Status of the Open Science Grid

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OSG Council Co-Chair

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DOSAR Workshop IX

Session: *Beyond HEP Computing - Part 2*

Johannesburg, South Africa

April 7th, 2010

3:30PM Johannesburg / 6:30AM Los Angeles

OSG: Consortium View

Science Projects & Communities

Multi-disciplinary Facilities

LHC Experiments & LIGO

University Facilities

Regional & Campus Grids

Open Science Grid

U.S. Grid Projects

Education Communities

Laboratory Centers

Computer Science

**Technologists: (Network, HPC, …)**

OSG Culture

- Science Driven.
  - Reflects OSG's principle drivers and predecessor projects
  - Major VO science deliverables are cast as OSG milestones
- National Laboratory / University Leadership.
  - Arenas for accomplishing science and forming collaborations
  - Strong involvement from National Laboratories
  - O(100) sites, O(100,000) cores, O(10) TB of storage
- Collaboratory Sociology.
  - Partnerships, international involvement, multidisciplinary interactions
- Joint Funding from NSF/DOE.
  - Fostering agency teamwork: NSF, DOE, Networks
  - $30M for OSG Project spanning 2006 – 2011 (~50%|~50%)
  - 35 FTEs directly supported by OSG Project
  - OSG leverages far more $'s and FTE's from Consortium participants

OSG Brings to the Table …

- Low-threshold shared computing resources.
  - Resources owned by participating members, not OSG
  - Computation focusing on high throughput (HTC) rather than high performance (HPC)
  - Applications are general purpose science and engineering
- Software packaging, standards, testing & distribution.
  - Via the Virtual Data Toolkit (VDT)
- Centralized Grid Operations.
  - Facility-wide monitoring and security
  - Information Services
  - Software validation and system integration testing
- Education and Training.
  - Training sessions and workshops

OSG's Major Stakeholders

ATLAS experiment (LHC)
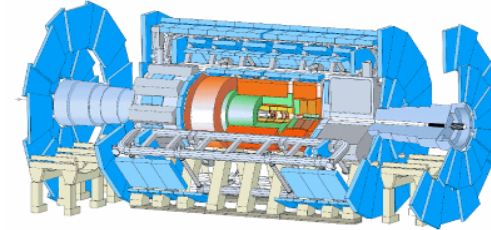
CMS experiment (LHC)
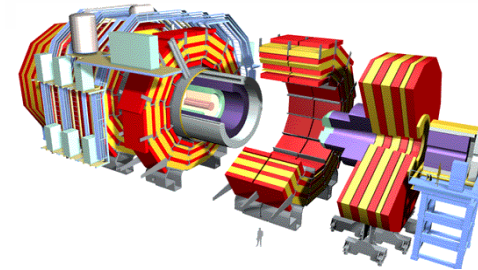
LIGO (gravitational wave physics)

Significant involvement of other physics communities: CDF, D0, STAR, Alice, ...
Coordination focusing on "engaging" new non-physics users and communities
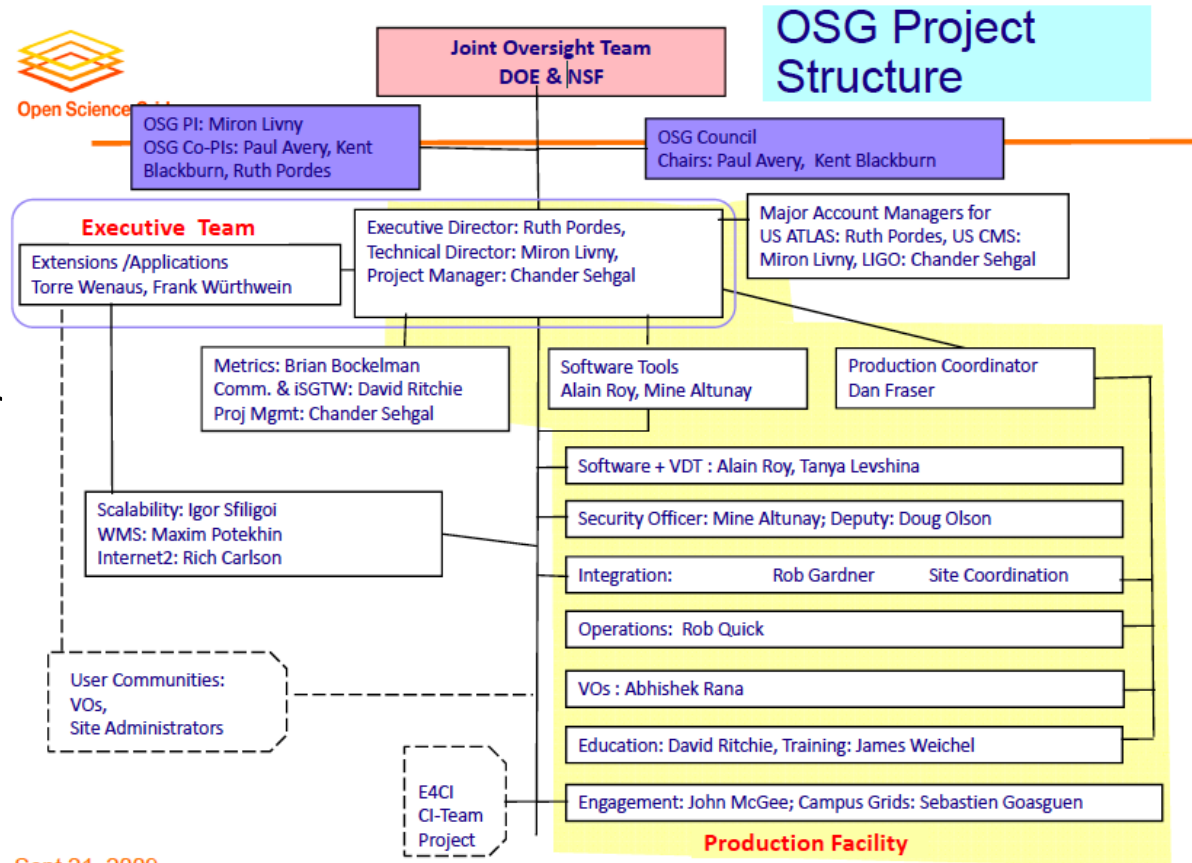
OSG Organization in a Nutshell

Co-Chair Council along with Paul Avery
- Began second 2 year term this March

OSG Council provides strategic governance for the OSG's stakeholders

Council Representative to DOSAR: Horst Severini
- Previous DOSAR Representative was Dick Greenwood

OSG Project Structure

Joint Oversight Team DOE & NSF

OSG PI: Miron Livny
OSG Co-PIs: Paul Avery, Kent Blackburn, Ruth Pordes

OSG Council Chairs: Paul Avery, Kent Blackburn

Executive Team
Extensions /Applications Torre Wenaus, Frank Würthwein

Executive Director: Ruth Pordes, Technical Director: Miron Livny, Project Manager: Chander Sehgal

Major Account Managers for US ATLAS: Ruth Pordes, US CMS: Miron Livny, LIGO: Chander Sehgal

Metrics: Brian Bockelman Comm. & iSGTW: David Ritchie Proj Mgmt: Chander Sehgal

Software Tools Alain Roy, Mine Altunay

Production Coordinator Dan Fraser

Scalability: Igor Sfiligoi WMS: Maxim Potekhin Internet2: Rich Carlson

Software + VDT : Alain Roy, Tanya Levshina

Security Officer: Mine Altunay; Deputy: Doug Olson

Integration: Rob Gardner   Site Coordination

Operations: Rob Quick

User Communities: VOs, Site Administrators

VOs : Abhishek Rana

Education: David Ritchie, Training: James Weichel

E4CI CI-Team Project

Engagement: John McGee; Campus Grids: Sebastien Goasguen

Production Facility

Sept 21, 2009

OSG Satellite Projects

- Satellites: Independent projects coupled into the OSG roadmap
- A Few Examples:
  - **"Embedded Immersive Engagement for Cyberinfrastructure"**

  - **Structural Biology Grid: Based from Harvard Medical School**

  - **VOSS**: **"Delegating Organizational Work to Virtual Organization Technologies: Beyond the Communications Paradigm"**

  - **CILogon**: **"Secure Access to National-Scale CyberInfrastructure"**

- Satellite Projects are anticipated to continue as a key aspect of the future planning for OSG.

OSG Engagement

- Brings the power of the OSG infrastructure to scientists and educators beyond the HEP domain.

- Using these experiences with new users and domains to drive new requirements for the natural evolution of the OSG infrastructure.

- Monitoring of the OSG sites with aim to increase the amount of opportunistically available resources.

- Common resource selection/matchmaking services on OSG to improve the success rate in scheduling jobs to run on particular sites.

The Engagement Team
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John McGee,
RENCI

Mats Rynge,
RENCI

Sebastien Goasguen,
Clemson University

Chris Green,
FNAL

Greg Thain,
UW Madison

Joint OSG-TeraGrid Collaborations

- Both TG and OSG recognize the value of interacting with each other and collaborating in areas of mutual benefit.
- Many people have already been involved in formulating collaborations at high levels within both organizations.
- Formal White Papers and Proposals …
  - "Collaborations of TeraGrid with Open Science Grid" re areas for potential collaborations. TeraGrid White Paper, 7/24/09
  - "Joint Statement of Agreed Upon Principles between OSG and TeraGrid." Joint White Paper, 7/30/09
  - "ExTENCI: Extending Science Through Enhanced National Cyberinfrastructure". Joint Proposal submitted Nov 2009 to NSF (pending)
  - Joint TG/OSG meeting Nov 09 with NSF and DOE re proposal
- Working towards job exchange between OSG & TG: Matching application to the resource … easy for users.

OSG Monitoring - One Stop OSG Information

OSG Sites around the Globe

Five separate continents!
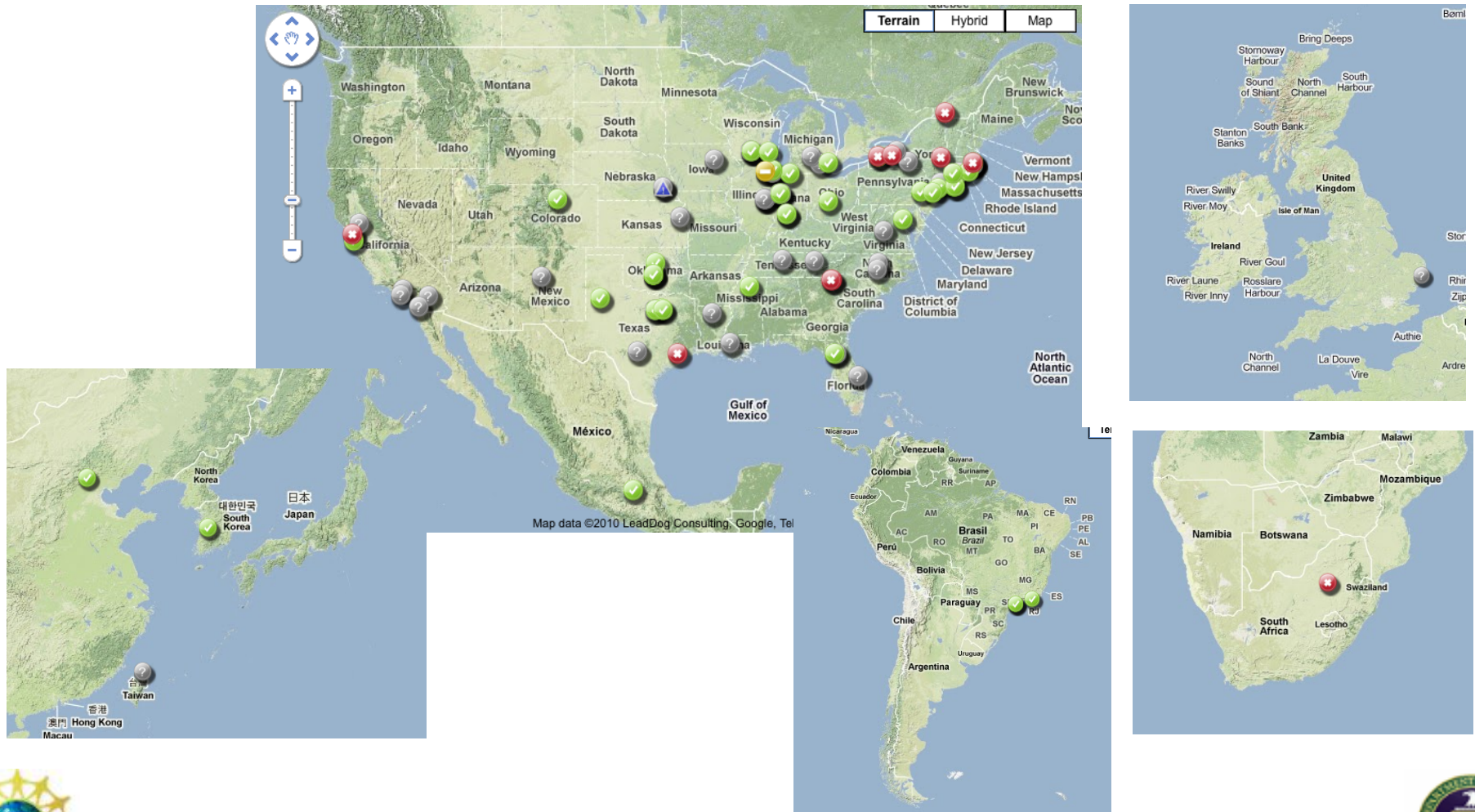
A Look-Back at Computational Growth

Hours Spent on Jobs By VO
166 Weeks from Week 00 of 2007 to Week 10 of 2010

2007:   71M hours
2008: 141M hours
2009: 241M hours
~500M hours 2007-10

Legend:
- cms
- engage
- nysgrid
- fgstore
- usatlas
- dosar
- glow
- Other
- ligo
- minos
- sbgrid
- accelerator
- cdf
- gpn
- star
- cdms
- dzero
- miniboone
- ilc
- mipp
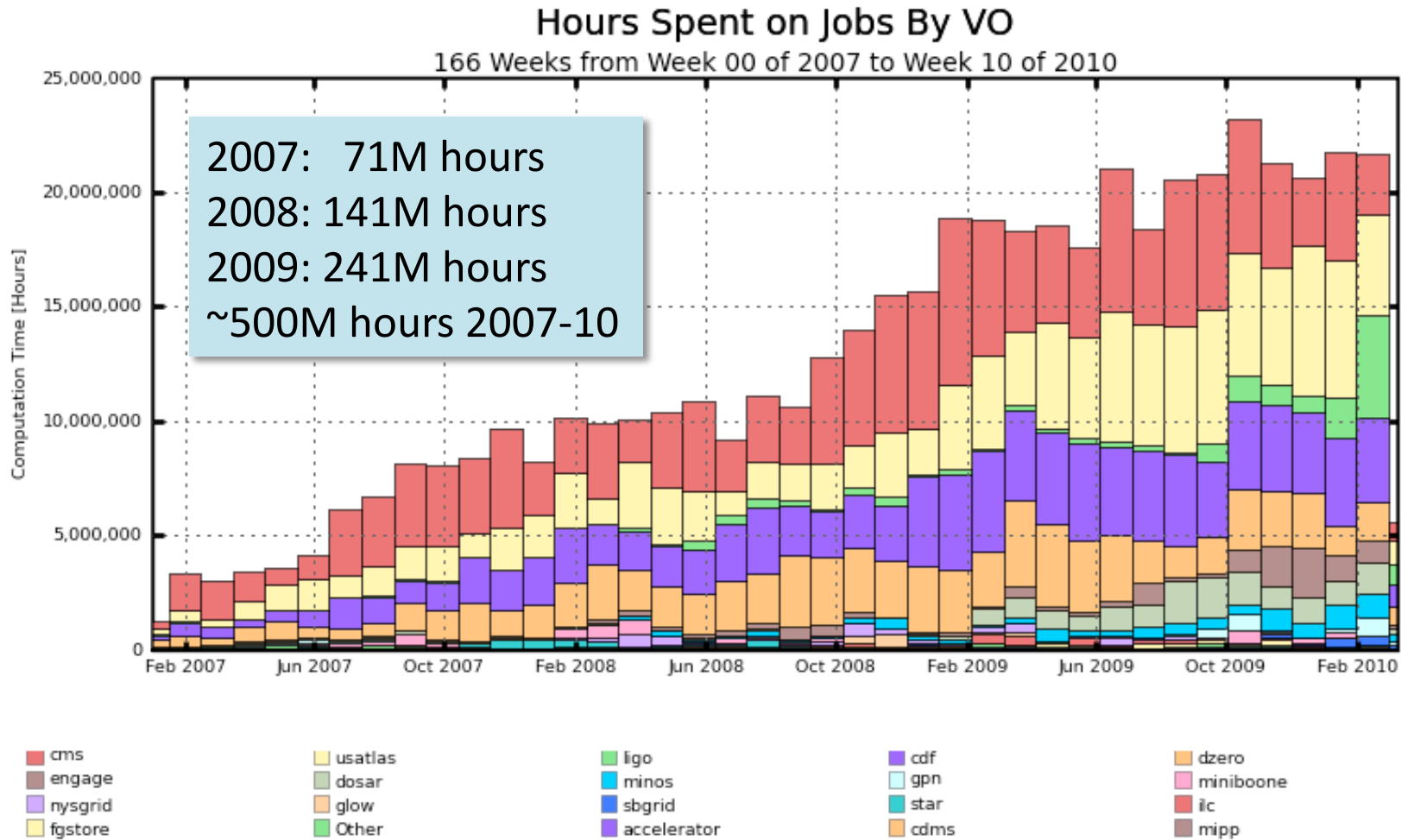
Maximum: 23,193,008 Hours, Minimum: 1,235,127 Hours, Average: 12,523,713 Hours, Current: 5,572,366 Hours
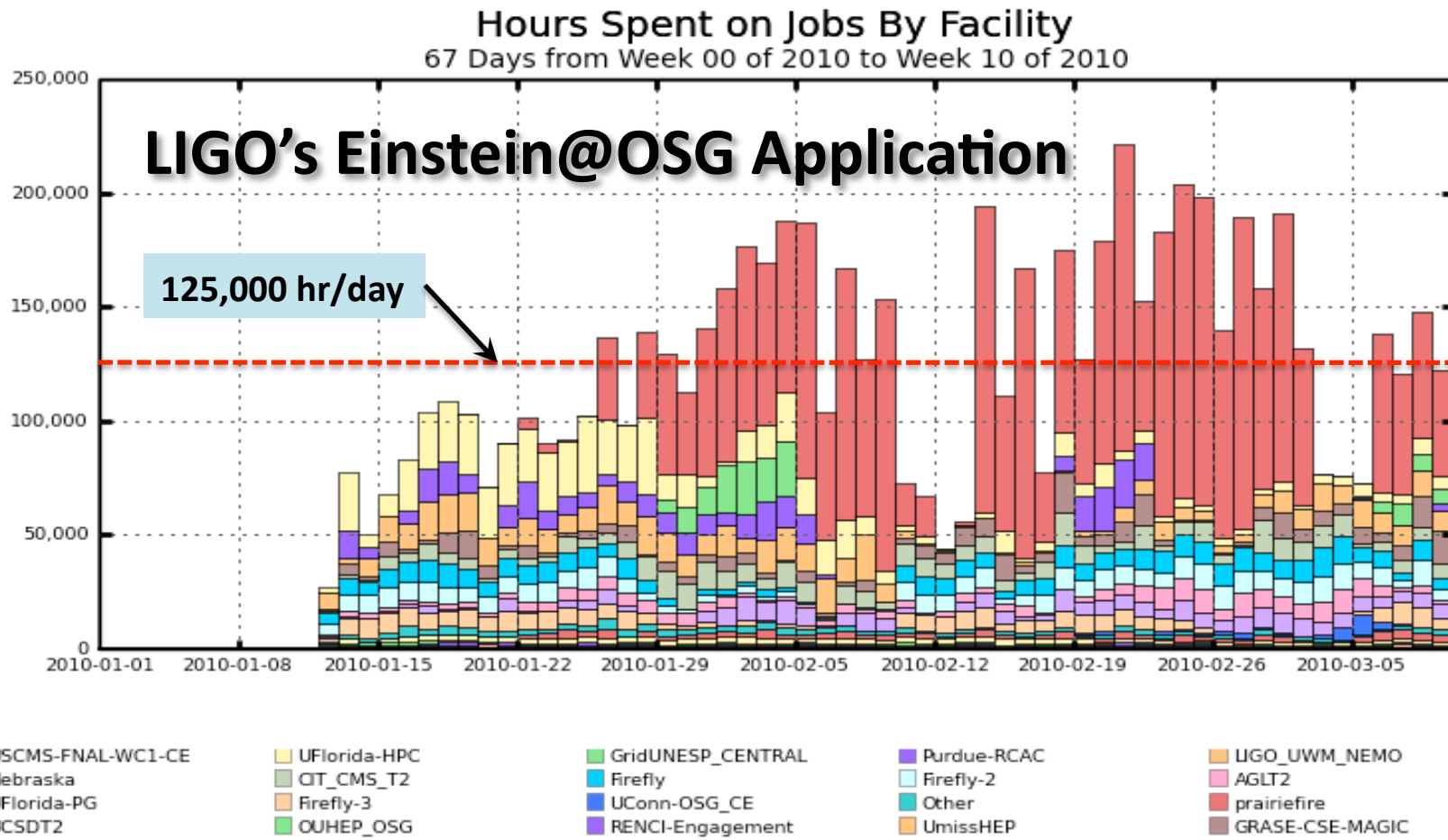
Opportunistic Use of OSG

Hours Spent on Jobs By Facility
67 Days from Week 00 of 2010 to Week 10 of 2010

LIGO's Einstein@OSG Application

125,000 hr/day

Legend:
- USCMS-FNAL-WC1-CE
- Nebraska
- UFlorida-PG
- UCSDT2
- UFlorida-HPC
- CIT_CMS_T2
- Firefly-3
- OUHEP_OSG
- GridUNESP_CENTRAL
- Firefly
- UConn-OSG_CE
- RENCI-Engagement
- Purdue-RCAC
- Firefly-2
- Other
- UmissHEP
- LIGO_UWM_NEMO
- AGLT2
- prairiefire
- GRASE-CSE-MAGIC
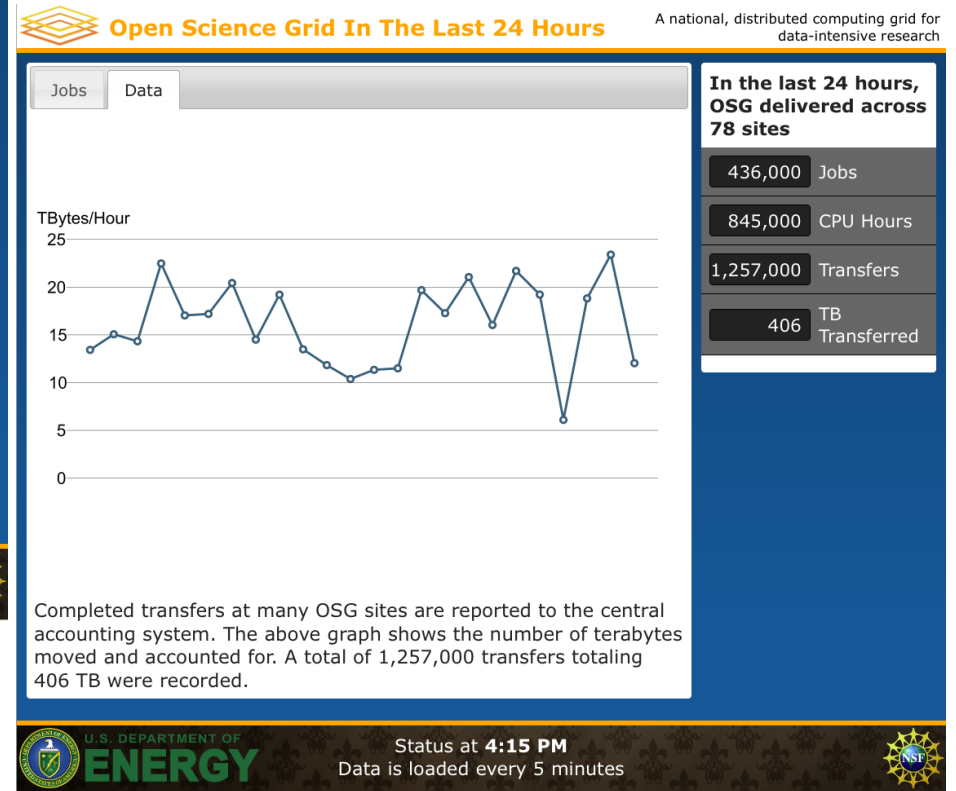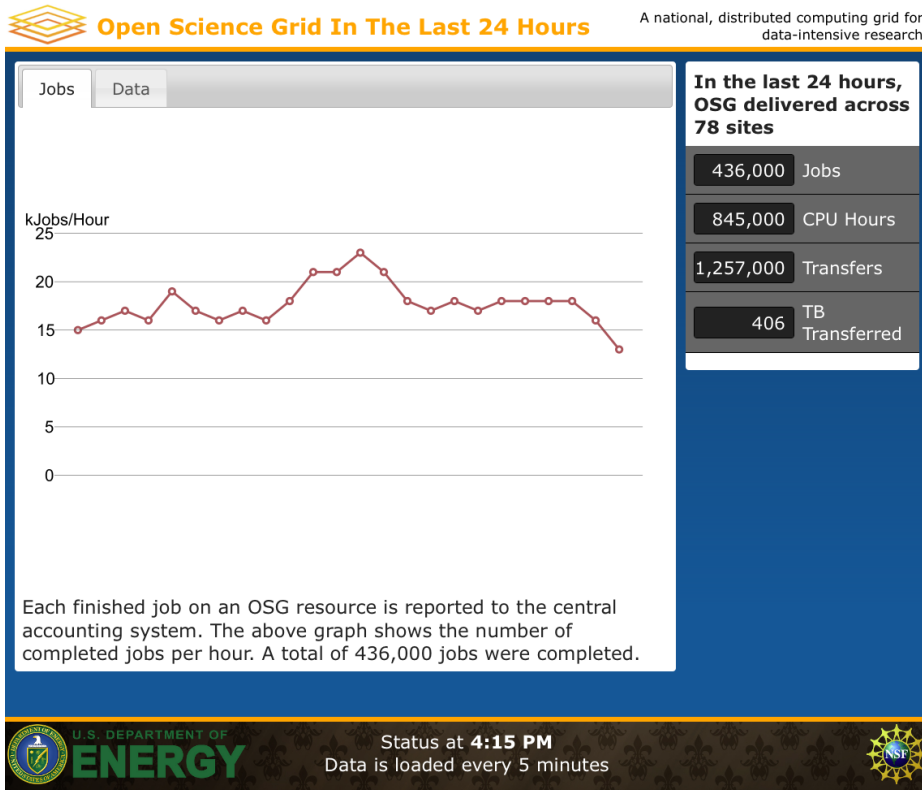
Maximum: 221,640 , Minimum: 4.26 , Average: 105,076 , Current: 121,928

Runs on many facilities

On Display at the DOE

Monthly OSG Newsletter

- http://www.opensciencegrid.org/osgnews

- February, 2010 (Example Article)

  OSG takes lead in Einstein@Home

  By taking advantage of available **opportunistic cycles on the Open Science Grid**, LIGO is contributing an **average of 140,000 CPU hours every day** to the search for gravitational waves; this application produces **1 out of every 10 current results for the Einstein@Home Project**. This result has been achieved by recent improvements to the methods used by the E@H application to run on the OSG; by enabling support for Condor-G, we allow our application to scale up to the many cores available on large OSG sites. And by using automated error detection and recovery methods, we were also able to reduce the staff effort required to operate this production to about one staff hour for every 100,000 cpu hours worth of scientific results; this has been key in scaling up to the 32 grid resources that are currently used by LIGO E@H. ~ *Robert Engel*

International Science Grid This Week

- **Current funding situation**
  - **U.S. supports 1.0 FTE (Miriam Boon)**
  - **EGEE supports 1.0 FTE (Dan Drollette)**
  - **Some content provided by a person in Asia**
- **U.S. editor position funded from multiple sources**
  - **1/8 ASCR/DOE**
  - **1/8 HEP/DOE**
  - **1/4 iVDGL/NSF (ending)**
  - **1/4 OSG/NSF**
  - **1/4 OSG/DOE**
- **We are pursuing a new proposal with TeraGrid**
  - **Possibly NSF + DOE**
  - **White paper describing new scope still being developed**
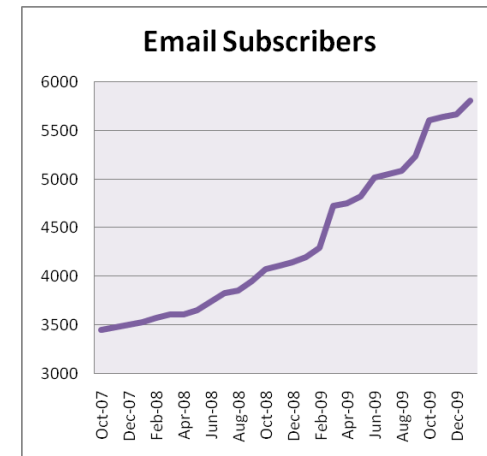
DOSAR IX Workshop!!

OSG – Planning for the Future

- OSG Funding – Noteworthy dates:
  - OSG DOE funding ends 3/15/2011
  - OSG NSF funding ends 8/31/2011
  - OSG Fiscal year-5 ends 9/30/2011

- Planning beyond the currently allocated budget to maintain stakeholder confidence and continue.
  - Support for evolving needs of stakeholders
  - Ongoing support for US-LHC & LIGO
  - Retention of staff and expertise

OSG's Key Directions into the Future

- Program of work driven by current and anticipated stakeholders.
- Solidify the concept and practice of OSG Satellites.
- Effort in core project ~same # of FTEs as current project (~35FTEs).
- Strategic plans informed by sponsors (NSF MPS, NSF OCI, DOE ASCR, DOE HEP, DOE NP, NIH?).
- Increased role and responsibilities on and across the university campuses.
- Core mission to encompass support of the US LHC Tier-3s.
- Core mission to provide US operational services for the WLCG.
- Support for and working with Community Grids is a core activity, including the LIGO Data Grid.
- Plan for a 5-year program of work.
- Well understood and agreed upon relationships, cooperation and interfaces with XD projects.

OSG Future Goals

- OSG will provide the LHC and LIGO communities with a common virtual facility…

- OSG will provide a common, shared distributed computing infrastructure which can be used by all members of the Consortium…

- OSG will continue as a grass-roots hands-on collaboratory…

- OSG will play a leadership role in the US National Cyberinfrastructure…

- OSG aims to have recognized responsibilities in partnership with the NSF XD…

- OSG aims to have recognized responsibilities as part of the next round of the DOE SciDAC program …

Final Thoughts

- The OSG has worked diligently to meet the needs of the stakeholders, including a growing ensemble of non-HEP communities.

- Many Virtual Organizations have been successful at leverage opportunistic use of the OSG.

- The OSG resources have seen steady grow of computation and storage since its formation.

- The OSG has a very active public outreach, communications, education and training culture.

- The OSG is planning a continuing role into the future to assure the continuity and needs of stakeholders, communities and partners, etc.