Special Issue on Parallel Algorithms, Scheduling and Architectures

Guest Editorial

Since applications of computing systems permeated in every aspects of our daily life, the efficiency of execution of parallel programs on distributed systems has become a critical issue in the research field of high-performance computing systems. In recent years, more and more researchers have recognized the fact that parallel algorithms, scheduling and architectures play an important role in improving the efficiency of computing systems, and hence continuously present their valuable research results in this field.

In this special issue, we selected some excellent papers from the third International Symposium on Parallel Architectures, Algorithms and Programming (PAAP 2010), which was held in Dalian, China, December 18-20, 2010. In addition, we invited and selected some representative research papers in the broad area of parallel algorithms, scheduling and architectures.

The paper titled "A Novel Differential Evolution with Uniform Design for Continuous Global Optimization" presents a uniform-differential evolution algorithm (UDE) which incorporates uniform design initialization method into differential evolution to accelerate its convergence speed and improve the stability.

The paper titled "Leveraging 1-hop Neighborhood Knowledge for Connected Dominating Set in Wireless Sensor Networks" proposes an algorithm leveraging 1-hop neighborhood knowledge for connected dominating set, aiming to get a small connected dominating set, meanwhile, to minimize the consumption of energy and time.

The paper titled "An Internet Traffic Identification Approach Based on GA and PSO-SVM" proposes an internet traffic identification approach which selects the best feature subset using Genetic Algorithm, and then calculate the correspondence weight of each feature selected by Particle Swarm Optimization (PSO). In addition, the traditional SVM algorithm is optimized by PSO algorithm.

The paper titled "Efficient and Scalable Thread-level Parallel Algorithms for Sorting Multisets on Multi-core Systems" proposes a cache-efficient, thread-level parallel and scalable algorithm for sorting Multisets on single multi-core computer and the heterogeneous cluster with multi-core computers.

The paper titled "A New Resource Scheduling Strategy Based on Genetic Algorithm in Cloud Computing Environment" presents a scheduling strategy on load balancing of VM resources based on genetic algorithm, brings in variation rate to describe the load variation of system virtual machines and introduces average load distance to measure the overall load balancing effect of the algorithm.

The paper titled "Task Scheduling Based On Thread Essence and Resource Limitations" discusses a task scheduling model takes into account the essence of the threads in simultaneously-running applications by granting higher priority to applications during their critical-serial phases and also considers the limited resources of the system by reducing the number of context swithches when there are more ready threads than cores.

The paper titled "A Game Theoretic Resource Allocation Model Based on Extended Second Price Sealed Auction in Grid Computing" proposes a model which focuses on the resource allocation problem in grids and cloud computing. This model introduces an analyst entity and designs analyst's prediction algorithm based on Hidden Markov Model and simulation results shows it performs better than traditional algorithms.

The paper titled "A Performance Model for Network-on-Chip Wormhole Routers" presents a generic analytical performance model of single-channel wormhole routes by using the M/D/l/B queuing theory.

The paper titled "Cocktail method for BitTorrent traffic identification in real time" proposes a cocktail approach consists of three sub-methods including application signature-based methods, message-based methods and pre-identification methods to identify BT traffic in real-time.

The paper titled "A Context-Aware Routing Protocol on Internet of Things Based on Sea Computing Model" proposes a new routing protocol CASCR (Context-Awareness in Sea Computing Routing Protocol) for Internet of Things, combining with the Sea Computing model for Internet of Things and the routing protocol for wireless sensor network (WSN) based on context-awareness, and describes the work flow, data structure and quantitative algorithm of the CASCR in details. Through theoretical and experimental analysis, the CASCR has higher energy efficiency and longer lifetime than the congeneric protocols.

The paper titled "An Energy-Aware Multi-Core Scheduler based on Generalized Tit-For-Tat Cooperative Game" proposes a game theoretic energy-aware scheduling algorithm for multi-core systems named GTFTES, which is designed to work in a resource-rich environment where resources always compete for tasks. Simulations results show that the proposed game can reduce the temperature difference between different groups of cores which effectively avoids the local hotspot of a processor.

The paper titled "A Failure Self-recovery Strategy with Balanced Energy Consumption for Wireless Ad Hoc Networks" discusses a solution of self-recovery strategy with balanced energy consumption in wireless ad hoc networks with the failure cluster which is out of work. Also, to keep the original performance of the whole WSNs, the energy consumption of the node is minimized.

The paper titled "An Attractive Force Model for Weighting Links in Query-Dependant Web Page Ranking" presents

a gravitation-like model for calculating the attractive force between papers. And then some features of web pages are taken into consideration while implementing an instance of the algorithm framework.

The paper titled "An Improved HITS Algorithm Based on Pagequery Similarity and Page Popularity" proposes a weighted HITS algorithm which differentiates the importance of links with the querypage similarities and the popularity of web pages. It can avoid the problem of topic drift and enhance the quality of web search effectively.

The paper titled "A Cooperative and Heuristic Community Detecting Algorithm" introduces the concept of community seed, vector and relation matrix. In terms of the relation similarity between free vertices and the existing communities, the authors put vertices into different groups. A minimum similarity threshold is proposed to filter which gives a method to find the vertices located at the overlapped area between different communities.

It has been a great pleasure to run this special issue, which reveals important research results in the field of parallel algorithms, scheduling and architectures. We would like to thank Prof. Prabhat Mahanti, Editor-in-Chief of Journal of Computers, and Dr. George J. Sun, Executive Editor of Academy Publisher, for giving us the opportunity to organize this special issue and for their great help in the organization of this issue. We thank all authors for their submissions and all reviewers for their diligent work in evaluating these submissions. We sincerely hope that you enjoy reading these distinguished papers.

Guest Editors:

Xianchao Zhang, School of Software, Dalian University of Technology, China xczhang@dlut.edu.cn

Wenxin Liang, School of Software, Dalian University of Technology, China liang@computer.org

Feng Xia, School of Software, Dalian University of Technology, China f.xia@ieee.org



Xianchao Zhang is a Full Professor at Dalian University of Technology, China. He received his B.S degree in Applied Mathematics and M.S. degree in Computational Mathematics from National university of Defense Technology in 1994 and 1998, respectively. He received his Ph.D. in Computer Theory and Software from University of Science and Technology of China in 2000. He joined Dalian University of Technology in 2003 after 2 years of industrial working experience at international companies. He worked as Visiting Scholar at The Australian National University and The City University of Hongkong in 2005 and 2009, respectively. His research interests include Algorithms, Machine Learning, Data Mining and Information Retrieval.



Wenxin Liang an Associate Professor at School of Software, Dalian University of Technology, China. He received his B.E. and M.E. degrees from Xi'an Jiaotong University, China in 1998 and 2001, respectively. He received his Ph.D. degree in Computer Science from Tokyo Institute of Technology in 2006. He was a Postdoc Research Fellow, CREST of Japan Science and Technology Agency (JST) and a Guest Research Associate, GSIC of Tokyo Institute of Technology from Oct. 2006 to Mar. 2009. His main research interests include XML Data Processing and Management, XML Storage, Indexing, Labeling and Querying Techniques, XML Keyword Search, Web-based IR, Knowledge Discovery and Management, etc. He is a senior member of China Computer Federation (CCF), and a member of IEEE, ACM, ACM SIGMOD Japan Chapter and Database Society of Japan (DBSJ).



Feng Xia received the B.E. and Ph.D. degrees from Zhejiang University, China, in 2001 and 2006, respectively. He was a Research Fellow at Queensland University of Technology, Australia, from 2007 to 2008. Before joining Dalian University of Technology (DUT) in Mar 2009, with which he is currently an Associate Professor and PhD Supervisor, Dr. Xia was an Assistant Professor at Zhejiang University. He is on the Editorial Board of several international journals. He serves as General Chair, PC Chair, Workshop Chair, Publicity Chair, or PC Member of a number of conferences. He is also the Guest Editor of several journal special issues. Dr. Xia has (co-)authored one book and over 80 scientific papers. His research interests include cyber-physical systems (CPS), mobile computing, and social computing. He is a member of IEEE and ACM.