

# GRID @ IFCA

## HARDWARE and SOFTWARE Setup

Jesús Marco, Oscar Ponce, David Rodríguez, Angel Camacho, **Rafael Marco**  
Instituto de Física de Cantabria, CSIC-UNICAN, Spain



UNIVERSIDAD DE CANTABRIA

# IFCA

- Research Institute :
  - University of Cantabria
  - Consejo Superior de Investigaciones Científicas
- Three main research lines:
  - Astrophysics (XMM, Planck...)
  - Statistical Physics (Lasers, fractals & chaos...)
  - High Energy Physics:
    - DELPHI, LEP (Physics Analysis)
    - CDF, Fermilab (TOF detector & Physics Analysis)
    - CMS, LHC (Aligment & Geant4 Sim, OSCAR)
- Common Interest:
  - Computing needs:
    - Data Management
    - Advanced Analysis Techniques
  - Limited resources for infraestructure & manpower

# HEP Computing at IFCA

- Previous experience:
  - DELPHI Fast simulation
  - RPC software for DELPHI on-line
  - Analysis software for DELPHI (NN, IES...)
- Initiatives:
  - Databases (use of ORDBMS in HEP)
    - FEDER project with DB software company (Semicrol)
  - GRID Initiatives:
    - DataGRID: testbed site & CA for Spain
    - CROSSGRID: WP1 (HEP appl, meteo), WP2, **WP4 (testbeds)**
    - Technology transfer with ISP company (Mundivia)
    - Participation in testbed of DataTag (CDF)
  - Computing for LHC (CMS)

# Hardware and Software Summary

- 80 IBM xSeries 220
  - 72 Computing Elements. Worker Nodes.
  - 8 Storage Elements
- 1 IBM xSeries x250
  - LTO Ultrium (Mass Storage)
- 5 APC SmartUPS 3000
  - Electrical Power, UPS, Refrigeration
- 3COM Switch 4924, 3 3COM Switch 4400
- 1 IBM xSeries 230
  - Web,... Server
- Remote Automatic Installation
- Installation Monitor

# 72 Computing Elements. Worker Nodes. 8 Storage Elements

## IBM xSeries 220

- 1 CPU 1.26 GHz
- 128Mb+512Mb SDRAM
- Hard Disk:
  - SCSI 30Gb
  - IDE 60Gb
- Network: 100 Mbps
- CDROM, floppy
- Two machines with 4Gb SDRAM for tests

### NEXT UPDATES

### 8 Network Cards 1000Mbps

(for Storage Elements,...)

Join 1.26GHz CPUs

in **dual setup**

Buy new **>=1.4GHz CPUs**



# Mass Storage | Web,... Server

- IBM x250 Server
  - 1 CPU 1GHz
  - 5 Hot Plug SCSI Disks 30Gb (RAID 5 = 120Gb)
  - LTO Ultrium TAPE

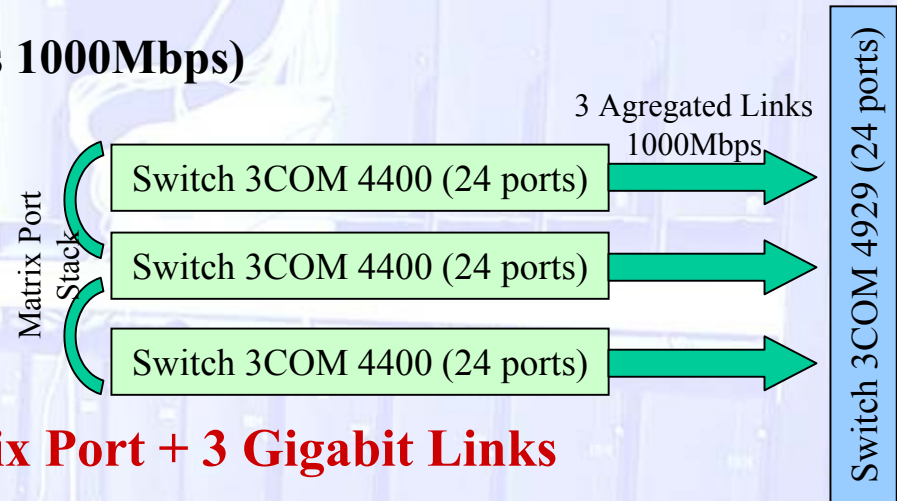
- IBM x230 Server
  - 1 CPU 1GHz
  - 1 Hot Plug SCSI Disk 30Gb
- PLAN: add more disks as needed



# Local Network

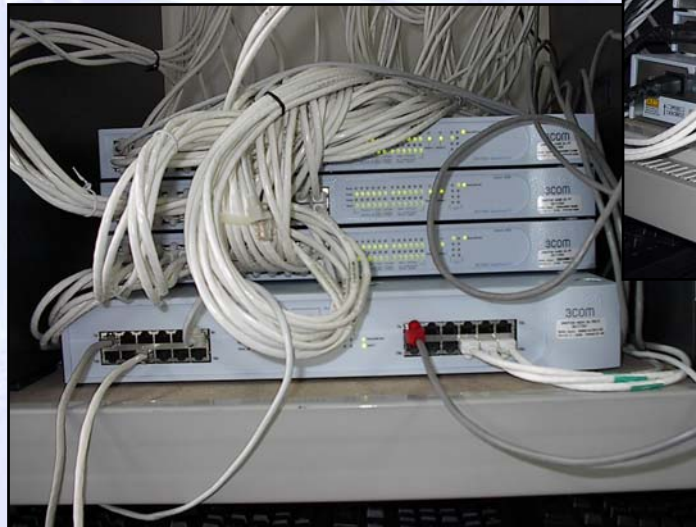
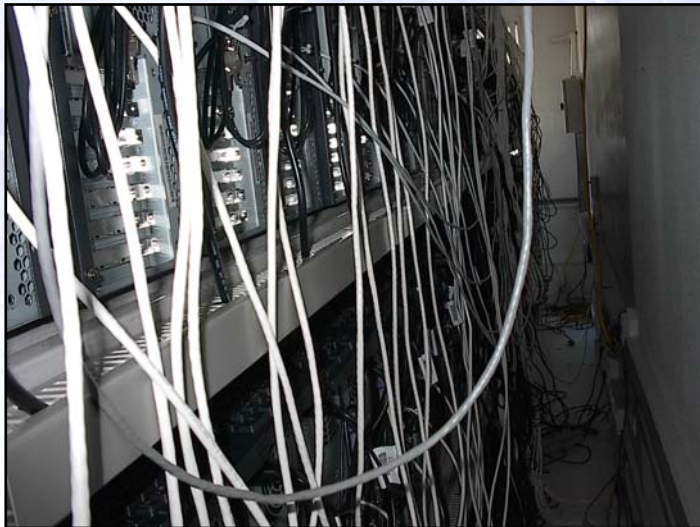
- **1 Unit 3COM Switch 4924 (24 ports 1000Mbps)**

- 24 ports 1000Mbps for
  - 3 aggregated links from cluster switch
  - 8 Storage Elements
  - 1 Mass Storage
  - 2 Gridbrothers (Grid control)



- **3 Units 3COM Switch 4400 + Matrix Port + 3 Gigabit Links**

- 72 ports 100Mbps for 72 Computing Elements (Working Nodes)
- 3 Aggregated links 1000Mbps



# Electrical Power, UPS, Refrigeration

- **Electrical Power**
  - 3 Units 10.000 W
  - TOTAL: 30.000W



- **UPS**
  - 5 Units APC SmartUPS 3000 (3.000W)

- **Cooling Capability**
  - 5.600 W (4800 Kcal/hora)
  - 2x 4.250 W
  - TOTAL: 14.100W





# Installation Monitor

- Logs written in XML format in a web server from Kickstart installation %pre and %post sections

```
root@gridbrother-
File Edit Settings Help
#@Windows Compatibility / Interoperability
#@Games and Entertainment
#pre
echo "*****"
echo "  "
echo "  Bienvenuto al IFCA-Grid  "
echo "  "
echo "*****"
echo -e "time%37/tcp" > /etc/services
mkdir /tmp/kk_labmonitor
mount 193.144.209.18:/labmonitor /tmp/kk_labmonitor
/tmp/kk_labmonitor/rdate -s 193.144.209.18
ip_txt="grep \grep HOSTNAME /tmp/netinfo | cut -d" " -f2\ /tmp/kk_labmonitor/eth-
ip-hn.txt | cut -d" " -f2"
echo -e "<EVENT>\n\t<DATE>"date"</DATE>\n\t<STATUS>Start Installation</STATUS>\n\t<
S VERSION=RedHat-72</KS VERSION>\n</EVENT>" >> /tmp/kk_labmonitor/"${ip_txt}"-log
mount /tmp/kk_labmonitor
mkdir /tmp/kk_labmonitor
%post --nochroot
```

```
root@gridbrother-
File Edit Settings Help
umount /tmp/kk_labmonitor
rmdir /tmp/kk_labmonitor
%post --nochroot
mkdir -m 755 /mnt/sysimage/root/.ssh
echo "ssh-dss AAAAB3NzaC1kc3MAAACBAK1PQovHcHnt0MsSnAX56NjWK42v9nuMjkrvpOfus8KzK14A
7dTOT1HoDTAaRtqHspQtg+y+AD2AKHzMwT7f8N8WILVqzW+3PBfQ3dk2Rn4chUxp+NSH7z TURB5vYr1Q4
xSLXcuctr6XmWstps2qy4qVvYvYtpBwEdIbAAAFCMfZ0h3YB5ycdr+s1RHR5Fe5X+wAAA1A15wpRGU
jhs8Fdy8NF3/URMfoA3qKdsE7f9JkfAMACeJ/+s89n1s11B9xhzTPGTlhw2x2K7s4X672fJ1/s0n1V94xd
tcdnS8Bq1emyyal eypMhPm3EuBSwLybA1Bkp8xavWUTQ1ZtjbpA07s4FE8uA1noe41w2vKrhduVjJQAAAI
BqS+oukpN/aopuKb5Wf/gb70cPAJ/V8701uMD9YJ73ZrRH3P0eOH1sLlvk4M31s5BA0ehcNW3FOFj4e16+
yIrs1Eh+RT+AKaw/zVFXG/rsvDLORMm11+VUCU9hd13JqGMECMAacV3PmyEDrF1Qj9s9CjP0anPI kuz
VyYa= root@gridbrother.ifca.unicon.es" > /mnt/sysimage/root/.ssh/authorized_keys2
mkdir /tmp/kk_labmonitor
mount 193.144.209.18:/labmonitor /tmp/kk_labmonitor
ip_txt="grep \grep HOSTNAME /mnt/sysimage/etc/sysconfig/network | cut -d" " -f2\ /
/tmp/kk_labmonitor/eth-ip-hn.txt | cut -d" " -f2"
mkdir /tmp/kk_tftpboot
mount 193.144.209.18:/tftpboot /tmp/kk_tftpboot
ln -s /tmp/kk_tftpboot/pxenlinux.cfg/${ip_txt}"
ln -s Local-BOOT "/tmp/kk_tftpboot/pxenlinux.cfg/${ip_txt}"
umount /tmp/kk_tftpboot
echo -e "<EVENT>\n\t<DATE>"date"</DATE>\n\t<STATUS>End Installation</STATUS>\n\t<KS
VERSION=RedHat-72</KS VERSION>\n</EVENT>" >> /tmp/kk_labmonitor/"${ip_txt}"-log
umount /tmp/kk_labmonitor
echo "*****"
echo "  "
echo "  IFCA-Grid node installed  "
echo "  "
echo "*****"
echo
```

```
root@gridbrother-
File Edit Settings Help
label linux
kernel vmlinuz
append ksdevice=eth0 console=ttyS0,38400 console=tty0 load_ramdisk=1 initrd=initrd.l
sg network ks=nfs:193.144.209.18:/kickstart/RedHat-7.2
[root@gridbrother root]#
[root@gridbrother root]# ls /
bin          etc          installgrid lib          opt
boot        grid         kickstart  lost+found pepe
boot.catalog home        kk         misc        proc
dev          initrd      labmonitor mnt         redhat62
[root@gridbrother root]# ls /labmonitor
193.144.209.100-log 193.144.209.41-log 193.144.209.63-1
193.144.209.21-log 193.144.209.42-log 193.144.209.64-1
193.144.209.22-log 193.144.209.43-log 193.144.209.65-1
193.144.209.23-log 193.144.209.45-log 193.144.209.66-1
193.144.209.24-log 193.144.209.46-log 193.144.209.67-1
193.144.209.25-log 193.144.209.47-log 193.144.209.68-1
193.144.209.26-log 193.144.209.48-log 193.144.209.69-1
193.144.209.27-log 193.144.209.49-log 193.144.209.70-1
193.144.209.28-log 193.144.209.50-log 193.144.209.71-1
193.144.209.29-log 193.144.209.51-log 193.144.209.72-1
193.144.209.30-log 193.144.209.52-log 193.144.209.73-1
193.144.209.31-log 193.144.209.53-log 193.144.209.74-1
193.144.209.32-log 193.144.209.54-log 193.144.209.75-1
193.144.209.33-log 193.144.209.55-log 193.144.209.76-1
193.144.209.34-log 193.144.209.56-log 193.144.209.77-1
193.144.209.35-log 193.144.209.57-log 193.144.209.78-1
193.144.209.36-log 193.144.209.58-log 193.144.209.79-1
193.144.209.37-log 193.144.209.59-log 193.144.209.80-1
193.144.209.38-log 193.144.209.60-log 193.144.209.81-1
193.144.209.39-log 193.144.209.61-log 193.144.209.82-1
193.144.209.40-log 193.144.209.62-log 193.144.209.83-1
[root@gridbrother root]#
```

| File Name          | Size  | Modified   | Permissions |
|--------------------|-------|------------|-------------|
| 193.144.209.24.log | 15-KB | 2002-14-34 | 16          |
| 193.144.209.25.log | 15-KB | 2002-14-34 | 16          |
| 193.144.209.26.log | 15-KB | 2002-14-34 | 16          |
| 193.144.209.27.log | 15-KB | 2002-17-54 | 16          |
| 193.144.209.28.log | 15-KB | 2002-15-50 | 16          |
| 193.144.209.29.log | 15-KB | 2002-19-25 | 16          |
| 193.144.209.30.log | 15-KB | 2002-14-35 | 16          |
| 193.144.209.31.log | 15-KB | 2002-14-35 | 16          |
| 193.144.209.32.log | 15-KB | 2002-14-35 | 16          |
| 193.144.209.33.log | 15-KB | 2002-14-35 | 16          |
| 193.144.209.34.log | 15-KB | 2002-14-35 | 16          |
| 193.144.209.35.log | 15-KB | 2002-14-35 | 16          |
| 193.144.209.36.log | 15-KB | 2002-14-35 | 16          |
| 193.144.209.37.log | 15-KB | 2002-14-35 | 16          |
| 193.144.209.38.log | 15-KB | 2002-14-35 | 16          |
| 193.144.209.39.log | 15-KB | 2002-14-35 | 16          |
| 193.144.209.40.log | 15-KB | 2002-14-35 | 16          |

```
EVENT: [Sat May 16 15:38:30 2002]-DATE-
[STATUS]Start Installation-STATUS-
[KS VERSION=RedHat-72]-KS VERSION-
EVENT:
EVENT: [Sat May 16 15:42:43 2002]-DATE-
[STATUS]End Installation-STATUS-
[KS VERSION=RedHat-72]-KS VERSION-
EVENT:
EVENT: [Sat May Apr 9 11:16:27 2002]-DATE-
[STATUS]Start Installation-STATUS-
[KS VERSION=RedHat-72]-KS VERSION-
EVENT:
EVENT: [Sat May Apr 9 11:22:53 2002]-DATE-
[STATUS]End Installation-STATUS-
[KS VERSION=RedHat-72]-KS VERSION-
EVENT:
```

# Plans for next days...

- Setup LCFG installation Server and grid testbeds
  - Several testbeds setup for CrossGrid/DataGrid/IFCA
  - Easy and comfortable procedure needed
- Setup Automatic backup procedure
- Local Network tests
  - Data sample distribution from central server
  - Data sample re-distribution from distributed nodes
  - Gigabit Network cards
- Databases tests
- Improve Security

# Plans for next months...

- Upgrade of cluster
  - Double CPU + upgrade to 1.4 GHz
- Tape storage
  - IBM UltraLTO (10 TB)
- Network connection
  - Now: via university switches and routers
  - Next: direct to RedIris link to Madrid (155Mbps)
- Migration to new building
  - Two dedicated well conditioned 2 x 150 m<sup>2</sup>

# CROSSGRID testbed

