PROCEEDINGS OF
THE 2013 INTERNATIONAL CONFERENCE ON
GRID & CLOUD COMPUTING & APPLICATIONS

GCA 2013

Editors

Hamid R. Arabnia
George A. Gravvanis
Ashu M. G. Solo

WORLDCOMP'13
July 22-25, 2013
Las Vegas Nevada, USA
www.world-academy-of-science.org

©CSREA Press

This volume contains papers presented at The 2013 International Conference on Grid & Cloud Computing & Applications (GCA'13). Their inclusion in this publication does not necessarily constitute endorsements by editors or by the publisher.

Copyright and Reprint Permission

Copying without a fee is permitted provided that the copies are not made or distributed for direct commercial advantage, and credit to source is given. Abstracting is permitted with credit to the source. Please contact the publisher for other copying, reprint, or republication permission.

Copyright © 2013 CSREA Press
ISBN: 1-60132-244-5
Printed in the United States of America

CSREA Press
U. S. A.

Foreword

It gives us great pleasure to introduce this collection of papers to be presented at the 2013 International Conference on Grid & Cloud Computing and Applications (GCA'13) July 22 through 25, 2013, at The New Tropicana Hotel, Las Vegas, USA.

An important mission of the World Congress in Computer Science, Computer Engineering, and Applied Computing (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."* By any definition of diversity, this congress is among the most diverse scientific meeting in USA. We are proud to report that this federated congress has authors and participants from 82 different nations representing variety of personal and scientific experiences that arise from differences in culture and values. As can be seen (see below), the program committee of this conference as well as the program committee of all other tracks of the federated congress are as diverse as its authors and participants.

The program committee would like to thank all those who submitted papers for consideration. Each submitted 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. In addition, papers whose authors included a member of the conference program committee were evaluated using the double-blinded review process. One exception to the above evaluation process was for papers that were submitted directly to chairs/organizers of pre-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 32%; 9% of the remaining papers were accepted as poster papers (at the time of this writing, we had not yet received the acceptance rate for a few individual tracks.)

We are very grateful to the many colleagues who offered their services in organizing the conference. In particular, we would like to thank the members of the Program Committee of GCA'13, members of the congress Steering Committee, and members of the committees of federated congress tracks that have topics within the scope of GCA. Many individuals listed below, will be requested after the conference to provide their expertise and services for selecting papers for publication (extended versions) in journal special issues as well as for publication in a set of research books (to be prepared for publishers including: Springer, Elsevier, BMC, and others).

- *Dr. Alireza Abbasi; School of Eng. & IT, University of New South Wales (UNSW), Canberra, Australia*
- *Dr. Selim Aissi (World Congress Steering Committee); formerly, Chief Strategist - Security, Intel Corporation, USA; Senior Business Leader & Head of Global Enterprise Security Architecture, Visa Corporation, USA*
- *Prof. Babak Akhgar (World Congress Steering Committee); Fellow of the British Computer Society, CITP; Professor of Informatics; Co-Director of CENTRIC (Centre of Excellence in Terrorism, Resilience, Intelligence & organised Crime research), Sheffield Hallam University, Sheffield, UK*
- *Prof. Nizar Al-Holou (World Congress Steering Committee); Professor and Chair, Electrical and Computer Engineering Department; University of Detroit Mercy, Detroit, Michigan, USA*
- *Prof. Hamid R. Arabnia (World Congress Steering Committee); Professor, Computer Science; Editor-in-Chief, The Journal of Supercomputing (Springer); Elected Fellow, Int'l Society of Intelligent Biological Medicine (ISIBM); The University of Georgia, Department of Computer Science, USA*
- *Peyman Arebi; Assistant Professor, Department of Computer Engineering, Technical and Vocational University, Bushehr, Iran*
- *Prof. Ezendu Ariwa (Publicity Vice-Chair); Chair, IEEE Consumer Electronics Chapter, UK&RI; Visiting Professor, Gulf University, Bahrain*

- *Prof. Juan Jose Martinez Castillo; Director of The Acantelys Research Group and Coordinator of the Computer Engineering Department, Universidad Gran Mariscal de Ayacucho, Venezuela*
- *Dr. Hsi-Ya (Jerry) Chang; Division Chief, National Center for High-Performance Computing, Taiwan; Secretary General of ACCTA; Member, Council of the Taiwan Association of Cloud Computing (TACC); Taiwan, ROC*
- *Prof. Juan Cuadrado-Gallego; Universidad de Alcala, Edificio Politecnico, Madrid, Spain; Ecole de technologie superieure, University of Quebec, Canada*
- *Prof. Kevin Daimi (World Congress Steering Committee); Director, Computer Science and Software Engineering Programs; Department of Mathematics, Computer Science and Software Engineering; University of Detroit Mercy, Detroit, Michigan, USA*
- *Prof. George A. Gravvanis (Vice-Chair GCA); Democritus University of Thrace, Greece*
- *Prof. Houcine Hassan; Universitat Politecnica de Valencia, Spain*
- *Prof. George Jandieri (World Congress Steering Committee); Georgian Technical University, Tbilisi, Georgia; Chief Scientist, The Institute of Cybernetics, Georgian Academy of Science, Georgia; Editorial Board Member: International Journal of Microwaves and Optical Technology, The Open Atmospheric Science Journal, American Journal of Remote Sensing, Georgia*
- *Prof. Dong Hwa Kim; Department of Electronic and Control Engineering, Hanbat National University, Korea; Visiting Professor, Budapest University of Technology and Economic, Hungary; International Einstein awardee for Scientific achievement (2010)*
- *Prof. Dattatraya V. Kodavade (World Congress Steering Committee); Head of Computer Science and Engineering, D.K.T.E Society's Textile & Engineering Institute, Ichalkaranji, Maharashtra State, India*
- *Prof. Kun Chang Lee (World Congress Steering Committee); Professor of MIS and WCU Professor of Creativity Science, Business School and Department of Interaction Science, Sungkyunkwan University, Seoul, South Korea*
- *Dr. Bala Krishna Maddali; University School of IT, GGS Indraprastha University, India*
- *Muhammad Naufal Bin Mansor; Intelligent Signal Processing Group (ISP), University Malaysia Perlis, Kangar, Perlis, Malaysia*
- *Prof. Gevorg Margarov; Head of Information Security and Software Development Department, State Engineering University of Armenia, Armenia*
- *Prof. George Markowsky (World Congress Steering Committee and SAM Session Chair); Professor and Associate Director, School of Computing and Information Science; Chair International Advisory Board of IEEE IDAACS; Director 2013 Northeast Collegiate Cyber Defense Competition; Chair Bangor Foreign Policy Forum; Cooperating Professor Mathematics and Statistics Department UMaine; Cooperating Professor School of Policy & International Affairs UMaine; University of Maine, Orono, Maine, USA*
- *Dr. Sara Moein; Editorial Board, International Journal of Science and Technology; Faculty of Engineering, MultiMedia University, Malaysia*
- *Dr. Ali Mostafaeipour; Industrial Engineering Department, Yazd University, Iran*
- *Dr. Saurabh Mukherjee; Associate Professor, Department of Computer Science, Banasthali University, Banasthali, Rajasthan, India*
- *Prof. Noel De Palma; Associate Vice President for Research, Computer Science; Leader, ERODS Research, LIG Labs.; Board of Directors, OW2 Consortium; Department of Computer Science; University Joseph Fourier (UJF), Grenoble, France*
- *Prof. G. N. Pandey (World Congress Steering Committee); Vice-Chancellor, Arunachal University of Studies, Arunachal Pradesh, India; Adjunct Professor, Indian Institute of Information Technology, Allahabad, India*
- *Prof. James J. (Jong Hyuk) Park (World Congress Steering Committee); Professor of Computer Science and Engineering, Seoul National University of Science and Technology (SeoulTech), Korea; President, KITCS; President, FTRA; Editor-in-Chiefs: HCIS, JoC and IJITCC Journals*
- *Dr. Satish Penmatsa; Computer Science, University of Maryland - Eastern Shore, Maryland, USA*
- *Prof. Junfeng Qu; Clayton State University, Morrow, Georgia, USA*
- *Dr. Liang Shi; Senior Researcher, McAfee, USA*
- *Dr. Kok Swee Sim; Faculty of Engineering and Technology, Jalan Ayer Keroh Lama, Melaka, Malaysia*
- *Ashu M. G. Solo, (Publicity Chair); Fellow of British Computer Society, Principal/R&D Engineer, Maverick Technologies America Inc., USA*
- *Dr. Alain Tchana; Grenoble University, France*
- *Prof. Fernando G. Tinetti (World Congress Steering Committee); School of Computer Science, Universidad Nacional de La Plata, La Plata, Argentina; Co-editor, Journal of Computer Science and Technology (JCS&T)*
- *Dr. Predrag Tosic (World Congress Steering Committee); Microsoft, Washington, USA*

- *Prof. Vladimir Volkov (World Congress Steering Committee & Vice-Chair of IPCV); The Bonch-Bruevich State University of Telecommunications, Saint-Petersburg, Russia*
- *Dr. Wei Wei; School of Computer Science & Engineering, Xi'an University of Technology, Xi'an, P. R. China*
- *Dr. Alexander Wohrer; Program Manager ICT at Vienna Science and Technology Fund, Schlickgasse, Vienna, Austria*
- *Prof. Jongwook Woo; Director, High-Performance Information Computing Center (HiPiC), Computer Information Systems Department, California State University, Los Angeles, California, USA*

As Sponsors-at-large, partners, and/or organizers each of the followings (separated by semicolons) provided help for at least one track of the World Congress: Aldebaran Robotics Inc., USA (http://www.aldebaran-robotics.com); Altera Corporation, USA (http://www.altera.com/); Computer Science Research, Education, and Applications Press (CSREA); Impulse Accelerated Technologies, Inc., USA (http://www.impulseaccelerated.com/); NVIDIA Corporation, USA (http://www.nvidia.com/object/about-nvidia.html); Parallella Community, Supercomputing for Everyone, USA (http://forums.parallella.org/); Pico Computing, Inc., USA (http://picocomputing.com/); SemiWiki.com, The Semiconductor Wiki Project, USA (http://www.semiwiki.com/); Solarflare Communications, Inc., USA (http://www.solarflare.com/); Stream Computing, Performance Engineers, The Netherlands (http://streamcomputing.eu/); Taylor & Francis, UK (http://www.taylorandfrancis.com/); US Chapter of World Academy of Science (http://www.world-academy-of-science.org/) ; and WEBestSOL & Webest Solutions Ltd, UK (http://webestsol.com/). In addition, a number of university faculty members and their staff (names appear on the cover of the set of proceedings), several publishers of computer science and computer engineering books and journals, chapters and/or task forces of computer science associations/organizations from 5 countries, and developers of high-performance machines and systems provided significant help in organizing the conference as well as providing some resources. We are grateful to them all.

We express our gratitude to keynote, invited, 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 the New Tropicana Hotel in Las Vegas for the professional service they provided. Last but not least, we would like to thank the Co-Editors of GCA'13: Prof. Hamid R. Arabnia, Dr. George A. Gravvanis, and Ashu M. G. Solo.

We present the proceedings of GCA'13.

Steering Committee, 2013
http://www.world-academy-of-science.org/

Contents

SESSION: PARALLEL AND DISTRIBUTED ALGORITHMS AND APPLICATIONS + GRID COMPUTING

VM Migration Approach for Autonomic Fault Tolerance in Cloud Computing **3**
Anju Bala, Inderveer Chana

Adaptive Data Replication Scheme Based on Access Count Prediction in Hadoop **10**
Jungha Lee, JongBeom Lim, Daeyong Jung, Heonchang Yu, KwangSik Chung, JoonMin Gil

Elastic Integration of a Dedicated Grid Site with an Opportunistic Cloud Infrastructure **17**
Harold Castro, Nathalia Garcés, Mario Villamizar

Instantaneous Availability-Aware Scheduling Method for Parallel Task in Cloud Environment **25**
Jie Cao, Guosun Zeng

BLASTer: A Hub-based Tool for Bioinformatics **32**
Benjamin Cotton, Christopher Thompson, Brian Raub

An Efficient Method by Using Prediction to Reduce Times in Live Migration of Virtual Machine **37**
Boseob Kim, Sungchun Kim

SESSION: CLOUD COMPUTING AND RELATED ISSUES

Towards a User Deployable Service-oriented Autonomic Multi-cloud Overlay Infrastructure for Sky Computing **45**
Courtney Powell, Masaharu Munetomo, Takashi Aizawa

SLA-Aware Adaptive Provisioning Method for Virtualized Application Execution Environments **52**
Seunghwan Yoo, Sungchun Kim

Harnessing the Benefits of Big Data in the Cloud **58**
Felix Njeh, Bo Yang

A Stream Symmetric Homomorphic Encryption Scheme With Finite Automata **64**
Alejandro Llamas, Raul Ernesto Gonzalez

Energy Efficiency Models Implemented in a Cloud Computing Environment **71**
Thusoyaone Joseph Moemi, Obeten Obi Ekabua

A System of Cloud Services and SOA to Improve Healthcare Organizations **77**
Giulio Concas, Katiuscia Mannaro, Luisanna Cocco, Marco Di Francesco

Essential Cloud Security Features in Windows Azure **81**
Ramya Dharam, Sajjan G. Shiva

An Approach for QoS-aware Cloud Service Selection Based on Genetic Algorithm and Simplex Method **88**
Chengwen Zhang, Jian Kuang, Zhitao Dai, Bo Cheng, Lei Zhang

Maximizing SLA and QoE in Heterogeneous Cloud Computing Environment **95**
Md Sabbir Hasan, Eui-Nam Huh

Social Network Storage Allocation **102**
Faruk Bagci, Mohamed Esam, Aya Kamel, Iman Mansour, Rimon Hanna, Seif El-Din Allam, Taher Galal

SESSION: VIRTUAL MACHINES AND CLOUD COMPUTING

A Fast Live Migration Algorithm of Virtual Machine with CPU Scheduling **111**
Jia Zhao, Liang Hu, Gaochao Xu, Decheng Chang, Yan Ding, Xiaodong Fu

A Fuzzy Predictable Load Balancing Approach in Cloud Computing **118**
Fahimeh Ramezani, Jie Lu, Farookh Hussain