

Plenary Talk in Industrial and Computational Mathematics

The End of the Lazy Programmer: Challenges of Multicore Computing

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Hard physical constraints in computer chip manufacturing have led the industry down the glorious multicore path, where Moore's Law doubling now manifests itself in the number of cores per chip. However more is not always better: Performance scaling on multicore is generally sub-linear and frequently gets worse beyond some number of cores. This performance "gap" will only be resolved with a fundamental change in the way we develop software. Multicore forces each programmer to become a parallel programmer; to think of their chips as clusters; and to deal with the issues of communication, synchronization, data transfer and non-determinism as integral elements of their algorithms. For those already familiar with clusters and parallel programming, multicore processors add a new level of parallelism and additional layers of complexity. This talk will highlight some of the challenges that need to be overcome in order to get better performance scaling on multicore, and will suggest some solutions.