

KEYNOTE TALK

Monday, October 7, 2019 at 1:30pm
(Sand Harbor II)

Approaches to Massive Scientific Data Visualization and Analysis

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Abstract: Science is advancing via the development of highly-precise scientific simulations that are run on the world's largest and fastest supercomputers. The goal of these simulations is to better understand complex physical processes at all scales from the quantum level to the workings of our universe. In this talk, I will describe a set of approaches to analyzing the massive scientific data generated by these simulations, by transforming it into visual knowledge to support scientific understanding. By looking at the massive data visualization and analysis problem abstractly and asking questions about 1.) what computing and human resources are available, 2.) what are the strengths and limitations of these resources, different solutions emerge. These approaches include data parallelism, data streaming, data reduction operators and reduced size data representations, and in-situ analysis. I will summarize these approaches and discuss how emerging trends, such as, machine learning, data science and hardware accelerated ray-tracing, will play an important role in future work.



Speaker Bio-Sketch: Dr. James Ahrens is a senior scientist in the Applied Computer Science Group at Los Alamos National Laboratory. His primary research interests are visualization, computer graphics, data science and parallel systems. Ahrens is author of over 100 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, downloaded approximately a quarter of a million times per year, and is in use at supercomputing and scientific centers worldwide. Dr. Ahrens has extensive management experience as a technical program manager. He has over twenty awards as a principal or co-investigator from the U.S. Department of Energy and the U.S. National Science Foundation. These awards have evolved in scope over the course of his career to multi-million dollar, interdisciplinary, data analysis/visualization projects involving multiple partners from academia, laboratories and industry. Ahrens is currently the U.S. Exascale Computing Project's Data and Visualization lead for a collection of storage, data management and visualization projects that will be a key part of a vibrant exascale supercomputing application and software ecosystem. Dr. Ahrens provides leadership to the international visualization and graphics community. In November 2018, he was elected Chair of the IEEE Computer Society Technical Committee on Visualization and Graphics (VGTC). The VGTC is the Visualization and Graphics Technical Committee, the governance body that oversees and sponsors all IEEE visualization and virtual reality conferences including VIS, VR, ISMAR, 3DUI, Pacific Vis, and EuroVis (as a co-sponsor). He helped start the successful Large Data Analysis and Visualization Symposium (LDAV) held at IEEE Visualization. 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.