



Enabling Grids for E-science

# VO-level application support in EGEE

*Andrea Sciabà*

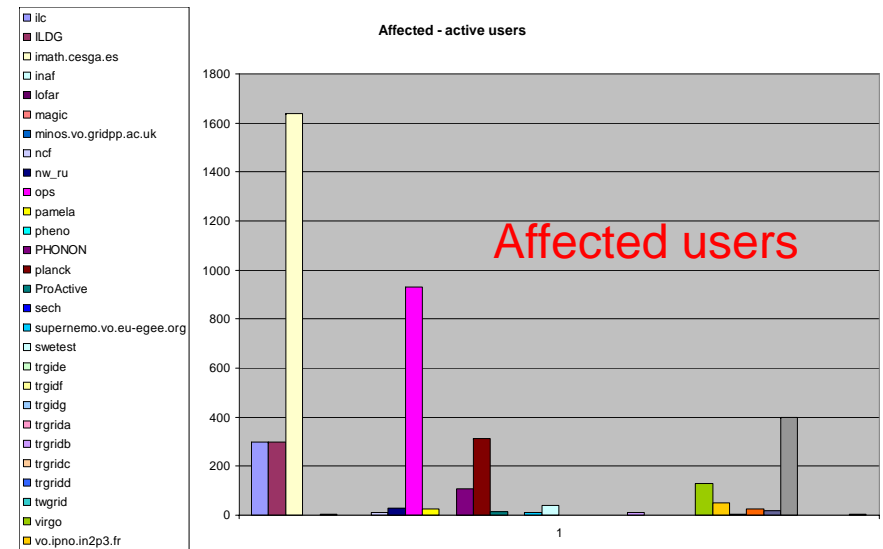
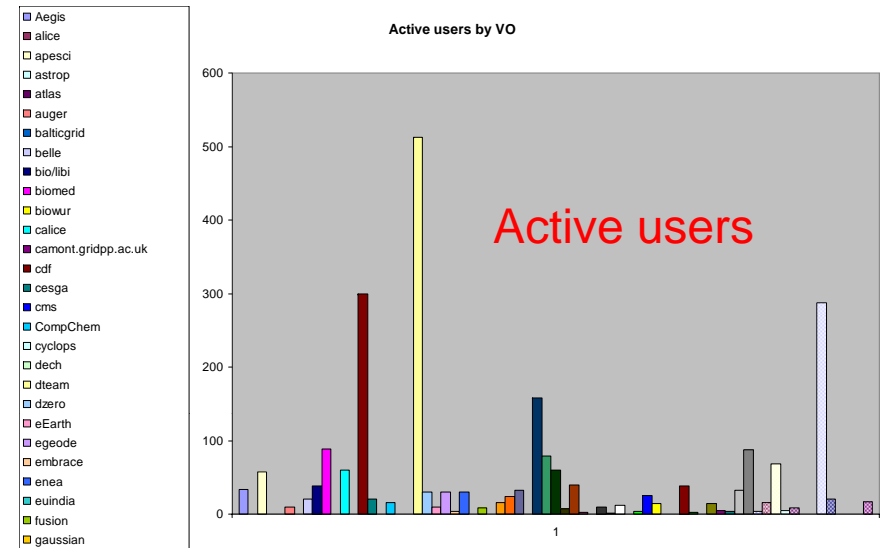
**3<sup>rd</sup> EGEE User Forum**  
**11-14 February 2008**  
**Clermont-Ferrand**

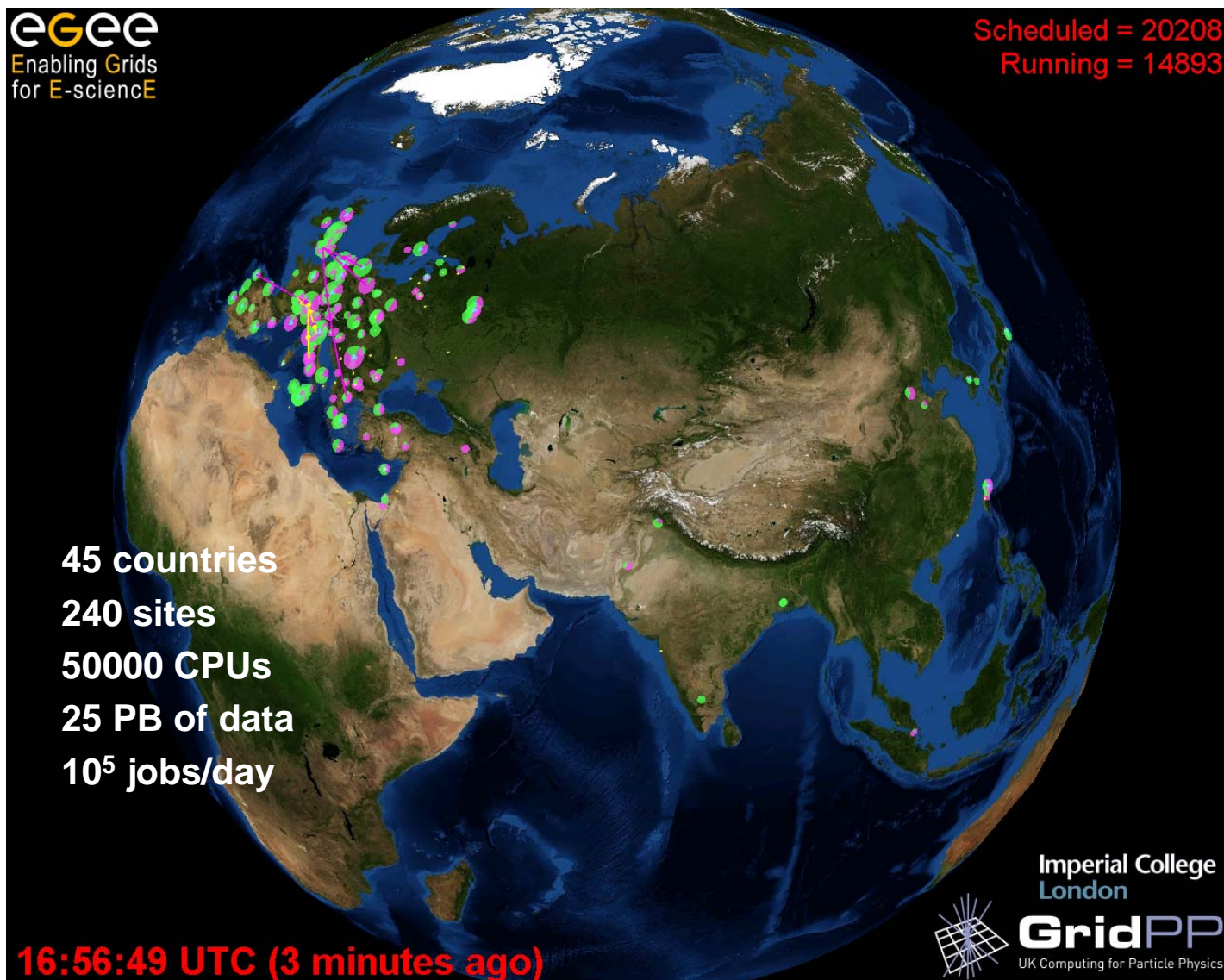
[www.eu-egee.org](http://www.eu-egee.org)



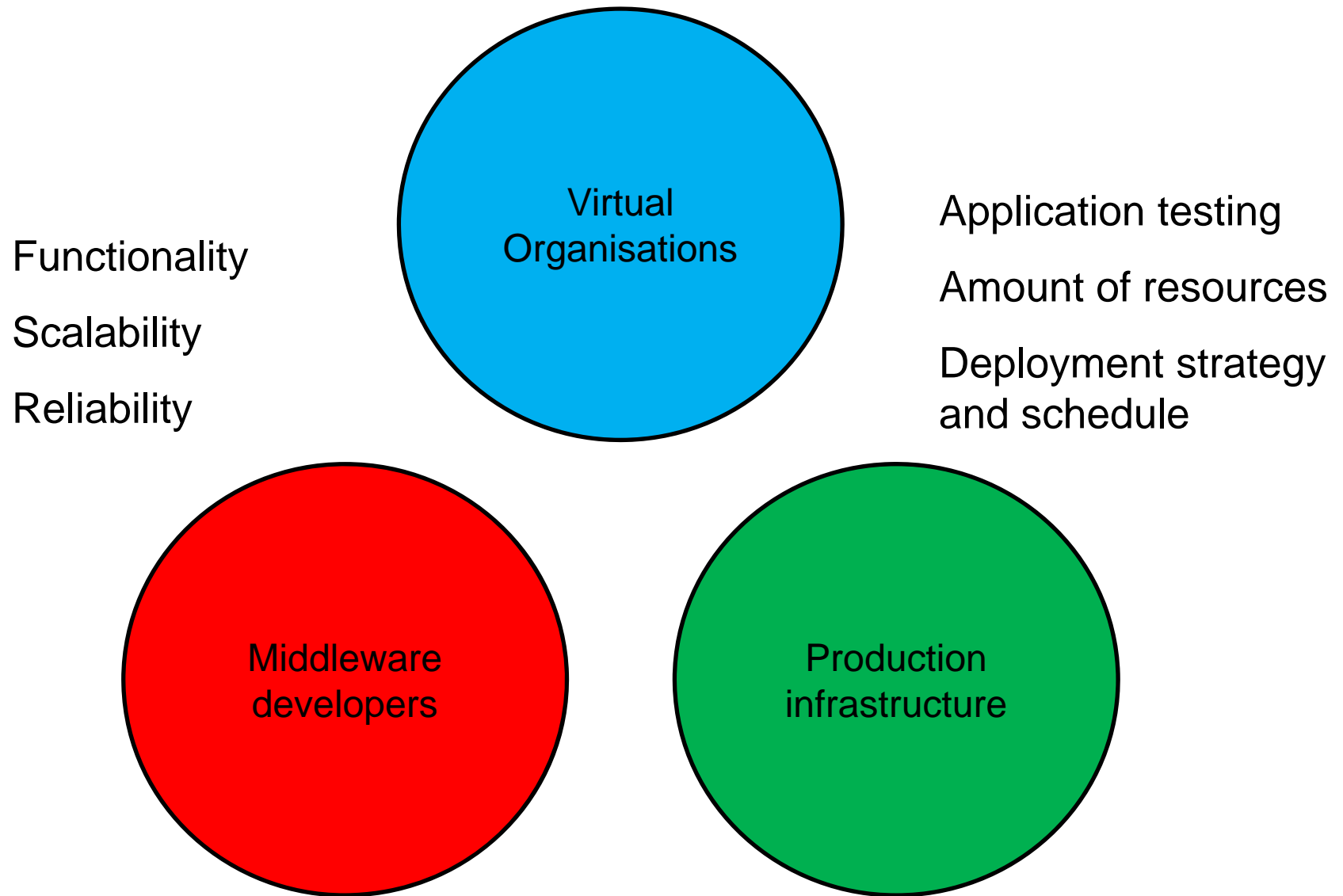
- **What is VO support?**  
**It can mean several things**
  - Provide expertise for development
    - Application porting
    - Application-Grid interface development
    - User tools, utilities
    - Middleware testing
  - User support
    - GGUS
  - Provide support for operations
    - Help debugging problems with sites and services
    - Participate to VO-specific Grid operations
  - Provide training and documentation
    - GILDA, UIG, NA3

- **EGEE users come from about 100 Virtual Organisations**
  - Astronomy & Astrophysics
  - Computational Chemistry
  - Earth Sciences
  - Fusion
  - High Energy Physics
  - Life Sciences
  - Condensed Matter Physics
  - Computational Fluid Dynamics
  - Computer Science
  - Finance
- **Active users are about 8000, 22000 users benefit from the work done on the EGEE Grid**





# Basic VO relationships

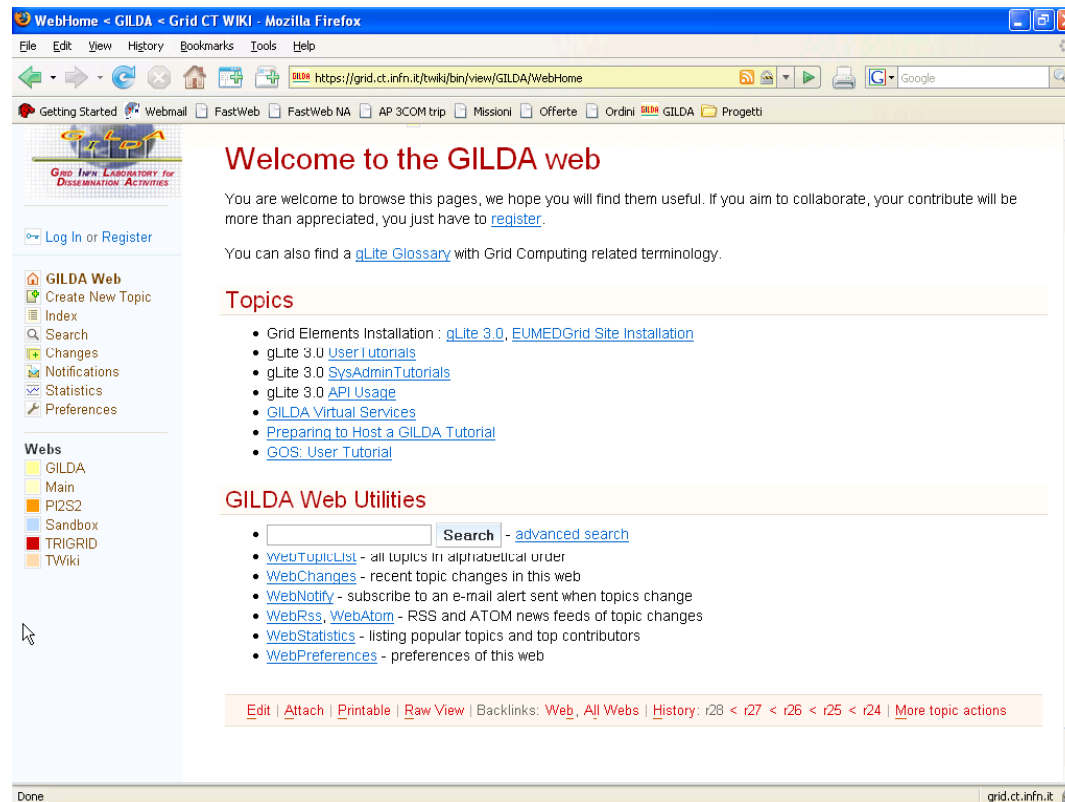


- **Technical Coordination Group**
  - 4 LHC VO representatives, Biomed, NA4, developers, sites, certification and operations
- **VO managers coordination group**
  - Generic VO support
- **Specifically for the Worldwide LHC Computing Grid:**
  - Management Board
    - Supervision and planning
  - Grid Deployment Board
    - Agreements between VOs and sites, information exchange
  - EIS team
    - Daily support for LHC VOs
  - Task forces
    - To address very specific technical issues

- **Typically, lack of dedicated support**
  - VOs are expected to participate actively in user support via the Global Grid User Support
    - But non VO-specific support to users is guaranteed by GGUS
- **NA4 though provides high-level support for the VO management**
  - Mostly via the VO Managers group
    - Help to start a new VO
    - Effort in this area should improve in EGEE3
    - Main tool: CIC Portal (<https://cic.gridops.org/>)
- **Application porting support**
  - Grid Application Support Centre (**GA**SuC)
    - See Gergely's talk



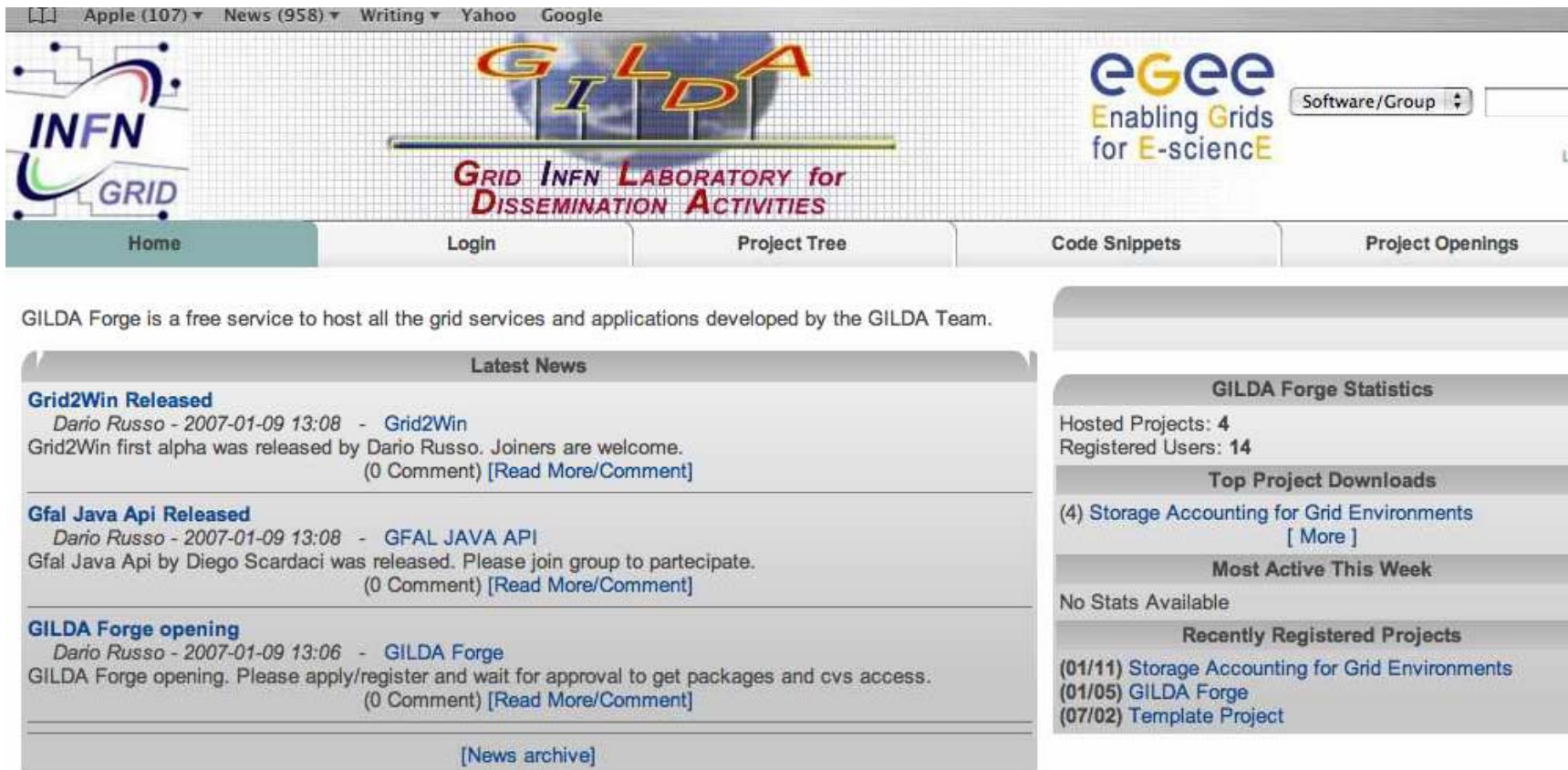
- A vast collection of material
  - 100+ topics for users, site managers, developers
  - Plenty of exercises
    - Difficulty levels: basic, medium, advanced



(<https://grid.ct.infn.it/twiki/bin/view/GILDA/WebHome>)



- **Code repository to share**
  - Examples, exercises
  - Actual development for demonstrative applications



The screenshot shows the GILDA Forge website interface. At the top, there is a navigation bar with links: Home, Login, Project Tree, Code Snippets, and Project Openings. The main content area is divided into two columns. The left column, titled 'Latest News', contains three news items: 'Grid2Win Released' by Dario Russo, 'Gfal Java Api Released' by Diego Scardaci, and 'GILDA Forge opening' by Dario Russo. The right column, titled 'GILDA Forge Statistics', displays 'Hosted Projects: 4' and 'Registered Users: 14'. Below this, it lists 'Top Project Downloads' and 'Most Active This Week'. At the bottom of the right column, it shows 'Recently Registered Projects' with a list of projects and their registration dates.

GILDA Forge is a free service to host all the grid services and applications developed by the GILDA Team.

**Latest News**

**Grid2Win Released**  
Dario Russo - 2007-01-09 13:08 - Grid2Win  
Grid2Win first alpha was released by Dario Russo. Joiners are welcome.  
(0 Comment) [\[Read More/Comment\]](#)

**Gfal Java Api Released**  
Dario Russo - 2007-01-09 13:08 - GFAL JAVA API  
Gfal Java Api by Diego Scardaci was released. Please join group to participate.  
(0 Comment) [\[Read More/Comment\]](#)

**GILDA Forge opening**  
Dario Russo - 2007-01-09 13:06 - GILDA Forge  
GILDA Forge opening. Please apply/register and wait for approval to get packages and cvs access.  
(0 Comment) [\[Read More/Comment\]](#)

[\[News archive\]](#)

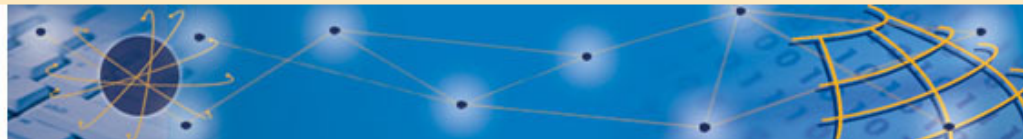
**GILDA Forge Statistics**

Hosted Projects: 4  
Registered Users: 14

**Top Project Downloads**  
(4) Storage Accounting for Grid Environments  
[\[ More \]](#)

**Most Active This Week**  
No Stats Available

**Recently Registered Projects**  
(01/11) Storage Accounting for Grid Environments  
(01/05) GILDA Forge  
(07/02) Template Project

[FAQ/Wiki](#) • [Documentation](#) • [Training](#) • [Contact](#) • [Masthead](#)

[Home](#) • [Submit ticket](#) • [Registration](#) • [Support staff](#)

## Documentation

[\[Documentation for Grid Users\]](#) - [\[VO-related documentation\]](#) - [\[Documentation for TPM\]](#) - [\[Documentation for Grid Site Administrators\]](#) - [\[Middleware documentation\]](#) - [\[Us](#)

### Documentation for Grid Users



Description of the **DLI** interface: <http://edms.cern.ch/document/572489>

The **Grid Dictionary** If you are confused by all Grid acronyms, you can search this grid dictionary for an explanation <http://www.eu-egee.org/introduction/EGEEGLOSSARY/>

**gLite 3.0 User Guide** <https://edms.cern.ch/document/722398>

**The AFS grid UI at CERN** <https://twiki.cern.ch/twiki/bin/view/LCG/AfsUiUserSetup>

### VO-related documentation

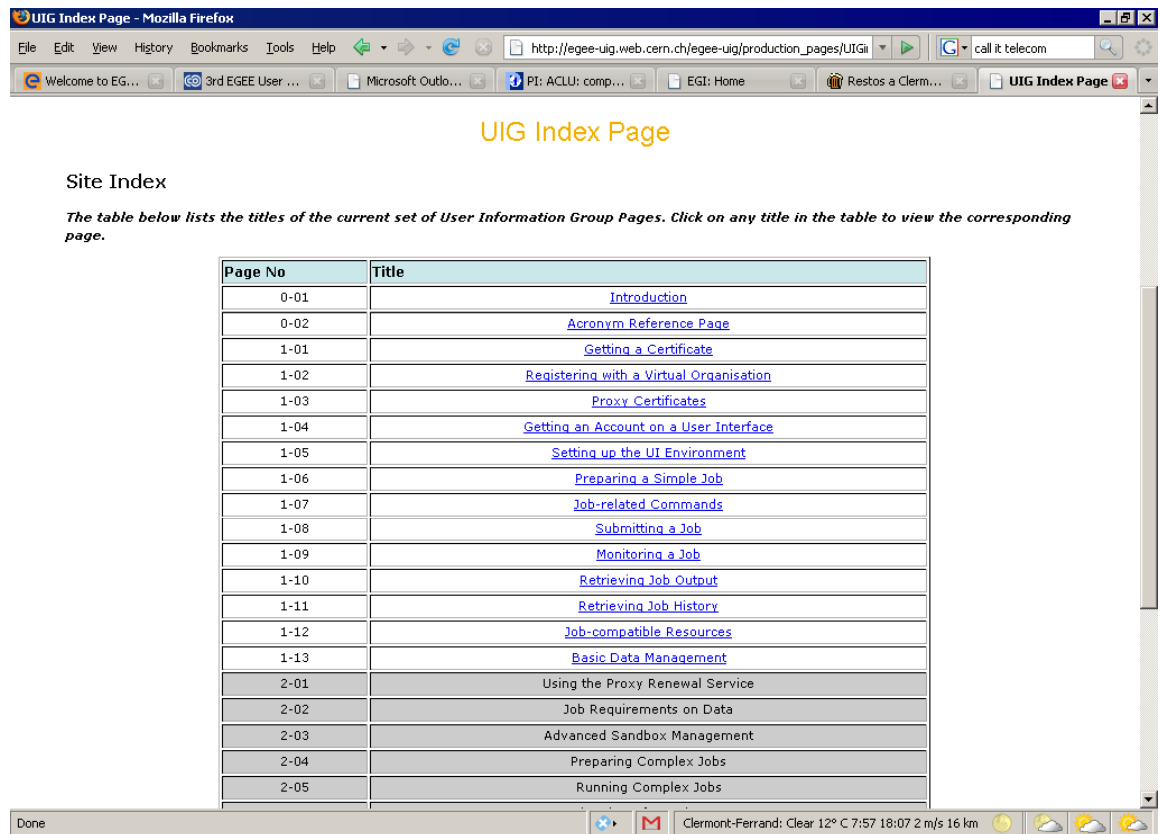


**VO BOX description**, appendix E.3 of LCG User Guide <https://edms.cern.ch/file/454439/LCG-2-UserGuide.html#SECTION000143000000000000000003>

**VOBOX HowTo for the ALICE VO** <http://alien.cern.ch/twiki/bin/view/AliEn/HowToInstallLcgVoBox>

**VOBOX HowTo for all other VOs** [http://goc.grid.sinica.edu.tw/gocwiki/VO-box\\_HowTo](http://goc.grid.sinica.edu.tw/gocwiki/VO-box_HowTo)

- The UIG is a service for users to provide
  - Documentation
  - Contacts, links to sites, access to user support
  - Information about training, tutorials, workshops, etc.
- Docs as “use cases”
  - Beginner
  - Normal
  - Skilled users

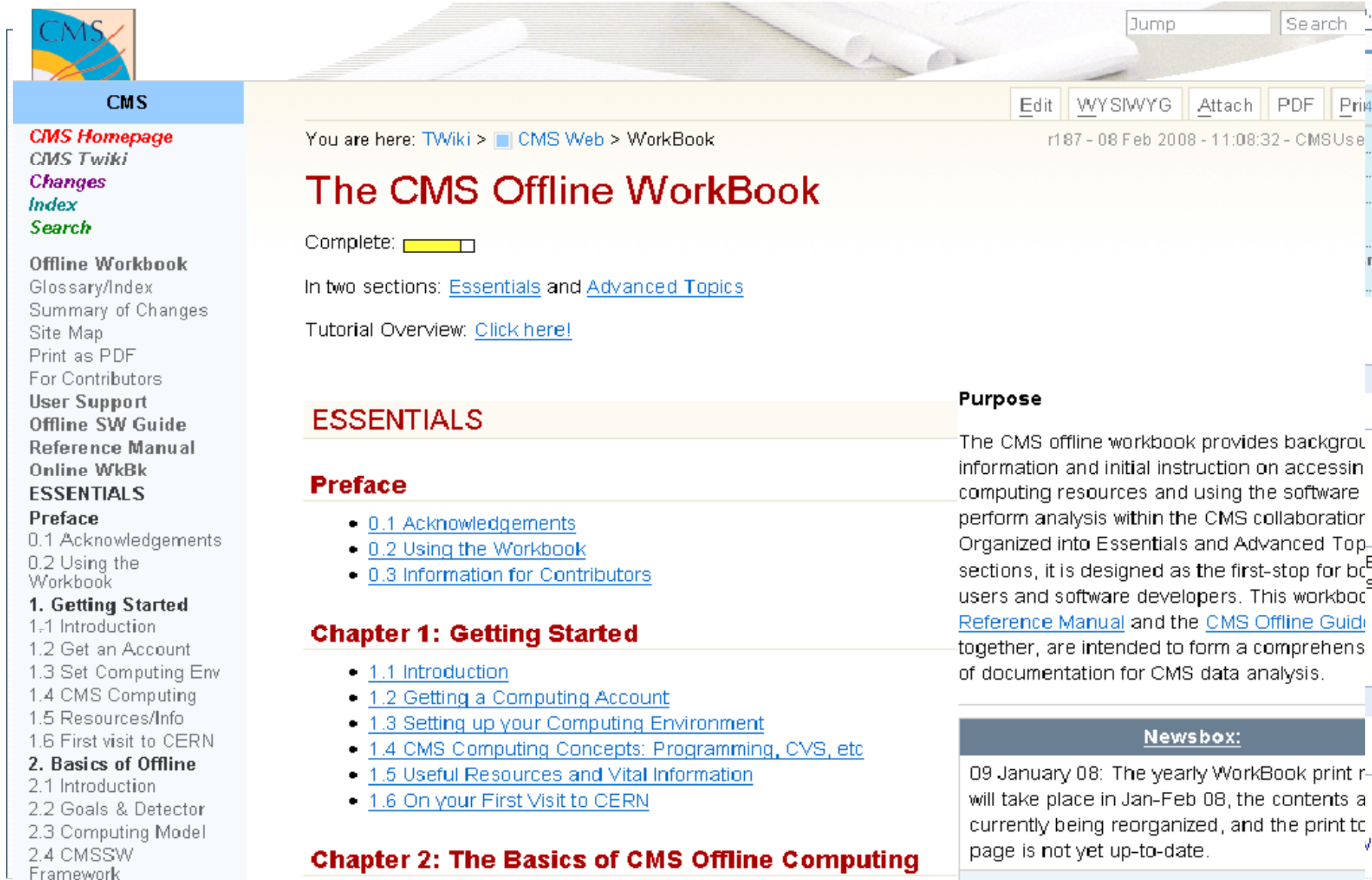


UIG Index Page

Site Index

The table below lists the titles of the current set of User Information Group Pages. Click on any title in the table to view the corresponding page.

Page No	Title
0-01	<a href="#">Introduction</a>
0-02	<a href="#">Acronym Reference Page</a>
1-01	<a href="#">Getting a Certificate</a>
1-02	<a href="#">Registering with a Virtual Organisation</a>
1-03	<a href="#">Proxy Certificates</a>
1-04	<a href="#">Getting an Account on a User Interface</a>
1-05	<a href="#">Setting up the UI Environment</a>
1-06	<a href="#">Preparing a Simple Job</a>
1-07	<a href="#">Job-related Commands</a>
1-08	<a href="#">Submitting a Job</a>
1-09	<a href="#">Monitoring a Job</a>
1-10	<a href="#">Retrieving Job Output</a>
1-11	<a href="#">Retrieving Job History</a>
1-12	<a href="#">Job-compatible Resources</a>
1-13	<a href="#">Basic Data Management</a>
2-01	Using the Proxy Renewal Service
2-02	Job Requirements on Data
2-03	Advanced Sandbox Management
2-04	Preparing Complex Jobs
2-05	Running Complex Jobs



The screenshot shows the CMS Offline Workbook web page. The top navigation bar includes a 'Jump' search box and a 'Search' button. Below the navigation bar, the page title 'The CMS Offline Workbook' is displayed in large red font. The left sidebar contains a list of links: CMS Homepage, CMS Twiki, Changes, Index, Search, Offline Workbook, Glossary/Index, Summary of Changes, Site Map, Print as PDF, For Contributors, User Support, Offline SW Guide, Reference Manual, Online WkBk, ESSENTIALS, Preface, 0.1 Acknowledgements, 0.2 Using the Workbook, 1. Getting Started, 1.1 Introduction, 1.2 Get an Account, 1.3 Set Computing Env, 1.4 CMS Computing, 1.5 Resources/Info, 1.6 First visit to CERN, 2. Basics of Offline, 2.1 Introduction, 2.2 Goals & Detector, 2.3 Computing Model, 2.4 CMSSW Framework. The main content area shows the breadcrumb 'You are here: TWiki > CMS Web > Workbook' and a progress bar labeled 'Complete:'. Below this, it states 'In two sections: Essentials and Advanced Topics' and 'Tutorial Overview: Click here!'. The 'ESSENTIALS' section is highlighted, and the 'Preface' section is expanded, showing a list of links: 0.1 Acknowledgements, 0.2 Using the Workbook, 0.3 Information for Contributors. The 'Chapter 1: Getting Started' section is also expanded, showing a list of links: 1.1 Introduction, 1.2 Getting a Computing Account, 1.3 Setting up your Computing Environment, 1.4 CMS Computing Concepts: Programming, CVS, etc, 1.5 Useful Resources and Vital Information, 1.6 On your First Visit to CERN. The 'Chapter 2: The Basics of CMS Offline Computing' section is also expanded. The 'Purpose' section explains that the CMS offline workbook provides background information and initial instruction on accessing computing resources and using the software to perform analysis within the CMS collaboration. It is organized into Essentials and Advanced Topics sections, designed as the first-stop for both new users and software developers. This workbook, together with the Reference Manual and the CMS Offline Guide, are intended to form a comprehensive set of documentation for CMS data analysis. The 'Newsbox' section at the bottom right contains a message dated 09 January 08, stating that the yearly Workbook print run will take place in Jan-Feb 08, the contents are currently being reorganized, and the print page is not yet up-to-date.

**CMS**

[CMS Homepage](#)  
[CMS Twiki](#)  
[Changes](#)  
[Index](#)  
[Search](#)

**Offline Workbook**  
[Glossary/Index](#)  
[Summary of Changes](#)  
[Site Map](#)  
[Print as PDF](#)  
[For Contributors](#)

**User Support**  
**Offline SW Guide**  
**Reference Manual**  
**Online WkBk**  
**ESSENTIALS**  
**Preface**  
[0.1 Acknowledgements](#)  
[0.2 Using the Workbook](#)  
**1. Getting Started**  
[1.1 Introduction](#)  
[1.2 Get an Account](#)  
[1.3 Set Computing Env](#)  
[1.4 CMS Computing](#)  
[1.5 Resources/Info](#)  
[1.6 First visit to CERN](#)  
**2. Basics of Offline**  
[2.1 Introduction](#)  
[2.2 Goals & Detector](#)  
[2.3 Computing Model](#)  
[2.4 CMSSW Framework](#)

You are here: [TWiki](#) > [CMS Web](#) > [Workbook](#)

## The CMS Offline Workbook

Complete:

In two sections: [Essentials](#) and [Advanced Topics](#)

Tutorial Overview: [Click here!](#)

### ESSENTIALS

#### Preface

- [0.1 Acknowledgements](#)
- [0.2 Using the Workbook](#)
- [0.3 Information for Contributors](#)

#### Chapter 1: Getting Started

- [1.1 Introduction](#)
- [1.2 Getting a Computing Account](#)
- [1.3 Setting up your Computing Environment](#)
- [1.4 CMS Computing Concepts: Programming, CVS, etc](#)
- [1.5 Useful Resources and Vital Information](#)
- [1.6 On your First Visit to CERN](#)

#### Chapter 2: The Basics of CMS Offline Computing

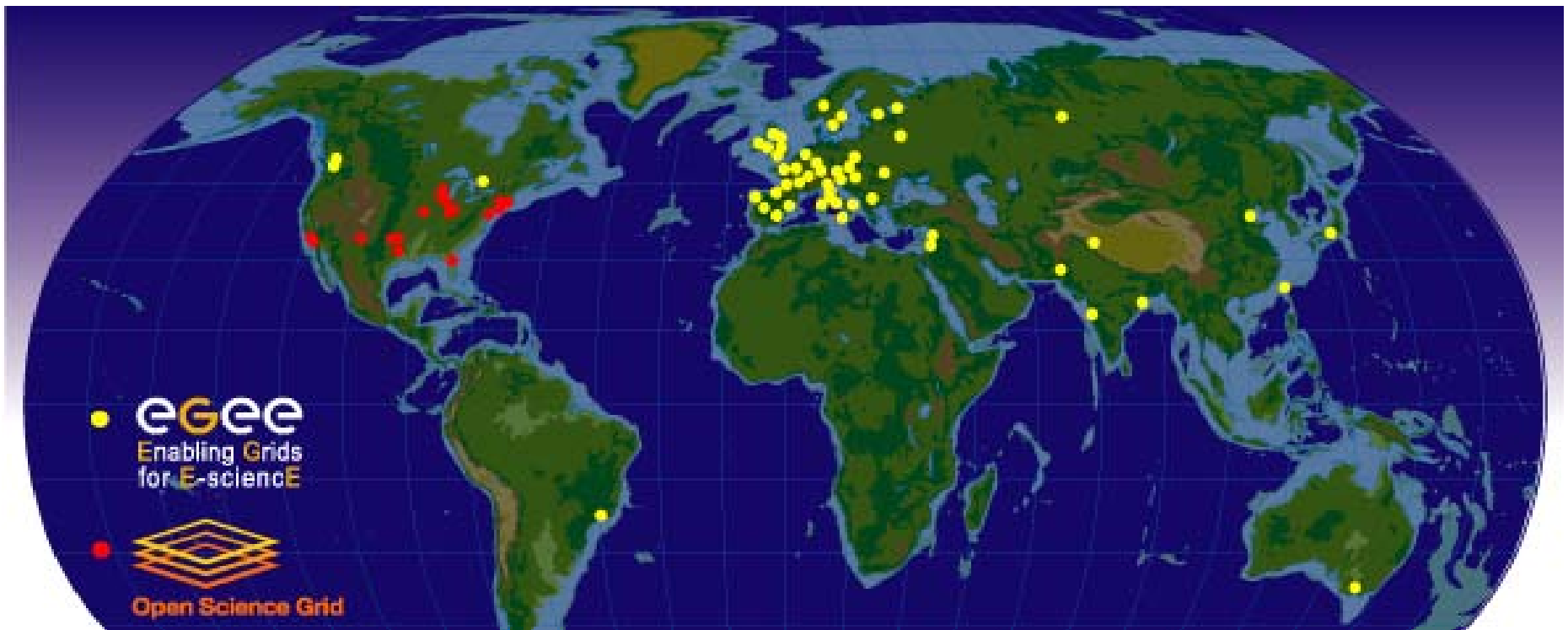
#### Purpose

The CMS offline workbook provides background information and initial instruction on accessing computing resources and using the software to perform analysis within the CMS collaboration. Organized into Essentials and Advanced Topics sections, it is designed as the first-stop for both new users and software developers. This workbook, together with the [Reference Manual](#) and the [CMS Offline Guide](#), are intended to form a comprehensive set of documentation for CMS data analysis.

#### Newsbox:

09 January 08: The yearly Workbook print run will take place in Jan-Feb 08, the contents are currently being reorganized, and the print page is not yet up-to-date.

- WLCG depends on two major Grid infrastructures
  - EGEE
  - US Open Science Grid



*A map of the worldwide LCG infrastructure operated by EGEE and OSG.*

- **Experiment Integration Support (EIS) team**
  - Born in 2002 with the LHC Computing Grid project
  - ~10 members, all high energy physicists
  - Funded by CERN and INFN
- **EIS main goals**
  - Helping the four LHC experiments (ALICE, ATLAS, CMS, LHCb) in Grid-related issues
  - Acting as interface between the experiments and WLCG
  - Not only for HEP: also Biomed and other VOs
- **ARDA team**
  - Devoted to development for the experiments (and not only!)
    - Monitoring dashboard, GANGA, Diane, AMGA, ...

- **Integration and testing**
  - Evaluation of middleware functionality
    - Identify possible shortcomings
  - Middleware scalability testing
    - Determine if the middleware meets the application scale requirements

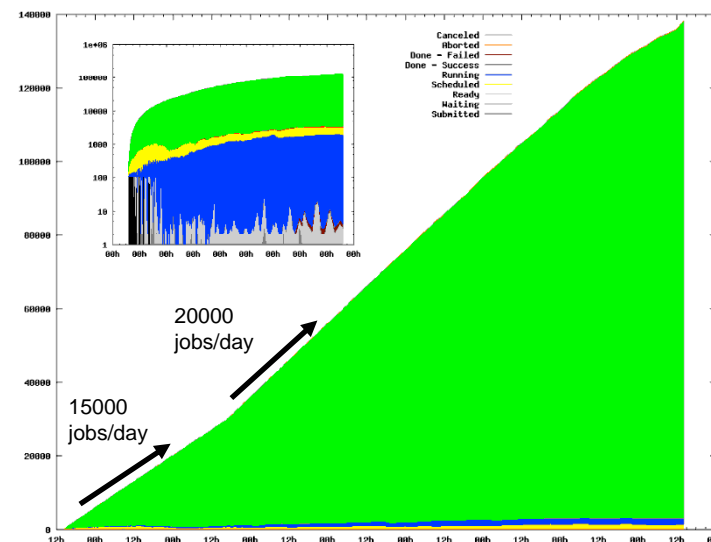


- **Testing the middleware against the VO use cases should start well before it is released to production**
- **Noteworthy examples**
  - gLite Workload Management System
  - CREAM Computing Element
- **HEP experiments currently have the most demanding performance requirements, therefore provide the most stringent criteria for middleware testing**

## Examples

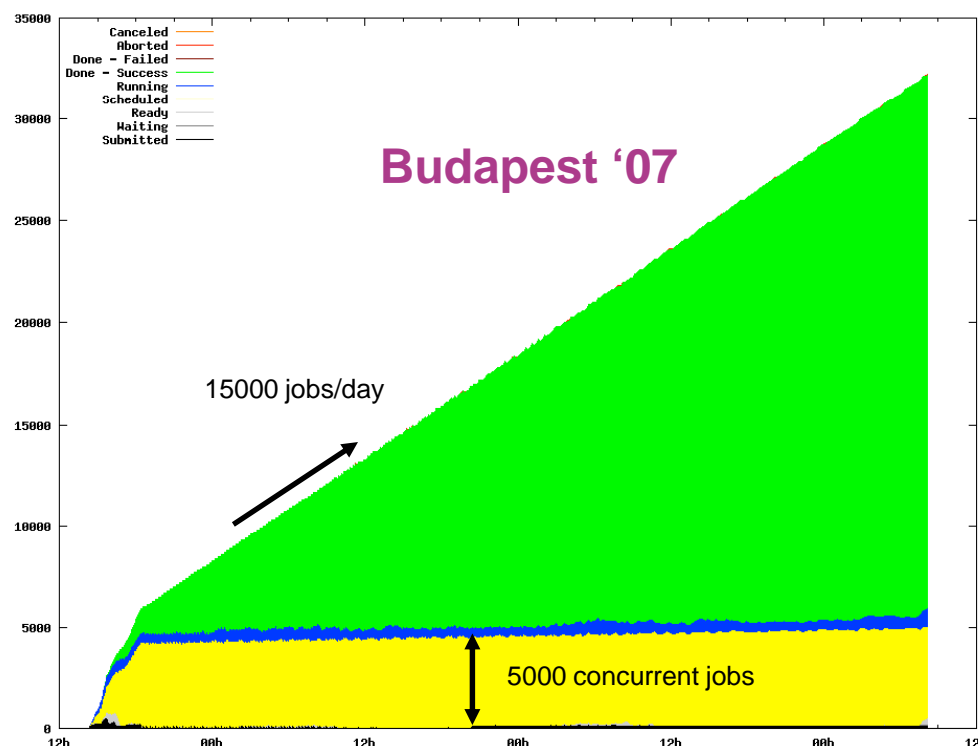
# Testing the gLite WMS

- **ATLAS and CMS requirements**
  - ~50,000 jobs/day in 2007
  - ~200,000 jobs/day in 2008
  - High reliability of the job management system
    - Very few downtimes
    - No performance degradation with time
- **Was the gLite WMS up to to the task?**
  - Intensive testing activity by the EIS team, JRA1, SA3
  - Lots of problems initially found, eventually fixed
- **Now the WMS is routinely used for both Monte Carlo and analysis jobs**
  - Stable at 20,000 jobs/day



# Testing the CREAM CE

- The same test methodology was applied to see if the prototype of the CREAM Computing Element satisfied the scalability requirements for a CE in WLCG
- Test criteria
  - Submission via WMS at a 10000 jobs/day rate
  - > 5000 concurrent jobs
  - At least 5 days of uninterrupted testing
  - Stable system
- The criteria were eventually met



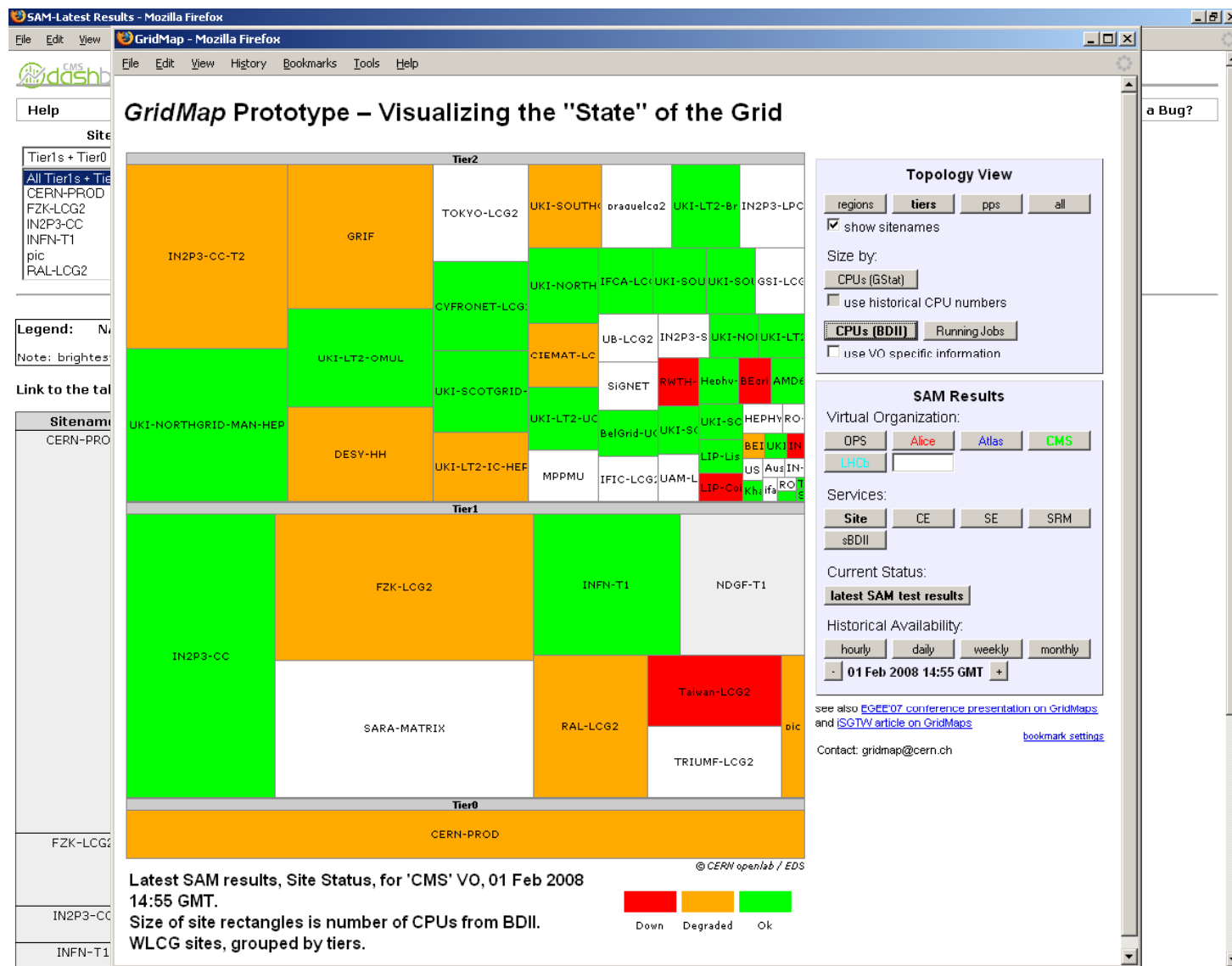
- **Development of missing components**
  - User tools that can be reused by other VOs
  - ... and can help "power users" in developing Grid interfaces

## Examples

- **VOs need to have the full picture of the Grid status...**
  - Grid services
  - VO-specific services
- **... and to know how they are doing on the Grid**
  - Job status, success/failure statistics
  - Status of data transfers
- **Exactly at the boundary between the application and the Grid domain**
- **Examples from the LHC computing:**
  - Usage of the Service Availability Monitoring (SAM) for VO-specific service monitoring
  - ARDA dashboard to monitor the experiment workflows

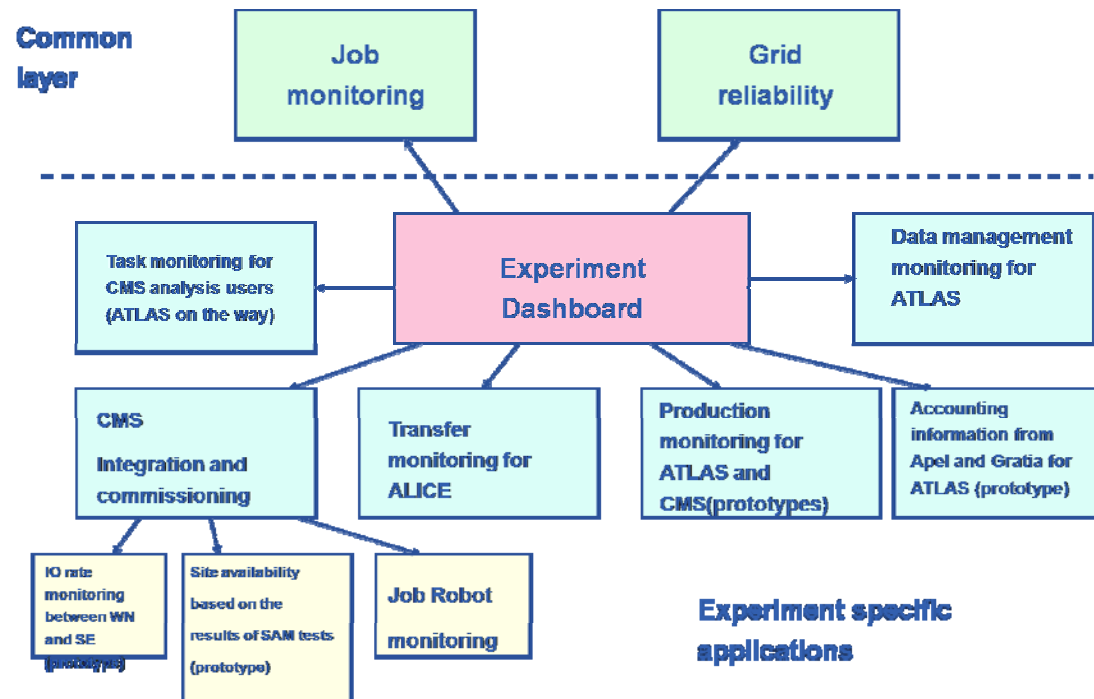
- **Adapting to the applications the SAM framework, used by EGEE Grid operations to monitor the site status**
  - Define specific tests for different aspects
    - VO software installation, VO services and processes, etc.
  - Produce an adequate GUI, or integrate in an existing one
- **What can SAM provide?**
  - Calculation of service availability/reliability
  - Alarms
  - Overall status of the Grid from the VO point of view

# SAM monitoring displays

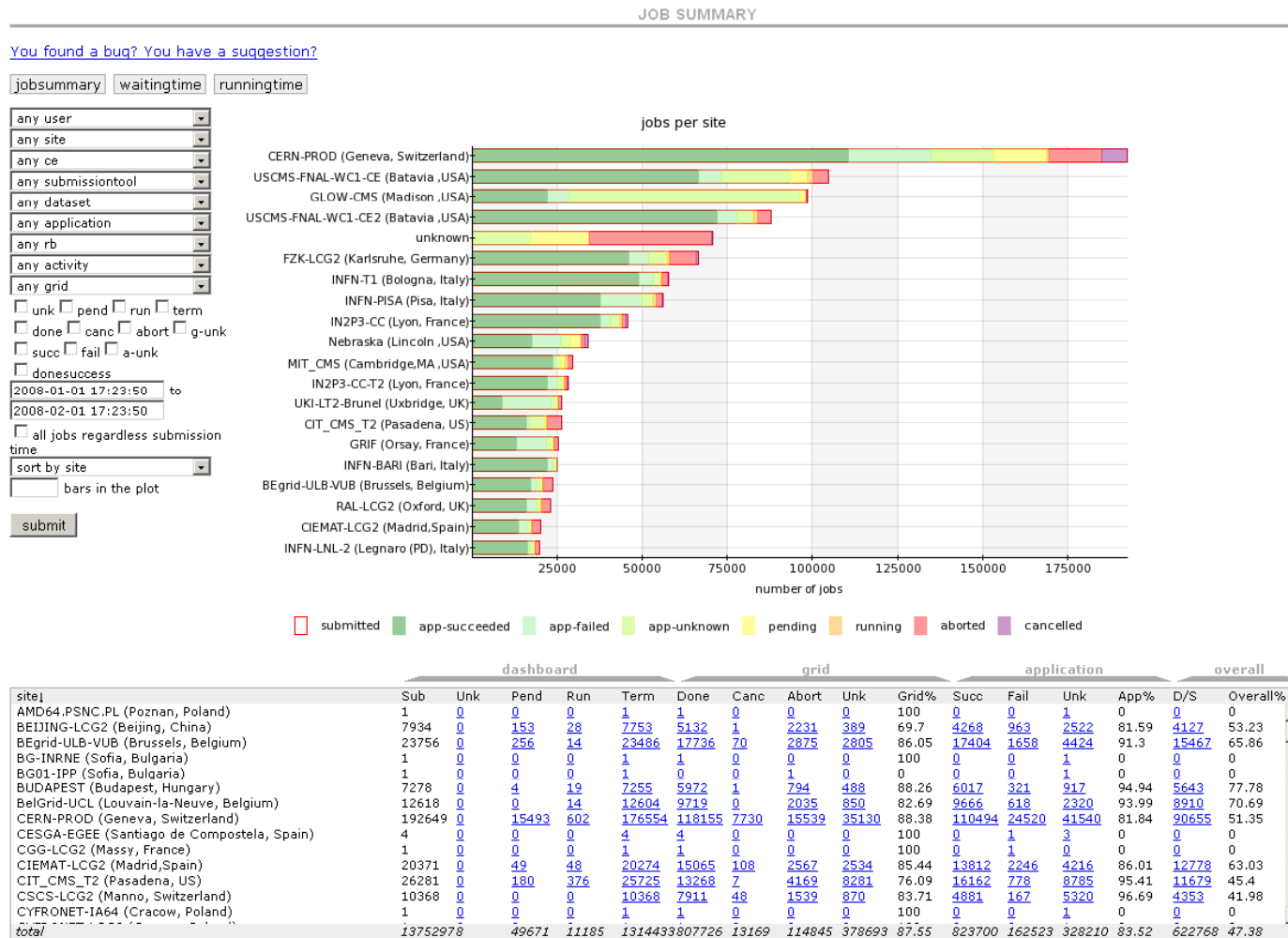




- A common project to provide monitoring pages for the LHC experiments
- Different purposes in mind
  - Global view of Grid jobs
  - Status of user analysis tasks
  - Status of data transfers
  - ...



# Interactive job monitoring



(also used by the VL-eMed VO at NIKHEF)

- **Often VO support involves development of software to fill the gap between the Grid middleware and the applications**
- **GANGA**
  - A framework for job definition and management
  - Supports several back-ends (local, batch, Condor-G, gLite WMS and many others) in a totally transparent way
  - Used by lots of applications (ATLAS, LHCb, telecommunications, QCD, Biomed, etc.)
    - Ideal for many “gridification” activities
- **VO Box**
  - A service to host VO-specific services
  - Provides several Grid utilities
    - gLite User Interface, proxy renewal service, GSI-ssh login

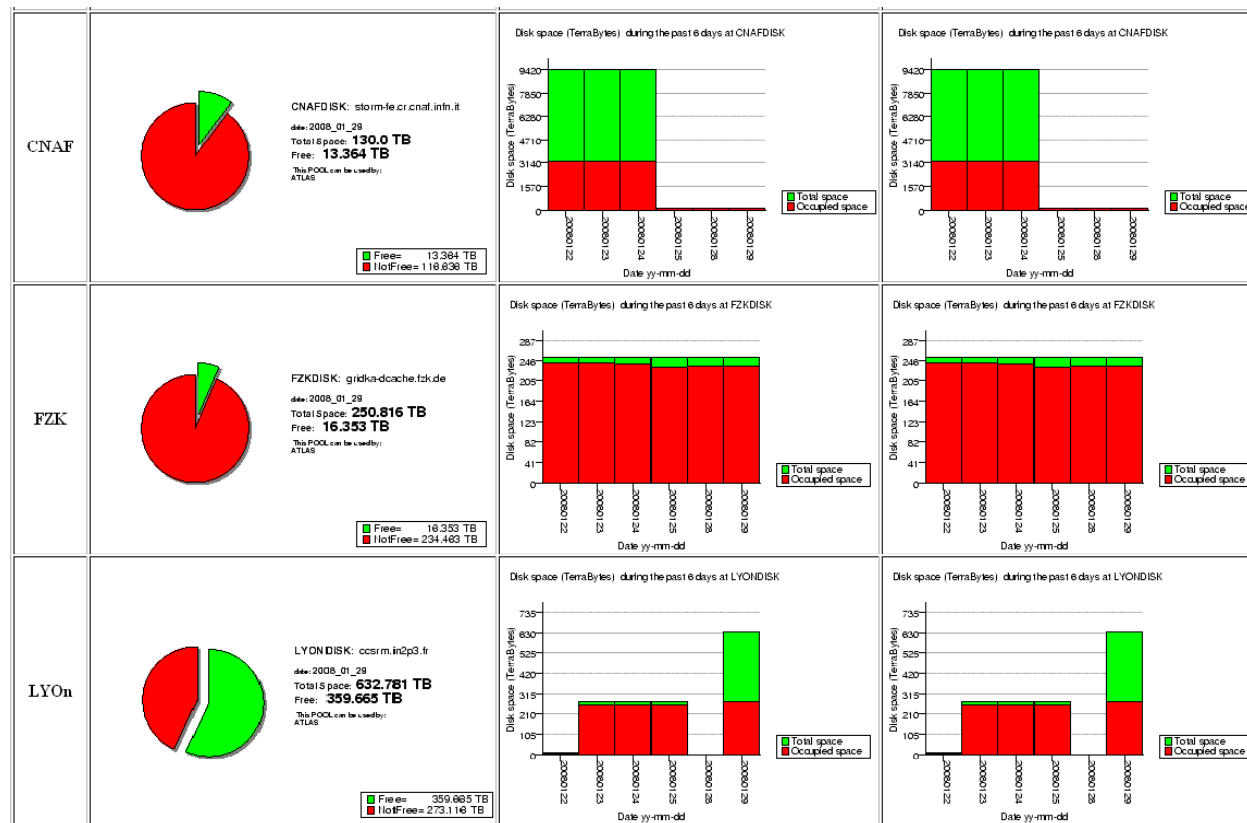
- **Operations and user support**
  - Help the VO with running the "production"
    - Manage Grid and VO-specific services
  - Provide documentation if missing
    - gLite User Guide (started as the "LCG" User Guide)
  - If necessary, contribute to end user support
- **Problem solving**
  - Provide expertise for understanding and solving Grid-related issues
    - Site problems (misconfigurations, etc.)
    - Middleware problems (bugs)
  - Easier with a deep knowledge of both the Grid middleware and the VO computing system

- A complete monitoring was developed for ALICE and Grid services running at sites
  - Test Grid services (Proxy renewal, GSI-sshd, Resource Broker, etc.)
  - Test ALICE software installation
- Output integrated with SAM and with ALICE monitoring

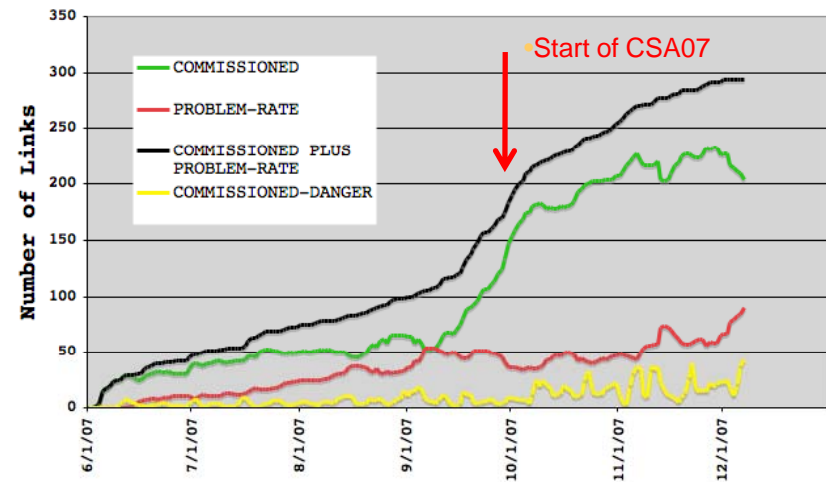
SAM Tests								
What is this about?								
Site	Delegated proxy duration	Proxy of the machine	Proxy Renewal	Proxy Server Registration	RB status	Software area	User Proxy Registration	WMS Stats
1. Athens	unknown	unknown	unknown	unknown	unknown	unknown	unknown	unknown
2. Bari	OK	OK	OK	OK	OK	OK	OK	OK
3. Birmingham	OK	OK	OK	OK	OK	OK	OK	OK
4. Bologna	OK	OK	OK	OK	OK	OK	OK	OK
5. CCIN2P3	unknown	unknown	unknown	unknown	unknown	unknown	unknown	unknown
6. CERN-L	OK	OK	OK	OK	OK	OK	OK	OK
7. CERN_gLite	OK	OK	OK	OK	OK	OK	OK	WARNING
8. CNAF	OK	OK	OK	OK	OK	OK	OK	WARNING
9. Gagliari	OK	OK	OK	OK	OK	OK	OK	WARNING
10. Catania	OK	OK	OK	OK	OK	OK	OK	WARNING
11. Clermont	OK	OK	OK	OK	OK	OK	OK	OK
12. Cyfronet	OK	OK	OK	OK	OK	OK	OK	OK
13. FZK	OK	OK	OK	OK	OK	OK	OK	OK
14. GRIF_DAPNIA	OK	OK	OK	OK	OK	OK	unknown	ERROR
15. GSI	OK	OK	OK	OK	OK	OK	OK	WARNING
16. IHEP	OK	OK	OK	OK	OK	OK	OK	ERROR
17. IPNO	OK	OK	OK	OK	OK	OK	unknown	WARNING
18. ITEP	OK	OK	OK	OK	OK	OK	OK	ERROR
19. JINR	OK	OK	OK	OK	unknown	OK	OK	unknown
20. KFKI	OK	OK	OK	OK	OK	OK	OK	OK
21. KISTI	ERROR	OK	OK	OK	OK	OK	ERROR	WARNING

No	SiteName	NodeName	Status	alice									
				SA	UPR	PR	PSR	ssh	PM	DPD	RBS	gsc	WMS
AsiaPacific													
1	GOG-Singapore	soursop.ngpp.ngp.org.sg	NA	na	na	na	na	na	na	na	na	error	na
2	IN-DAE-VECC-01	grid.tier2-kol.res.in	ERROR	ok	error	ok	ok	na	ok	error	error	error	ok
3	KR-KISTI-GRCT-01	vobox.gridcenter.or.kr	ERROR	ok	error	ok	ok	na	ok	error	ok	na	warn
CERN													
4	CERN-PROD	lxb7281.cern.ch	OK	ok	ok	ok	ok	na	ok	ok	ok	na	ok
5	CERN-PROD	voalice03.cern.ch	OK	ok	ok	ok	ok	na	ok	ok	ok	na	warn
CentralEurope													
6	BUDAPEST	grid156.kfki.hu	OK	ok	ok	ok	ok	na	ok	ok	ok	na	ok
7	CYFRONET-IA64	ares01.cyf-kr.edu.pl	OK	ok	ok	ok	ok	na	ok	ok	ok	error	ok
8	IEPSAS-Kosice	vobox-icp-grid.saske.sk	OK	ok	ok	ok	ok	na	ok	ok	ok	error	warn
9	egee.man.poznan.pl	ce.egee.man.poznan.pl	OK	ok	ok	ok	ok	na	ok	ok	ok	error	warn
10	pragueicp2	goliasx31.farm.particle.cz	OK	ok	ok	ok	ok	na	ok	ok	ok	na	ok

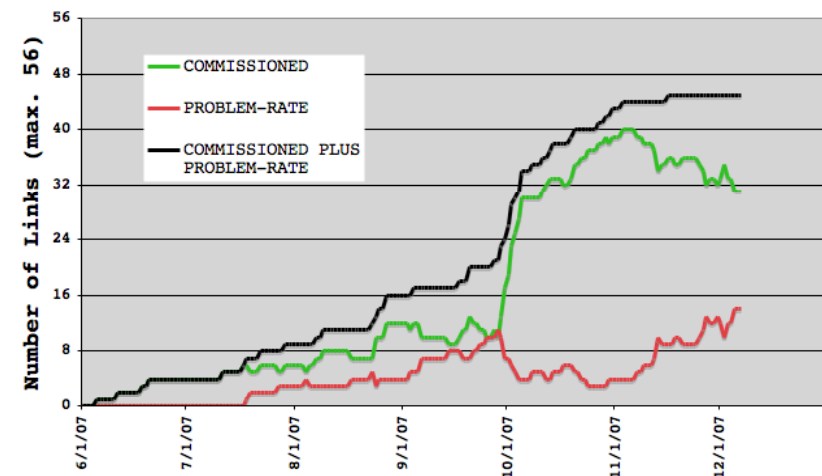
- Reliable calculation of the used and free space at all storage elements in ATLAS sites



## COMMISSIONED LINKS



## COMMISSIONED T[01]-T1 LINKS



- **The problem**
  - How to make sure that data transfers between pairs of CMS sites can be performed as required
- **The solution**
  - Periodically perform test data transfers between all relevant site pairs (“links”)
  - Declare “commissioned” only the links that satisfy minimum criteria
  - Decommission links that consistently fail
  - In the process, track and document common problems



- **The goal**
  - A redundant and reliable File catalogue service for LHCb based on LFC
  - A system that best matches the LHCb use cases
- **Implementation**
  - a master LFC at CERN and mirrored replicas at Tier-1 sites using Oracle Streams
- **Several technical aspects to consider**
  - Coherence of data and access control
  - Latency in the propagation of updates
- **VO support team contributed to the project**
  - Definition of the solution
  - Functionality and stress tests
  - Readiness of sites

**The distributed LHCb file catalogue was deployed in time for the currently ongoing combined computing challenge (CCRC'08)**

LFC mirrors. Last update Wed Feb 6 15:39:05 2008

LFC instance	<a href="#">CERN-Master</a>	<a href="#">CERN-RO</a>	<a href="#">CNAF</a>	<a href="#">RAL</a>	<a href="#">IN2P3</a>	SARA	PIC	FZK
<a href="#">Stress Test</a>	<a href="#">100 %</a>	<a href="#">100 %</a>	<a href="#">100 %</a>	<a href="#">100 %</a>	<a href="#">100 %</a>	<a href="#">Not available</a>	<a href="#">Not available</a>	<a href="#">Not available</a>
<a href="#">Replication Test</a>	<a href="#">1</a>	<a href="#">1</a>	<a href="#">1</a>	<a href="#">1</a>	<a href="#">1</a>	<a href="#">Not available</a>	<a href="#">Not available</a>	<a href="#">Not available</a>

- **Large Virtual Organisations like the LHC experiments needed a dedicated support from WLCG**
  - From people coming from the experiments themselves
- **Very often the work primarily done for the LHC VOs has been or can be useful to others**
  - Middleware testing (gLite WMS, CREAM, ...)
  - Dashboard, Ganga/DIANE, ...
  - gLite User Guide
  - Service Availability Monitoring for VO monitoring
- **Also the expertise has been made available to other VOs**
  - Gridification
  - Biomed support

- **An adequate support for VOs is essential for an efficient usage of the EGEE (or any) production Grid**
  - Allow VOs to interact with all components of the project
  - Allow VO members to have access to training and documentation
  - Provide support for application porting
  - Encourage the usage of high level tools
    - A lot of work done for LHC experiments could be reused by other VOs “for free”
  - Real VO-specific support will have to come from the VOs