LCG: the LHC Computing Grid project

WLCG-EGEE-OSG Operations Workshop:
Introduction & goals

CERN
19th-20th June 2006

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Overview

- Status of EGEE infrastructure
- Status of OSG infrastructure
- Broad goals for this workshop
Global Science needs a Global Grid

- LCG depends on two major science grid infrastructures -
  EGEE and the US Open Science Grid

- and others providing regional support
EGEE:
Steady growth over the lifetime of the project

> 180 sites, 40 countries
> 24,000 processors,
~ 5 PB storage

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A global, federated e-Infrastructure

EGEE infrastructure
~ 200 sites in 39 countries
~ 20,000 CPUs
> 5 PB storage
> 20,000 concurrent jobs per day
> 60 Virtual Organisations
Use of the infrastructure

Sustained & regular workloads of >30K jobs/day
- spread across full infrastructure
- doubling/tripling in last 6 months - no effect on operations
Use of the infrastructure

Massive data transfers > 1.5 GB/s

- Several applications now depend on EGEE as their primary computing resource

Sustainability:
- Usage can (and does) grow without need for additional operational effort
EGEE Achievements

- **Scale of the infrastructure**
  - Has grown steadily during the project
  - Now slowed – expansion with related projects
- **Sustained real production use of the infrastructure**
  - Which is supported by the operations teams
- **Maturing but evolving operations procedures**
  - Dealing with all aspects of operations
- **User support**
  - GGUS is becoming the central coordination point, use is growing
- **Middleware distribution**
  - Now clear how to evolve the production service
  - Convergence between existing LCG-2.x and gLite-1.x
- **Progress on interoperability and interoperation**
  - With OSG significant progress, progress with ARC
  - Related projects
Grid operator on duty
- 6 teams working in weekly rotation
  - CERN, IN2P3, INFN, UK/I, Ru, Taipei
- Crucial in improving site stability and management
- Expanding to all ROCs in EGEE-II

Operations coordination
- Weekly operations meetings
- Regular ROC managers meetings
- Series of EGEE Operations Workshops
  - Nov 04, May 05, Sep 05, June 06

Geographically distributed responsibility
- There is no “central” operation
- Tools are developed/hosted at different sites:
  - GOC DB (RAL), SFT (CERN), GStat (Taipei), CIC Portal (Lyon)

Procedures described in Operations Manual
- Introducing new sites
- Site downtime scheduling
- Suspending a site
- Escalation procedures
- etc.

Highlights:
- Distributed operation
- Evolving and maturing procedures
- Procedures being introduced into and shared with the related infrastructure projects
**OSG & WLCG**

**OSG Infrastructure** is a core piece of the WLCG.

**OSG delivers accountable resources** and cycles for LHC experiment production and analysis.

**OSG Federates** with other infrastructures.

Experiments see a **seamless global computing** facility.
Ramp up of OSG use last 6 months

Total Jobs per VO

OSG 0.4.0 deployment

OSG 0.4.1 deployment
Currently ~20,000 Jobs/Day

Total No of finished jobs

- ATLAS
- CMS
- CDF
- D0
- GLOW, STAR

Monday, June 19, 2006

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Data Transfer by VOs

e.g. CMS
OSG Services - non-uniform

- **Job Execution**
  - Pre-WS + WS-Gram job submission.
  - Role based mapping to accounts on Sites allows coarse-grained prioritization of jobs.
  - Mitigation of pre-ws CE infrastructure using “Managed Fork-queue”, non-NFS based configurations etc.
  - Local environment has ENV-Variable, srm-client, gridftp based access to data.

- **Data Movement & Access**
  - SRM V1.1 based SEs. SRM V2.1 in Test.
  - GridFTP from Globus 4.0.1
  - Reliable File Transfer for WS-GRAM configurations.
  - VO based file and replica catalogs.

- **Information, Monitoring, Testing**
  - Information consistent with EGEE. Goal for full information of Services at Sites.
  - Monitoring based on MonaLisa.
  - Validation and testing through publication of Site Verification scripts and GridExerciser job robots.
OSG - EGEE Interoperability
bringing transparency for VOs

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Picture thanks to I. Fisk
Operations

- Grid Operations Center.
- Facility, Service and VO Support Centers.
- Manual or automated flow of tickets within OSG and bridged to other Grids.
- Ownership of problems at end-points and by GOC.
- Guided by Operations Model, Standard Procedures, Support Center Agreements

http://osg.ivdgl.org/twiki/bin/view/Operations/WebHome
Workshop goals

• Absorb the operational implications of the capabilities, scale and schedule of the LHC experiments’ distributed systems from now until LHC startup and commissioning (~18 months)
  ▪ Quantify the increases in scale.
  ▪ 24x7 Coverage of core services

• Ensure a System View of the Global Facility.
  ▪ Do End Points talk to each other?
  ▪ Smooth transition as Grid infrastructure boundaries.

• Ensure the operational and support workflows and procedures are effective, lead to personal ownership and solution of each and every problem.
  ▪ Measure time to resolution.
  ▪ Have appropriate access to experts as needed.

• Identify missing services and procedures for an effective operational distributed system.
• Identify action items and activities (from the small to the large) to be done for an effective operational distributed system.
  ▪ Look at “outliers” in metrics as well as the mean.
  ▪ Look a latencies as well as throughput?
Goals - …

- Workshop – idea is to solve problems not just sit back and listen – your input and ideas are important
- Please become more involved in the ongoing work … this is an opportunity to see what needs to be done