which has ensured the very high quality of the ICCS 2009. We are indebted to all the members of the Local Organizing Committee for their enthusiastic work towards the success of ICCS 2009, and to numerous colleagues from CCT for their help in editing the proceedings and organizing the event. We owe thanks to the ICCS 2009 sponsors: Intel, SiCortex, NSF, Elsevier, CCT and LSU Foundation for their generous support.

We wholeheartedly invite you to once again visit the ICCS 2009 website (http://www.iccs-meeting.org/iccs2009/), to recall the atmosphere of those May days in Louisiana.

May 2009

Gabrielle Allen
Jarek Nabrzyski
Ed Seidel
G. Dick van Albada
Jack J. Dongarra
Peter M.A. Sloot

Organization

ICCS 2009 was organized by the Center for Computation and Technology, Louisiana State University (Baton Rouge, USA), the University of Amsterdam (Amsterdam, The Netherlands) and the University of Tennessee (Knoxville, USA). All the members of the Local Organizing Committee are staff members of the Center for Computation and Technology, Louisiana State University.

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