



Distinguished Lecture Series

Towards a Science of Parallel Programming

Monday, August 10th, 2009 10:00 am
Auditorium 106 at new IIS Building



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Abstract

When parallel programming started in the 70's and 80's, it was mostly art: languages such as functional and logic programming languages were designed and appreciated mainly for their elegance and beauty. More recently, parallel programming has become engineering: conventional languages like FORTRAN and C++ have been extended with constructs such as OpenMP, and we now spend our time benchmarking and tweaking large programs no one understands to obtain performance improvements of 5-10%. In spite of all this activity, we have few insights into how to write parallel programs to exploit the performance potential of multicore processors.

To break this impasse, we need a science of parallel programming. In this talk, I will introduce a concept called "amorphous data-parallelism" that provides a simple, unified picture of parallelism in a host of diverse applications ranging from mesh generation/refinement/partitioning to SAT solvers, maxflow algorithms, stencil computations and event-driven simulation. Then I will present a natural classification of these kinds of algorithms that provides insight into the structure of parallelism and locality in these algorithms, and into appropriate language and systems support for exploiting this parallelism.

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