

## Session TBD

Pete Beckman - KEYNOTE

Co-director of the Northwestern-Argonne Institute for Science and Engineering at Argonne National Laboratory

“The Convergence of Extreme Computing and Big Data: From Edge Computing to Exascale”

### Abstract

For decades, the basic architecture of extreme-scale systems has been largely static. In one area of our machine room we have compute nodes and in another area, a large shared file system. A slowly evolving, spartan “HPC Software Stack” links the two pieces. This arrangement is out of step both with today’s new architectures and a services-based software infrastructure. Parallel file systems are being replaced by object stores, and NVRAM is available everywhere. Many advanced computational science applications are moving past simple bulk-synchronous programming models, and pursuing programming frameworks to support in-situ analysis, live processing of streaming instrument data, and on-demand software stacks. Computing at the edge, where the data is generated, is needed to support massive sensor arrays. Convergence is coming. We need a more agile system software architecture that can simultaneously support both classic HPC computation and new Big Data approaches. From the low-level operating system to the high-level workflow tools, convergence is moving forward. Are we ready?

### Bio

Pete Beckman is the co-director of the Northwestern-Argonne Institute for Science and Engineering. From 2008-2010 he was the director of the Argonne Leadership Computing Facility, where he led the Argonne team working with IBM on the design of Mira, a 10 petaflop Blue Gene/Q. Pete joined Argonne in 2002. He served as chief architect for the TeraGrid, where he led the design and deployment team that created the world’s most powerful Grid computing system for linking production HPC computing centers for the National Science Foundation. After the TeraGrid became fully operational, Pete started a research team focusing on petascale high-performance system software, wireless sensors, and operating systems. Pete also coordinates the collaborative research activities in extreme-scale computing between the US Department of Energy and Japan’s ministry of education, science, and technology. Pete leads the Argo project for extreme-scale operating systems and run-time software. He is the founder and leader of the Waggle project to build intelligent attentive sensors. The Waggle technology and software framework is being used by the Chicago Array of Things project to deploy 500 sensors on the streets of Chicago beginning in 2016. Pete also has experience in industry. After working at Los Alamos National Laboratory on extreme-scale software for several years, he founded a Turbolinux-sponsored research laboratory in 2000 that developed



the world's first dynamic provisioning system for cloud computing and HPC clusters. The following year, Pete became vice president of Turbolinux's worldwide engineering efforts, managing development offices in the US, Japan, China, Korea, and Slovenia. Dr Beckman has a Ph.D. in computer science from Indiana University (1993) and a BA in Computer Science, Physics, and Math from Anderson University (1985).