Graph Theory Guided Designs of Supercomputer Network Topologies

Title: Graph Theory Guided Designs of Supercomputer Network Topologies
Speaker: Professor Yuefan Deng
Stony Brook University New York, USA

Time: 17 March 2014, 02:00 PM to 03:00 PM
Venue: Video Conference Room, COM1-02-13

Chaired by: Dr Wong Lim Soon, Kitct Chair Professor, School of Computing
(wongls@comp.nus.edu.sg)

Abstract:
Supercomputers, capable of performing $10^{16}$ floating-point operations per second (34 PFlops), are required to connect millions of computing cores by complex networks. In the case of the Tianhe-2, 3.12 million cores require networking. In 2019, it is projected that more than 100 million cores must be connected and the traditional intuition for networking them will unlikely survive to produce efficient networks. To advance, we must borrow mathematics, conceptually and computationally. We have discovered a series of basic topologies with which we embed to generate composite topologies for networks. These will enable discovery of network topologies for thousands of vertices. Additionally, we introduce metrics to measure the network-performance-relevant properties of the topologies.

Biodata:
Yuefan Deng is Professor of Applied Mathematics at Stony Brook University and the Taishan Scholar at the National Supercomputer Center in Jinan. His research is in Parallel Computing, Molecular Dynamics, Monte Carlo Methods, and Computational Science. He published more than 85 papers and supervised 25 doctoral theses. He is the architect of Galaxy Beowulf Supercomputer at Stony Brook built in 1997 and of NankaiStars Supercomputer which was China's fastest computer when it was completed in 2004. He lectured widely in US, Germany, Russia, Brazil, South Korea, Saudi Arabia, Turkey, as well as the Greater China region. US DOE, NSF, NIH as well as China's Ministry of, and Shanghai's Commission of, Science and Technology have supported his research. Professor Deng earned his BA in 1983 in Physics from Nankai University and his Ph.D. in Theoretical Physics from Columbia University in 1989.