Argonne NATIONAL LABORATORY

Pete Beckman

"The Future of Extreme-Scale Computing Hardware and Software"

Computing hardware is rapidly changing. System architects are working on ways to integrate fast networking and memory, increase parallelism, and manage heterogeneous computing elements. However, those changes must be optimized within new, constrained power budgets; we cannot continue to double power demands with each new platform. Every hardware company is looking for ways to squeeze out more performance per watt. The new Argonne Leadership Computing Facility system, Mira, is extraordinarily energy efficient, and that architecture leads the world in performance, programmability, and energy efficiency. Future high-performance computing systems built from new technology will fundamentally change many parts of our system software stack. While the technology is still emerging, some disruptive and new technology paths are within sight. This presentation will focus on the areas of system architecture and the software that sits between the application and the hardware that must either evolve or be reinvented to reach our computing goals.

Pete Beckman is a recognized global expert in high-end computing systems. During the past 25 years, he has designed and built software and architectures for large-scale parallel and distributed computing systems. Peter joined Argonne National Laboratory in 2002. As director of engineering and chief architect for the TeraGrid, he designed and deployed the world's most powerful Grid computing system for linking production high-performance computing centers for the National Science Foundation. He served as director of the Argonne Leadership Computing Facility from 2008 to 2010, bringing Intrepid (BlueGene/P) into production and completing the contract for the delivery of Mira (BlueGene/Q). He is currently the director of the Exascale Technology and Computing Institute and Co-Director of the Northwestern-Argonne Institute for Science and Engineering. He was co-founder of the International Exascale Software Project (IESP), and continues to work internationally to push the limits of extreme-scale computation.

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