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Trends in high-performance computing and communications for ubiquitous computing

TAI-HOON KIM[1], CHING-HSIEN HSU[2] and SAJID HUSSAIN[3]

[1]*Hannam University, 133 Ojeong-dong, Daedeok-Gu, Daejeon 306-791, Korea;*
e-mail: thkim2005@gmail.com;
[2]*Chung Hua University, 707, Sec.2, WuFu Road, Hsinchu, 30012 Taiwan, R.O.C.;*
e-mail: robertchh@gmail.com;
[3]*Acadia University, 15 University Avenue, Wolfville, Nova Scotia, B4P 2R6 Canada;*
e-mail: dr.sajid.hussain@gmail.com

With the rapid growth in computing and communications technology, the past decade has witnessed a proliferation of powerful parallel and distributed systems and an ever-increasing demand for practice of high-performance computing and communications (HPCC) for ubiquitous computing. HPCC has moved into the mainstream of computing and has become a key technology in determining future research and development activities in many academic and industrial branches, especially when the solution of large and complex problems must cope with very tight timing schedules.

This special issue aims to foster the dissemination of high-quality research in any new idea, method, theory, technique and research regarding HPCC. The objective of this special issue is to showcase the most recent developments and research, as well as to enhance its state-of-the-art.

Topics include, but not limited to:

- parallel and distributed system architectures;
- parallel and distributed software technologies;
- parallel and distributed algorithms;
- embedded systems;
- grid, cluster and peer-to-peer computing;
- Web services and Internet computing;
- performance evaluation and measurement;
- distributed systems and applications;
- high-performance scientific and engineering computing;
- database applications and data mining;
- biological/molecular computing;
- mobile computing and wireless communications;
- network protocols, routing, algorithms;
- pervasive/ubiquitous computing and intelligence;
- autonomic, reliability and fault tolerance;
- trust, security and privacy.

We received 15 manuscripts. Each manuscript was blindly reviewed by at least three reviewers consisting of guest editors and external reviewers. After the review process, six manuscripts were finally selected for this Special Issue.

The first paper in this special issue is on ‘Mobility-aware balanced scheduling algorithm in mobile Grid based on mobile agent’ by Jonghyuk Lee, Sungjin Choi, Taeweon Suh and Heonchang Yu. This work first presents a mobile Grid system architecture based on mobile agents that support the location management and the asynchronous message delivery in a multi-domain proxy environment. Second, it presents a novel balanced scheduling algorithm that takes users’ mobility into account in scheduling. Third, the paper

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proposes an adaptive load-balancing technique by classifying mobile devices into nine groups depending on availability and by utilizing adaptability based on the multi-level feedback queue to handle the job type change. The experimental results show that the proposed scheduling algorithm provides a superior performance in terms of execution times to the one without considering mobility and adaptive load balancing.

The second paper in this special issue is on 'Adaptivity in high-performance embedded systems: a reactive control model for reliable and flexible design' by Huafeng Yu, Abdoulaye Gamatie, Eric Rutten and Jean-Luc Dekeyser. They propose a reactive control model that has been introduced in Gaspard. The proposed model aims at expressing adaptivity as well as reconfigurability in systems performing data-intensive computations. It is generic enough to be used for description in the different parts of an embedded system, for example, specification of how different data-intensive algorithms can be chosen according to some computation modes at the functional level; expression of how hardware components can be selected via the usage of a library of intellectual properties according to execution performances. The transformation of this model towards synchronous languages is also presented, in order to allow an automatic code generation usable for formal verification, based on techniques. This work, based on model-driven engineering and the standard UML MARTE profile, has been implemented in Gaspard.

The third paper in this special issue is on 'An efficient route scheduling mechanism for WiMAX network' by Ming-Huang Guo, Der-Jiunn Deng, Horng-Twu Liaw and Jong Hyuk Park. The paper proposes a two-tier cluster-based route scheduling mechanism on WiMAX Mesh mode. It achieves both fairness and efficiency inside and outside the cluster. The simulation result shows that the proposed mechanism provides great improvement in average delay time and throughput than other research.

The fourth paper in this special issue is on 'Taxonomy of reputation assessment in peer-to-peer systems and analysis of their data retrieval' by Farag Azzedin. He proposes a reputation assessment process and uses it to classify the existing reputation systems. Simulation experiments are conducted and focused on the different methods in selecting the recommendation sources and collecting the recommendations. These two phases can contribute significantly to the overall performance owing to precision, recall and communication cost.

The fifth paper in this special issue is on 'QoS-based active dropping mechanism for NGN video streaming optimization' by Chi-Yuan Chen, Tin-Yu Wu, Wei-Tsong Lee, Han-Chieh Chao and Jen-Chun Chiang. This work proposes an active dropping mechanism to deal with the effective bandwidth utilization. It uses scalable video coding (SVC) extension of H.264/AVC standard to provide different video quality for users of different levels. In the proposed dropping mechanism, when the network loading exceeds the threshold, the dropping mechanism starts to drop data of the enhancement layers for users of low service level. The dropping probability alters according to the change in network loading. With the dropping mechanism, the base station increases the system capability and users are able to obtain better service quality when the system is under heavy loading. This work also designs several methods to adjust the threshold value dynamically. By using the proposed mechanism, better quality can be provided when the network is in congestion.

The last paper in this special issue is on 'Conceptual modeling for knowledge management to support agile software development' by Amritesh and Subhas C. Misra. In the paper, the authors map the agile values and agile principles, and in its support, they argue upon the need for integrated knowledge management infrastructure and propose a knowledge management model that can be employed within the organization. They also develop a conceptual framework for knowledge sharing and learning for the individual practitioners for sustainability of agile team.

Finally, we would like to thank all authors for their contributions to this special issue. We also extend our thanks to the following external reviewers for their excellent job in reviewing the manuscripts: Antonios Litke, Chi-Yuan Chen, Konstantinos Tserpes, Jonghyuk Lee, Sudip Misra, Jongsung Kim, Yao-Chung Chang, Jen-Wen Ding, Jiann-Liang Chen, Naixue Xiong, Bin Xie, Yi-Ying Zhang, Zhanqi Cui, Ilsun You, Changhoon Lee, Yangsun Lee, Isaac Woungang, P. Venkata Krishna, V. Saritha, Sang-Soo Yeo, Deok Gyu Lee, Taeshik Shon, Hangbae Chang, Seungmin Rho and Jong Hyuk Park.

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