



# Infraestructura GRID en el IFCA

UIMP – GRID & e-Science. Santander 15-19 Jun 2009

# Overview

- Introduction
- Visiting the IFCA
- Basic Room Infrastructure: Power, Cooling, ...
- Computing Power
- Storage
- Network
- Monitoring and Administration
- Basic Grid Components
- Resource Integration in Grid Projects
- Challenges
- Human Infrastructure

# Introduction

- Infrastructure ?

- Wikipedia:

Infrastructure can be defined as the **basic physical and organizational structures** needed for the operation of a society or enterprise, [1] or the **services and facilities** necessary for an economy to function. [2]

# Infrastructure @ IFCA

- ... several “independent” parts:

Global Coordination  
Project Management

Global Support  
Disemination and Outreach

Hardware Deployment  
Maintenance

System Administration  
Users Support

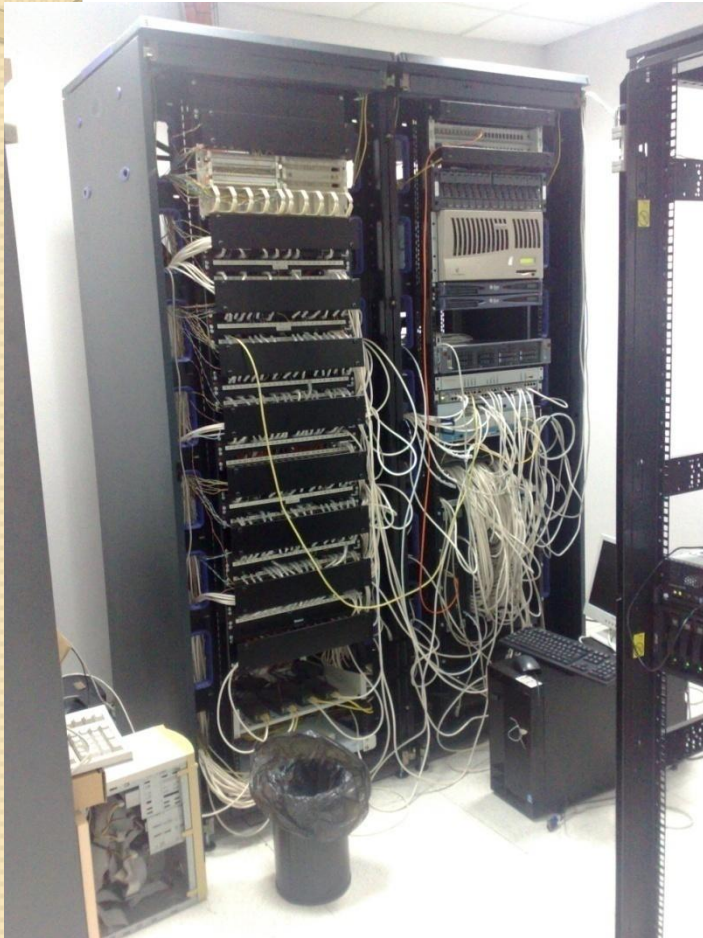
Software and Middleware  
Development

Application Integration  
Final Users

Transferencia Tecnológica  
Colaboración con Empresas

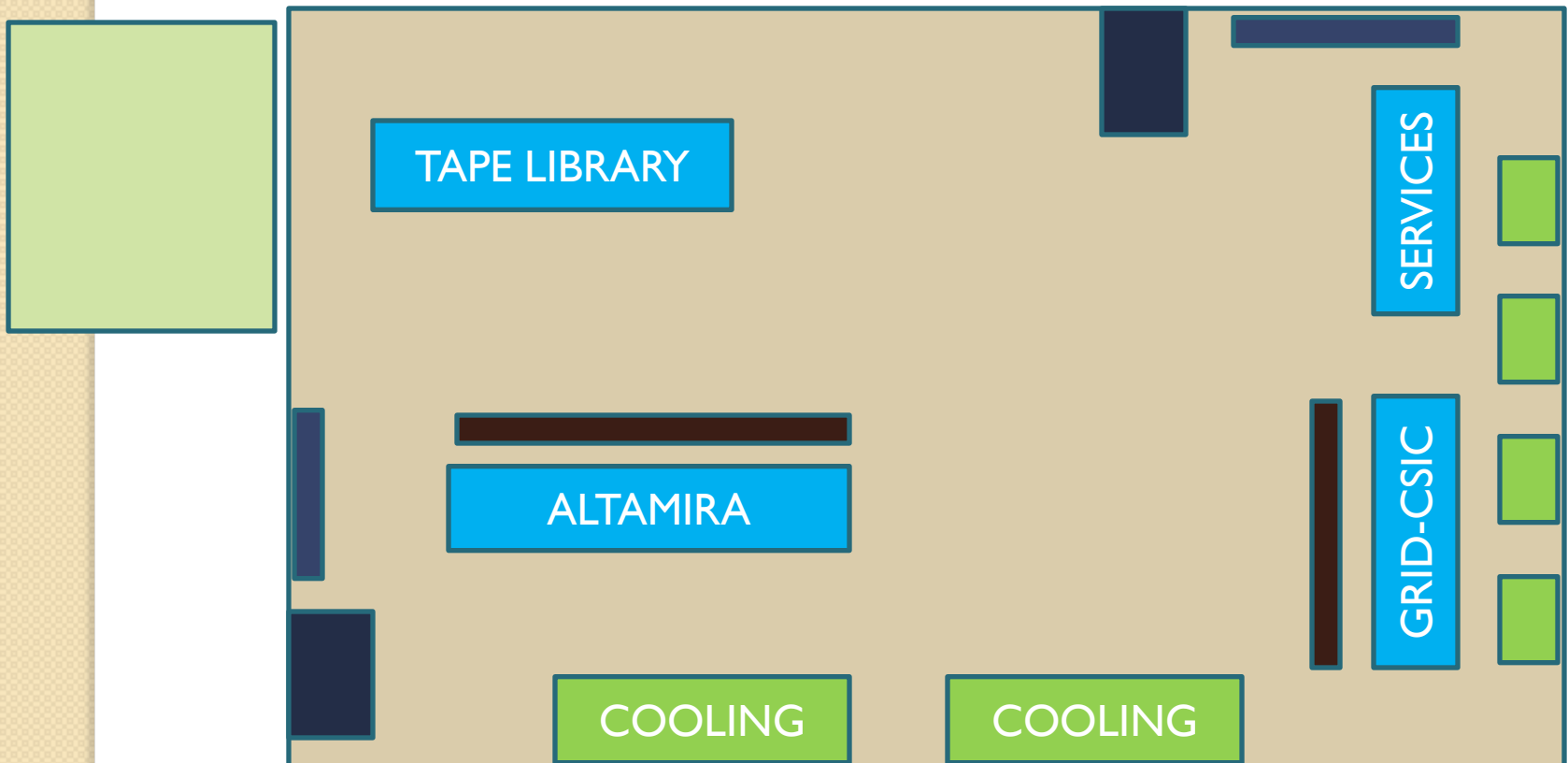
# Visiting the IFCA

- Communications Room + few servers in floor 0



# Visiting the IFCA

- Computing Room in floor -2





# Basic Room Infrastructure

- Room. Suelo Técnico.
- Electrical Power. UPS.



# Basic Room Infrastructure

- Cooling Systems.
- Detección de Fuego y Extinción.



**Big initial effort + Maintenance**



# Altamira (RES)

## Red Española de Supercomputación

- Job submission using grid middleware
  - **KEPLER** allows Drag&Drop creation and execution of workflows for distributed applications + **UNICORE**



# Computing Power

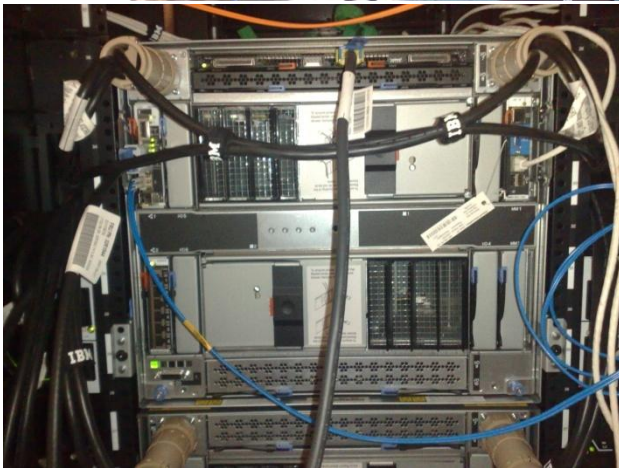
Cluster	Nodes	Model	Processor	Cores	Freq.Total	RAM Memory	RAM Total	Hard Disk	HD Total
GRID-CSIC	182	IBM Bladecenter HS21	2 Pentium Xeon Quad Core 2.3GHz	1456 Cores	3348.8GHz	16GB = 8x2GB	2912GB	080GBo = 80GBo SAS	14.5TBo
CMS	28	IBM Bladecenter HS21	2 Pentium Xeon Quad Core 2.3GHz	224 Cores	515GHz	16GB = 8x2GB	448GB	080GBo = 80GBo SAS	2240GBo
INGRID	20	IBM x3550	16 x 2 Pentium Dual Core 2.3GHz + 4 x 2 Pentium Quad Core 2.3 GHz	96 Cores	220GHz	16 x 4048MB = 2x2GB + 4 x 8098 = 4 x 2GB	048GB	073GBo = 73GBo SAS	1460GBo
EIFCA	90	IBM x336	2 Pentium Xeon 3.2GHz	180 Cores	576GHz	2048MB = 2x1GB/4x512MB	180GB	480GBo = 80GBo + 400GBo SATA	43200GBo
GRID	80	IBM x220	2 Pentium III 1.26GHz	160 Cores	201.6GHz	0640MB = 128MB+512MB	050GB	140GBo = 33GBo SCSI + 60GBo IDE	7440GBo
EGAES	20	IBM x206	1 Pentium IV 3.2GHz	20 Cores	64GHz	1280MB = 256MB+1GB	030GB	480GBo = 80GBo + 400GBo SATA	9600GBo
<b>TOTAL</b>	<b>420</b>	<b>IBM xSeries</b>	<b>2736 Cores</b>		<b>4926.6GHz</b>	<b>3TB</b>		<b>78,4TBo</b>	



TORQUE + MAUI .Access from several Grid CE and direct queue access for Local Users

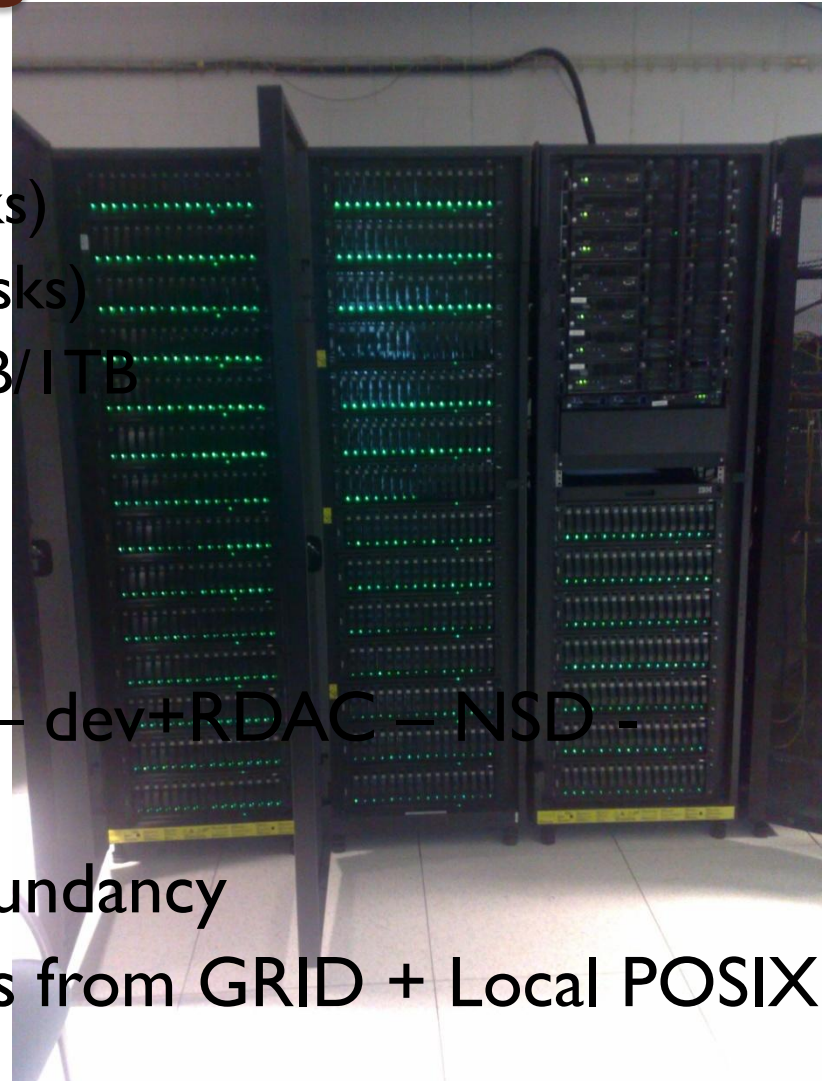


# Bladecenter HS21 XM (Grid-CSIC)



# Massive Storage

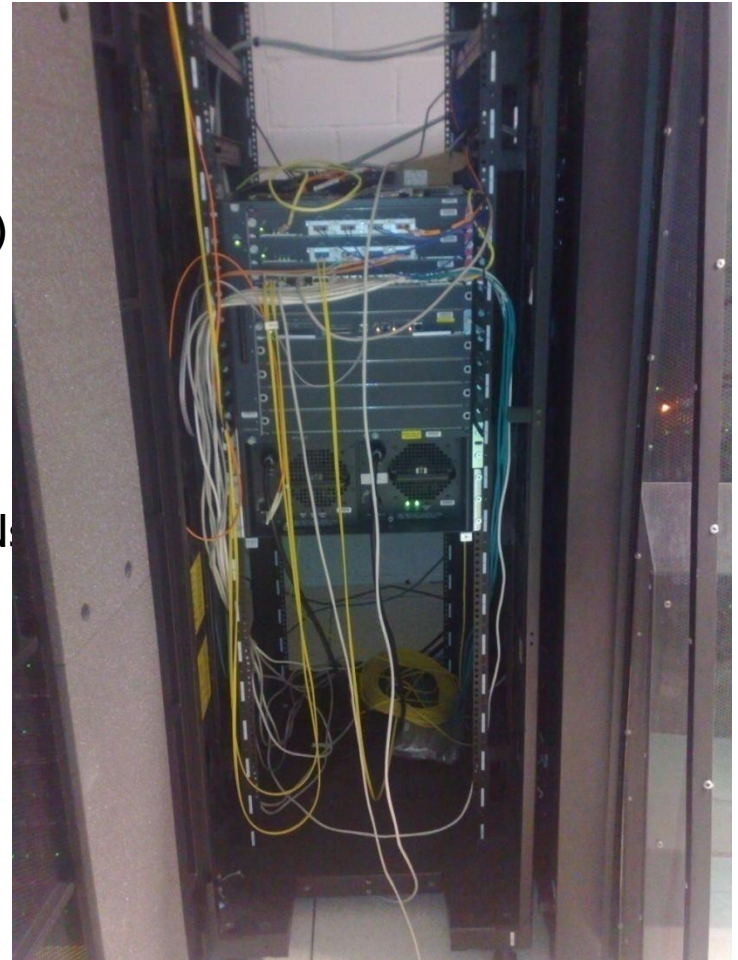
- Based on GPFS
  - IBM ds4700 (16 disks)
    - + 6 x exp810 (16 disks)
  - Disks 500GB/750GB/1TB
  - 1 IFCA
    - 2 CMS (+2)
    - 2 Grid-CSIC
- Array – LD – LUN – dev+RDAC – NSD – Filesystem
- Performance + Redundancy
- SRM (storm): Access from GRID + Local POSIX





# Network

- CISCO 6509
- 2x 4 10Gbps ports card
  - Storage + Blade Centers
- 1x 24 1Gbps ports card (services)
  - Several Services + other switches
- Backbone 40Gbps
- Performance, Stability
- Private Networks (different VLANs)
  - Altamira
  - Grid
  - Administration
- Conexión to RedIRIS
  - 1+1 Gbps
  - To be upgraded next year ?

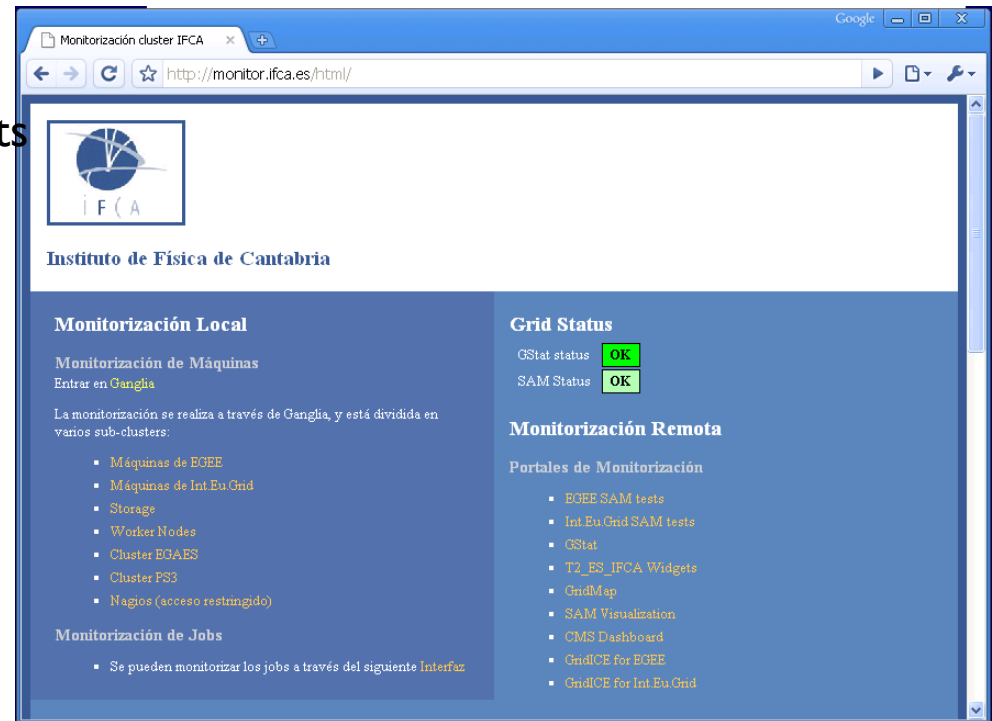




# Monitoring

- Ganglia
- WNs / Storage / Projects
- Nagios
- Job Mon-Arch
- Cacti

- GRID Projects Tools
- CMS Monitoring Tools



- Development of Software “AGRESTE”: A Great Resource Supervision Tool
  - Monitoring and warning supervision tool for large clusters
  - Very light and modular design
  - Under development, first prototype running

# Administration Hardware Tools

The image displays three screenshots of IBM storage management tools:

- IBM System Storage DS Storage Manager 10 (Enterprise Management):** Shows a tree view of storage subsystems under 'TOOTS'. The selected subsystem is 'Storage Subsystem GPFS\_01-IFCA\_01'.
- GPFS\_05-GCSIC\_02 - IBM System Storage DS Storage Manager 10 (Subsystem Management):** Shows a logical view of the storage subsystem 'GPFS\_05-GCSIC\_02'. It displays a hierarchy of RAID groups and storage spaces. The selected RAID group is 'RAID5\_256k\_S5S\_A01\_LD2\_CB (2,045 TB)'.
- IBM BladeCenter - H Advanced Management Module:** Shows the system status summary and a table of blades. The system is operating normally. The table lists 16 blades with their status, name, power, and various control options.

**System Status Summary**

System is operating normally. All monitored parameters are OK.

The following links can be used to view the status of different components.

- [Blades](#)
- [I/O Modules](#)
- [Management Modules](#)
- [Power Modules](#)
- [Power Module Cooling Devices](#)
- [Chassis Cooling Devices](#)
- [Media Tray](#)

**Blades**

Click the icon in the Status column to view detailed information about each blade.

Bay	Status	Name	Pwr	Owner**		cKVM*	I/O Compatibility	WOL*	Local Control			
				KVM	MT*				Pwr	KVM	MT*	BEM*
1	On	SN#YK105385D19Y	On				OK	Off	*	*	*	----
2	On	SN#YK105385D1DZ	On				OK	Off	*	*	*	----
3	On	SN#YK10538591RA	On				OK	Off	*	*	*	----
4	On	SN#YK105385D15X	On				OK	Off	*	*	*	----
5	On	SN#YK105084T1H6	On				OK	Off	*	*	*	----
6	On	SN#YK105385D113	On				OK	Off	*	*	*	----

- Private Network  
- Expert tools  
- ssh, and a scripts

# Basic GRID Components

- UI, CE, SE, BDII, RB, VOMS, SRM(storm),  
...

- Scalability problems
  - Pools of UIs, CEs, SEs
- Services non shared  
by different projects



# Resource Integration in GRID Projects. Problems and Challenges

- Stability versus Updated
- Several services have to be replicated (CE, MON)
- Others have to be modified (CrossBroker access to several top BDII)
- Resource allocation
- CMS requirements
- Grid Users + Local Users – security
- Abuses , users and Vos
- Dangerous jobs detection (8 cores/node mix)
- Complex Environment
  - Not allways easy to locate of the sources of a problem

# Human Infrastructure

e-Ciencia

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► Inicio

► Agenda

► IFCA Wiki

► Proyectos Actuales:

► Iniciativas Nacionales:

► Iniciativas en el CSIC:

► Iniciativas Locales:

▼ Iniciativas con Empresas:

Monitoring (CIC-SL)

Simulación de Embalses  
(Ecohydros-SL)

► Proyectos Finalizados:

► Equipo de Trabajo

► Infraestructura

► Presentaciones

► Cursos

► Información:

e-Ciencia@IFCA > Equipo de Trabajo

## e-Ciencia@IFCA: Equipo de Trabajo

### Personal

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**The Rebellion of the Grid , Hunterwasser / Maite Marco**