Abstract:
Distributed computing started decades ago with great successes in scientific computing, but the technology was mislabeled as only useful in cases with trivially parallelism. Now we confront a world of many-core and mobile devices. Volunteer distributed systems like distributed.net or Folding@home must confront the worst case scenarios for latency, bandwidth, connectivity, heterogeneity, reliability, security, and social dynamics. Despite this we can now build distributed systems that are effective in a wide variety of computational situations, from divide and concur to process migration and global energy optimization. Getting to this point has been a process of putting together a set of lessons that can be applied from the cluster/cloud down to the chip layer with many-core.

A thousand-core chip can be seen as a low-latency, high-bandwidth, shared(ish) memory distributed system, with only a thousand nodes. With the lessons we've learned, such a system can be seen not as a nightmare but a manageable platform for computation. We will describe how to change computer science teaching to help people get performance from such systems. The thousand core example portends the distributed computation that will be central to moving from batch processing on a cluster to planetary scale sharing of computational resources.

The other aspect of this work is the nuts and bolts of development across so many levels and how to incorporate it into the curriculum. The development model required to survive the heterogeneity and reliability issue of volunteer distributed systems, has also produced a model for cleanly navigating and optimizing the layers of vectorization, threading, SMP, and cluster scale computations that is especially useful in the classroom.

About the Speaker:
Adam L. Beberg has been building distributed systems since 1990. He founded Mithral Communications & Design in 1995, which is the home of the Cosm distributed computing tools. In 1997 he was a founder and president of distributed.net until 1999, during which RC5 was cracked once and DES was cracked twice - the second time in 22 hours with the additional help of the EFF's Deep Crack. In 1999 he met Vijay Pande and collaborated on Folding@home, using Cosm as the framework and network library for Folding@home. He was also honored as one of MIT Technology Review's TR100 top young innovators of 1999. He has worked and spoken
extensively in the areas of distributed computing, storage, and computer security. With a B.S. in Computer Engineering from Illinois Institute of Technology, he has more recently been at Stanford working on a PhD in Computer Science with a focus on next generation distributed computing methodologies.