

ORGANIZATION BUILDING GRID COMPUTING

These organizations and individuals are the real users of Grid Computing. They are benefiting from resource sharing and virtualization. As of now these projects are mostly in the scientific areas. We will be discussing some of the major grid projects and infrastructures around the world. In general, these grid users need:

- On-demand construction of virtual computing system with the capabilities to solve the problems at hand including scarcity of computing power, data storage, and real-time processing
- A provision for collaborative visualization of the results of the above process
- A dynamic construction of virtual organizations to solve certain specific problems at hand

United States Department of Energy: Science Grid (DOE)

The DOE Science Grid[13] aims to provide an advanced distributed computing infrastructure based on Grid Computing middleware and tools to enable a high degree of scalability in scientific computing. The vision is to revolutionize the use of computing in science by making the construction and use of large-scale systems of diverse resources as easy as using today's desktop environments.

The following describes characteristics of DOE:

- Most of the DOE projects are widely distributed among collaborators and non-collaborators. It requires a cyberinfrastructure that supports the process of distributed science with sharable resources including expensive and complex scientific instruments.
- All of the science areas need high-speed networks and advanced middleware to discover, manage, and access computing and storage systems.

The DOE Science Grid is an integrated and advanced infrastructure that delivers:

- Computing capacity adequate for the tasks in hand
- Data capacity sufficient for scientific tasks with location independence and manageability
- Communication power sufficient for the above tasks
- Software services with rich environments that let scientists focus on the science simulation and analysis aspects rather than on management of computing, data, and communication resources

The construction of grids across five major DOE facilities provides the computing and data resources. To date major accomplishments include the following:

- Integration of DOE's Office of Science supercomputing center providing large-scale storage systems into the grid
- Design and deployment of a grid security infrastructure for collaboration with U.S. and European High Energy Physics projects, helping to create a single-sign-on solution within the grid environment

The following work is used by the DOE's Particle Physics Data Grid, Earth Systems Grid, and Fusion Grid projects:

- A resource monitoring and debugging infrastructure for managing these widely distributed resources
- Several DOE applications use this grid infrastructure including computational chemistry, ground water transport, climate modeling, bio informatics, and so on.

European Union: EUROGRID Project

The EUROGRID[14] project is a shared-cost Research and Technology Development project (RTD) granted by the European Commission, with the participation of 11 partners and 6 European Union countries, in order to create an international network of high performance computing centers. This project will demonstrate the use of GRIDs in selected scientific and industrial communities in order to address the specific requirements of these communities, and highlight the benefits of using GRIDs.

The major objectives of the EUROGRID project are:

- To establish a European GRID network of leading high performance computing centers from different European countries
- To operate and support the EUROGRID software infrastructure
- To develop important GRID software components and to integrate them into EUROGRID (fast file transfer, resource broker, interface for coupled applications, and interactive access)
- To demonstrate distributed simulation codes from different application areas (biomolecular simulations, weather prediction, coupled CAE simulations, structural analysis, real-time data processing, etc.)
- To contribute to the international GRID development and work with the leading international GRID projects

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