

Foreword

It gives us great pleasure to introduce this collection of papers to be presented at the 2010 International Conference on Bioinformatics and Computational Biology (BIOCOMP'10), July 12 through 15, 2010, at Monte Carlo Resort, Las Vegas, USA.

The Academic Co-Sponsors of this year's conference include:

The Berkeley Initiative in Soft Computing (BISC), University of California, Berkeley, USA; Collaboratory for Advanced Computing and Simulations (CACS), University of Southern California, USA; Intelligent Data Exploration and Analysis Laboratory, University of Texas at Austin, Texas, USA; Harvard Statistics Department Genomics & Bioinformatics Laboratory, Harvard University, Cambridge, Massachusetts, USA; BioMedical Informatics & Bio-Imaging Laboratory, Georgia Institute of Technology and Emory University, Atlanta, Georgia, USA; Minnesota Supercomputing Institute, University of Minnesota, USA; Hawkeye Radiology Informatics, Department of Radiology, College of Medicine, University of Iowa, USA; Center for the Bioinformatics and Computational Genomics, Georgia Institute of Technology, Georgia, USA; Medical Image HPC & Informatics Lab (MiHi Lab), University of Iowa, USA; The University of North Dakota, Grand Forks, North Dakota, USA; NDSU-CIIT Green Computing and Communications Laboratory, USA; Knowledge Management & Intelligent System Center (KMIS) of University of Siegen, Germany; UMIT, Institute of Bioinformatics and Translational Research, Austria; SECLAB of University of Naples Federico II, University of Naples Parthenope, and Second University of Naples, Italy; National Institute for Health Research; World Academy of Biomedical Sciences and Technologies; Supercomputer Software Department (SSD), Institute of Computational Mathematics & Mathematical Geophysics, Russian Academy of Sciences, Russia; International Society of Intelligent Biological Medicine (ISIBM); The International Council on Medical and Care Computetics; The UK Department for Business, Innovation and Skills, UK; and Medical Modeling and Simulation Database (EVMS) of Eastern Virginia Medical School & the American College of Surgeons, USA.

Corporate Co-Sponsors, Co-Sponsors At-Large and Organizers include:

A number of university faculty members and their staff (names appear below and also on the cover of the proceedings); World Academy of Science (www.world-academy-of-science.org/); Computer Science Research, Education, and Applications Press; SuperMicro Computer, Inc., San Jose, California, USA; Manjrasoft (Cloud Computing Technology company), Melbourne, Australia; High Performance Computing for Nanotechnology (HPCNano); Space for Earth Foundation; VMW Solutions Ltd.; Scientific Technologies Corporation; HoIP, Health without Boundaries; and Hodges' Health. In addition, several publishers of computer science and computer engineering books and journals, chapters and/or task forces of computer science associations/organizations from 8 countries, and developers of high-performance machines and systems provided significant help in organizing the conference as well as providing some resources.

An important mission of WORLDCOMP (a federated congress to which this conference is affiliated with) includes "Providing a unique platform for a diverse community of constituents composed of scholars, researchers, developers, educators, and practitioners. The Congress makes concerted effort to reach out to participants affiliated with diverse entities (such as: universities, institutions, corporations, government agencies, and research centers/labs) from all over the world. The congress also attempts to connect participants from institutions that have **teaching** as their main mission with those who are affiliated with institutions that have **research** as their main mission. The congress uses a quota system to achieve its institution and geography diversity objectives."

The program committee would like to thank all those who submitted papers for consideration. About 46% of the submissions were from outside the United States. Each paper was peer-reviewed by two experts in the field for originality, significance, clarity, impact, and soundness. In cases of contradictory recommendations, a member of the conference program committee was charged to make the final decision; often, this involved seeking help from additional referees by using a double-blinded review process. In addition, papers whose authors included a member of the conference program committee were evaluated using the double-blinded review process. The only exception to the above evaluation process was for papers that were submitted directly to chairs/organizers of approved sessions/workshops; in these cases, the

chairs/organizers were responsible for the evaluation of such submissions. The overall paper acceptance rate for regular papers was 27%; 14% of the remaining papers were accepted as poster papers.

We are very grateful to the many colleagues who helped in organizing the conference. In particular, we would like to thank the members of the BIOCOMP'10 Program Committee who we hope will offer their help again in organizing the next year's conference (BIOCOMP'11). The BIOCOMP'10 Program Committee members were:

- Dr. Shandar Ahmad; National Institute of Biomedical Innovation, Ibaraki-shi, Osaka, Japan
- Dr. Selim Aissi; Chief Strategist - Security, Manageability and Virtualization, Ultra Mobile Group; Intel Corporation, USA (Steering Committee)
- Prof. Hamid Arabnia; Coordinator/Chair, WORLDCOMP 2010; ISIBM Fellow & Professor; Editor-in-Chief, *The Journal of Supercomputing* (Springer); Advisory Board, IEEE TC on Scalable Computing; University of Georgia, Georgia, USA (Steering Committee)
- Prof. Dr. Baharuddin Aris; UTM Professor of Multimedia and Internet-based Learning; Director, Centre for Teaching and Learning, Universiti Teknologi Malaysia, Malaysia
- Prof. Ezendu Ariwa; Chartered Fellow, British Computer Society (CITP, FBCS); Fellow, Institute of IT Training (FIITT); Fellow, Higher Education Academy of UK (FHEA); Member, Elite Group of The British Computer Society; Editor-in-Chief, *Int'l J. of Green Computing*; London Metropolitan University, UK
- Prof. Ruzena Bajcsy; Member, National Academy of Engineering, IEEE Fellow, ACM Fellow; Professor; University of California, Berkeley, California, USA (Steering Committee)
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- Dr. Seongah Chin; Director, Industry & Cooperation Group; Director, Visual & Virtual Computing Lab.; Sungkyul University, Korea
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- Prof. Matthew He; Director, Division of Math, Science, & Technology; Nova Southeastern University, Ft. Lauderdale, Florida, USA
- Prof. Dawn E. Holmes; University of California, Santa Barbara, California, USA
- Dr. Seddik Khemaissia; Riyadh College of Technology, Saudi Arabia and Sheffield University, UK
- Prof. Whe Dar Lin; The Overseas Chinese University, Taiwan, R.O.C.
- Dr. Xiong Liu; Intelligent Automation, Inc., Rockville, Maryland, USA
- Prof. Alicia Troncoso Lora; Professor and Vice Chancellor for Quality and Planning of the Pablo de Olavide, University of Seville, Spain
- Dr. Yan Luo; Chief Editor, IJCAET and IJSEC; National Institute of Standards and Technology (NIST), Maryland, USA
- Prof. Andy Marsh; Director HoIP, Secretary-General WABT; Vice-president ICET (Int'l Council for Engineering & Technology) & ICMCC (Int'l Council on Medical & Care Computenics), Visiting Prof., University of Westminster, UK (Steering Committee and BIOCOMP Vice-Chair)
- Dr. Ali Masoudi-Nejad; Co-Founder, Laboratory of Systems Biology and Bioinformatics (LBB), University of Tehran, Iran
- Prof. Michael L. Nelson; Dean & Graduate Program Director, School of Technology, Hodges University, Ft. Myers, Florida, USA
- Dr. Ranadip Pal; Texas Tech University, Lubbock, Texas, USA
- Prof. R. Ponalagusamy; National Institute of Technology, India
- Dr. Lalit Ponnala; Cornell University, Ithaca, New York, USA

- *Dr. Meena Kishore Sakthar; Managing Editor, Frontiers in Bioscience; National Technological University, Singapore*
- *Prof. Abdel-Badeeh M. Salem; Head, Medical Informatics & Knowledge Engineering Research Unit, Ain Shams University, Cairo, Egypt*
- *Prof. Brijendra Singh; Head, Department of Computer Science, University of Lucknow, Lucknow, India*
- *Ashu M. G. Solo; Maverick Technologies America, Inc. (Publicity Chair)*
- *Dr. Rahman Tashakkori; Director, S-STEM NSF Supported Scholarship Program and NSF Supported AUAS, Appalachian State University, North Carolina, USA (Steering Committee)*
- *Dr. Quoc-Nam Tran; Principal Investigator, Collaborative Research, NSF; Lamar (Texas State) University, Texas, USA (BIOCOMP Vice-Chair)*
- *Prof. Layne T. Watson; IEEE Fellow, NIA Fellow, ISIBM Fellow, Fellow of The National Institute of Aerospace, Virginia Polytechnic Institute & State University, Blacksburg, Virginia, USA (Steering Committee)*
- *Prof. Jongwook Woo; California State University, Los Angeles, California, USA*
- *Dr. Jack Y. Yang; University of California, San Diego, California, USA*
- *Prof. Lotfi A. Zadeh; Member, National Academy of Engineering; IEEE Fellow, ACM Fellow, AAAS Fellow, AAAI Fellow, IFSA Fellow; Director, Berkeley Initiative in Soft Computing; Professor, University of California, Berkeley, USA (Steering Committee)*
- *Dr. Erliang Zeng; University of Notre Dame, Notre Dame, Indiana, USA*
- *Dr. Songfeng Zheng; Missouri State University, Missouri, USA*
- *Dr. Wei Zhong; University of South Carolina Upstate, South Carolina, USA*

We are indebted to the following distinguished speakers for accepting our invitation to present WORLDCOMP's and individual conference tutorials (a partial list at the time of this writing): Prof. H. J. Siegel (Abell Endowed Chair Distinguished Professor of ECE and Professor of Computer Science; Director, CSU Information Science & Technology Center, ISTeC; Colorado State University, Fort Collins, Colorado, USA); Dr. Ziping Liu (Southeast Missouri State University, USA); Dr. Akash Kumar Singh (IBM, Advisory IT Architect, California, USA); Dr. Sandeep Chatterjee (Co-founder, Chief Technology Officer and Vice President, SourceTrace Systems, Inc., USA); Prof. Vladimir Cherkassky (IEEE Fellow; Prof. ECE Department, University of Minnesota, Minneapolis, MN, USA; Former Director, NATO Advanced Study Institute, ASI); Dr. Brian J. d'Auriol (Kyung Hee University, Korea); Prof. Gevorg Margarov (Professor & Head, Information Security and Software Development Department, State Engineering University of Armenia, Yerevan, Armenia); Prof. Susan Lincke (University of Wisconsin-Parkside, Wisconsin, USA); Prof. Patrick S. P. Wang (IAPR Fellow; Editor-in-Chief, IJPRAI; Professor, Northeastern University, Boston, MA, USA and ECNU); Prof. Ray Kresman (Bowling Green State University, Bowling Green, Ohio, USA); Dr. Zachariah Tanko (Champlain College, Computer Networking and Information Security, USA); Dr. Peter Geczy (National Institute of Advanced Industrial Science and Technology, AIST, Japan); and Prof. Anthony A. Maciejewski (Fellow of IEEE; Professor and Head, ECE, Colorado State University, Fort Collins, Colorado, USA).

We express our gratitude to keynote and invited speakers of WORLDCOMP's and individual conference/tracks (a partial list at the time of this writing): Prof. Lotfi A. Zadeh (Member of National Academy of Engineering; Fellow of IEEE, ACM, AAAS, AAAI, and IFSA; Professor of EECS and Director BISC University of California, Berkeley, USA); Dr. Firouz Naderi (Associate Director, Project Formulation and Strategy, Jet Propulsion Laboratory, CalTech/NASA; Head, NASA Mars Exploration Program, 2000-2005; Fellow, AIAA); Jon Huppenthal (President and Chief Executive Officer, SRC Computers, LLC; Co-Founder with Late Seymour Cray, SRC Computers, LLC); Prof. Yaroslav D. Sergeyev (Distinguished Professor, University of Calabria, Rende, CS, Italy and Professor, N.I. Lobachevsky State University of Nizhni Novgorod, Russia); Prof. Patrick S. P. Wang (IAPR Fellow, Editor-in-Chief, IJPRAI; Professor, Northeastern University, Boston, MA, USA and ECNU); Prof. Rajkumar Buyya (Professor and Director, CLOUDS Lab, The University of Melbourne, Australia; CEO, Manjrasoft Pvt Ltd, Melbourne, Australia); Louis Leahy (Director, Armorlog International Ltd., Australia); Dr. Ziga Turk (Professor, University of Ljubljana, Slovenia; Secretary General, Reflection Group on the Future of Europe, Brussels, EU; Former minister, Growth in the Government of Slovenia & national Lisbon Strategy Coordinator during the Slovenian presidency of the EU); Prof. Vladimir Cherkassky (Fellow of IEEE; Professor, ECE Department, University of Minnesota, Minneapolis, MN, USA; Former Director, NATO Advanced Study Institute, ASI); Prof. Serge Chaumette (LaBRI, University

Bordeaux 1, France; Leader of the Muse research group; Leader of the Languages, Systems and Networks research group); and Prof. Eduard Babulak (Fellow, British Computer Society CS and IS; Professor, University of the South Pacific, Fiji).

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We present the proceedings of BIOCOMP'10.

Hamid R. Arabnia and Quoc-Nam Tran
General Co-Chairs/Vice-Chairs & Coordinators, BIOCOMP'10