



HEP grid computing in Portugal

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HEP in Portugal

- LIP is a Portuguese High Energy Physics laboratory
- LIP is an associated laboratory funded by the Portuguese public funding agencies
- LIP has three centres:
 - Lisbon, Coimbra and Faro
- LIP participation in experiments includes:
 - Atlas, CMS, Compass, Auger, AMS, SNO, Zeplin, Hades, n-TOF, ...
- Other activities include:
 - Building DAQ systems and detectors, detectors R&D, medical physics, grid computing , Geant4

Grid computing at LIP

- Centred on HEP:
 - WLCG support for ATLAS and CMS
- Participation in EU funded grid computing projects:
 - EGEE
 - EELA
 - int.eu.grid

LIP and EU grid projects

- LIP has been participating in EU grid projects since FP5
- Since LIP is involved both in Atlas and CMS grid computing has become a priority
- Objective:
 - Obtain know-how needed to operate a grid infrastructure for Portuguese HEP users
 - Build a grid operations and support team
 - Build the national grid infrastructure for LHC
 - Provide support for the Portuguese HEP users
 - Establish links with other organizations

Grid computing - old projects

- LIP started as an unfunded collaborator in the DataGrid project: (April 2001 to March 2004)
 - First contacts with grid middleware
 - Creation of the LIP certification authority
 - Test of middleware
- CrossGrid: (March 2002 to February 2005)
 - Operations, middleware validation, integration, authentication and authorization, monitoring, support
- EGEE: (April 2004 to March 2006)
 - Operations, user and site support, test of middleware, core services, authentication, production cluster

Grid computing – current projects

- EELA: (started January 2006)
 - Extending grid computing to Latin America
 - Using EGEE middleware
 - LIP is the only Portuguese partner
 - Operations, authentication, authorization, virtual organizations, support, core services, CA deployment and coordination for Latin America
- EGEE-II: (started April 2006)
 - Production grid computing infrastructure
 - LIP is the only Portuguese partner
 - Operations, user and site support, global support, core services, authentication, pre-production, production cluster, dissemination, training, relations with scientific community, deployment coordination

Grid computing – current projects

- int.eu.grid: (started May 2006)
 - Focused on interactivity and MPI issues
 - Building on EGEE middleware
 - LIP is the only Portuguese partner
 - Operations, infrastructure management, authentication and authorization, support, middleware deployment coordination
- LIP is almost the only Portuguese organization involved in EU funded grid projects in Portugal.
- Other Portuguese organizations in this kind of projects are focused on middleware and grid technology development.

LIP Certification Authority

- Created during the DataGrid project
- Currently operated as a production service for the Portuguese Scientific community
- Issue certificates for grid computing without any cost for the subscribers
- Vital for the participation of Portuguese users and sites
- Registration authorities already in some Universities and institutes:
 - Uporto, UMinho, IST fusion, IEETA, UAL, Lusiada, LIP-Lisbon, LIP-Coimbra, FCT-UNL
- Recognized by IGTF
- CA upgrade funded during 2006 by the Ministry of Science (FCT)

LIP and WLCG

- Portugal is contributing to the WLCG effort by sending engineers to work for grid computing at CERN
 - 7 engineers working at CERN funded by Portugal
- LIP supports both ATLAS and CMS VOs:
 - Enable LIP users to access the experiments computing resources and data
 - Contribute with computing and storage resources for the ATLAS and CMS VOs
 - Provide support for local users
 - Build and operate a tier 2

LIP and WLCG

- MoU voluntary additional contributions to the LCG deployment at CERN

GRICES/FCT/UMIC, Portugal	Pledged	Planned to be pledged			
	2006	2007	2008	2009	2010
Personnel (FTE)	3,5	3,5			
Materials (kCHF)					

4.5

3.5

Tier 2

- Federated tier 2 with to centres:
 - Lisbon (ATLAS + CMS)
 - Coimbra (ATLAS)
- About 2/3 of the computing capacity will be deployed in Lisbon
- The tier 1 for the LIP federated tier 2 is PIC in Barcelona - Spain

Portugal, LIP Tier-2 Federation	Pledged	Planned to be pledged			
	2006	2007	2008	2009	2010
CPU (kSI2K)	250	500	750		
Disk (Tbytes)	43	84	130		
Nominal WAN (Mbits/sec)	100	100	100		

Tier 2 - WLCG MoU

ATLAS	2006	2007	2008
CPU (SSI2K)	175	350	525
Disk (TB)	28	56	84
WAN (Mbits/s)	100	100	100

CMS	2006	2007	2008
CPU (SSI2K)	75	150	225
Disk (TB)	14	28	42
WAN (Mbits/s)	100	100	100

- Some values need to be revised:
 - Networking
 - Some 2006 expectations will not be fulfilled

Tier 2 status

- Lisbon
 - 26 CPUs for ATLAS and CMS
 - Xeon 2.8GHz and Opteron 2.2GHz
 - dcache based disk pool with 13 TB
 - Some more Opteron 2.2GHz CPUs being deployed until the end of the year
 - Actual tier-2 deployment foreseen for next year
- Coimbra
 - integrating a cluster for ATLAS ~ 100 CPUs
 - Xeon 2.2GHz – Xeon 2.8GHz
 - Storage to be acquired
 - Site to become available until the end of the year
 - Upgrade foreseen for next year

Tier 2 status

- The LIP computer centre facilities in Lisbon were improved during 2006
 - More space
 - More power
 - New UPS system
 - New cooling equipment
 - Raised floor
 - Network infrastructure partially improved
- Unfortunately the space available is still insufficient for a tier-2
 - It must be shared with all LIP Computer Centre systems and with other experiments
 - Total area around 39 m²
 - Many old systems not rack mounted

Tier 2 status

- In Coimbra the Tier 2 will be housed at the University's Computational Physics Centre
 - Agreement established with the University
 - CFC is being currently improved
 - Power
 - Cooling
 - UPSs
 - Large computer room
- The agreement includes grid computing and the possibility of sharing resources from the CFC cluster
 - 500 new Opteron CPUs

Network connectivity

- LIP federated tier 2 bandwidth:
 - Coimbra - 1Gb/s (shared with CFC)
 - Already using proprietary fibre
 - Lisbon - still at 100Mbits/s
 - Studying proprietary fibre link to connect to the NREN backbone
 - Network connectivity is still partially paid by the users
 - 100Mbits/s in the current price list is 137,945.00 Euro + TVA
 - Commercial operators are dropping prices and a new NREN price list will become available soon.

Network connectivity

- NREN backbone is 10Gb/s
 - Uses proprietary dark fibre
 - Bough to the railway company
- Last mile is starting to be delivered at gigabit rates for some (few) Universities
 - Mostly using proprietary last mile links
 - Agreements with gas companies, underground etc.

Network connectivity

- Connectivity with Geant only 2.5Gb/s:
 - connection through Madrid
 - backup through London
- New proprietary fibre optic links will be established with Spain at North to Galicia (Tui or Caminha) and at South to Badajoz
 - Proprietary dark fibre until the Spanish border
 - These new fibres will be used to provide Geant connectivity through Spain and to share resources with Spanish centres
 - The call for the Badajoz link has been launched very recently
 - The link through the North is still pending

Human resources

- The Tier-2 will be operated by the LIP computer centre personnel from Lisbon and Coimbra
- Current personnel:
 - Lisbon
 - Computer centre operations and support team
 - 9 FTEs – 6 in grid computing
 - spread in several projects (LCG, EGEE, EELA, int.eu.grid)
 - 2 FTEs – Physicists from ATLAS and CMS to interface with the experiments
 - Coimbra
 - Computer centre system managers
 - ~2 FTEs – 1 in grid computing (beginning)

National Grid Initiative

- NGI officially launched by the Ministry of Science in April 2006.
- Programme details and funding already defined
- The initiative will be based on projects
 - Strong focus on infrastructure projects
 - Also includes: R&D, pilot applications and training
- First Portuguese NGI workshop (INGRID'06) will take place on November 11
 - Focused on internal organization
 - The way to proceed will be discussed there
 - Collaboration with Spain will be in the agenda

National Grid Initiative

- Call for projects will open still in 2006.
- Funding will become available in 2007.
- LIP will likely become deeply involved both at organizational and at the projects level.
- Funding for the tier 2 will come likely from an NGI project to be submitted.
- NGI funding for 2007 is 2.5 Million Euro