GRID ACTIVITIES AT IAA

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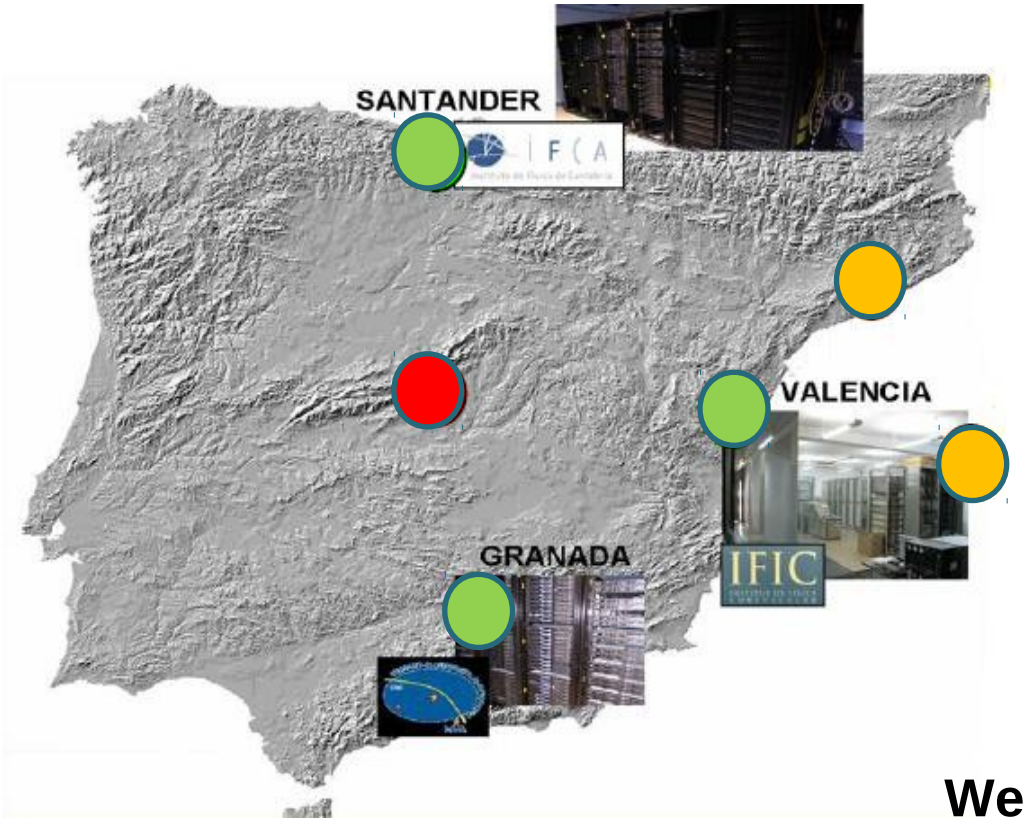
GRANADA

Overview

1.- IAA and Grid Members.
2.- Infrastructure.
3.- Teaching.
4.- Gridified Aplications.
5.- Information Services.
6.- Statistical Evolution of Grid Use Through Time.

1.- IAA and Grid Members. (1/2)

IAA (Instituto de Astrofísica de Andalucia) is situated in Granada (Andalusia).



Incorporation:

- 1st Phase
- 2nd Phase
- 3rd Phase

Web: www.iaa.es

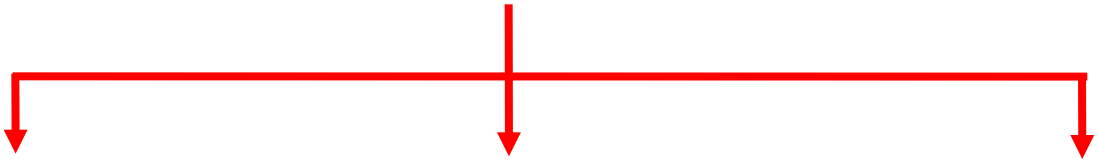
1.- IAA and Grid Members. (2/2)

Dr. José Ruedas

Principal Researcher

Grid-CSIC Project

Computer Center Department



José Ramón Rodón

Contract Staff

Grid-CSIC Project

Computer Center Department

Alicia D. Benítez

Contract Staff

Grid-CSIC Project

Computer Center Department

Susana Sánchez

Collaborator

e-CA Project

Extragalactic Astronomy Research Department

2.- Infrastructure. (1/3)

Computational Resources:

⇒16 nodes (16 cores, 128 GB).
⇒4 nodes (64 cores, 512 GB).
⇒Total:512 cores.

Grid room at IAA

Storage Resources:

Total capacity: 315 TB

Comunication Resources (per node)

⇒Infiniband (20 Gbps).
⇒GigaEthernet (1 Gbps).

Middleware: **gLite (http://glite.web.cern.ch/glite)**

2.- Infrastructure. (2/3)

Our infrastructure supports the following VOs:

NGI VOs	
vo.operationes.es-ngi.eu	Operations
vo.general.es-ngi.eu	General
vo.formacion.es-ngi.eu	Tutorial

2.- Infrastructure. (3/3)

IBERGRID VOs	
ops.vo.ibergrid.eu	Operations
iber.vo.ibergrid.eu	General
tut.vo.ibergrid.eu	Tutorial
phys.vo.ibergrid.eu	Physics and Space Sciences
ict.vo.ibergrid.eu	Mathematics, Electronics and Communications, Computer science and information technology
chem.vo.ibergrid.eu	Chemistry, Materials Science and Technology, Chemical Technology
life.vo.ibergrid.eu	Plant and Animal Biology, Ecology, Physiology and Pharmacology, molecular biology …
social.vo.ibergrid.eu	Social Sciences, Psychology and Education Sciences, Economics, Philology and Philosophy, History…
eng.vo.ibergrid.eu	Civil Engineering and Architecture, Electrical Engineering, electronic and automatic, mechanical engineering, naval and aeronautical
earth.vo.ibergrid.eu	Earth Sciences

3.- Teaching.

Grid Courses:

1. **Introduction to Grid Infrastructure. Second week of March 2010. 25 hours. 30 students.**

2. **Advanced Grid and Parallelism. Second week of May 2010. 25 hours. 16 students. External teachers collaborated with us:**

    - **University of Granada (UGR)**
    - **Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas (CIEMAT)**
    - **University of Valencia (UV).**

4.- Gridified Applications. (1/7)

Astrophysic is an observational science but needs to create teorical models too, in order to compair them with the observations.

NEEDS

Computational resources.

Astrophysical applications generates big amounts of data.

NEEDS

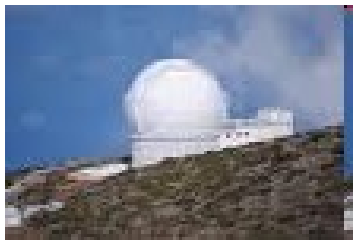
Storage resources.

4.- Gridified Applications. (2/7)

Astrophysic researchers of IAA are very interested in this infrastructure due to the reduction of the applications run time and the storage capacity.

Number of Gridified Applications: 5. Now, they are using the IAA's grid infrastructure.

Number of Applications in gridification phase: 8



4.- Gridified Applications. (3/7)

GraCo

(Granada Code)

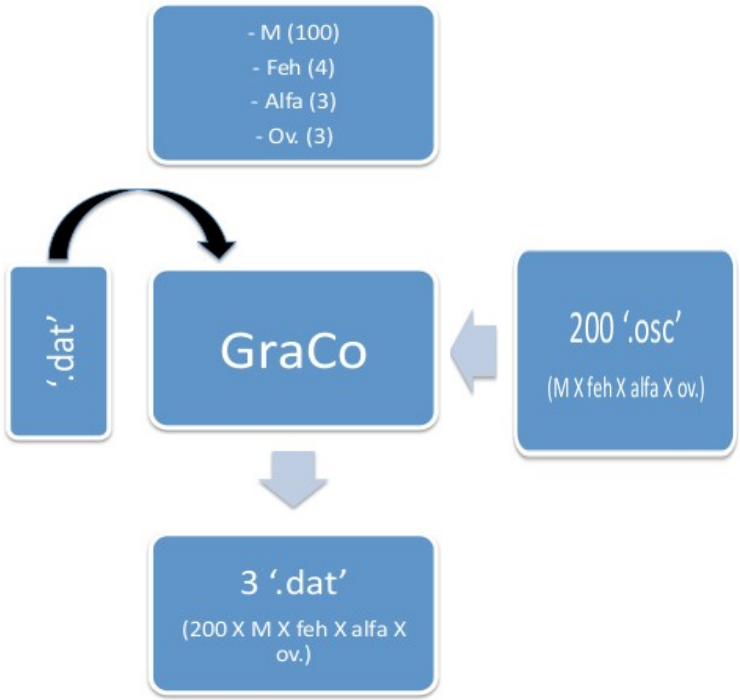
Granada oscilation Code is a software that calculates frequencies, growing ratios and other physic quantitative values.

The run time is not big, but the application has a higher number of combinations.

This application is runned in order to create all posible star models and analyze them.

Idea: Submit the maximum number of runs in order to decrease the global run time.

The migration to Grid infrastructure was made by Antonio García Hernández (IAA-CSIC).

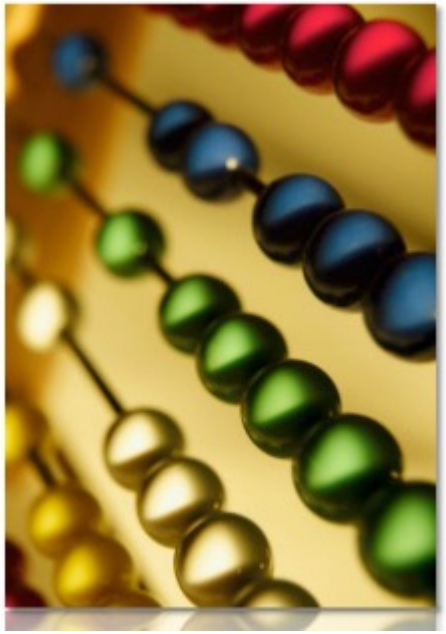


4.- Gridified Applications. (4/7)

GraCo

(Granada Code)

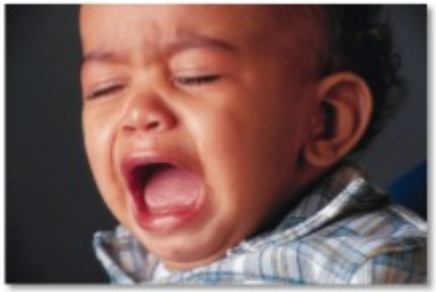
GraCo Run Time:



Personal Computer with 4 cores:

600.000 models x 15 min / 4 cores

=> **4.3 years**



GRID-IAA:

600.000 models x 15 min / 440 cores

=> **14 days!**

4.- Gridified Applications. (5/7)

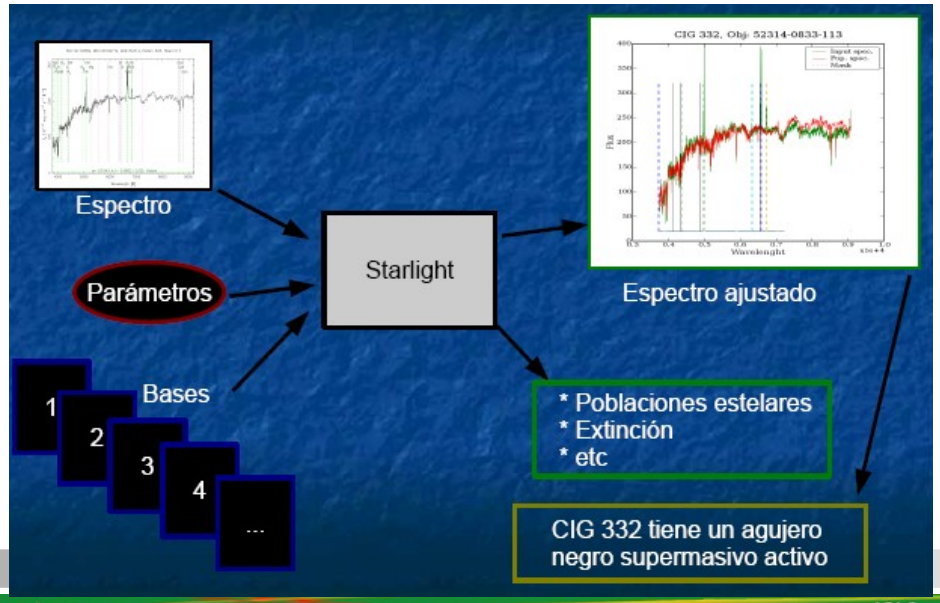
SLGRID:

It is the integration of Starlight application in the Grid infrastructure.

It was a pilot application of the Spanish Net of e-Science.

The gridification was made by Dr. José Sabater Montes (IAA-CSIC), member of e-CA Project, and with the collaboration of CETA-CIEMAT.

The application searches supermassive black holes in isolated galaxies.



4.- Gridified Applications. (6/7)

SLGRID:

Number of serial runs: 4320

360 galaxies.
6 different combination of parameters.
2 base-type.
~30 min per run => 90 days

Perfect to Gridifier!

4.- Gridified Applications. (7/7)

Installed software:

FFTW 3.2.1: is a C subroutine library for computing the discrete Fourier transform (DFT) in one or more dimensions (**http://www.fftw.org/**).

OpenMPI: *It is a open code implementation of* Message Passing Interface (MPI) and used in parallel or distributed computing (**http://www.open-mpi.org/**).

GSL: *It* is a numerical library for C and C++ programmers. It is free software under the GNU General Public License (**http://www.gnu.org/software/gsl/**).

OpenMP: The OpenMP Application Program Interface (API) supports multi-platform shared-memory parallel programming in C/C++ and Fortran on all architectures (**http://openmp.org/wp**).

5.- Information Services.

Web page: http://grid.iaa.csic.es/.

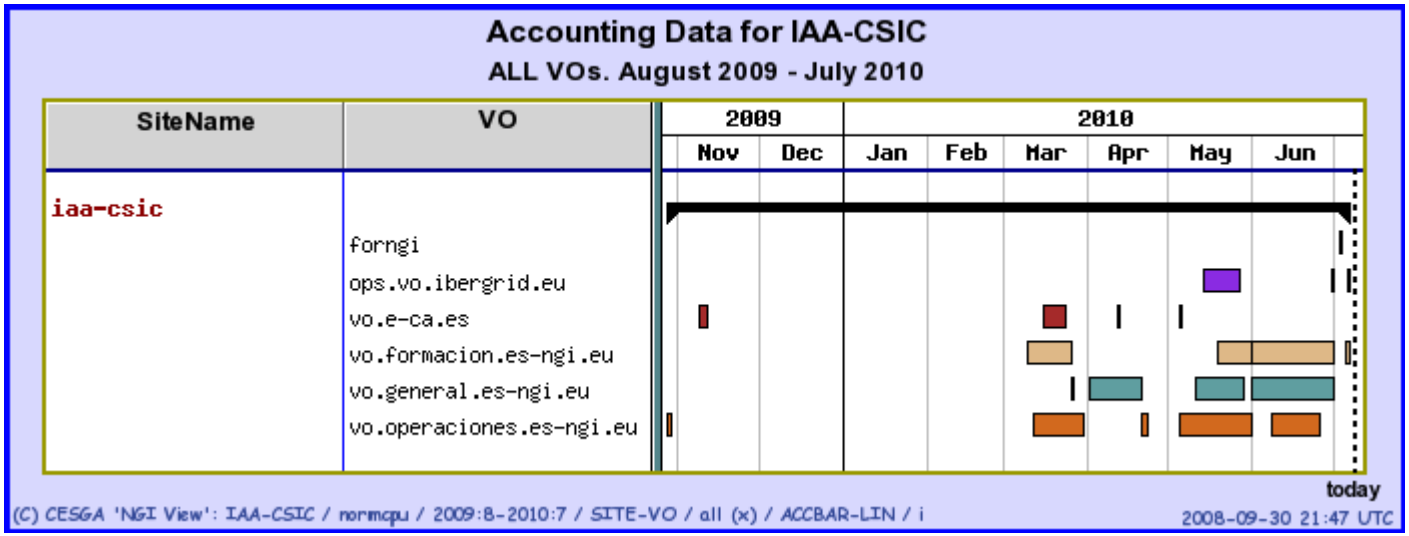
The aim is:

1. **Give general information**: the group, departments, services, activities, teaching and news.
2. **Application Support** by means of ticket system (Request Tracker, http://support.iaa.es).
3. **Give information to grid users**, thanks to a wiki, http://grid.iaa.csic.es/wiki.
4. **Build a global scientific forum to researchers** (Foros, http://grid.iaa.csic.es/phpBB).

6.- Statistical Evolution of Grid Use Through Time.

Normalised CPU time (hours):

Site	*vo.formacion.es-ngi.eu*	*vo.operaciones.es-ngi.eu*	*Total*
IAA-CSIC	32	2346	2378



http://www.ngi.cesga.es/gridsite/accounting/CESGA/ngi_view.php

References.

- A. Moya, R. Garrido. “Granada oscillation code (GraCo)”. Astrophysics and Space Science, 316:129-133, 2008.

- J. Sabater. Proyecto: “SLGRID: Starlight Spectral Synthesis Code”. Instituciones:
IAA-CSIC; CETA-CIEMAT, 2009-2010

- Starlight: http://www.starlight.ufsc.br/

Thank you for you attention!

Any questions?