Mathematics and CS Seminar

Passing Messages while Sharing Memory

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Host: Dan Alistarh

The shared-memory and message-passing models have traditionally been studied separately in the distributed computing community. However, recent trends in hardware have led to machines that may use both shared memory and message-passing primitives. Motivated by these trends, we consider a hybrid message-and-memory model that allows programs to both share memory and pass messages.We show that the message-and-memory model can leverage the shared memory to become more powerful than the message-passing model in isolation.In this talk, I will exemplify the power of a message-and-memory network by considering the classic consensus problem. I will show that such a network can tolerate more failures when solving consensus than a purely message-passing one. This is true even when limiting shared memory communication to be only between neighbors in a shared memory graph, rather than between every pair of processes. In particular, I will show that graphs with good expansion properties provide a good trade-off between scalability and fault-tolerance in this context, and prove upper and lower bounds on the fault-tolerance of a message-and-memory network.If time permits, I will also discuss how messages and memory together can be used to implement a leader election algorithm that is more robust to network asynchrony than previous algorithms.Based on joint work with Marcos Aguilera, Irina Calciu, Rachid Guerraoui, Erez Petrank, and Sam Toueg.

Tuesday, November 27, 2018 03:30pm - 04:30pm
Meeting room 2nd floor / Central Bldg. (I01.2OG.)

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