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Keynote

To Exascale and Beyond: Accomplishments and Challenges for Large Scale Scientific Visualization

James Ahrens

Los Alamos National Laboratory

Abstract

Visualization plays a critical role in the scientific understand of the massive streams of data from scientific simulations and experiments. Continued growth in performance and availability of large scale supercomputing resources (e.g. exascale soon and faster over the next decade) enables both increasing simulation resolutions and an increasing number of and breadth of simulation ensemble runs. In the modern scientific process these simulation ensembles are verified for correctness and then validated with experimental ensembles to increase our overall scientific knowledge. Effective visualization of the verification and validation (V&V) process is a significant challenge. Additional challenges include the significant gap between supercomputer processing and data storage speeds. In this talk, I will highlight current accomplishments from the U.S. Exascale Computing Project to address these challenges include high-dimensional visual analysis, comparative visualization, in situ visualization, portable multi-threaded visualization algorithms, and automated techniques. I will present a vision of a set of needed initiatives to support the visual understanding of the complex and evolving modern scientific process.

Short Biography

Dr. James Ahrens is the director of the Information Science Technology Institute at Los Alamos National Laboratory. He is also the Department of Energy Exascale Computing Project (ECP) Data and Visualization lead for seven storage, data management and visualization projects that will be a key part of a vibrant exascale supercomputing application and software ecosystem. His research interests include visualization, data science and parallel computing. Dr. Ahrens is author of over 120 peer reviewed papers and the founder/design lead of ParaView, an open-source visualization tool designed to handle extremely large data. ParaView is broadly used for scientific visualization and is in use at supercomputing and scientific centers worldwide. Dr. Ahrens received his B.S. in Computer Science from the University of Massachusetts at Amherst in 1989 and a Ph.D. in Computer Science from the University of Washington in 1996. Dr. Ahrens is a member of the IEEE and the IEEE Computer Society. Contact him at ahrens@lanl.gov.