## EDITORIAL



## Editorial for the special issue on innovations in supercomputing techniques

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This issue focuses on the topic of innovations in supercomputing techniques. Six invited papers are finally selected based on a peer review procedure, which cover research progress of China's supercomputing, interconnection network, performance evaluation and parallel algorithm. Prof. Yutong Lu summarizes the recent progress of supercomputing system in China by introducing the three pre-Exascale supercomputers. The report further outlooks on the nextgeneration supercomputer in China. Based on the exciting report, we have strong confidence in China's leadership in supercomputing. There are two research papers on interconnection network in supercomputing. Undoutbely, interconnection network is the core component of large-scale parallel computers. One paper written by Dr. En Shao presents a novel design and implementation of wormhole optical network architecture. The authors describe the practical experience on applying optical circuit switching to the 6D-torus interconnection in Sugon's pre-Exascale supercomputer.

Another paper written by Prof. Dong Xiang is about the theoretical analysis of on-chip networks design. The authors introduce a new low-power fully adaptive routing algorithm is proposed for virtual cut-through (VCT) or wormhole (WH) switched networks-on-chip (NOCs). It's a good reference to the investigation of low-power and high-performance adaptive algorithm design. The following two papers belong to performance evaluation work. One paper written by Dr. Jiajia Li proposes a new sparse tensor algorithm benchmark suit (PASTA). The benchmark contains sparse tensor algorithms which is extensively used in machine learning and scientific computing applications. Another paper written by Dr. Feng Zhang reports evaluation of eight sparse matrix kernels on an AMD CPU-GPU heterogeneous processor by using 956 sparse matrices. The experiment analysis is comprehensive and insightful. The last one paper written by Dr. Junmin Xiao is on large-scale parallel algorithm design. The authors take the dynamical core of global atmospheric

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general circulation model (AGCM) as an example to show how to design a communication-avoiding algorithm. A solid analysis of performance bound is presented in this paper.

Last but not the least, we appreciate the hard work of all reviewers and the contribution of all authors. It's the tight cooperation of us that makes this issue ready for readers. We look forward to more and more papers of high quality appeared in the journal CCF THPC.



Guangming Tan Professor from the Institute of Computing Technology, Chinese Academy of Sciences. His research interest includes parallel programing and algorithm, domain-specific architecture and bioinformatics. He has published more than 50 papers including top conference/ journals like SC, PLDI and TPDS. He is serving as an associated editor of IEEE Transactions on Parallel Distributed Systems.



Guang R. Gao Professor from University of Delaware. Gao's main research interests are dataflow models and their applications in high performance computing systems. He focuses on architectures, programming models, compilers, and runtime systems, and he addresses data and computer intensive problems. Due to their unique knowledge and expertise in parallel computation based on dataflow models and their extensions, Prof. Gao and his research group have led or participated in a large

number of research projects involving supercomputing systems that have been sponsored by government agencies and leading computer industry organizations. Prof. Gao has published over 270 papers in peer-reviewed international journals and conferences, has co-initiated several top international conferences (such as PACT, and CASES), and has served as a member of program/steering/organization committees in many prestigious international conferences and workshops.