
# Open Science Grid
## *Education, Training and Outreach*

OpenScienceGrid.org/Education

OpenScienceGrid.org/About/Outreach

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# Open Science Grid (OSG)

- takes High Throughput Computing to the next level, to transform data-intensive science through a cross-domain, self-managed nationally distributed cyber-infrastructure.
- brings together campuses and communities, and facilitates the needs of Virtual Organizations at all scales.
- The OSG Consortium includes
  - universities
  - national laboratories
  - scientific collaborations
  - software developers

working together to meet these goals

# OSG EOT Mission

- Organize and deliver *training* for OSG
  - OSG End Users
  - Site Administrators
  - Support new communities / VOs joining OSG
- *Engage* young people in (e)Science and CS
  - Primary focus: undergraduate and early graduate students
  - Reach high schools through I2U2 (QuarkNet follow-on)
  - Promote and train in interdisciplinary collaboration
- *Reach out*
  - To *under-represented* communities
    - Engage and assist minority students and minority serving institutions by providing resources and opportunities.
  - *internationally*
    - Strengthen and assist emerging, underserved regions of strategic importance to form bonds to US science and Grid communities
    - Focus (for outreach) is on Latin America and Africa
    - OISE focus on engagement in Europe and Asia

# OSG EOT Program Overview

- End User Education
  - In-person workshops
  - Online training
  - EOT VO for student engagement, access and support
- Community Outreach
  - International student/faculty exchange via OISE
  - Supporting under-represented and under-resourced communities in US, Latin America and Africa through workshops, technical assistance and grid access
  - High School Education – I2U2 support - http://ed.fnal.gov/uueo/i2u2.html
- Site Admin Training
  - Training grid administrators in setup and support of OSG sites using the OSG/VDT software stack

# 2007-08 Workshop Program

## www.opensciencegrid.org/workshops

- ***Florida International Grid School 2008,* Jan 23-25, at Florida International University, Miami, Florida**
- *Supercomputing '07 tutorials,* Nov 11 & 13, at Reno, Nevada
- *Great Plains Grid School (GPGS'07),* Aug 8-10, at the U. of Nebraska-Lincoln
- *Rio Grande Grid School (RGGS'07),* Jun 8-10, at the U. of Texas at Brownsville, coordinated with UT-Pan American
- *TeraGrid Conference tutorials,* Jun 4-8, at the U. of Wisconsin-Madison
- *South Africa Workshop*, Mar 26-30, at the IFIP School on Software (ISS'07), Gordon's Bay, South Africa
- *Midwest Grid Workshop (MGW'07)*, Mar 24-25 at the U. of Illinois at Chicago
- *Argentine Grid Workshop*, Mar 12-14 at Santa Fe, Argentina
- *OSG Collaboration Meeting*, Mar 5-7 at the Renaissance Computing Institute, Chapel Hill, North Carolina.

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# Grid School Syllabus

- Intro to distributed computing and the Grid
- Grid security and basic Grid access
- Grid resource and job management
- Grid data management
- Building, monitoring, maintaining & using Grids
- Grid applications and frameworks
- Workflow and related issues (scheduling, provenance)
- *Future*:
  - *Porting applications to the Grid*
  - *Web services and the resource framework*
  - *Advanced networking; data mining*

# Self-paced / online instruction

- www.ci.uchicago.edu/osgedu/schools/gridlab/

- Flexible roadmaps for navigating the material
- Lectures and labs
- Access to online community to provide support
- Online office hours

# *I2U2*
## *Interactions In Understanding the Universe*

- **The Grid for Secondary Science Education**

  *"educational virtual organization"*

- creates an infrastructure to develop
  - hands-on laboratory course content and
  - an interactive learning experience that
    - brings tangible aspects of each experiment into a "virtual laboratory."
- These labs use the Grid for education in the same way that science uses the Grid.
- www.i2u2.org

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# I2U2

- "e-Labs"
  - delivered as Web-based portals accessible in the classroom and at home
  - implemented with of Web-based media capabilities
- "i-Labs"
  - delivered as interactive interfaces typically located within science museums and similar public venues
  - leverage the latest advances in
    - display technology and
    - human-computer interaction,
  - and bring the experiences and appreciation of scientific investigation and inquiry to the wide audience of informal education

# List of e-Labs

- Cosmic Ray e-Lab
  - High school students investigate data from a cosmic ray detector array. (not necessary to have a detector to participate.)
  - Possible investigations:·Muon Lifetime·Diurnal changes in flux·Effects of shielding·High-energy showers·Altitude effects
- CMS Test Beam e-Lab (Beta Version)
  - High school students analyze CMS test beam data in an online graphical ROOT environment.
  - Shower Depth·Lateral Shower Size·Beam Purity·Detector Resolution
- LIGO e-Lab (Beta version)
  - High school and middle school students investigate seismic behavior with data from LIGO ( Laser Interferometer Gravitational-wave Observatory).
  - Earthquake Studies·Frequency Band Studies·Microseismic Studies·Studies of Human-induced Seismic Activity
- ATLAS e-Lab
- STAR e-Lab

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# i-Labs

- To engage the general public in science, we envision using appealing museum exhibits to attract visitors' attentions and engage them in a short taste of exploration

- they will use virtual data tools and techniques to access, process and publish data, report their results as online posters, have online discussions about their work with peers, and then present posters and meet scientists at museums.

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# i-Lab Example

- Adler Planetarium
  - is developing a cosmic ray i-Lab with support from QuarkNet and the Compact Muon Solenoid (CMS) experiment.
  - effort to research an informal-education model

# International Outreach

- South Africa Program
  - Led by Jeremy Dodd, Columbia/ATLAS
  - Providing mentorship to University of Witwatersrand, Johannesburg
  - Grid site development
  - Student mentorship; students/teachers to US Workshops to facilitate S. African workshops
  - Ian Foster lecture at Cape Town IFIP Workshop
- South American Efforts
  - Argentine Grid School, March 12-14 2007
  - Linking to HEP via Brazil, CHEPREO; Columbia.
- Projects for Pan-Am and S. Africa schools

# OISE Interoperability Project

OSG - NorduGrid interoperability of information systems applications and applications:

- Interoperability of Information Services between the OSG and the European Grid infrastructures.
  - Using Glue Schema
  - bring the NorduGrid (NGDF) information structure to be compatible with EGEE and OSG
  - involves junior faculty from the University of Iowa (Shaowen Wang) and University of South Florida traveling to Lund University to work with the NGDF group.
  - Part of the OSG External Project led by Gabriele Garzoglio, Fermilab

- D0, LHC and IceCube applications running across the NorduGrid and OSG infrastructures.
  - Junior faculty from the University of Wisconsin (coordinated through Albrecht Karleand) and the University of Maryland (coordinated through Nick Hadley and Greg Sullivan)
  - The participants travel to the Stockholm University for this collaboration.

# OISE Grid Training

US Grid Schools - European International Schools on Grid Computing

- OSG as co-organizer for ISSGC'07 and ISSGC'08
- Each year 5-7 alumni of US Grid Schools will attend the International Summer school.
- Joint lectureships and material sharing / development efforts
- Content sharing
- Sponsor US junior faculty instructor at the International School
- Potential participants: University of Chicago, ISI, Notre Dame, University of Wisconsin

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# Education VO

- Join OSGEDU VO
  - Use OSG resources
  - Contribute resources
- Wiki, email lists, followup discussions
- Support, engagement
- Postings of opportunities for students

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# Students

2004-2007 facts:

- International participation:
  - Argentina , Brazil, Canada, Columbia, India, Mexico, New Zealand, Russia, South Africa, Uruguay
- Women
  - Aprox. 25%
- Minorities
  - Aprox 10%

Try to improve these statistics


# Participants' domains

Computer Science
- Image processing
- Communications
- Networking

Physics
- Astrophysics
- High Energy Nuclear Physics
- Optical Networks
- Theoretical solid state physics
- Atomic Physics
- Computational Physics

Chemistry
- Computational Chemistry
- Molecular Dynamics & Simulation

Applied Mathematics

Geosciences

Computational Multibody Dynamics for Distributed computing

Judicial Administration

Engineering
- Materials Science

Quantum theory

…and others …


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# Conclusion

- Integrate efforts with TeraGrid
- Measurement tools for success metrics

- International outreach started in South America, South Africa, and via OISE
- Education VO starting to provide engagement and access to resources

- Contact us: eot-team@opensciencegrid.org
- Subscribe to:
  Grid-EDU-announce@opensciencegrid.org