中央研究院 資訊科學研究所
Institute of Information Science, Academia Sinica

Distinguished Lecture Series

# The Parallel Revolution in Computational Science and Engineering

**Thursday, June 23rd, 2011 10:00am**

**Auditorium 106 at New IIS Building**


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## Abstract


The computer industry is going through a disruptive transformation by switching to massive parallelism in processor design. While the revolution started in desktops and clusters, it has quickly spread into laptops and mobile devices. Today, more than 200 million computers are running parallel applications 5-70 times faster than their sequential versions. By year 2006, chip-level parallelism could provide over 1,000 times speedup. More importantly, there is no known approach to future application performance growth with Moore's Law other than converting them into massively parallel applications. In short, massive parallelism will not only be necessary for achieving high application performance today but will also be key to the future advancement of computational science and engineering. For some areas, one can increase parallelism by solving more and/or larger sized problems in the same amount of time, commonly referred to as weak scaling. The high-performance computing community has made excellent progress in weak scaling in the past decades using large compute clusters. For many other areas, it is more important to solve the same problem in a smaller amount of time, or strong scaling. In order to achieve strong scaling, many core numerical algorithms and even the higher-level problem definitions need to be reformulated. In this talk, I will discuss some recent progress in application algorithms and programming systems for strong scaling that are fueling the current parallel revolution in computational science and engineering.


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