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Published in:
Procedia Computer Science

DOI:
10.1016/j.procs.2015.05.177

Citation for published version (APA):

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Computational Science at the Gates of Nature,
Preface for ICCS 2015

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Welcome to the 15th Annual International Conference on Computational Science (ICCS), to be held on June 1-3, 2015 in Reykjavík, Iceland. Located in the North Atlantic Sea between Europe and America, Iceland is world-renowned for its stunning nature and inspiring culture. Reykjavík University, located in the heart of the nation’s capital, is a dynamic international university with state-of-the-art facilities and a proud host of the conference. ICCS 2015 is organized by Reykjavík University, Universiteit van Amsterdam, NTU Singapore and the University of Tennessee.

The International Conference on Computational Science is an annual conference that brings together researchers and scientists from mathematics and computer science as basic computing disciplines, researchers from various application areas who are pioneering computational methods in sciences such as physics, chemistry, life sciences, and engineering, as well as in arts and humanitarian fields, to discuss problems and solutions in the area, to identify new issues, and to shape future directions for research.

Since its inception in 2001, ICCS has attracted increasingly higher quality and numbers of attendees and papers, and this year is not an exception, with over 400 expected participants. The proceedings series have become a major intellectual resource for computational science researchers and serve to define and advance the state of the art of the field.

ICCS 2015 in Reykjavík, Iceland, will be the fifteenth in this series of highly successful conferences. For the previous fourteen meetings see: http://www.iccs-meeting.org/iccs2015/previous-iccs/
The theme for ICCS 2015 is "Computational Science at the Gates of Nature", to mark the crucial role of computational science in tackling the myriad problems and applications within natural systems. The realization of computational science as a multidisciplinary environment and provider of crucial tools for the understanding of our world has literally put it at the gates of nature, a role that growing research and investment have increasingly confirmed. This conference will be a unique event focusing on recent developments in: scalable scientific algorithms; advanced software tools; computational grids; advanced numerical methods; and novel application areas. These innovative novel models, algorithms and tools drive new science through efficient application in areas such as physical systems, computational and systems biology, environmental systems, finance, and others.

ICCS is well known for its excellent line up of keynote speakers. The keynotes for 2015 are:

- **David Abramson**, The University of Queensland, Australia
- **Tim Cornwell**, Square Kilometre Array Telescope (SKA), UK
- **Petros Koumoutsakos**, Swiss Federal Institute of Technology Zurich, Switzerland
- **J. Stephen Lansing**, Nanyang Technological University, Singapore
- **Xin-She Yang**, Middlesex University London, UK
- **Kári Stefánsson**, deCode Genetics, Iceland

In addition to our distinct keynote speakers, out of the submitted papers to the main track and workshops, we selected about 360 high-quality papers for presentation at the conference and publication in the proceedings, published by Elsevier in open-access *Procedia Computer Science* series. Submission was very competitive this year and the main track accepted 81 papers from 248 submissions (33% acceptance rate).

ICCS relies strongly on the vital contributions of our workshop organizers to attract high quality papers in many subject areas. We would like to thank all committee members for the main track and workshops for their contribution to ensure a high standard for the accepted papers. We would also like to thank Elsevier, as the conference is organized with their financial and administrative support.

We are proud to note that ICCS is an ERA 2010 A-ranked conference series.

We wish you a successful and enjoyable conference in Reykjavík.

June 2015

The ICCS 2015 Organizers:
- Slawomir Koziel
- Leifur Leifsson
- Michael Lees
- Valeria V. Krzhizhanovskaya
- Jack Dongarra
- Peter M.A. Sloot
Local Organizing Committee in Iceland

Organizing Committee Co-Chairs  Slawomir Koziel and Leifur Leifsson
Organizing Committee Members  Ýr Gunnlaugsdóttir, Maria Gião

Workshops and Organizers

**Multiscale Modelling and Simulation, 12th International Workshop**
Derek Groen, Valeria Krzhizhanovskaya, Bartosz Bosak, Alfons Hoekstra

**6th Workshop on Computational Optimization, Modelling and Simulation**
Xin-She Yang, Slawomir Koziel, Leifur Leifsson

**5th International Workshop on Advances in High-Performance Computational Earth Sciences: Applications and Frameworks**
Xing Cai, Henry Tufo

**Agent-based Simulations, Adaptive Algorithms and Solvers**
Robert Schaefer, Krzysztof Cetnarowicz, Maciej Paszynski, Victor Calo, David Pardo

**Architecture, Languages, Compilation and Hardware support for Emerging ManYcore systems**
Loïc Cudennec, Stéphane Louise

**6th Workshop on Data Mining in Earth System Science**
Forrest M. Hoffman, Jitendra Kumar, J. Walter Larson

**Dynamic Data Driven Application Systems**
Craig C. Douglas, Abani Patra, Ana Cortés

**9th Workshop on Computational Chemistry and Its Applications**
Ponnadurai Ramasami

**Workshop on Teaching Computational Science**
Valerie Maxville, Angela B. Shiflet, Alfredo Tirado-Ramos

**Tools for Program Development and Analysis in Computational Science**
Andreas Knüpfen, Arndt Bode, Karl Fürlinger, Dieter Kranzlmüller, Jens Volkert, Jie Tao, Roland Wismüller

**Solving Problems with Uncertainties**
Vassil Alexandrov

**Modeling and Simulation of Large-scale Complex Urban Systems**
Heiko Aydt, Matthias Berger, Francisco Pereira
Urgent Computing: Computations for Decision Support in Critical Situations  
Alexander V. Boukhanovsky, Marian Bubak

Large Scale Computational Physics  
Elise de Doncker, Fukuko Yuasa

12th Workshop on Computational Finance and Business Intelligence  
Yong Shi, Yingjie Tian

Bridging the HPC Talent Gap with Computational Science Research Methods  
Evguenia S. Alexandrova, Vassil Alexandrov

Mathematical Methods and Algorithms for Extreme Scale  
Vassil Alexandrov, Jack Dongarra

Computational Optimisation in the Real World  
Andrew Lewis, Timoleon Kipouros, Marcus Randall

8th Workshop on Biomedical and Bioinformatics Challenges for Computer Science  
Mario Cannataro, Riccardo Dondi

Paradigms for Control in Social Systems  
Derek Ruths, Justin Ruths

Applications of Matrix Computational Methods in the Analysis of Modern Data  
Kourosh Modarresi

Numerical and Computational Developments to Advance Multi-scale Earth System Models  
Kate Evans, Hans Johansen, Carol Woodward

International Workshop on Computational Flow and Transport: Modeling, Simulations and Algorithms  
Shuyu Sun, Jiangguo Liu, Hua Zhong

Workshop on Nonstationary Models of Pattern Recognition and Classifier Combinations  
Bartosz Krawczyk, Michal Wozniak

Dynamic Data Driven Applications Systems and Large-Scale-Big-Data & Large-Scale-Big-Computing  
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PRACE User Forum Satellite Symposium  
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