

Web Service Grids for iSERVO

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This presentation describes the Web Service architecture possible for the International Solid Earth Research Virtual Observatory iSERVO and which has been prototyped in the USA SERVOnet project led by JPL. We describe Grids built from Web Services and how they provide support for building virtual organizations harmonized by community resources such as data bases, sensors and computers. These shared resources are supplemented by the interactive workgroups with real time tools such as shared applications and audio-video conferencing. Grid technology provides a service level Internet that provides high quality of service including security and fault tolerance on top of a typically incoherent but high volume background of ordinary internet applications. One architects SERVOnet as a Grid of Grids building it in terms of computing, sensor, database, visualization and GIS (Geographical Information System) Grids. These can be assembled to support earthquake research, education and emergency response. We discuss performance issues and how these allow one to distinguish parallel computers from loosely coupled clusters and how this allows one to choose the granularity of the services on which iSERVO will be based. The SERVOnet prototype offers services that support simulation codes wrapped as services, job submission and monitoring, file management, workflow (or the composition of multiple services), databases and GML (Geography Markup Language) based observations. We have used the OGCE (Open Grid Computing Environment) collaboration approach to build portlet-based user interfaces integrating Grid services from several different sources. We explain how future high volume sensors and data assimilation will be supported in a Grid architecture linking a central massively parallel simulation engine to multiple distributed sensors and filters. We have built prototype OGC (Open Geospatial Consortium) Web Feature and Web Map Services. We are researching how these can support the high rates of streaming data implied by visualization of parallel codes and the future inSAR missions.

iSERVO must tackle several important issues. The collaboration should agree on the services that will be supported and their interfaces. Security and access control issues must be addressed for both data and computers. Success requires that some standards be established in both the area of data provenance (meta-data to describe the history and origins of the data) and data curation to ensure that iSERVO can offer some guarantee as to the quality of its repositories.

Indiana University is building core technology that addresses high performance and fault tolerant transport of data streams. It is building the GIS Grid and leading the architecture team on SERVOnet.