High performance computing and communications

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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), which 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 brings together seven research papers providing a snapshot of the current state of the art of high performance computing and communications. These papers have been selected among those presented at the successful “IEEE International Conference on High Performance Computing and Communications” which was held in September 2008, in Dalian, China.

In “An adaptive task-level fault-tolerant approach to Grid,” Yongwei Wu et al. propose an adaptive task-level, fault-tolerant approach to Grid, which aims at han-

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dling quite a complete set of failures arising in Grid environment by integrating basic fault-tolerant approaches.

In “Analytical modelling of networks in multicomputer systems under bursty and batch arrival traffic,” Yulei Wu et al. present a new and concise analytical model for hypercube and torus networks in the presence of batch message arrivals modeled by the compound Poisson process with geometrically distributed batch sizes.

In “Designing energy-efficient target tracking protocol with quality monitoring in wireless sensor networks,” Minyi Guo et al. propose an energy-efficient target tracking protocol that utilizes two algorithms. The protocol focuses on reducing energy usage by limiting the number of sensors used to track a target through monitoring their data quality and by limiting the amount of data being sent to the cluster head.

In “Sharable file searching in unstructured peer-to-peer systems,” Wenyu Qu et al. present several fully dynamic algorithms for searching sharing files in unstructured peer-to-peer systems. The solutions can handle any topology pattern with small search time and computational overhead.

In “Defending against the propagation of active worms,” Xiang Fan and Yang Xiang propose several strategies to shorten a worm’s slow start phase in its propagation and found the cost-effective hit-list size and average size of internally generated target lists. They also present a novel active defense mechanism and three novel discrete-time deterministic propagation models of active worms.

In “DAGMap: efficient and dependable scheduling of DAG workflow job in Grid,” Haijun Cao et al. propose a heuristic efficient and dependable scheduling, called DAGMap, which is based on the list scheduling and group scheduling.

In “Re-match: a highly reliable scheduling algorithm on heterogeneous wireless mesh network,” Panlong Yang and Guihai Chen propose a heuristic stochastic programming model in achieving maximized network utilization. The algorithm is a two-stage matching process, which can effectively utilize network resources with stochastic channel states.

We hope that the readers will find the papers in this issue to be both informative and inspiring. For the elaboration of this special issue, a selection of papers from the conference was invited to submit the extended versions by no less than 30% revision. A new review process was performed by at least two different reviewers. We would like to thank the authors for their contributions. We would also like to thank the reviewers in providing timely and thorough reviews. This special issue would not have been possible without their hard work.