

# Open Science Grid

Working Towards a Global Shared Cyberinfrastructure for Science



The Open Science Grid (OSG) is jointly funded by NSF and DOE to operate and evolve a distributed computing infrastructure for large-scale scientific research. The OSG Consortium includes many universities, national laboratories, scientific collaborations and software developers working together to harness computing and storage resources located around the globe. Scientists from many fields, including astrophysics, bioinformatics, medical imaging, nanotechnology and physics, use the OSG today to advance their research.

OSG sites provide computing and storage resources for grid users and a common set of tools to access these resources. The OSG integrates assets from more than 50 sites in the United States and beyond. OSG members work actively with a host of partners, including grid and network organizations and campus, regional and national grids, to create a metagrid that spans the globe.



MonALISA map showing status of OSG sites

Upcoming particle physics at the Large Hadron Collider has been a driving force behind grid development in general and OSG in particular. OSG is one of the grids that participates in the Worldwide Large Hadron Collider Computing Grid collaboration. With over 150 sites, WLCG will provide a global infrastructure for the seamless distribution and analysis of particle physics data. This data will be generated by the experiments at CERN starting later this year and will be used by physicists for more than a decade. The WLCG will run hundreds of thousands of data processing jobs every day, and will distribute and store petabytes of data every year.

The OSG engages innovators in science, information technology and education to further and spread knowledge about grid computing. Along with its partners, OSG provides Summer Grid Workshops for advanced undergraduate and graduate students at which they get hands-on training and gain a basic understanding of distributed computing. OSG is collaborating with Interactions in Understanding the Universe (IU2) to use e-labs that can enhance learning in classrooms or at home. OSG also collaborates with Tera-Grid and with the Mariachi cosmic ray experiment in the areas of Education, Training and Outreach.



Participants in the Summer Grid Workshop, 2006

Open Science Grid  
[www.opensciencegrid.org](http://www.opensciencegrid.org)  
[osg-contact@opensciencegrid.org](mailto:osg-contact@opensciencegrid.org)



# Open Science Grid

Working Towards a Global Shared Cyberinfrastructure for Science



Open Science Grid

## Nanotechnology

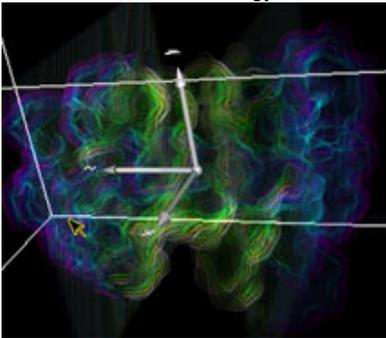


Image Credit Shawn Rice, Purdue University

The nanoHUB allows researchers and students to harness simulation tools, educational materials and computing resources necessary to study matter at the nanometer scale. Several tools available through the nanoHUB run on the OSG infrastructure.

## Community Grids

Community grids give communities of people working collaboratively shared access to computers, software, data and other resources. OSG welcomes community grids into its infrastructure and supports them administratively as Virtual Organizations. The VOs perform scientific, educational, and computer science research and administrative work using the grid and its resources.

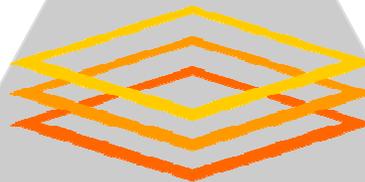
## Bioinformatics



Image Credit Alice Dohnalkova, Pacific Northwest National Laboratory

The Genome Analysis and Database Update system developed at Argonne National Laboratory provides the core for several bioinformatics applications that compare genome and protein sequences and metabolic pathways. GADU uses OSG resources to run these computationally intensive tools using publicly available genome sequence data.

## Community



Interoperability with other grids is a high priority of OSG to enable scientists to move their data and run jobs securely and easily across grid administrative and technical boundaries. High performance and managed networking is an underlying foundation. OSG works with ESN, Internet2, Geant and others to provide gigabit/second data transfers within OSG and between OSG and the Worldwide Large Hadron Collider Grid.

As an example of network usage and data transfer, in October 2006, CMS, one of the upcoming experiments at the Large Hadron Collider, sustained a data transfer rate of more than four gigabits per second between Fermilab's computing center in Illinois and the DESY center in Germany.

## Campus

## National

### Campus and Regional Grids

Campus grids allow organizations to simplify deployment and support of their local computing and storage assets and increase their effectiveness. They promote sharing, provide for collective buying power and standardization of administration and synergies.

### National Grids

OSG and TeraGrid are examples of National grids that provide a common distributed facility to enable access to large numbers of resources across the United States. Each grid provides grid-wide services, software and support to make a coherent infrastructure with common policies, agreements and organization. Many sites and VOs that are part of local campus or regional grids and community shared cyberinfrastructures are also connected to national grids

OSG Partners	OSG Projects & Technical Activities	External Projects
Data Intensive Science University Network Enabling Grids for E-Science Grid Laboratory of Wisconsin Grid Operations Center at Indiana University Grid Research and Education Group at Iowa Nordic Data Grid Facility Northwest Indiana Computational Grid TeraGrid Texas Internet Grid for Research and Education TWGrid (from Academia Sinica Grid Computing) Worldwide LHC Computing Grid Collaboration	Applications Education, Training and Outreach Engagement Facilities Governance Middleware Monitoring Networks Operations Security Storage Support Centers	Community Driven Improvement of Globus Software Center for Enabling Distributed Petascale Science Condor dCache Data Intensive Science University Network DRM Laser Interferometer Gravitational-Wave Observatory OSG Accounting OSG Privilege/Authorization Security for Open Science UltraLight/advanced networks