

Applying Web Service-Based Geographical Information System Grids to Earthquake Modeling

Mehmet S. Aktas, Galip Aydin, Harshawardhan Gadgil, Marlon Pierce, and Ahmet Sayar
Community Grids Laboratory
Indiana University

We summarize Community Grids Laboratory efforts to build Web Service-based grid applications that integrate Geographical Information System (GIS) services with earthquake modeling and simulation codes. The Open Geospatial Consortium defines several useful standards for problems in earth system modeling: XML data models (based on the Geography Markup Language schema family), data access services (such as the Web Feature Service), and map-based data representation services (the Web Map Service). Similarly, the Sensor Web Enablement activity defines standards for supporting real-time sensors. We examine the problem of converting these HTTP-based systems into Web Services and integrating them with simulation codes for earthquake forecasting and time-series data analysis. Here, GIS systems provide information, metadata, and data archive services that complement the more typical Grid problems of managing executable codes and data transfer. When integrating GIS and Grid services, we must address several important problems, including event-based service orchestration and Web Service performance. We also review research areas where traditional GIS systems may be usefully extended by general real-time streaming approaches. Featured efforts include our work integrating a) Global Positioning System data streams with publish/subscribe messaging software to provide successive data filters ranging from format translators to data analysis codes and b)GIS map generating tools with video collaboration systems.