

# "GRID" Computing in Portugal (LIP Grid Activities)

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# Roadmap

- “Introduction to LIP”
- Motivation for Grid Computing
- LIP involvement in EU and CERN projects
- The story so far ...
- Learnings and perspectives
- CA's and RA's
- Current status (as of today)
- Other Portuguese institutions
- Future directions

# “Introduction to LIP”

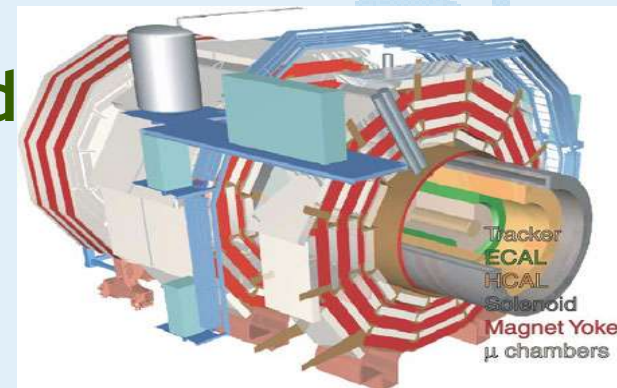
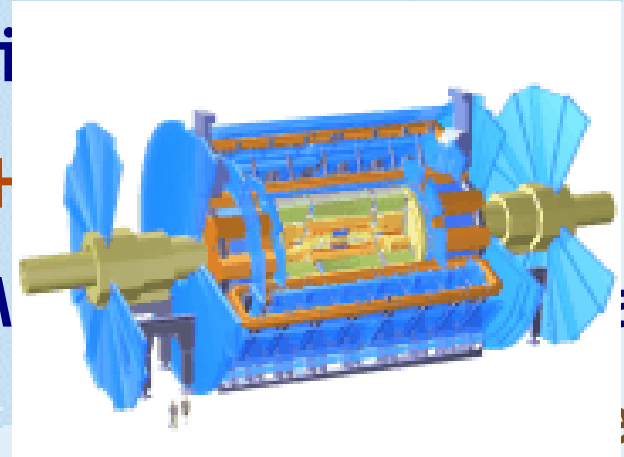
- LIP is a High Energy Physics Laboratory
- Created in 1986 when Portugal joined CERN.
- Associated Laboratory since November 2001.
- Hosts the majority of Experimental Particle Physicists in Portugal through collaborations with main CERN experiments.
- LIP activities also include research and development in astro-particle physics, medical applications and grid computing

# “Introduction to LIP” (cont.)

- In the context of those collaborations - expertise in:
  - Data Analysis.
  - Physics Simulation.
  - Electronics/Instrumentation.
  - Data acquisition.
  - Computing.
  - Development of particle detectors.
- Training new students:
  - Master.
  - PhD.

# Motivation in “Grid Computing”

- Large Hadron Collider (LHC) Experiment
  - $10^9$  collisions/second (1 Ghz) - 100Hz
  - 1 collision  $\Rightarrow$  1 MB of data  $\Rightarrow$  100 MB per second
  - Data distributed through research network
  - World: ~ 2 petabytes per experiment per year.
  - Computing power  $\Rightarrow$  100 000 “today's” PC for analysis and simulation.
  - Users  $\Rightarrow$  8000+ researchers around the world



1 LHC year =  $10^7$  seconds

# Motivation in “Grid Computing” - LIP

- Involved in ATLAS and CMS experiments for LHC.
- Participate in the effort for the LHC Computing.
- Setup a Grid Infrastructure at LIP.
- Gather knowledge and help ATLAS and CMS users in the usage of Grid infrastructures.
- More recently, dissemination in Portugal: started collaborations with other institutes and Universities.

# LIP involvement in EU projects

- 2001: First involvement of LIP in Grid projects “EDG”, as an unfunded partner.
- 2002 - 2005: Partner in the Crossgrid Project.
- 2003 - : Partner in the LCG project
- 2004 - 2006: Partner in the EGEE project (South West Federation).
- Member of the CERN/LHC project

# The story so far ...

- 3 years since the beginning and, to long to be told but... Here it goes a bit of it.
  - Deployment of LIP Certification Authority (CA).
  - Learning and testing phase:
    - Globus and EDG middleware, deployment on the first testbed.
    - Fabric management tools: automatic installation, configuration and administration of machines.
    - Close collaboration with EDG people: bug reporting and testing of new versions of middleware. Allowed us to learn (in the hard way) the “itches and glitches of this business”.



# The story so far... (cont.)

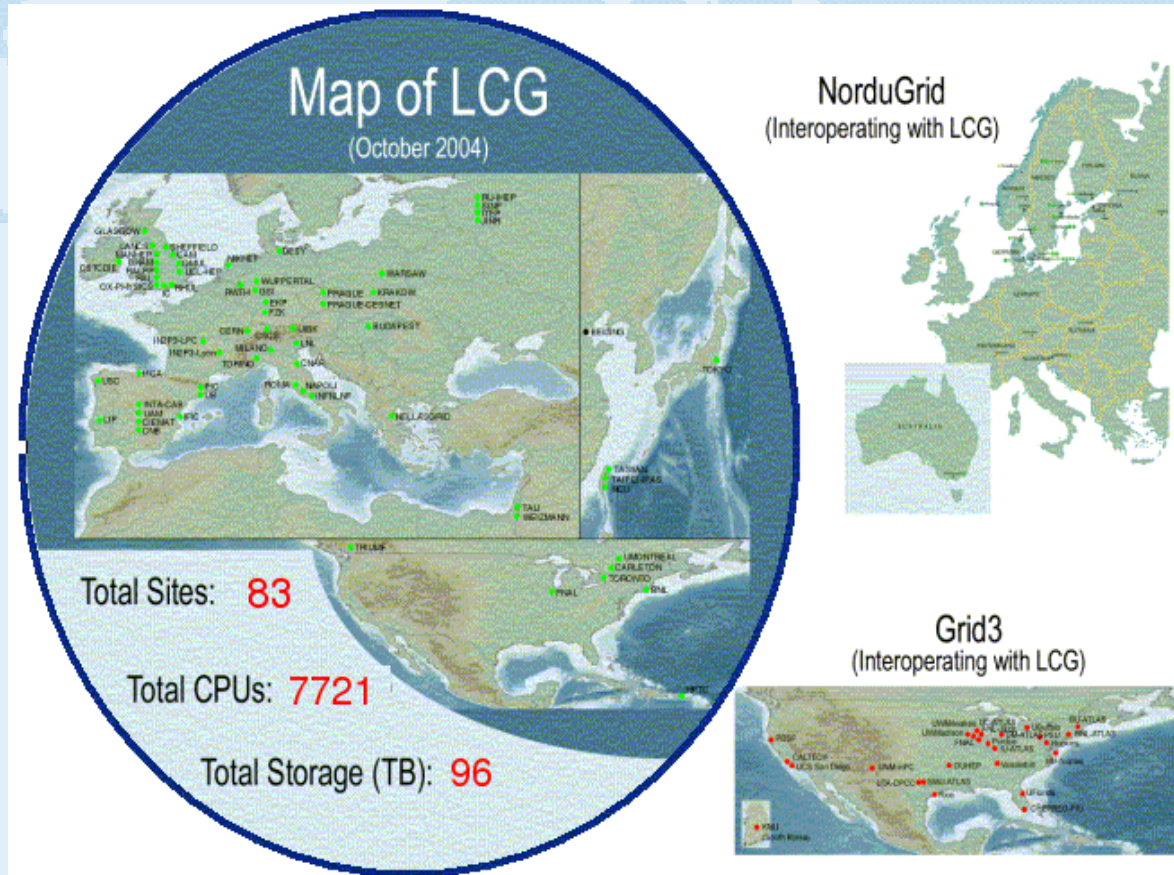
- Crossgrid arrives and: “LIP is participating on the International Testbed Organization WP4, with a particular involvement in task 4.4, Verification and Quality Control.”
- LIP become responsible for the production and validation central systems:
  - Resource Brokering, Information Index, Proxy Server, Replica Catalog;
  - Monitoring of services (Mapcenter);
  - Development of tools for: site verification, uptime measurement, RB and CE usage;
  - Provide help and support for users and site administrators.

# The story so far... (cont.)

- In a later phase: Test and Validation of new middleware and tools developed by Crossgrid.
- Member of the crossgrid integration team:
- Close collaboration with developers and site administrators;
- Major involvement in the support of the testbed;
- Currently organizing an integration meeting here at LNEC.

# The story so far... (cont.)

- Participation in LHC Computing Grid (LCG): **This is the largest grid ever attempted.**
- Integration of LIP resources into the LCG  
“Testbed”: 8 CPU's , 600 Gbytes of storage



# The story so far... (cont.)

- LIP is representing Portugal in EGEE.
- Part of South-West federation with Spain.
  - Provide support for the integration of Portuguese resources into the LCG infrastructure.
  - Support of the national CA.
  - Provide training and dissemination of Grid technologies in Portugal. (What we are doing now).
  - Testing new “Fabric Management” tools.
  - Testing Grid middleware in newer versions of Linux.
  - Part of the “Pre-Production” testbed in the SW Fed.
  - Coordination of the User Support in the SW Fed..





# Production Testbed @LIP 4 CG

The CrossGrid production testbed - Netscape

File Edit View Go Bookmarks Tools Window Help

http://www.lip.pt/computing/cg-pro/ Search

The CrossGrid production testbed Mail :: INBOX Home Page

**crossgrid** The CrossGrid production testbed  

**Central services**  
**Testbed sites**  
**Installing**  
**Resource Broker**  
**Replica Catalogue**  
**The MDS tree**  
**VO server**  
**Other changes**  
**Checking**  
**Using the testbed**  
**Common problems**  
**Monitoring**  
**Interfaces and portals**

This page contains information about the setup and architecture of the CrossGrid production testbed. The information provided is mainly targeted at the CrossGrid site administrators. However it can be also very useful to users wishing to understand the testbed characteristics and setup.

The CrossGrid production testbed is used to develop, test and run applications in a near production environment.

**The production testbed official basic middleware is LCG-2.**



**These web pages are intended to help site administrators and users into deploying and maintaining the official production middleware. The previous LCG-1 web pages are still available [here](#).**

For more information about the CrossGrid testbed see:

- ♦ [CrossGrid WP4 International testbed organization web site at IFCA](#)

For more information about the CrossGrid project see:

- ♦ [The main CrossGrid web site at Cyfronet](#)

 [HelpDesk](#)  [grid.support@lip.pt](mailto:grid.support@lip.pt)

Start | The CrossGrid product... | C:\mario\grid\my-grid-pre... | grid-portugal-MDavid.sxi ... | 16:23

CrossGrid Central production services - Netscape

File Edit View Go Bookmarks Tools Window Help

http://www.lip.pt/computing/cg-pro/central-services.htm

CrossGrid Central production services Mail :: INBOX Home Page



## Central production services



### Central services

#### Testbed sites

#### Installing

#### Resource Broker

#### Replica Catalogue

#### The MDS tree

#### VO server

#### Other changes

#### Checking

#### Using the testbed

#### Common problems

#### Monitoring

#### Interfaces and portals

A set of central services is required for proper testbed operation. These services are essential for user authentication, authorization, workload management, monitoring and location of file replicas.

The CrossGrid central services for the production testbed are currently being maintained and hosted by the LIP Computer Center in Lisbon. The Roaming Access central services are maintained by PSNC in Poznan. The following table shows the available central services.

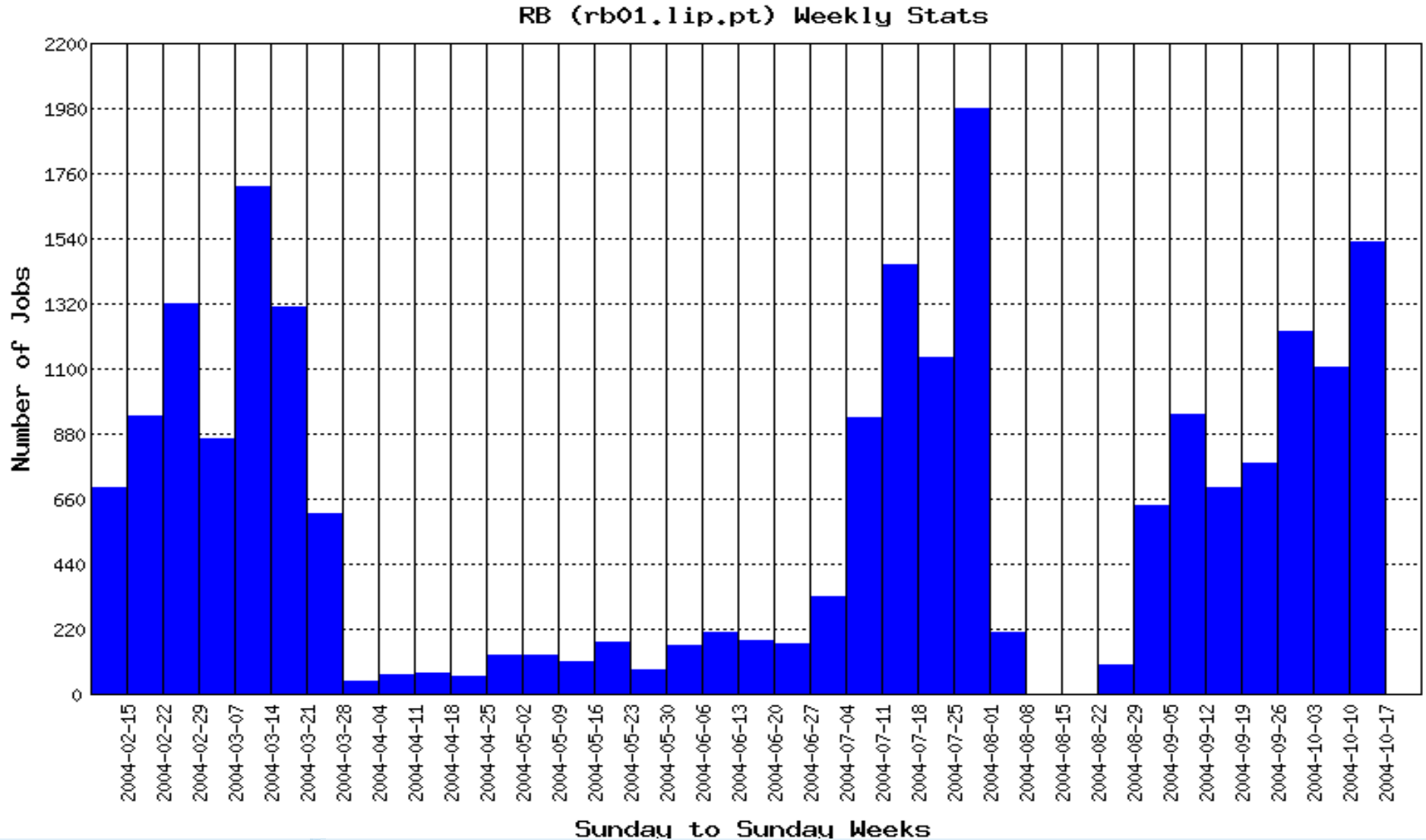
Service	Host	Port	Description	Information
Resource Broker (RB)	rb01.lip.pt	7771-7772 2811 9002	Main central engine for job submission. (LCG-2)	<a href="#">RB STATS</a> <a href="#">GRAPH</a>
Logging and Bookkeeping (LB)	rb01.lip.pt	9000-9001	Used to maintain information about jobs in the Grid. (LCG-2)	
MyProxy	px01.lip.pt	7512	Provides proxy certificates for long lived jobs.	
VO server	grid-vo.lip.pt	9990	Hosts the "crossgrid" and "gdmppservers" virtual organizations.	
Replica Location Service (RLS)	rc02.lip.pt		Information about files and the location of their replicas. (LCG-2)	
Information Index (II)	ii01.lip.pt	2170	Hosts the BDII server. (LCG-2).	
Monitoring	mapcenter.lip.pt	80	Web server with crossgrid monitoring information.	<a href="#">MAPCENTER</a>
Roaming Access Server	ras.man.poznan.pl	8080 389	CROSSGRID RAS used by Migrating Desktop and Portals	
RAS Job Submission Service	cedar.man.poznan.pl ui03.lip.pt	8080	CROSSGRID RAS JSS module	

**Resource Broker (RB):** Is the heart of the testbed workload management system. The RB receives job requests sent by users

Start | CrossGrid Central prod... | C:\mario\grid\my-grid-pre... | grid-portugal-MDavid.sxi ... | 16:27

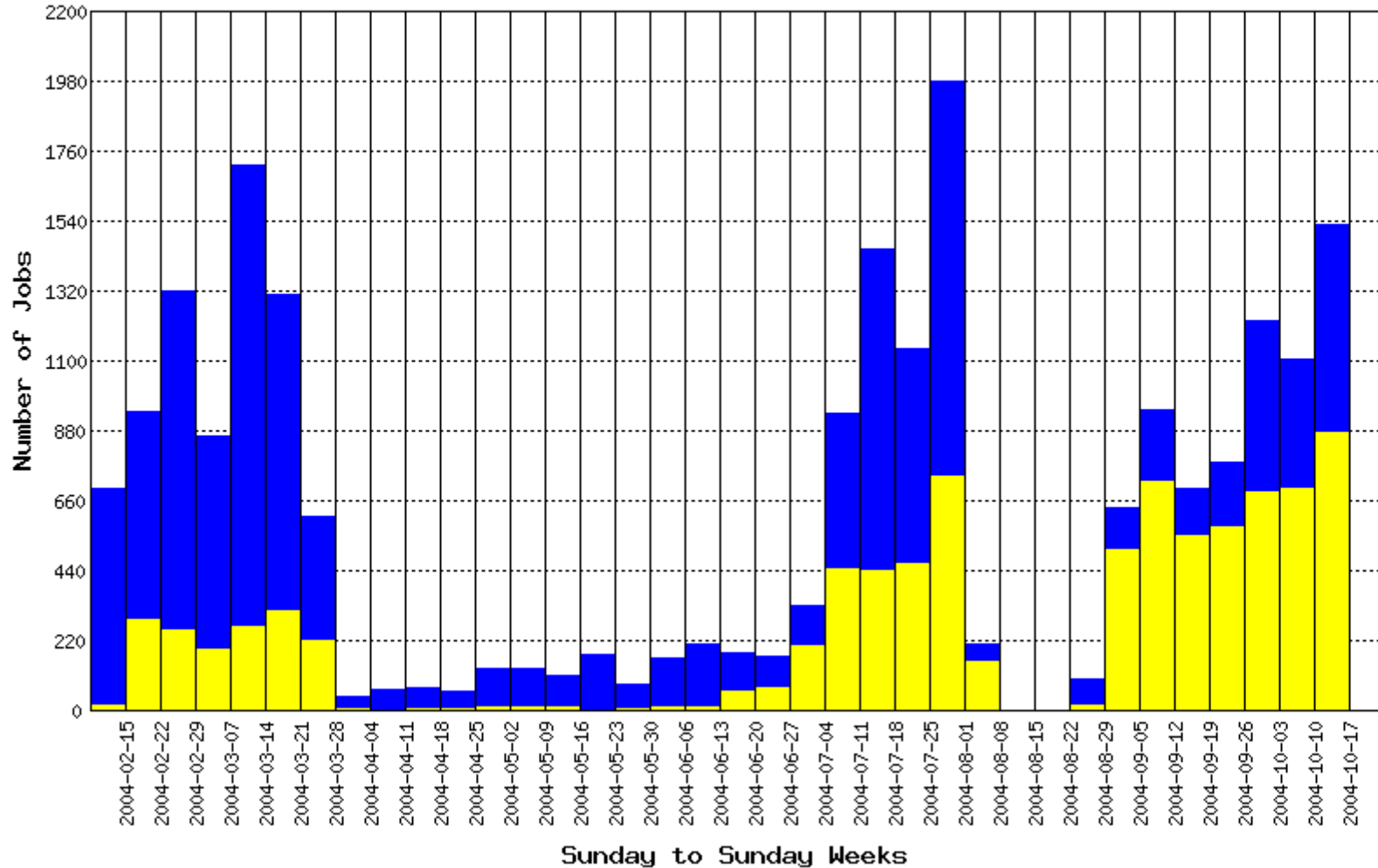


# RB Statistics



# RB Statistics The Real Thing

RB (rb01.lip.pt) Weekly Stats



RB:

Type:



Last  Weeks

- Total Jobs
- Accepted Jobs
- Transferred Jobs
- Matching Jobs
- Jobs Received by JC
- Jobs Aborted by JC
- Run Jobs
- Done Jobs
- Cleared Jobs
- Canceled Jobs
- Aborted Jobs

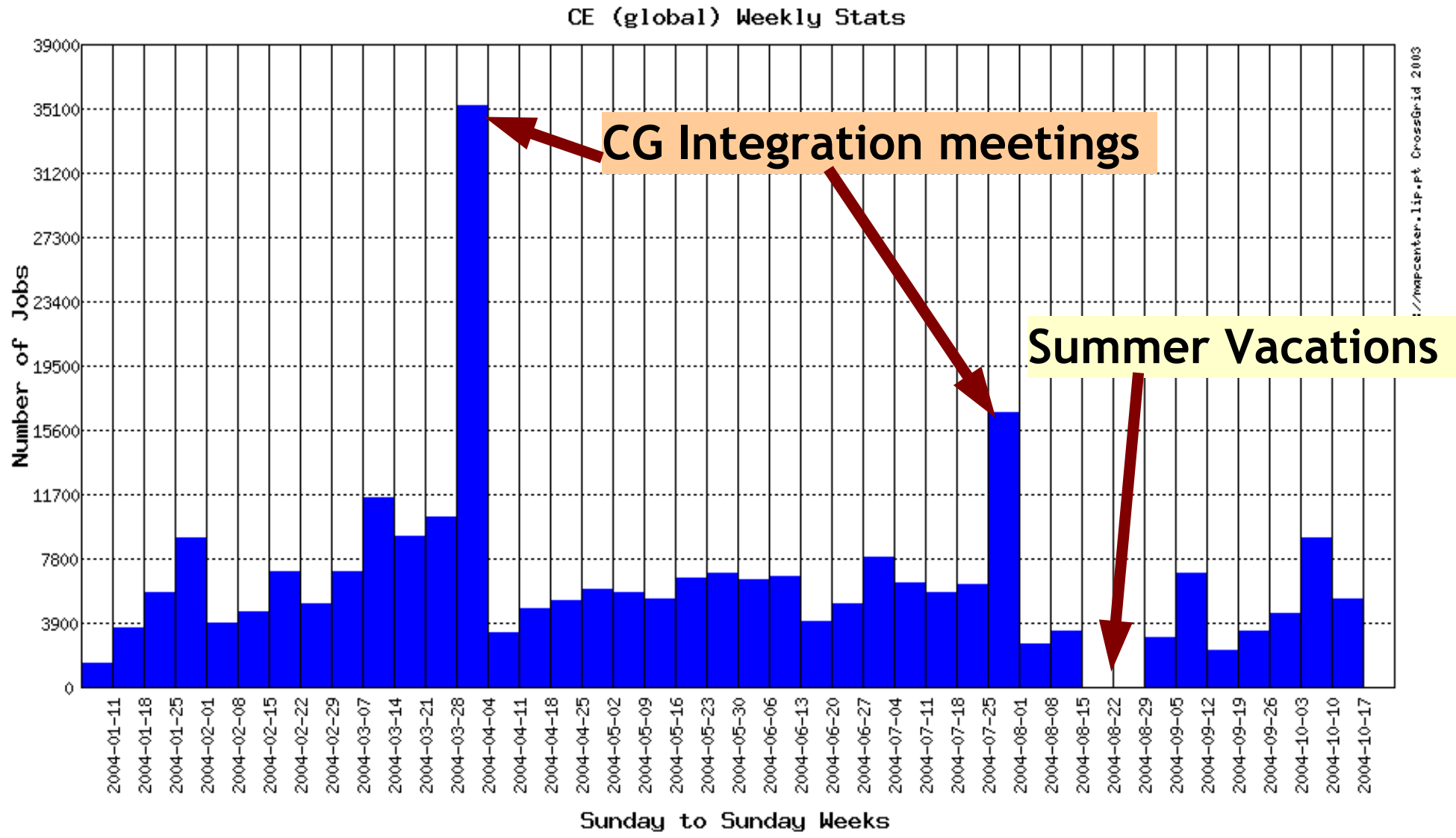
Graph:

http://wpcenter.lip.pt/CrossGrid/2003



# CE Statistics

CE: Global



# Mapcenter (Crossgrid)

10/16 15:56 GMT

**CrossGrid Europe (alarms)**

10/16 15:56 GMT (refresh=10min)

**Views**

- Countries
- Organization
- Main Servers
- Development

**Graphs**

- CrossGrid Europe

**Lists**

Full View	Objects
History	Alerts
Services	URLs

**Tools** Search

**Full View**

- Geographical List (alarms)
- Portugal (alarms)
  - LIP (alarms)
    - Lisbon (alarms)
      - Production LCG-2 (alarms)
        - CE [ce02.lip.pt](#) (icmp | gk mds gsiftp | stats)
        - SE [se02.lip.pt](#) (icmp | mds gsiftp)
        - UI [ui02.lip.pt](#) (icmp)
        - VO [grid-vo.lip.pt](#) (icmp | vo)
        - MyProxy [px01.lip.pt](#) (icmp | myproxy)
        - RLS [rc02.lip.pt](#) (icmp | tomcat)
      - Test & Validation (alarms)
        - RB/LB [rb02.lip.pt](#) (icmp | ns bk ld ld | stats)
        - UI [ui01.lip.pt](#) (icmp)
        - II [ii02.lip.pt](#) (icmp)

- LIP/FCCN (alarms)
- Lisbon (alarms)
  - Production LCG-2 (alarms)
    - RB/LB [rb01.lip.pt](#) (icmp | ns bk ld ld | stats)
    - II [ii01.lip.pt](#) (icmp | ii)
- Germany (alarms)
- FZK (alarms)
  - Karlsruhe (alarms)
    - Development (alarms)
      - CE [ce010.fzk.de](#) (icmp | gk mds gsiftp | stats)
      - SE [se010.fzk.de](#) (icmp | mds gsiftp)
      - RLS [rls.fzk.de](#) (icmp | tomcat)
      - CVS [gridportal.fzk.de](#) (icmp | http cvs)
      - II [ic.fzk.de](#) (icmp | ii)
      - RB/LB [rb.fzk.de](#) (icmp | ns bk ld ld | stats)
- Spain (alarms)
- IFIC (alarms)
  - Valencia (alarms)
    - Development (alarms)
      - CE [loki01.ific.uv.es](#) (icmp | gk mds gsiftp | stats)
      - SE [loki03.ific.uv.es](#) (icmp | mds gsiftp)

# Learnings and Perspectives

- **We have learned:**
  - **LIP has now deep knowledge and experience in the technologies involved in the deployment of grid infrastructures.**
- **Our perspectives:**
  - **Broaden the research interest and collaboration in Portugal.**

# Other grid related activities in the country

- Some initiatives in the last 2 years:
- EDG tutorial in Aveiro, organized by Univ. Aveiro in collaboration with EDG;
- Grid Technologies event organized by IBM in FCTUNL;
- Oracle event: Oracle 10g.
- Etc.

# CA and RA's, as of today

- LIP - New Portuguese CA (since Nov. 2003).
- LIP CA was approved and in operation since 2000.
- LIP is a member of EUGridPMA and was a member of EDG certification authorities task force.
- U. Lusiada (Famalicão) RA since Jun. 2004.
- U Autónoma Lisboa, RA in preparation.
- LIP Coimbra RA in preparation.
- **Contact us if you want to deploy one RA. Essencial if you want to participate.**




# CA and RA's, as of today

**LIP AUTORIDADE DE CERTIFICAÇÃO - COMO OBTER UM CERTIFICADO**

- ♦ POLITICA
- ♦ VALIDADE E RESPONSABILIDADE
- ♦ CERTIFICADO CA ROOT
- ♦ OBTER A CRL
- ♦ COMO OBTER UM CERTIFICADO
- ♦ CERTIFICADOS E GLOBUS
- ♦ WEB BROWSERS E CERTIFICADOS
- ♦ CERTIFICADOS EMITIDOS
- ♦ MAIS INFORMAÇÃO
- ♦ PÁGINA INICIAL

Para obter um certificado o requerente (e o utilizador) deve ser um membro de uma organização académica portuguesa. Os certificados podem ser obtidos através das seguintes contactos:

Autoridade De Registo	Contacto
<a href="#">Lusida Famalicão</a>	Rui Lima
<a href="#">LIP Lisboa</a>	Nuno Dias
LIP Coimbra	João Silva
UAL	em preparação


 LIP Autoridade de Certificação  
 Av. Elias Garcia 14, 1º  
 1000-149 Lisboa, Portugal  
 tel: (+351) 21 797 3880  
 fax: (+351) 21 793 4631  
[ca@lip.pt](mailto:ca@lip.pt)

# Other Portuguese Institutions

- **LIP Coimbra:**
  - Setting up the new RA.
  - Same objectives as LIP - Lisbon.
- **Universidade Lusiada (Pólo Famalicão):**
  - Started the deployment of a Testbed.
  - Learning Fabric Management software.
  - Deployed a Registration Authority.
  - Opportunity for Teachers and Students to learn the Technology.
- **Universidade Autónoma de Lisboa:**
  - Preparing RA.
  - Setting up a Testbed.
  - Opportunity for Teachers and Students to learn the Technology.

# Future directions

- **Presentation in Aveiro 22-23 October**
- **“Thematic network on grid computing”:**
  - **“Encontro Nacional de Ciência e Tecnologia 2004: Dinamização de Redes Temáticas de Investigação”.**
  - **Title “Computação Grid: Investigação, desenvolvimento e ensino”.**



# “Thematic network on grid computing”

- **Initial participating Institutes:**
  - **LIP – Lisboa**
  - **LIP – Coimbra**
  - **Universidade do Porto**
  - **Faculdade Ciências Tecnologia – Univ. Nova de Lisboa**
  - **Univ Autónoma de Lisboa**
  - **Universidade Lusiada – Polo Famalicão**
  - **FCCN**
  - **INESC - Id.**

# URL's and Contacts

- <http://www.lip.pt>
- <http://ca.lip.pt>
- 
- Jorge Gomes ([jorge@lip.pt](mailto:jorge@lip.pt))
- Mário David ([david@lip.pt](mailto:david@lip.pt))
- João Paulo Martins ([martinsj@lip.pt](mailto:martinsj@lip.pt))
- Nuno Dias ([ndias@lip.pt](mailto:ndias@lip.pt))
- Gaspar Barreira ([gaspar@lip.pt](mailto:gaspar@lip.pt))

# Future directions

**Interested people should  
come talk to us**

**Obrigado**