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Vassil N. Alexandrov
Geert Dick van Albada
Peter M.A. Sloot
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Computational Science – ICCS 2006

6th International Conference
Reading, UK, May 2006
Proceedings, Part III

3
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Preface

The Sixth International Conference on Computational Science (ICCS 2006) was held in Reading, United Kingdom, May 28-31 and continued the traditions of previous conferences in the series: ICCS 2005 in Atlanta, Georgia, USA; ICCS 2004 in Krakow, Poland; ICCS 2003 held simultaneously at two locations in, Melbourne, Australia and St. Petersburg, Russia; ICCS 2002 in Amsterdam, The Netherlands; and ICCS 2001 in San Francisco, California, USA.

Since the first conference in San Francisco, rapid developments in Computational Science as a mainstream area facilitating multi-disciplinary research essential for the advancement of science have been observed. The theme of ICCS 2006 was “Advancing Science through Computation”, marking several decades of progress in Computational Science theory and practice, leading to greatly improved applications science. The conference focused on the following major themes: tackling Grand Challenges Problems; modelling and simulations of complex systems; scalable algorithms and tools and environments for Computational Science. Of particular interest were the following major recent developments in novel methods and modelling of complex systems for diverse areas of science, scalable scientific algorithms, advanced software tools, computational grids, advanced numerical methods, and novel application areas where the above novel models, algorithms and tools can be efficiently applied such as physical systems, computational and systems biology, environmental systems, finance, and others.

Keynote lectures were delivered by Mateo Valero (Director, Barcelona Supercomputing Centre) - “Tackling Grand Challenges Problems”; Chris Johnson (Distinguished Professor, University of Utah) - “Visualizing the Future”; José Moreira (IBM, Chief Architect, Commercial Scale Out) - “Achieving Breakthrough Science with the Blue Gene/L Supercomputer”; Martin Curley (INTEL, Global Director of Innovation and IT Research) - “IT Innovation: A New Era”; Vaidy Sunderam (Samuel Candler Dobbs Professor of Computer Science, Emory University, USA) - “Metacomputing Revisited: Alternative Paradigms for Distributed Resource Sharing”; and Ron Bell (AWE plc.) - “The AWE HPC Benchmark”.

In addition, two special sessions were held - one by industry and one by the funding bodies. Three tutorials preceded the main technical program of the conference: “Tools for Program Analysis in Computational Science” by Dieter Kranzlmüller; “P-GRADE Portal” by P. Kascuk, T. Kiss and G. Sipos; and “Scientific Computing on Graphics Hardware” by Dominik Göddeke. We would like to thank all the keynote, the invited, and the tutorial speakers for their inspiring talks.

Apart from the plenary sessions and tutorials the conference included twelve parallel oral sessions and two poster sessions. Since the first ICCS in San

Francisco the conference has grown steadily attracting increasing numbers of researchers in the field of Computational Science. For ICCS 2006 we received over 1,400 submissions, around 300 for the main track and over 1,100 for the originally proposed workshops. Of these submissions, 98 were accepted as full papers and 29 as posters for the main track; and 500 were accepted as full papers, short papers or posters for the 32 workshops. This selection was possible due to the tremendous work done by the Program Committee and the 720 reviewers. The author index contains over 1,000 names and over 600 participants from all the major continents. The papers cover a wide variety of topics in Computational Science, ranging from Grand Challenges problems and modelling of complex systems in various areas to advanced numerical algorithms and new scalable algorithms in diverse application areas and software environments for Computational Science. The ICCS 2006 Proceedings consist of four volumes, 3991 to 3994, where the first volume contains the papers from the main track and all the posters; the remaining three volumes contain the papers from the workshops. ICCS this year is primarily published on a CD and we would like to thank Springer for their cooperation and partnership. We hope that the ICCS 2006 Proceedings will be a major intellectual resource for many computational scientists and researchers for years ahead. During the conference the best papers from the main track and workshops as well as the best posters were nominated and commended on ICCS 2006 website. A number of selected papers will also be published in special issues of relevant mainstream journals.

We would like to thank all workshop organisers and the program committee for the excellent work, which further enhanced the conference's standing and led to a very high quality event with excellent papers. We would like to express our gratitude to Advanced Computing and Emerging Technologies Centre staff, postgraduates and students for their wholehearted support of ICCS 2006. We would like to thank the School of Systems Engineering, Conference Office, Finance Department and various units at the University of Reading for different aspects of the organization and for their constant support in making ICCS 2006 a success. We would like to thank the Local Organizing Committee for their persistent and enthusiastic work towards the success of ICCS 2006. We owe special thanks to our sponsors: Intel, IBM, SGI, Microsoft Research, EPSRC and Springer; and to ACET Centre and the University of Reading for their generous support. We would like to thank SIAM, IMACS, and UK e-Science programme for endorsing ICCS 2006.

ICCS 2006 was organized by the Advanced Computing and Emerging Technologies Centre, University of Reading, with support from the Section Computational Science at the Universiteit van Amsterdam and Innovative Computing Laboratory at the University of Tennessee, in cooperation with the Society for Industrial and Applied Mathematics (SIAM), the International Association for Mathematics and Computers in Simulation (IMACS), and the UK Engineering and Physical Sciences Research Council (EPSRC). We invite you to visit the ICCS 2006 website (<http://www.iccs-meeting.org/iccs2006/>) and ACET Centre website (<http://www.acet.reading.ac.uk/>) to recount the events leading up

to the conference, to view the technical programme, and to recall memories of three and a half days of engagement in the interest of fostering and advancing Computational Science.

June 2006

Vassil N. Alexandrov
G. Dick van Albada
Peter M.A. Slood
Jack J. Dongarra

Organisation

ICCS 2006 was organised by the Centre for Advanced Computing and Emerging Technologies (ACET), University of Reading, UK, in cooperation with the University of Reading (UK), the Universiteit van Amsterdam (The Netherlands), the University of Tennessee (USA), Society for Industrial and Applied Mathematics (SIAM), International Association for Mathematics and Computers in Simulation (IMACS) and Engineering and Physical Sciences Research Council (EPSRC). The conference took place on the Whiteknights Campus of the University of Reading.

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A. Koukam	B. Ó Nualláin	C. Wang
A. Lagana	B. Autin	C. Weihrauch
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A. Li	B. Chopard	C. Xu
A. Ligeza	B. Christianson	C. Yang
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A. Martin del Rey	B. Dasgupta	C.-S. Jeong
A. McGough	B. Di Martino	C.G.H. Diks
A. Menezes	B. Gabrys	C.H. Goya
A. Motter	B. Javadi	C.H. Kim
A. Nasri	B. Kahng	C.H. Wu
A. Neumann	B. Kovalerchuk	C.K. Chen
A. Noel	B. Lesyng	C.N. Lee
A. Obuchowicz	B. Paternoster	C.R. Kleijn
A. Papini	B. Payne	C.S. Hong
A. Paventhan	B. Saunders	D. Abramson

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D. Brown	E. Puppo	G. Messina
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D. Déry	E. Valakevicius	G. Narasimhan
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D. Göddeke	E. Zudilova-Seinstra	G. Rojek
D. Johnson	E.A. Castro	G. Slusarczyk
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D. Kranzlmüller	E.S. Quintana-Orti	G. Szabó
D. Laforenza	F. Capkovic	G. Tempesti
D. Li	F. Cappello	G. Volkert
D. Luebke	F. Desprez	G. Watson
D. Maringer	F. Gava	G. Zheng
D. Pfahl	F. Hirata	G.-L. Park
D. Plemenos	F. Iavernaro	G.D. van Albada
D. Rodriguez-García	F. Kiss	G.D. Vedova
D. Shires	F. Lamantia	G.E. Fagg
D. Stoffer	F. Lee	G.J. Rodgers
D. Stokic	F. Loulergue	H. Bungartz
D. Szczerba	F. Markowetz	H. Choo
D. Taniar	F. Melendez	H. Diab
D. Thalmann	F. Perales	H. Fangohr
D. Vasuinin	F. Rogier	H. Jin
D. Wang	F. Terpstra	H. Kaltenbach
D. Xu	F. Zuccarello	H. Kosina
D.A. Bader	F.-X. Roux	H. Labiod
D.B. Davies	F.J. Keil	H. Lee
D.B.D. Birkbeck	G. Alexe	H. Moradkhani
D.C. Ghosh	G. Allen	H. Müller
D.C. Lee	G. Bosilca	H. Munakata
D.J. Roberts	G. Chen	H. Oh
D.M. Chiu	G. Cheng	H. Sarafian
D.M. Tartakovsky	G. Dobrowolski	H. Stockinger
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D.S. Kim	G. Erlebacher	H. Umeo
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