# NIHAM distributed computing system

-past, present and future-

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NIHAM Centre of Excellence
EGEE

# NIHAM

- "**Nuclear Interactions and Hadronic Matter**" Centre of Excellence
- Lead by Prof. Mihai Petrovici
- Members from many IFIN-HH departments and from other institutions
- The group is doing **research in many areas of nuclear physics**
- Core members of the group were involved in the past or are involved now in many international physics collaborations, such as **DRACULA** (designed by the group), **CHIMERA**, **FOPI**, **ALICE**, and also in the preliminary phase of **CBM**
- Members of the group were involved in the development of **ALICE-TRD detector** and **frontend electronics**
- NIHAM produce now **>20%** of **ALICE-TRD chambers**
- Members of the group are involved in **EGEE** project
- **NIHAM GRID site**

Enabling Grids for E-sciencE

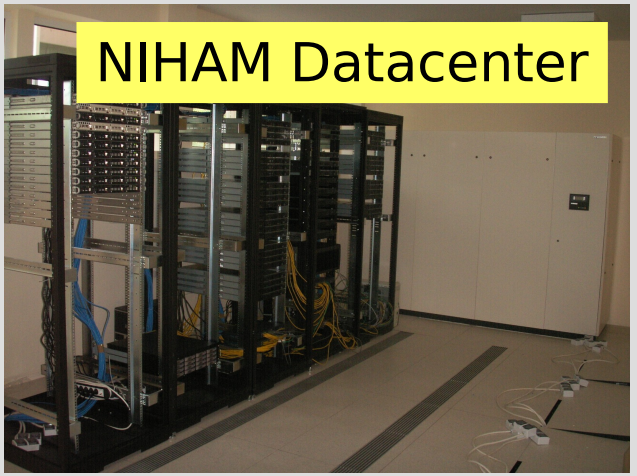
NIHAM

IFIN-HH

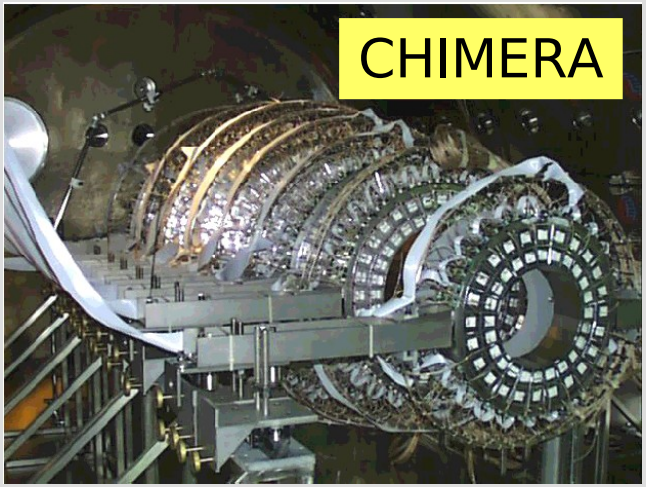
DRACULA

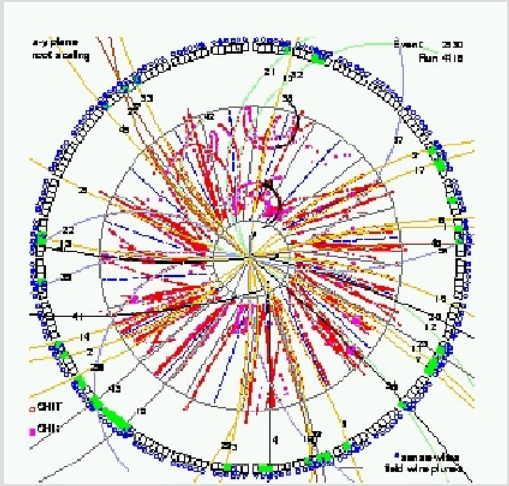
NIHAM DetLab

NIHAM Datacenter



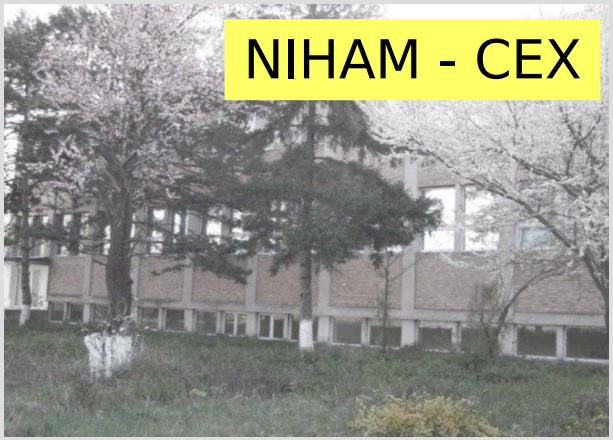
CHIMERA





FOPI – Event Display

NIHAM - CEX

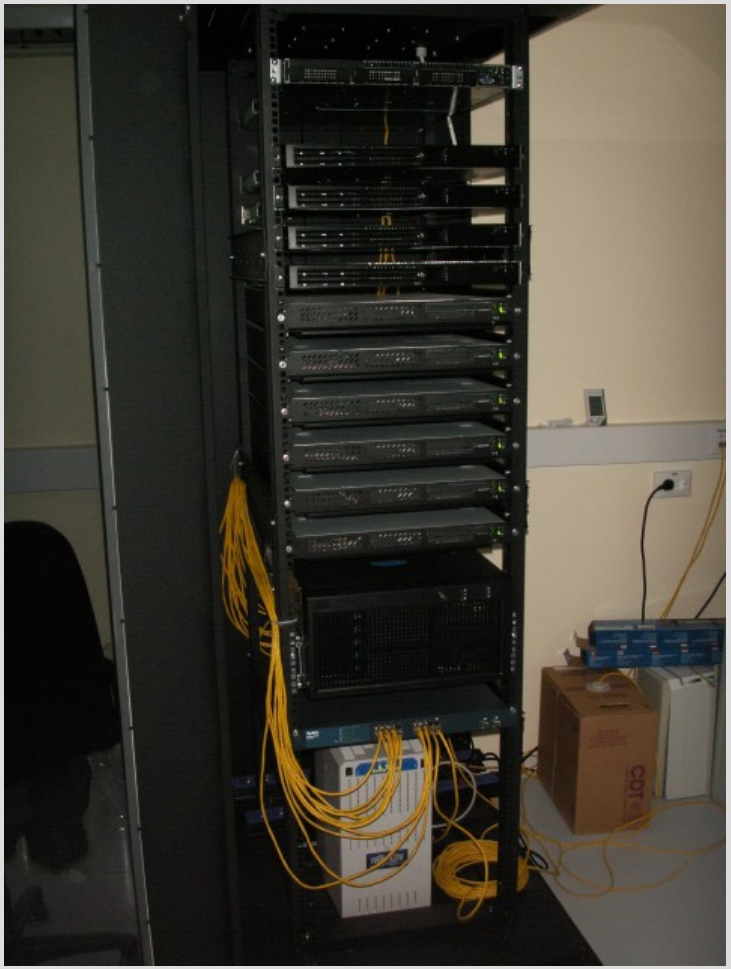


# Distributed computing - past

- Members regularly used clusters at international sites
- NFS regularly used between user computers
- MOSIX cluster – M. Duma
- AliEn site – C. Schiaua and G. Stoicea (2002)

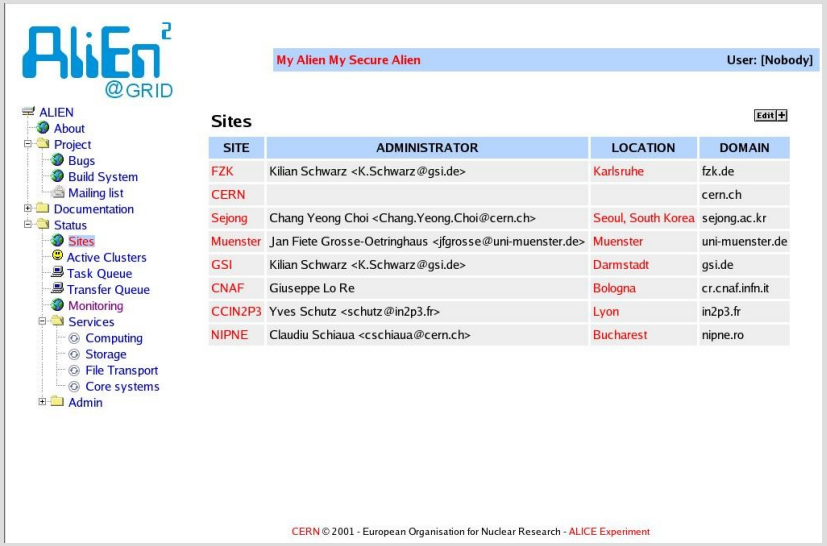
# Distributed computing - 2005

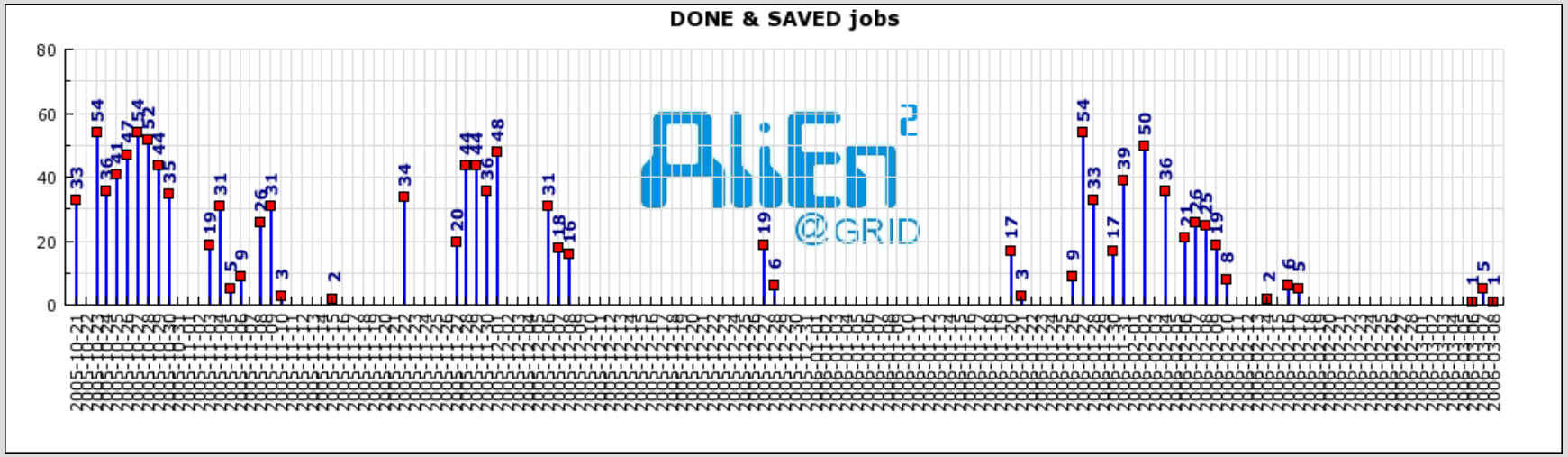
- The “present” started in 2005, when funding become available
- The first production-grade cluster, 1 frontend machine (dual Xeon 3GHz, 2GB RAM, 2.4 TB raw HDD), 6 nodes (dual Xeon 3GHz, 4GB RAM) another 4 at the end of the year, all server-class, 32bit
- 1 Gb/s network
- Fortunately, we had a proper space within the Detector Laboratory, cooled by the Lab's unit



# 2005 results

- Among the firsts AliEn2 sites (may-june 2005, C. Schiaua)
- In production since september 2005
- 838 jobs done



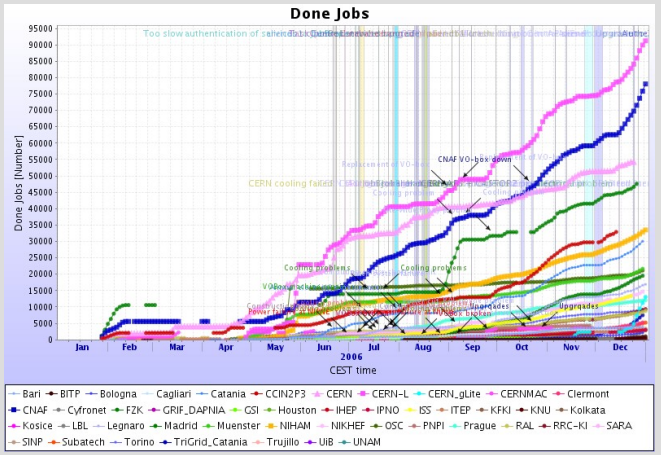



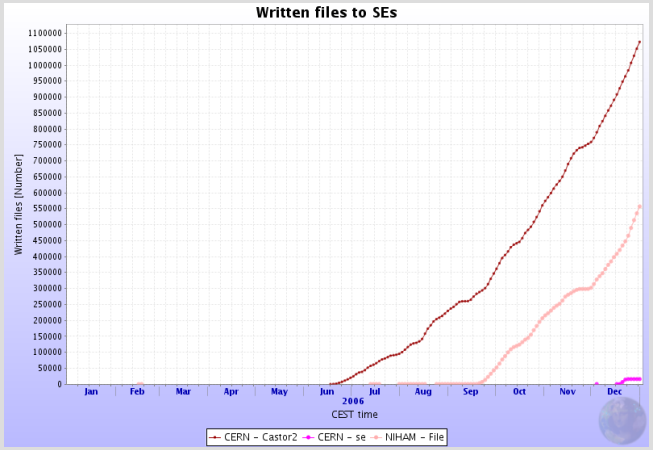
# 2006 takeoff: developments

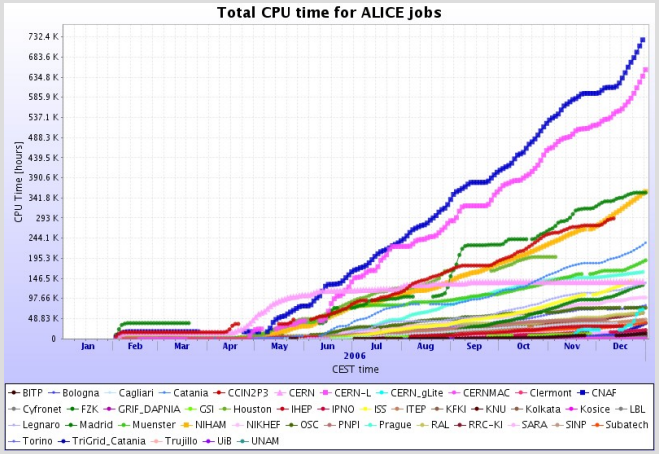
- 40 new machines deployed during the year (dual Xeon 3.2 Ghz, 2 MB L2, 4GB RAM), 64 bit
- EGEE site (C. Aiftimiei, C. Schiaua)
- Policy: “Regarding GRID, there is nothing more important than having a running and used site”
- Policy: exploit to the maximum extent the “dedicated” character of the site in order to achieve high stability and availability
- Policy: try to find as fast as possible solutions for the problems showing up during production

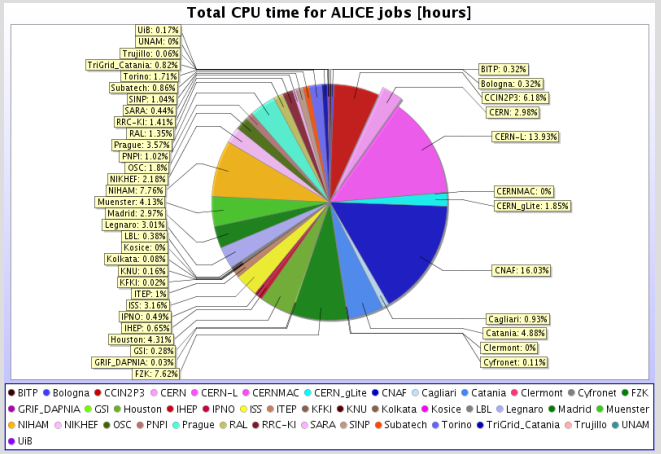
# 2006 takeoff: results

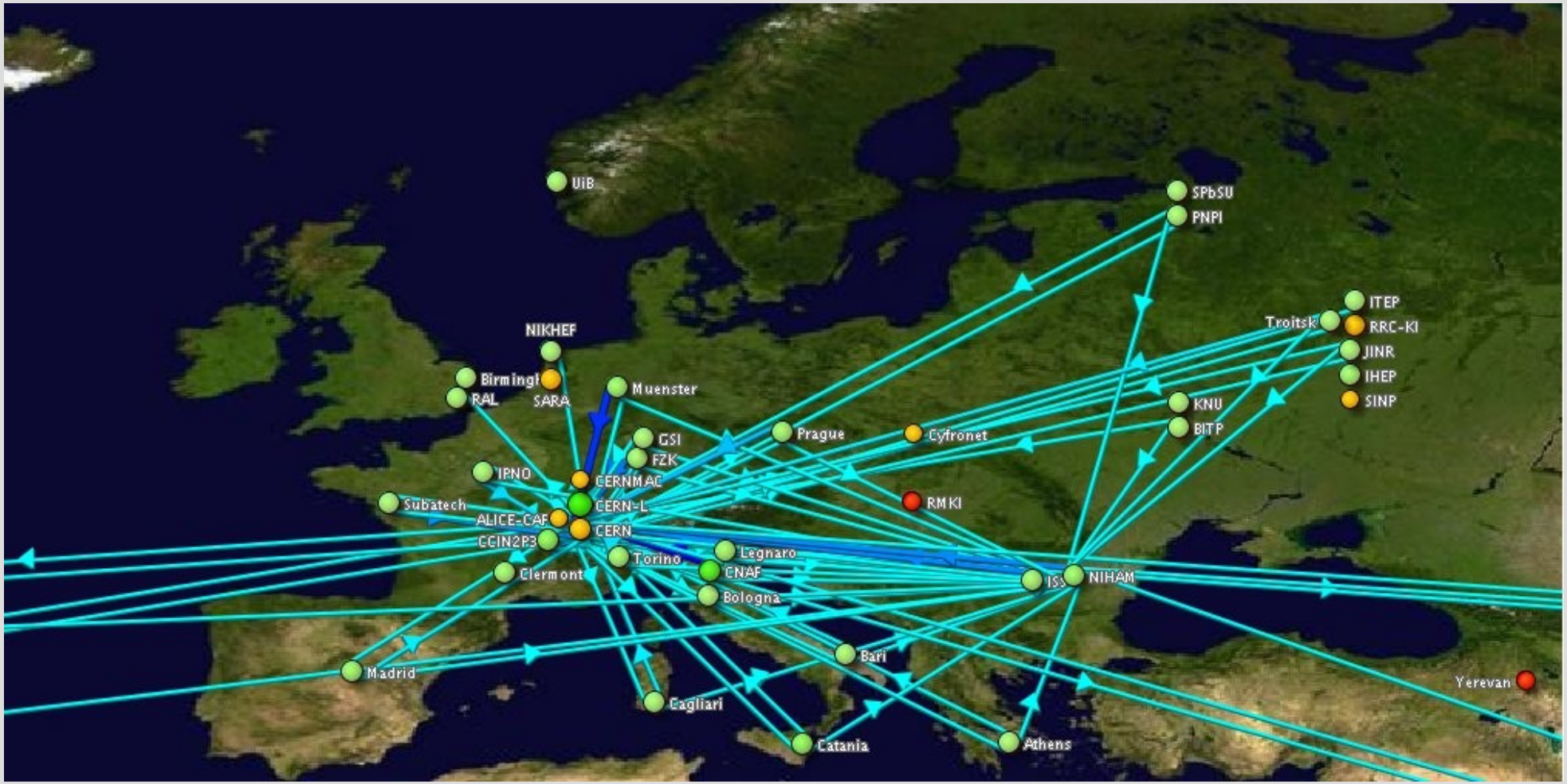
- ~33500 jobs DONE
- ~360 kHours CPUTime
- ~7% of ALICE
- Starting with September 2006, NIHAM Storage Element was used by ALICE production jobs to store log files

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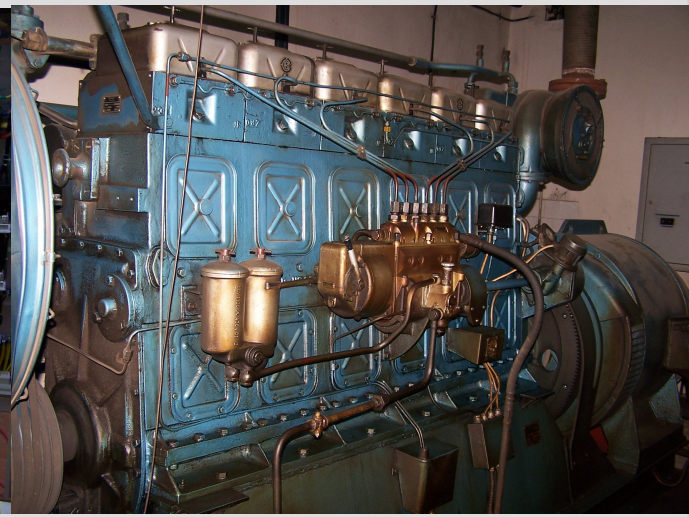
Yerevan
Cagliari
Catania
Athens

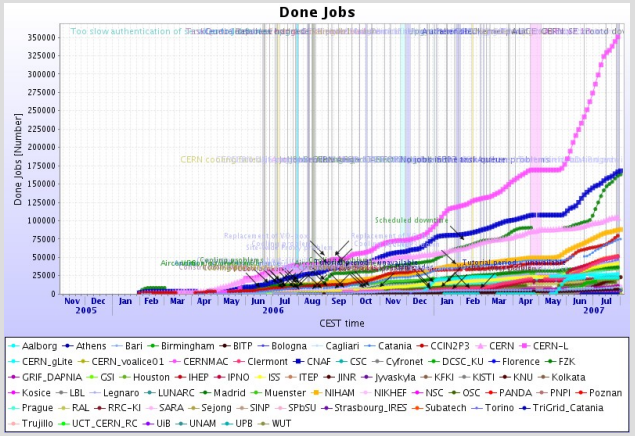
# 2007 developments

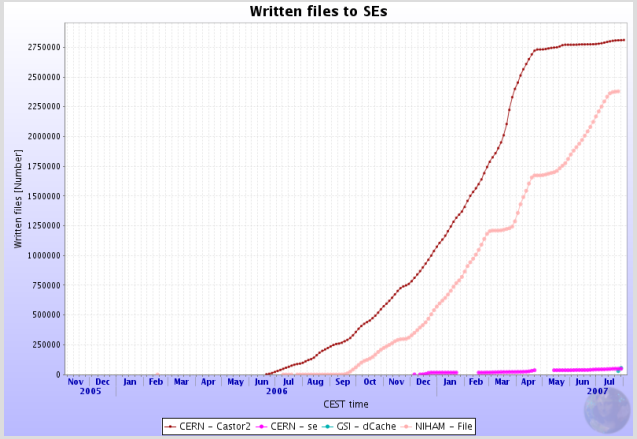
- 15 new machines (dual dual-core Opteron, 2GHz, 8GB RAM)
- 48 TB raw SAS storage (new technology)
- 10 Gbit/s connection to DIC
- The most important development: NIHAM Datacenter, industrial grade cooling unit, industrial-grade UPS-es, Cat. 6 cabling, connection to Institute's Diesel generator

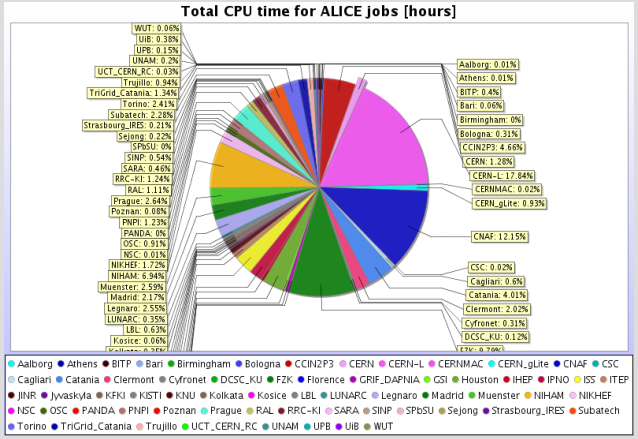


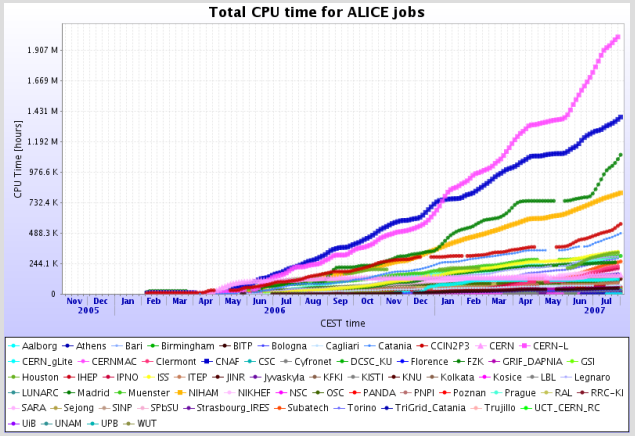
# Results up to date

- ~810 kHours delivered
- ~88000 jobs DONE
- ~6.7% of ALICE
- ~2380000 files saved to NIHAM SE
- Average Site Services Availability since July, 1, 2006 : >95%



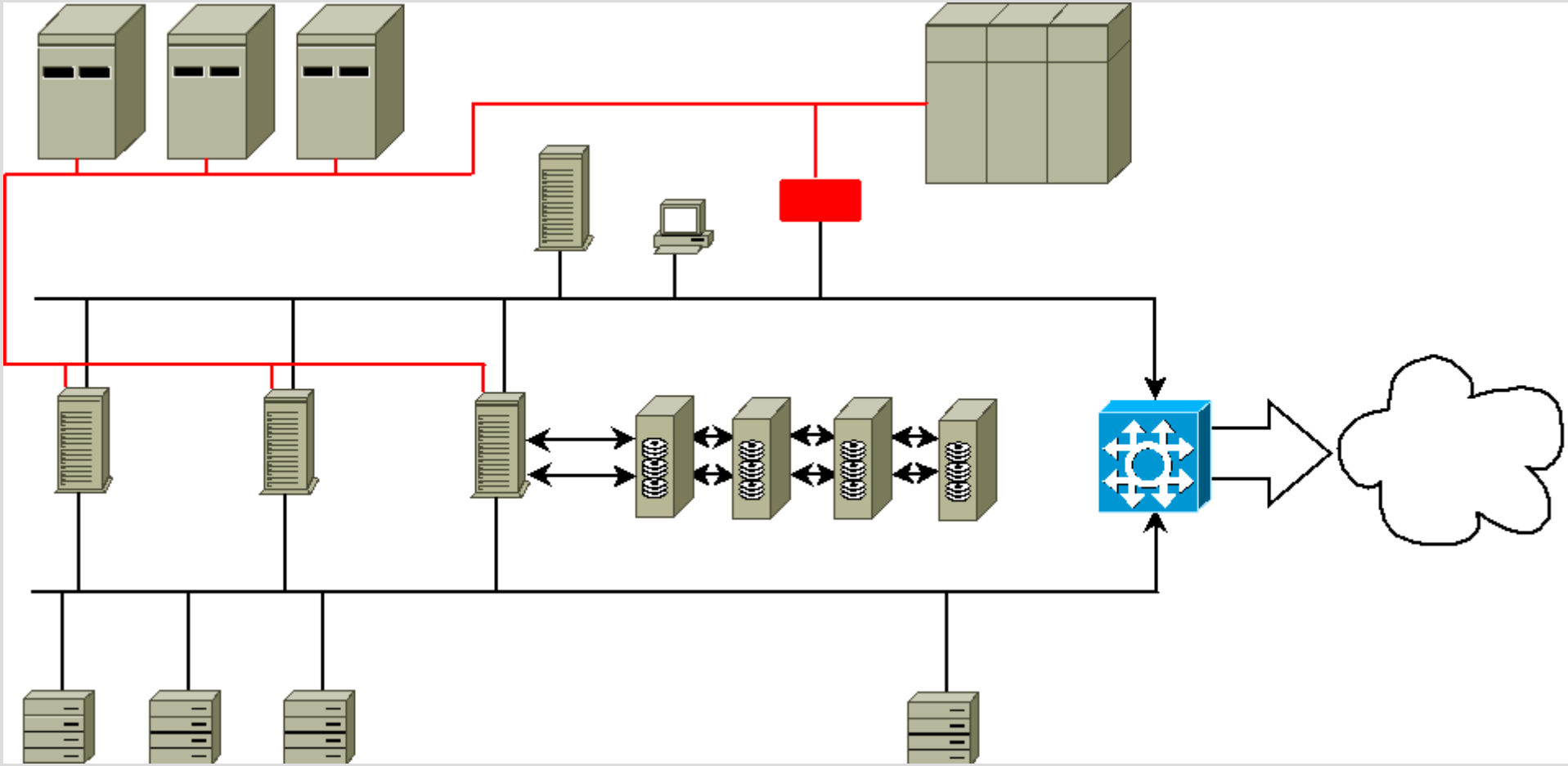



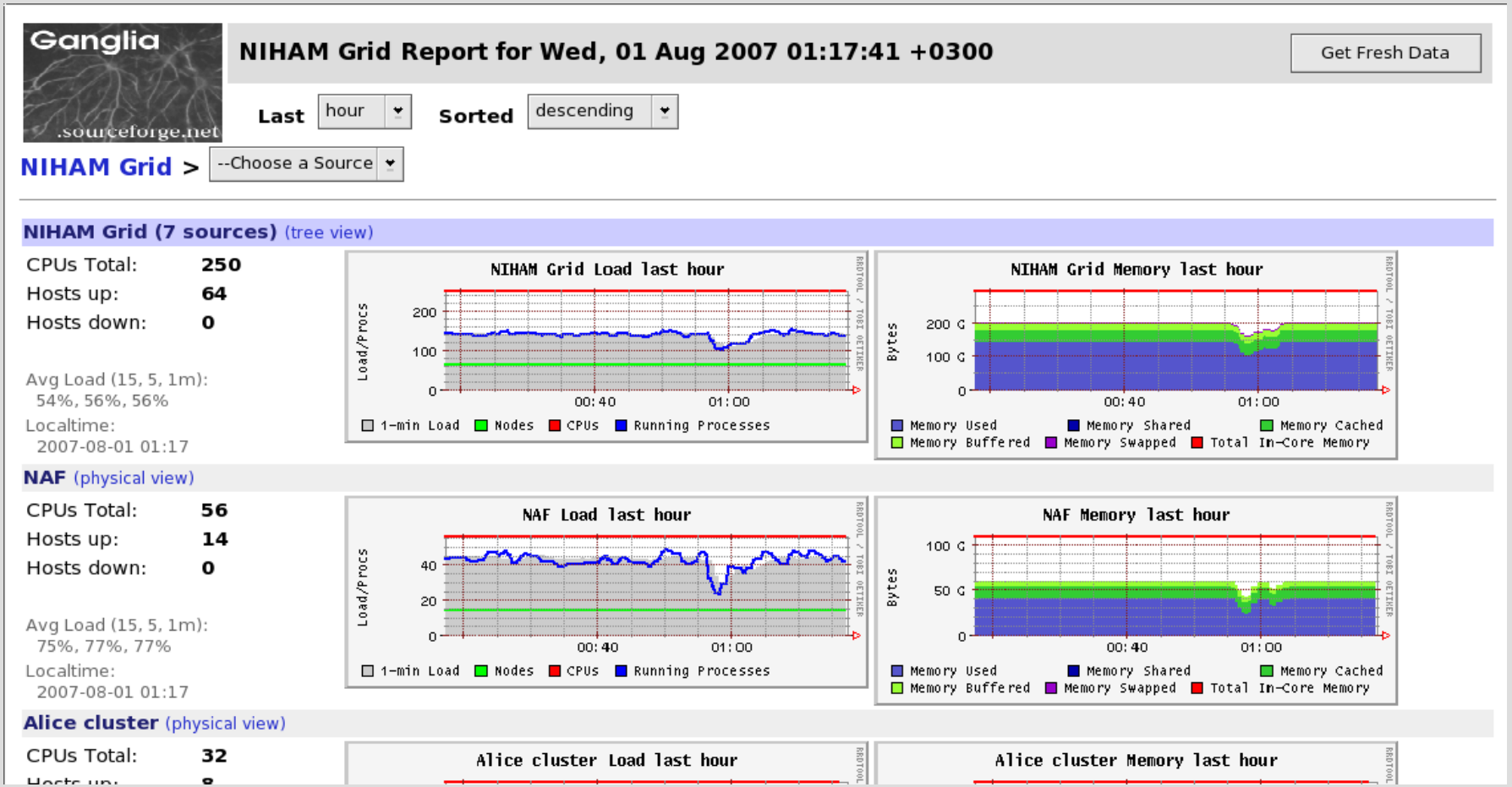
# Integration with EGEE

- Developed (C. Schiaua) a tool to report AliEn accounting data to RGMA. Still need some polishing before being published.
- EGEE data: >1mil kSi2K hours delivered
- According to EGEE data, NIHAM delivered more than 71% of country's contribution since EGEE accounting started (2004)
- This figure does not take into account last ~3 months of NIHAM (data not yet published by us) and does not include ISS GRID contribution (ISS is not yet EGEE site)
- Taking this 2 factors into account, and assuming that, except ISS, there is no other GRID site in Romania outside EGEE, NIHAM delivered ~75% of country's contribution to EGEE representing ~55% of Romania's computing time delivered trough GRID technologies

# Cluster structure



# Monitoring – Ganglia, MonALISA



# Current Developments

- Deploying a new SE, 48 TB raw, SAS. New technology, requires testing in order to find optimal configuration
- Designing an automatic monitoring, alarm and control system.
- Deploying the required software for local parallel analysis (proof)

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# NIHAM

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# Team

- Infrastructure planning: M. Petrovici, C. Schiaua
- Cluster maintenance & operation: C. Andrei, C. Schiaua
- GRID site management: C. Aiftimiei, C. Schiaua
- Cooling & Power maintenance: G. Giolu, P. Zaharia
- Immediate action when needed: NIHAM

***Thank you!***