Minimizing arithmetic and communication costs for faster matrix computations

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Algorithms are often evaluated in terms of the number of arithmetic operations they performed. However, on today's machines, communication, i.e., moving data through memory hierarchies and among processors often requires much more time (and energy) than performing computations. Hardware trends suggest that the relative costs of such communication will only increase. In this talk I will review several recent algorithms for reducing both arithmetic and communication costs, and show matching lower bounds, proving them to be optimal.

Based on joint papers with Grey Ballard, James Demmel, Andrew Gearhart, Olga Holtz, Elaye Karstadt, Ben Lipshitz, Yishai Oltchik, and Sivan Toledo.