

Foreword

It gives us great pleasure to introduce this collection of papers to be presented at the 2011 International Conference on Bioinformatics and Computational Biology (BIOCOMP'11), July 18 through 21, 2011, 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; Biomedical Cybernetics Laboratory, HST of Harvard University and Massachusetts Institute of Technology (MIT), USA; Intelligent Data Exploration and Analysis Laboratory, University of Texas at Austin, Austin, Texas, USA; Collaboratory for Advanced Computing and Simulations (CACs), University of Southern California, USA; Minnesota Supercomputing Institute, University of Minnesota, USA; Knowledge Management & Intelligent System Center (KMIS) of University of Siegen, Germany; UMIT, Institute of Bioinformatics and Translational Research, Austria; BioMedical Informatics & Bio-Imaging Laboratory, Georgia Institute of Technology and Emory University, Atlanta, Georgia, USA; Hawkeye Radiology Informatics, Department of Radiology, College of Medicine, University of Iowa, Iowa, USA; NDSU-CIIT Green Computing and Communications Laboratory, USA; Supercomputer Software Department (SSD), Institute of Computational Mathematics & Mathematical Geophysics, Russian Academy of Sciences, Russia; SECLAB (inter-university research groups at University of Naples Federico II, the University of Naples Parthenope, and Second University of Naples, Italy); Medical Image HPC & Informatics Lab (MiHi Lab), University of Iowa, Iowa, USA; Intelligent Cyberspace Engineering Lab., ICEL, Texas A&M University (Com./Texas), USA; and Model-Based Engineering Laboratory, University of North Dakota, North Dakota, 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; High Performance Computing for Nanotechnology (HPCNano); International Society of Intelligent Biological Medicine; World Academy of Biomedical Sciences and Technologies; The International Council on Medical and Care Computetics; The UK Department for Business, Enterprise & Regulatory Reform, UK; and Scientific Technologies Corporation; HoIP - Health without Boundaries. 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 44% 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 24%; 12% 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 BIOCAMP'11 Program Committee who we hope will offer their help again in organizing the next year's conference (BIOCAMP'12). The BIOCAMP'11 Program Committee members were:

- *Dr. Selim Aissi, (Steering Committee - WORLDCOMP), Chief Strategist - Security, Manageability and Virtualization, Ultra Mobile Group, Intel Corporation, USA*
- *Prof. Fadhl M. Al-Akwaa, Biomedical Engineering Department, University of Science & Technology, Sana'a, Yemen*
- *Prof. Hamid R. Arabnia, (Steering Committee - WORLDCOMP), Elected Fellow, ISIBM; Editor-in-Chief, The Journal of Supercomputing; Advisory Board, IEEE TC on Scalable Computing; University of Georgia, Georgia, USA*
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- *Dr. Junaid Chaudhry, University of Hail, Hail City, Saudi Arabia*
- *Dr. Long Chen, Senior Engineer, Qualcomm Incorporated, San Diego, California, USA*
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- *Prof. Ping-Tsai Chung, Chair, Computer Science Department, Long Island University, Brooklyn, New York, USA*
- *Prof. Kevin Daimi, Director, Computer Science and Software Engineering Programs, University of Detroit Mercy, Detroit, Michigan, USA*
- *Prof. Youping Deng, Director of Cancer Bioinformatics, Rush University Cancer Center, Rush University Medical Center, Chicago, Illinois, USA*
- *Dr. Mohsen Doroodchi, Cardinal Stritch University, Milwaukee, Wisconsin, USA*
- *Prof. (Winston) Wai-Chi Fang, (Steering Committee - WORLDCOMP), IEEE Fellow; Director, System-on-Chip Research Center; TSMC Distinguished Chair Professor; National Chiao Tung University, Hsinchu, Taiwan*
- *Dr. Haishan Gong, eBay Inc., Sunnyvale, California, USA*
- *Prof. George A. Gravvanis, Democritus University of Thrace, Greece*
- *Dr. Dongfeng Han, University of Iowa, Iowa City, Iowa, USA*
- *Prof. Ray R. Hashemi, Yamacraw Professor of Computer Science, Armstrong Atlantic State University, Savannah, Georgia, USA*
- *Prof. Matthew He, Director, Division of Math, Science, & Technology, Nova Southeastern University, Ft. Lauderdale, Florida, USA*
- *Prof. Xiangjian (Sean) He, Director of Intelligent Image Processing and Computer Vision; Deputy Director of Research Centre for Innovation in IT Services and Applications (iNEXT); University of Technology, Sydney, Australia*
- *Prof. Kun Chang Lee, (Steering Committee - WORLDCOMP), Professor of MIS and WCU Professor of Creativity Science, Sungkyunkwan University, Seoul, South Korea*
- *Prof. Simon Lin, Director of Bioinformatics, Center for Cancer Nanotechnology Excellence, Northwestern University, Chicago, Illinois, USA*
- *Dr. Shaoshan Liu, Microsoft, one Microsoft Way, Redmond, Washington, USA*
- *Dr. Yan Luo, National Institute of Standards and Technology (NIST), Maryland, USA*
- *Dr. Reza Malekian, Head, Computer Division, Azad University, Tonekabon, Iran*
- *Prof. Andy Marsh, (Steering Committee - WORLDCOMP), Director HoIP; Director HoIP Telecom, UK; Secretary-General WABT; Vice-president ICET; Visiting Professor University of Westminster, UK*
- *Dr. Ali Masoudi-Nejad, PI, Laboratory of Systems Biology and Bioinformatics (LBB) & Head of the Department of Bioinformatics, University of Tehran, Iran*
- *Sara Moein, Faculty of Engineering, Multimedia University, Malaysia*
- *Dr. Armin Mehran, Islamic Azad University, Tehran, Iran*
- *Dr. Niitin, Distinguished Adjunct Professor, University of Nebraska at Omaha, Omaha, Nebraska, USA*

- *Dr. R. Ponalagusamy, Professor and Head, Department of Mathematics, National Institute of Technology, Tiruchirappalli, India*
- *Prof. Junfeng Qu, Clayton State University, Morrow, Georgia, USA*
- *Prof. Kishore R. Sakharkar, Infectious Disease Cluster, Advanced Medical & Dental Institute (AMDI), University Sains Malaysia, Malaysia*
- *Dr. Akash Singh, IBM, Sacramento, California, USA*
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- *Prof. R. K. Singh, Uttarakhand Technical University, Dehradun, Uttarakhand, India*
- *Sunil Kr. Singh, Uttarakhand Technical University, Dehradun, Uttarakhand, India*
- *Ashu M. G. Solo, (WORLDCOMP Publicity Chair), Fellow of British Computer Society, Principal/R&D Engineer, Maverick Technologies America Inc.*
- *Dr. Jie Tang, University of California Irvine, California, USA*
- *Prof. Dr. Qurat-ul-Ain Tariq, Chairperson, Department of Computer and Information Systems Engineering, NED University of Engineering & Technology, Karachi, Pakistan*
- *Prof. Quoc-Nam Tran, (Vice-Chair, BIOCAMP), Lamar University, Beaumont, Texas, USA*
- *Dr. Vladimir Volkov, The Bonch-Bruевич State University of Telecommunications, Saint-Petersburg, Russia*
- *Dr. Guanghui Wang, Department of Systems Design, University of Waterloo, Canada*
- *Dr. Xuewei Wang, Michigan State University, East Lansing, Michigan, USA*
- *Prof. Yufeng Wang, University of Texas at San Antonio, Texas, USA and South Texas Center for Emerging Infectious Diseases, San Antonio, Texas, USA*
- *Prof. Layne T. Watson, (Steering Committee - WORLDCOMP), IEEE Fellow; NIA Fellow; ISIBM Fellow; Fellow of The National Institute of Aerospace; Virginia Polytechnic Institute & State University, Virginia, USA*
- *Prof. Jongwook Woo, President, KSEA-SC; Director of HiPiC; California State University, Los Angeles, California, USA*
- *Dr. Jack Y. Yang, Harvard University, USA & Board of Directors of ISIBM & Editor-in-Chief, Int'l Journal of Functional Informatics and Personalized Medicine, USA*
- *Prof. Lotfi A. Zadeh, (Steering Committee - WORLDCOMP), Member, National Academy of Engineering; IEEE Fellow, ACM Fellow; AAAS Fellow; AAAI Fellow; IFSA Fellow; Director, BISC; University of California, Berkeley, California, USA*
- *Hao Zheng, Georgia Institute of Technology, Georgia, USA*
- *Dr. Songfeng (Andy) Zheng, Missouri State University, Springfield, Missouri, USA*

We express our gratitude to keynote and invited speakers of WORLDCOMP and individual conference/tracks and tutorial speakers - the list of speakers appears on the conference web site.

We would also like to thank the followings: UCMSS (Universal Conference Management Systems & Support, California, USA) for managing all aspects of the conference; Dr. Tim Field of APC for managing the printing of the proceedings; and the staff of Monte Carlo Resort in Las Vegas for the professional service they provided. Last but not least, we would like to thank the Associate Editors of BIOCAMP 2011: Drs. Matthew He, Andy Marsh, Ashu M. G. Solo, and Jack Y. Yang.

We present the proceedings of BIOCAMP'11.

Hamid R. Arabnia and Quoc-Nam Tran

General Co-Chairs/Vice-Chairs & Coordinators, BIOCAMP'11

