GRID computing activities in JEM-EUSO and Auger at the University of Alcalá.

SPAS team

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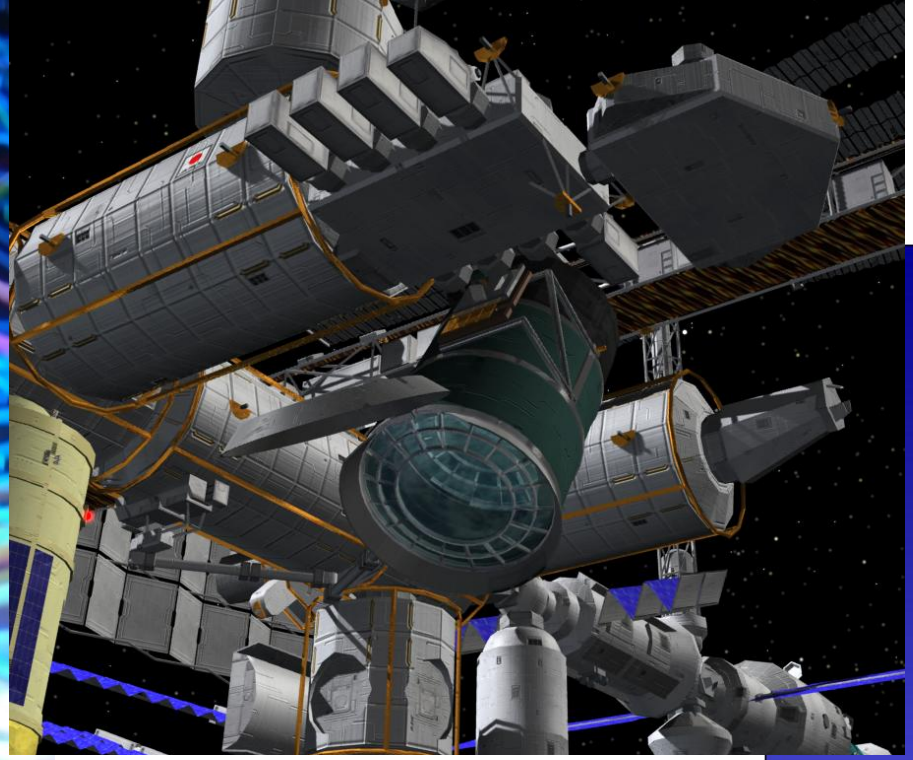
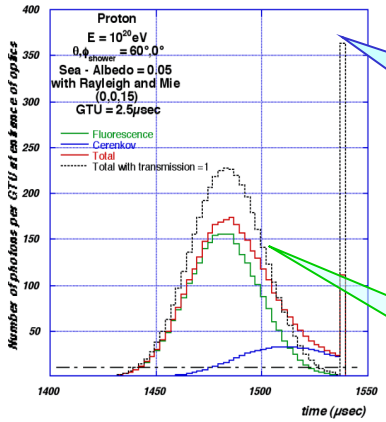
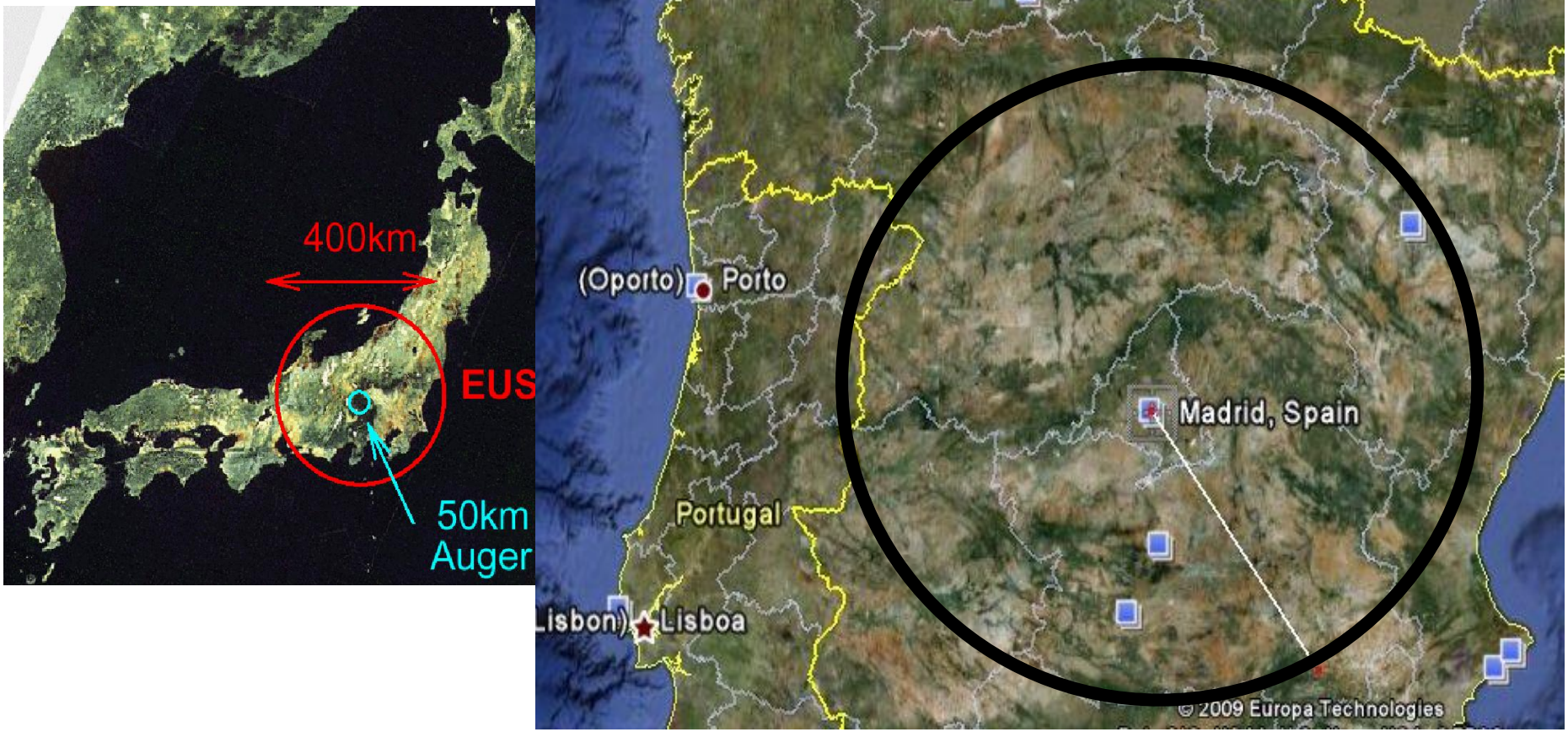
JEM-EUSO Telescope





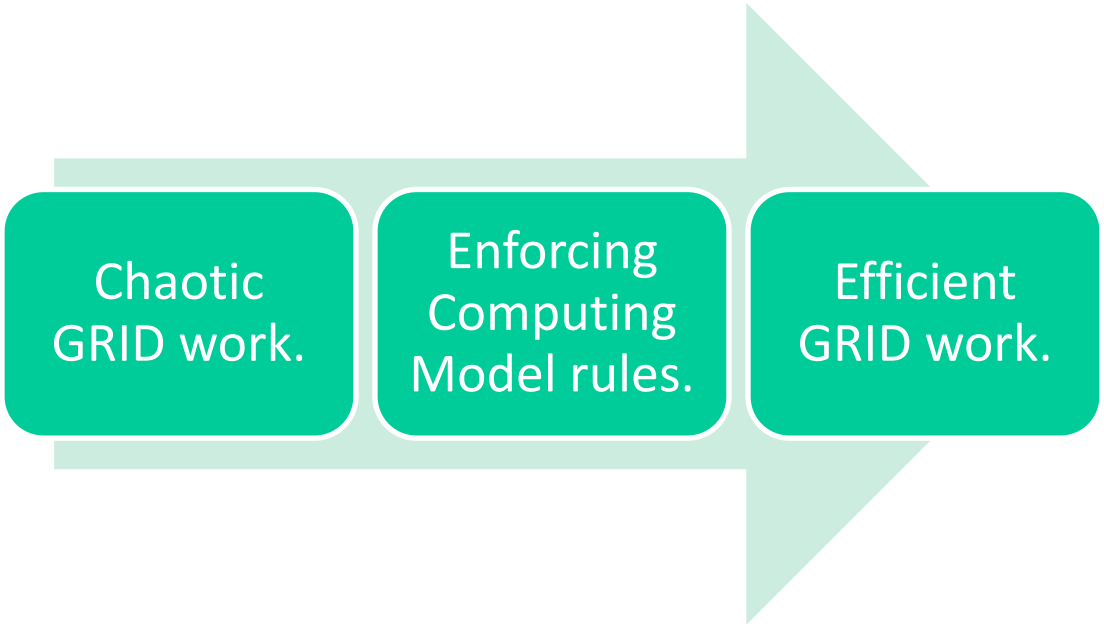
Cherenkov

Fluorescence


400km
EUS
50km
Auger
Bay of Biscay
(Oporto) Porto
Madrid, Spain
Portugal
Lisbon) Lisboa
© 2009 Europa Technologies

What is a computing model??

Its a document to settle the bases for “GRID (**Distributed Computing**)” work in the collaboration, and to ensure an efficient access and a proper utilization of the resources.



Why do we need avanced computational resources??

2.3 Computing Requirements

2.3.1 Monte-Carlo simulation.

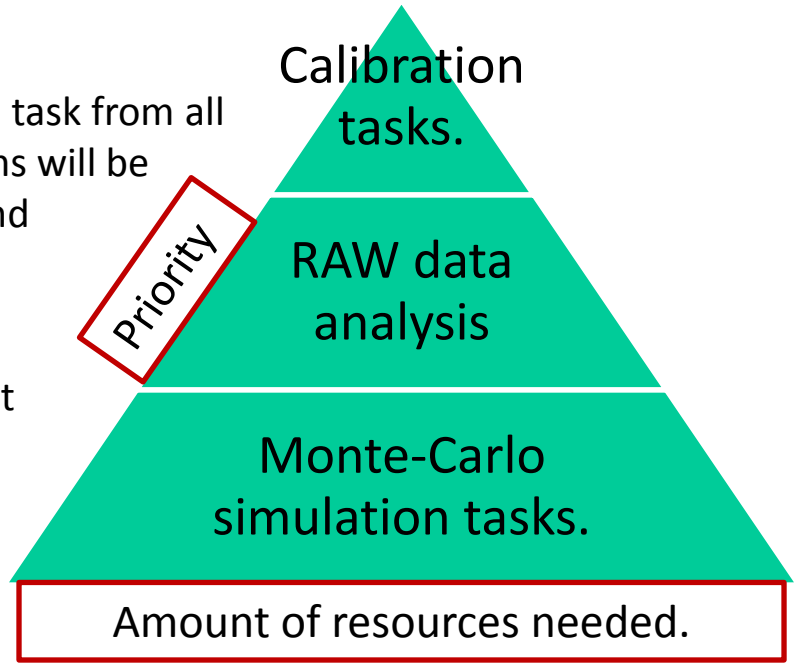
Based on the experience of past experiments, the data analysis will consume a large fraction of the total amount of resources. Monte-Carlo data will be generated in an amount of 100 or 1000 times faster to collected real data (1000 events expected for JEM-EUSO energies). This means that we will require from 100.000 to 1.000.000 simulated events .

2.3.2 RAW data and Analysis.

Although it is difficult to schedule all simulation task from all physicists of the collaboration, official algorithms will be scheduled. And resources for official analysis and unscheduled analysis should be considered.

2.3.3 Calibration.

Because of its importance, Calibration tasks that require “GRID” should be prioritized, and taken into account for the resources allocation.



2.4.1 CPU requirements.

All numbers in PFLOPS (petaflops = 10^15 flops). Yearly based estimation.

Task	Lower Estimation	Upper Estimation
Calibration	72	720
Data analysis	144	1440
UnScheduled tasks	144	1440
MC-Simulation	2880	28800
Total	3240	32400

Table 2.1: CPU requirements table.

Based on 1000 real events, Monte Carlo (1 event = 28,8 Tflops) should be around 100.000 to 1.000.000 events. Raw data and Analisis is estimated to be around 0.1% of Monte Carlo. For Unsheduled tasks estimation is the same for Raw data and Analysis, and calibration is estimated to be half the needs for Unsheduled tasks, but prioritized.

One Intel Q9400 is capable of 2GFLOPS (Based on Whetstone Benchmark), 63 PFLOPS is the equivalent of 365 Days of 1 intense CPU work. Yearly we will need around 100 or 500 CPU of this type, estimating 70% of eficiency. (This is a new high performance CPU, many computer centers may have older CPU.)

Permanent storage.

All numbers in Gb (Giga-bytes = 10^9 Bytes). Yearly based estimation.

Task	Lower Estimation	Upper Estimation
RAW data	1095	1095
Data analysis	1000	10000
MC-Simulation (Official)	30000	300000
Other data	2000	4000
Total	34095	315095

Table 2.2: Permanent storage requirements table.

Monte Carlo (1 event = 300 Mb) should be around 100.000 to 1.000.000 events. Raw data and Analisis is estimated as 10 Mb/event. Other data includes calibration data and monitoring data. Real data based in 3 Gb/day.

Transient storage.

All numbers in Gb (Giga-bytes = 10^9 Bytes). Yearly based estimation.

Task	Lower Estimation	Upper Estimation
UnScheduled tasks	1000	10000
Test software	50	100
MC-Simulation (In Prod)	30000	300000
Total	31050	310100

Table 2.3: Transient storage requirements table.

Estimated 80% of eficiency for Data storage resources.

Network requirements.

All numbers in Gb (Giga-bytes = 10^9 Bytes). Daily based estimation.

Task	N	Unity Estimation	Lower Estimation	Upper Estimation
Permanent storage sync	3		85	821
Review of daily raw data (research groups)	10	3-9	30	90
Physicist working on grid	10-30	1-9	10	270
Total			125	1181

Table 2.4: Network bandwith requirements table.

How to deal with the software?

JEM-EUSO Software Repository

3.1 JESR Release Policy

This define the rules that write the path for software development in the collaboration. Divides the software into Releases, Release candidates (Not approved by the certification process 3.4), test builds and personal versions.

3.3 JESR Deployment

1 main server, and local mirrors in each resource center.
The repository should be mounted in the /usr/JESR/ in each node of the resource center.

How can we store the data?

JEM-EUSO Data Repository (JEDR).

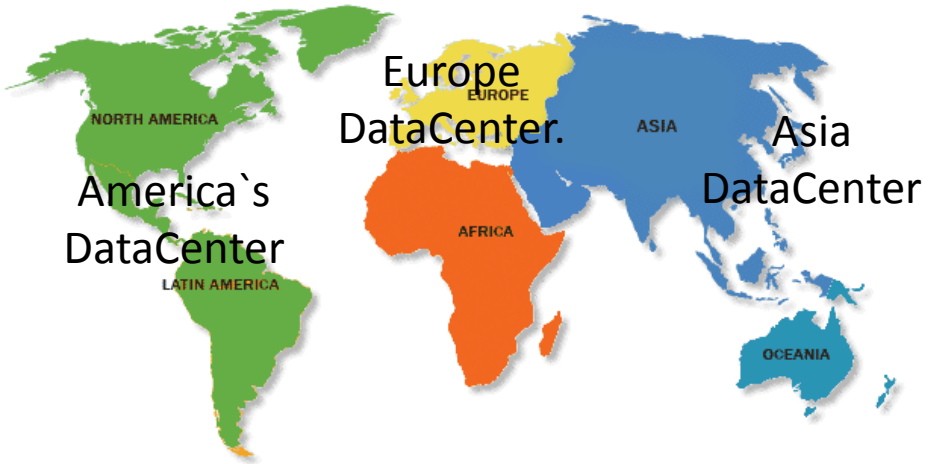
4.1 JEDR Architecture

JEM-EUSO could be host in only one resource center.

But.

Data bandwith and lag could be very high.

To solve this, data will be mirrored or simple stored in three sites, located in separated regions.



Europe DataCenter.

America`s DataCenter

Asia DataCenter

Tier architecture is not adecuated for JEM-EUSO, because of low/medium resources needs (For GRID projects standards).

4.2 JEDR catalog

For the files in the Data Repository a Catalog (Data Base) should be maintained to keep track of each file, and for faster searching. The catalog have diferents tables for each type of file; MC, Raw data and simulated/reconstructed data.

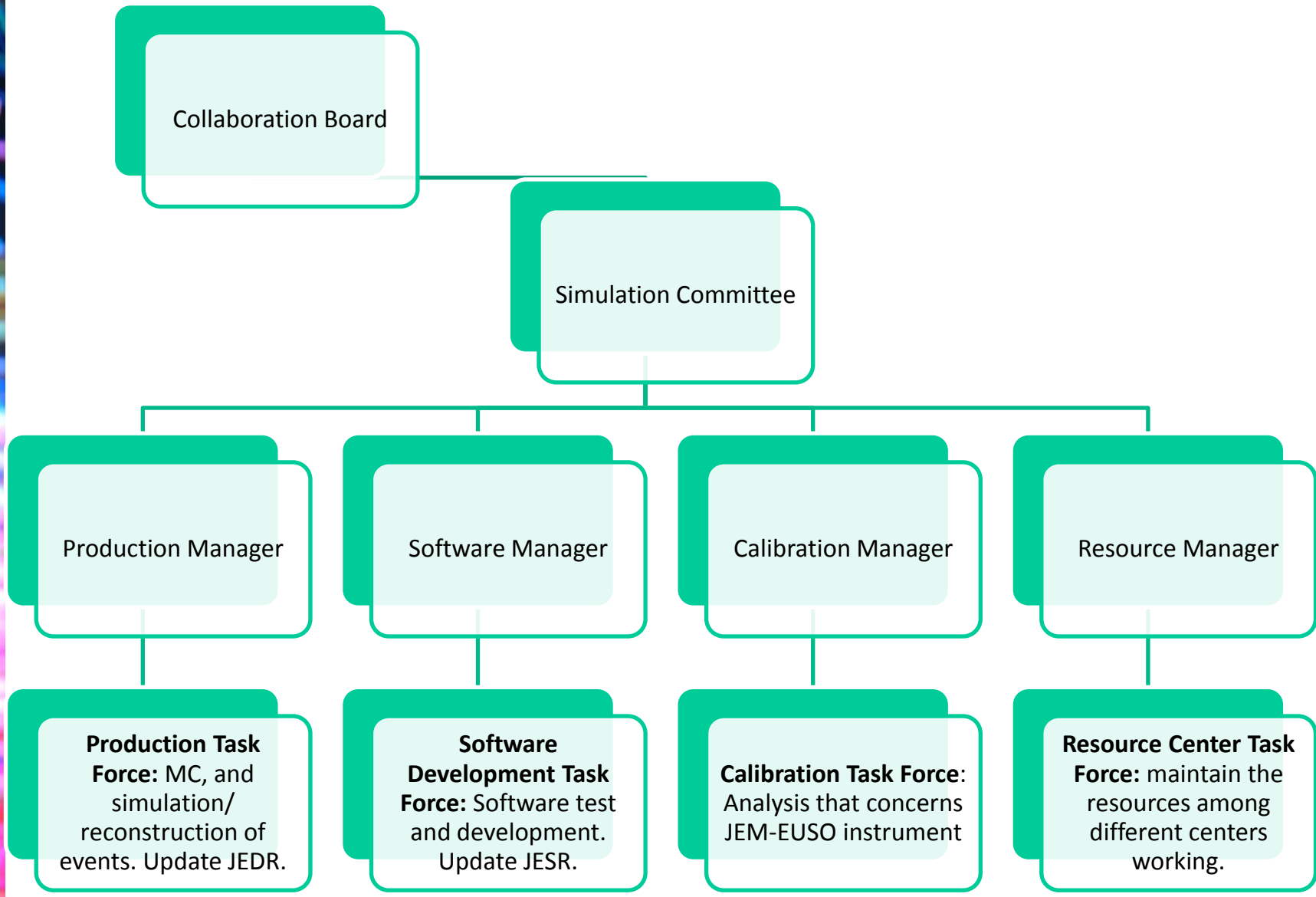
4.3 JEDR namespace

Archive directory structure.

simulation/ r01/eas/
det/
rec/
r02/eas/
det/
rec/
data/ rd/
re/

Basic access	Grid work tools
Toolkit (php web site or software) , options to search the catalog and download the files selected. Not suitable for high download amount.	Scripts and software for grid work. Including sample scripts to send jobs. It searchs the catalog and download the match files to the working node.

Who is behind this?



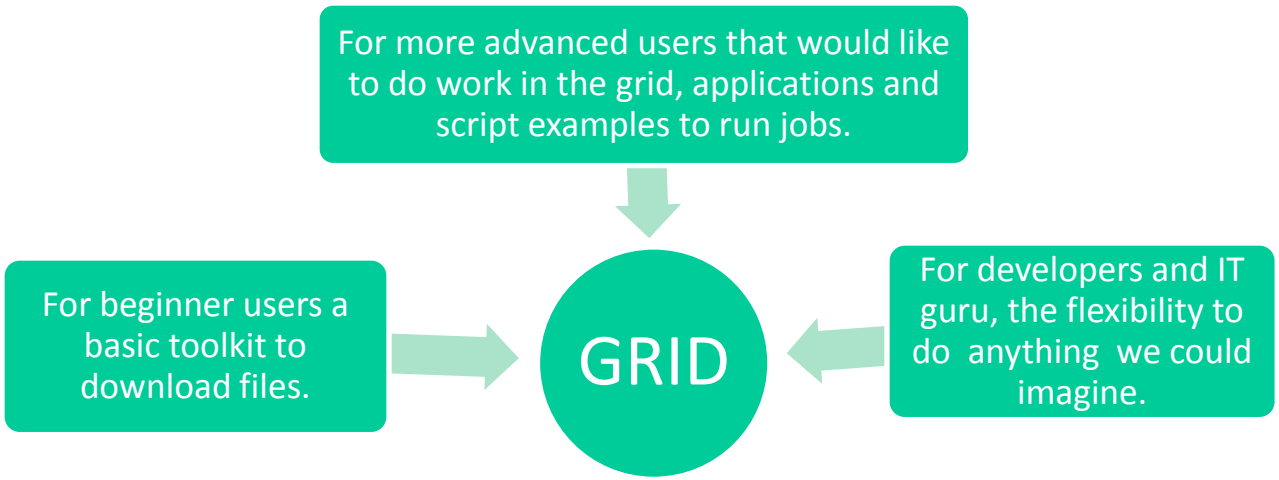
What about security, integration, resources sharing?

How can we simplify grid for normal users?

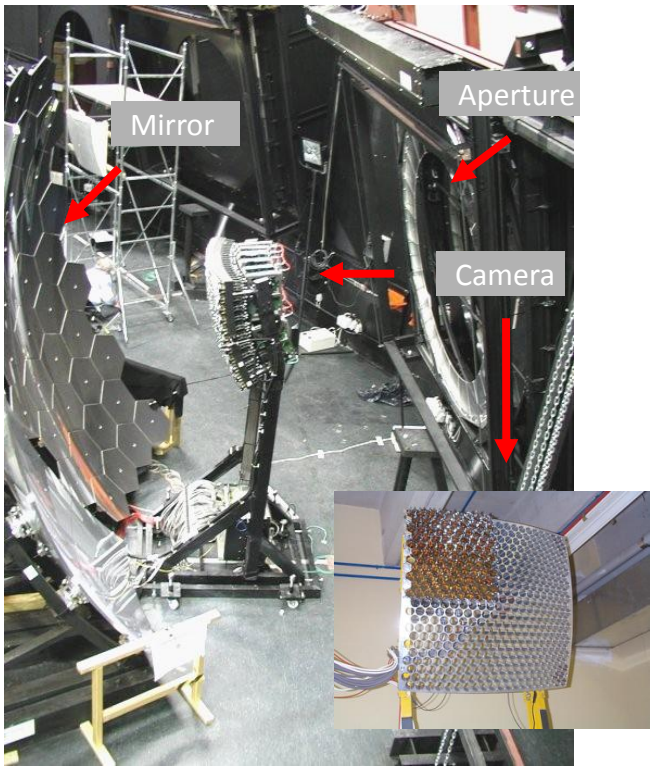
JEM-EUSO Middleware

As there are so many differents middleware, and each resource center could use a diferent one, JEM-EUSO needs tools to make work between different middleware. Starting from the mount types for the data and software repository and beyond basic tools for each architecture. There is the need to isolate the users from middleware specifics.

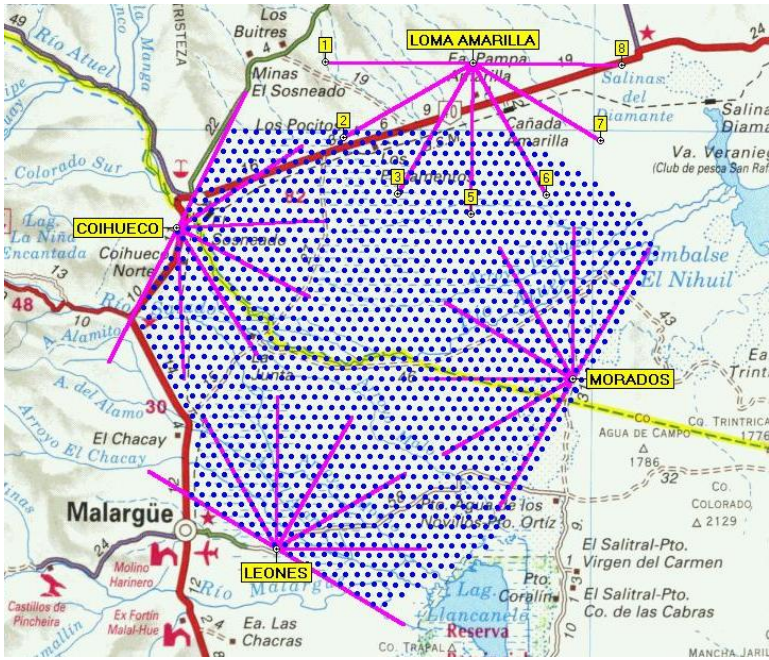
First step is the JESR toolkit for JEDR catalog and easy download for basic users.



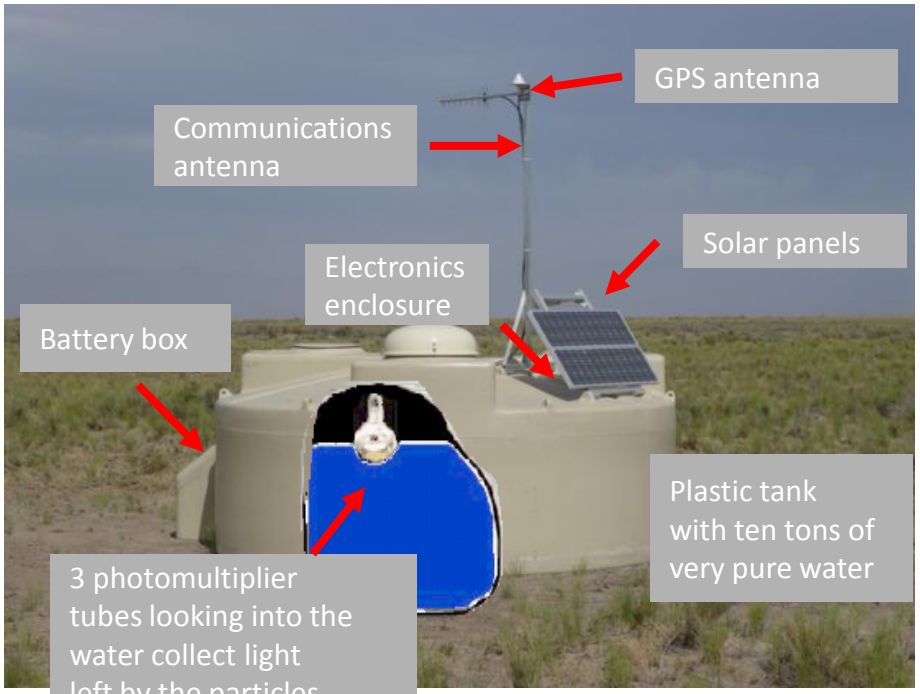
Auger experiment.



4 Buildings with
6 Fluorescence telescope each



1600 Surface Detector Station



VO Auger

Created in 2006 by the Czech group in cooperation with CESNET

- **15 sites from 9 countries support VO AUGER**
- **Currently 37 members**

- **Our experience in the VO Auger is based in Corsika, Aires and Offline simulation software.**

JEM-EUSO

EXTREME UNIVERSE SPACE OBSERVATORY ONBOARD JAPAN EXPERIMENT MODULE

地球を観て宇宙を知る“地文台”

Riken Integrated Cluster of Clusters

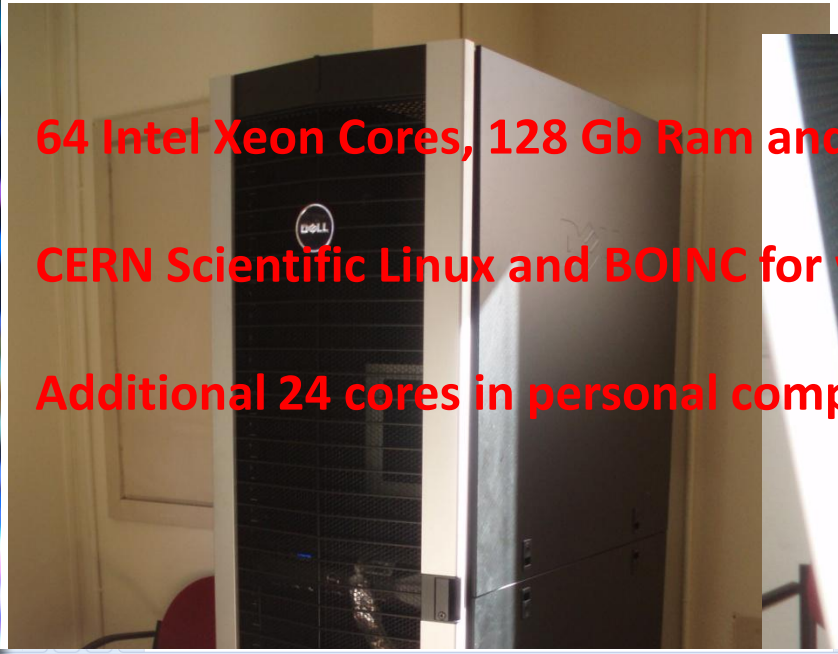
- 8192 cores.
- Just starting to use a Japanese middleware.

RIKEN

RICC
RIKEN Integrated Cluster of Clusters

	RICC
Theoretical performance (CPU)	107.0TFLOPS
Total memory capacity Shared memory capacity	15.98TB 512GB
Memory bandwidth (Xeon)	0.54Byte/FLOP
Total disk capacity Throughput bandwidth	550TB 16.0GB/s
Total local disk capacity Throughput bandwidth	622.5TB 300.0*3*1024MB/s
Total disk capacity Throughput bandwidth	4PB 1.44GB/s
Exernal network bandwidth	2GB/s

UAH owned resources.



64 Intel Xeon Cores, 128 Gb Ram and 15 Tb storage on Hard Disk drives.

CERN Scientific Linux and BOINC for work management.

Additional 24 cores in personal computers in the SPAS group.

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UAH SPAS Group Computational Center

About UAH SPAS Group Computational Center

This is a research project that uses Internet-connected computers to do research in High Energy Physics. You can participate by downloading and running a free program on your computer.

This project is based at [The University of Alcala, Madrid, Spain. www.uah.es]

- [http://spas.uah.es]
- [http://www2.uah.es/spas]

Join UAH SPAS Group Computational Center

- Lea nuestras políticas y normas
- This project uses BOINC. If you're already running BOINC, select Attach to Project. If not, download BOINC.
- When prompted, enter **http://spas.uah.es:81/Corsika/**
- If you're running a command-line or pre-5.0 version of BOINC, create an account first.
- If you have any problems, get help here.

Returning participants

- Your account - view stats, modify preferences
- Teams - create or join a team
- Certificate
- Programas

Comunidad

- Perfiles
- User search
- Foros

News

The begining
April 24, 2010, 19:50 GMT
Lanzamiento del servicio BOINC en el centro de calculo SPAS
Another item title
March 2, 2004, 11:50 GMT
Another item

News is available as an RSS feed

Thanks for your time…

Any question??

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