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Title
Meet the Proposed Visualization and Analytics Center for Enabling Technologies

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VACET focuses on levering scientific visualization and analytics software technology as an enabling technology for increasing scientific productivity and insight. Advances in computational technology have resulted in an “information big bang,” which in turn has created a significant data understanding challenge. This challenge is widely acknowledged to be one of the primary bottlenecks in contemporary science. The vision for our Center is to respond directly to that challenge by adapting, extending, creating when necessary and deploying visualization and data understanding technologies for our science stakeholders. Using an organizational model as a Visualization and Analytics Center for Enabling Technologies (VACET), we are well positioned to be responsive to the needs of a diverse set of scientific stakeholders in a coordinated fashion using a range of visualization, mathematics, statistics, computer and computational science and data management technologies.

Our main goal is to develop and deploy a variety of data analysis and visualization tools for our science stakeholders. They have diverse data understanding needs, use a variety of computing resources, and are geographically distributed. Additionally, we want to leverage solutions developed and deployed for one stakeholder to many other projects. We address these challenges by using a flexible approach to software development and project management that draws from the diverse strengths of our team. Based upon specific input from science stakeholders — which include the fields of climate modeling, fusion, combustion chemistry, astrophysics and environmental management — we group their needs into two main categories: (1) visualization techniques, ranging from classical rendering techniques to the most advanced data streaming and remote data access algorithms for managing extremely large datasets, and (2) analytics techniques, including data exploration, feature extraction, tracking and comparison that aid the scientist in the actual information discovery process.

Query-driven visualization and analytics refers to the process of limiting visualization and analytics processing to data a user deems “interesting.” This approach offers a promising alternative for high performance visualization and analysis by quickly finding, sorting and analyzing “needles in haystacks.” GDV is built upon a combination of technologies from scientific data management, visualization and analytics.

VisTrails

MEET THE PROPOSED VISUALIZATION AND ANALYTICS CENTER FOR ENABLING TECHNOLOGIES

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This visualization shows the topological analysis of magnetic islands from a NIMROD simulation of tearing modes obtained from an equilibrium fit of laboratory data from the DIII-D Tokamak that produced a reversed-shear discharge. This visualization was done using the SciRun / Fusion PSE, which was developed as part of the SciDAC CEMM.