Preface

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Parallel and distributed computing has been under many years of development, driving different research and application trends such as grid computing, cloud computing, green computing, etc. Nowadays the theory, design, analysis, evaluation and application of parallel and distributed computing systems are still burgeoning, to suit the increasing requirements on high efficiency and energy saving in global economy. The objective of this special section is to address some of the recent trends in the area of parallel and distributed computing, applications and technologies. This special section is based on the presentations made at the 13th International Conference on Parallel and Distributed Computing, Applications and Technologies (PDCAT 2012).

Hui Tian, Hong Shen and Yingpeng Sang in their paper "Maximizing network lifetime in wireless sensor networks with regular topologies" present how to place sensor nodes to maximize the coverage area when the communication radius of the sensor node differs from the sensing radius, which results in the application of regular topologies to the deployment of wireless sensor networks (WSNs). They also generalize the maximizing network lifetime problem to the randomly deployed WSNs which shows the significance of their mathematical formulation for this crucial problem in WSNs.

Lingling Xu and Shaohua Tang in their paper "Verifiable computation with access control in cloud computing" introduce and formalize the notion of verifiable computation with access control (AC-VC), in which only the computationally weak clients with necessary access control permissions can be allowed by a trusted source to apply the outsourced computation of a function to a server. They present a formal security definition and a proved secure black-box construction for AC-VC. This construction is built based on any verifiable computation in the secret key model and ciphertext-policy attribute-based encryption (CP-ABE).

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Ludan Zhang, Yi Liu, Rui Wang and Depei Qian in their paper "Lightweight dynamic partitioning for last-level cache of multicore processor on real system" propose a malloc allocator-based dynamic cache partitioning mechanism with page coloring, to reduce contentions in shared cache that restrict performance improvement of parallel programs. Memory allocated by their scheme can be dynamically partitioned among different applications. Only coloring the dynamically allocated pages can release memory pressure and reduce page copying overhead compared to all-page coloring.

Satoshi Fujita in the paper "Approximation scheme for burst scheduling with minimum overhead in time slicing mobile TV" considers the problem of minimizing switching overhead of burst scheduling in time slicing mobile TV broadcast systems. Their proposed scheme significantly improves the approximation ratio of the previous scheme of Hsu and Hefeeda, by generating a burst schedule for mobile TV systems whose switching overhead is at most $(1/\ln 2) + \epsilon \simeq 1.4427$ times of optimum, where ln is the natural logarithm and ϵ is arbitrary positive constant.

Mohammad Reza Hoseiny Farahabady, Young Choon Lee and Albert Y. Zomaya in their paper "Randomized approximation scheme for resource allocation in hybrid-cloud environment" explore how resources in the hybrid-cloud environment should be used to run Bag-of-Tasks applications. By introducing a simple yet effective objective function, their algorithm help the user make a better decision for realization of his/her goal. They also cope with the problem in two different cases of "known" and "unknown" running time of available tasks. A solution to approximate the optimal value of user's objective function is provided for each case.

Aysha Al-Hinai, Haibo Zhang, Yawen Chen and Yidong Li in their paper "TB-SnW: trust-based spray-and-wait routing for delay tolerant networks" investigate the problem of mitigating blackhole attacks in DTNs based on the Spray-and-Wait routing protocol. A new knowledge-based routing scheme, called trust-based spray-and-wait protocol (TB-SnW), is designed based on distributed trust management. Each node maintains the trust levels for encountered nodes based on the message exchange history, and uses the trust levels to smartly distribute message copies to bypass blackhole attackers.

Jigang Wu, Guiyuan Jiang, Yuze Shen, Siew-Kei Lam, Jizhou Sun and Thambipillai Srikanthan in their paper "Parallel reconfiguration algorithms for mesh-connected processor arrays" present two parallel algorithms to accelerate reconfiguration of the processor arrays. The first algorithm reconfigures a host array in parallel in a multi-threading manner. The threads in the parallel algorithm executes independently within a safe rerouting distance. The second algorithm is based on divide-and-conquer approach to first generate the leftmost segments in parallel and then merge the segments in parallel.

Frederic Gava, Franck Pommereau and Michael Guedj in their paper "A BSP algorithm for on-the-fly checking CTL* formulas on security protocols" present a distributed (bulk-synchronous parallel or BSP) algorithm to compute on-the-fly whether a structured model of a security protocol satisfies or not a CTL* formula. A simple method is designed using the structured nature of the security protocols, to distribute the state space under consideration in a need-driven fashion.

Ransheng Shen, Xianfeng Li and Hui Li in their paper "A space- and power-efficient multi-match packet classification technique combining TCAMs and SRAMs" present

a tree-based multi-match packet classification technique combining the benefits of both TCAMs and SRAMs. The experiments show that the proposed solution achieves significantly more savings on both memory space and power consumption on packet matching compared to existing solutions.

Xin Yan, Xiaohua Shi, Lina Wang and Haiyan Yang in their paper "An OpenCL micro-benchmark suite for GPUs and CPUs" design and implement an OpenCL micro-benchmark suite for GPUs and CPUs. They introduce the implementations of the OpenCL micro-benchmarks, and present the measuring results of hardware and software features like performance of mathematical operations, bus bandwidths, memory architectures, branch synchronizations and scalability, etc., on two multicore CPUs.

Wenxing Zhu, Jianli Chen and Weiguo Li in their paper "An augmented Lagrangian method for VLSI global placement" propose an augmented Lagrangian method to solve the VLSI global placement problem. In the proposed method, a cautious dynamic density weight strategy is used to balance the wirelength objective and the density constraints, and an adaptive step size is used to obtain a tradeoff between runtime and solution quality.

Fei Teng, Frederic Magoules, Lei Yu and Tianrui Li in their paper "A novel real-time scheduling algorithm and performance analysis of a MapReduce-based cloud" propose a paused rate monotonic (PRM) algorithm for scheduling hard real-time tasks on a MapReduce-based cloud. They prove a bound on cluster utilization, which can be used as a sufficient condition to test whether a given task set can be scheduled.

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