

Guest Editorial: Green and Cloud Computing

Meikang Qiu · Chi Ma

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Energy consumption is a bottleneck for information computing and communication. Green computing aims to reduce energy costs as well as to effectively reuse and recycle power usage. The topics include energy-efficient CPUs, memories, clusters, data centers, and peripherals as well as reduced resource consumption. The emerging cloud computing provides a new way to address the constraints of limited energy, capabilities, and resources. Cloud computing is the second focus of this special issue. Five papers have been accepted from an open call, and they are briefly discussed as follows.

First, “Optimizing Data Placement of Loops for Energy Minimization with Multiple Types of Memories”, by Zhuge et al. (10.1007/s11265-013-0774-y), studies the problem of how to optimally place array data in loops to multiple types of memory units such that the energy and time costs of memory accesses can be minimized and proposes several novel algorithms to solve the problem.

For green computing, storage system is an important area. The paper “Eco-Storage: A Hybrid Storage System with Energy-Efficient Informed Prefetching”, by Maen Al Assaf et al. (10.1007/s11265-013-0784-9), presents a power-aware informed prefetching technique that makes use of the application-disclosed access patterns to group the informed prefetching process in a hybrid storage

system with hard drives (HDDs) and solid state disks (SSDs). Simulation results show significant reduction of power consumption through this approach.

In another paper “Thermal Modeling of Hybrid Storage Clusters” (10.1007/s11265-013-0787-6), the authors propose a thermal model for hybrid storage clusters that are comprised of HDDs and SSDs, and develop a model to estimate cooling cost of a storage cluster equipped with hybrid storage nodes.

Power-aware computing is critical in wireless sensor networks. In the paper “BER-based Power Scheduling in Wireless Sensor Networks” (10.1007/s11265-013-0776-9), the authors investigate the Bit Error Rate (BER) during packet transmission and propose a power scheduling scheme to reduce the total energy consumption in the routing. The proposed approach controls the transmission power of each transmitter to achieve the minimum energy consumption for successful packet transmission.

For cloud computing, the paper entitled “SAFE: A Source Deduplication Framework for Efficient Cloud Backup Services”, by Yajuan Tan et al. (10.1007/s11265-013-0775-x), proposes a source deduplication framework for efficient cloud backup and restore operations. The framework has three features: hybrid deduplication, semantic-aware Elimination, and unmodified data removal. Experiments show this approach can shorten the backup time by an average of 38.7 %, and reduce the restore time by a ratio of up to 9.7 : 1.

In this special issue, based on the strict peer-reviewed process, we selected five outstanding papers covering a wide range green and cloud computing. These papers provide frontier information with current depth and breadth of green and cloud computing research.

M. Qiu (✉)
San Jose State University, San Jose, CA, USA
e-mail: qiumeikang@yahoo.com

C. Ma
Google Inc, Mountain View, CA, USA
e-mail: machi@google.com



Meikang Qiu received the B.E. and M.E. degrees from Shanghai Jiao Tong University, China. He received the M.S. and Ph.D. degrees of Computer Science from University of Texas at Dallas in 2003 and 2007, respectively. He had worked at Chinese Helicopter R&D Institute and IBM. Currently, he is an associate professor of Computer Engineering at San Jose State University. He is both IEEE and ACM Senior members. He has published 170 papers, including 18 IEEE/ACM Transactions papers.

He is the recipient of the ACM Transactions on Design Automation of Electronic Systems (TODAES) 2011 Best Paper Award. He also received four other best paper awards (IEEE ICSS'12, IEEE/ACM GreenCom'10, and IEEE CSE'10, IEEE EUC'09) and one best paper nomination. He also holds 3 patents and has published 3 books. He has also been awarded Navy Summer Faculty Award in 2012 and SFFP

Air Force summer faculty Award in 2009. He has been on various chairs and TPC members for many international conferences. He served as the Program Chair of IEEE EmbedCom'09 and EM-Com'09. His research interests include cloud and green computing, embedded systems, and computer security.



Chi Ma is a Senior Software Engineer in Google Inc. He received his PhD and MS degrees in the Department of Computer Science at the State University of New York at Stony Brook. His research has focused on Big Data, Cloud Computing and Distributed Systems. He has also conducted research in the broad areas of networking, parallel and distributed computing.