Guest Editorial: Special Issue on Algorithms and Computational Models for Sustainable Computing in Cloud and Data Centers

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Cloud computing and data centers offer computing and data storage services and solutions at very large scale. These solutions, however, come with high costs and environmental impacts due to high energy consumptions at various levels of the computational and data storage processes. Therefore, energy consumption has become a key issue for the normal operation and maintenance of cloud computing platforms and datacenters, raising serious concerns from Cloud providers. Research trends such as Green Cloud Computing (GCC), Sustainable Cloud Computing (SSC), and alike aim to minimize energy consumption and therefore minimize costs and environmental impacts.

This special issue brings together high quality contributions covering the topics of energy efficiency cloud computing, advances in sustainable cloud and data centers, energy-aware applications at various levels of the computational and data storage processes, and emerging trends in sustainable computing. New research findings, novel approaches, and algorithms are presented for energy-efficient Cloud computing, energy-aware memory management solutions for data centers and processing of large data sets, energy-aware scheduling approaches for data centers and processing of large data sets, energy consumption computational models, analytics and performance evaluations, and applications as well as emerging trends and applications.

The special issue received 37 submissions and accepted 13 submissions after a rigorous review process of 2-3 rounds of review. The papers of this special issue are arranged into two groups. The first seven papers cover energy-aware computing and energy-efficiency from computing and applications perspectives. These papers are the followings:

1. Medhane Darshan Vishwasrao and Arun Kumar Sangaiah, “ESCAPE: Effective Scalable Clustering Approach for Parallel Execution of Continuous Position-Based Queries in Position Monitoring Applications”.


4. Ugo Fiore, Aniello Castiglione, Alfredo De Santis, and Francesco Palmieri, “Exploiting Battery-Drain Vulnerabilities in Mobile Smart Devices”.


The second group of six papers deals with hardware and network-oriented energy-efficiency of Cloud data centers. These papers are the followings:


6. Hui Dou, Yong Qi, Wei Wei, and Houbing Song, “Carbon-Aware Electricity Cost Minimization for Sustainable Data Centers”.

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The papers included in this special issue present state-of-the-art approaches to relevant research issues in sustainable computing. We believe that the research findings and the new computational models in these papers will serve as a basis and inspiration for researchers and developers in the field to further investigate these research issues in sustainable computing as well as digging into new and emerging issues.

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Ciprian Dobre with University Politehnica of Bucharest, Romania, has scientific and scholarly contributions in the field of large scale distributed systems concerning mobile applications and smart technologies to reduce urban congestion and air pollution (TRANSYS), context-aware applications (CAPIMoV), smart networks and mobile data offloading (SPRINT, SENSE), monitoring (MonALISA), high-speed networking (VINCI, FDT), Grid application development (EGET, SEE-GRID), and evaluation using modeling and simulation (MONARC 2, VNSim). These contributions led to important results, demonstrating his qualifications and potential to go significantly beyond the state of the art. He was awarded a PhD scholarship from the California Institute of Technology (Caltech, USA), and another one from Oracle. His results received one IBM Faculty Award, two CENIC Awards, and three Best Paper Awards (in 2013, 2012, and 2010). The results were published in six books, 10 chapters in edited books, 34 articles in major international peer-reviewed journal (19 as main author, cumulated impact factor of 13.24), and over 100 articles in well-established international conferences and workshops (with more than 200 citations). More information is available on his web page: http://cipsm.hpc.pub.ro.

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