Session: C21 Poster: T257B

Observations for ocean climate: The Live Access Server and the Ferret-THREDDS Data Server: The visualization and analysis engine behind the Earth System Grid Center for enabling technologies

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The Live Access Server (LAS) is a well-established Web-application software system for display and analysis of geo-science data sets. LAS gives data providers an easy way to establish services for their on-line data holdings so their users can make plots, create and download sub-sets in a variety of formats, and compare and analyze data. We have incorporated LAS into the ESG software stack to create information products (scientific graphics, animations, etc.) and server-side analysis capabilities for ESG users. These new tools break down many of the traditional barriers that have inhibited model inter-comparisons such as the vast size of the datasets; physically distributed files; differing and sometimes challenging coordinate systems; and the subtle metadata that explains the differences between model configurations and the need for access controls.. This poster will focus two aspects of LAS the inter-comparison tool called the Interactive Earth Science Data Visualization Gallery, vizGal); and the technology we have developed to allow collaborating LAS sites to work as a single sign-on federation. To provide visualization services for very large, distributed datasets, the vizGal architecture ensures that operations are performed remotely, where feasible. Data are sub-setted by the remote server and server-side data reductions are performed (e.g. area averaging of a surface temperature field) using an ESG-enhanced version of the THREDDS Data Server (TDS), known as F-TDS. Additionally, the LAS system uses a sophisticated cache system to reuse plots and computations whenever possible. The vizGal user interface, which offers a level of interactivity that rivals desktop applications, was built using the Google Web Toolkit (GWT). In order to federate together the distributed collection of LAS servers that are part of ESG, we developed server technology that allows us to "flow together" user interface client/server Ajax interactions so that any ESG LAS user interface displays the data collections from all the other LAS server in the federation. This technology (which we call the "confluence server") is the engine that insures that even though the user interface elements appear together in one server, expensive data-intensive operations are performed on the server on which the data resides. The ESG-CET executive committee consists of Dean N. Williams, Lawrence Livermore National Laboratory (LLNL); Ian Foster, Argonne National Laboratory (ANL); and Don Middleton, National Center for Atmospheric Research (NCAR). The ESG-CET team is a group of researchers and scientists with diverse domain knowledge, whose home institutions include eight laboratories and two universities: ANL, Los Alamos National Laboratory (LANL), Lawrence Berkeley National Laboratory (LBNL), LLNL, NASA/Jet Propulsion Laboratory (JPL), NCAR, Oak Ridge National Laboratory (ORNL), Pacific Marine Environmental Laboratory (PMEL)/NOAA, Rensselaer Polytechnic Institute (RPI), and University of Southern California Information Sciences Institute (USC/ISI). All ESG-CET work is accomplished under DOE open-source guidelines and in close collaboration with the project's stakeholders, domain researchers, and scientists.