

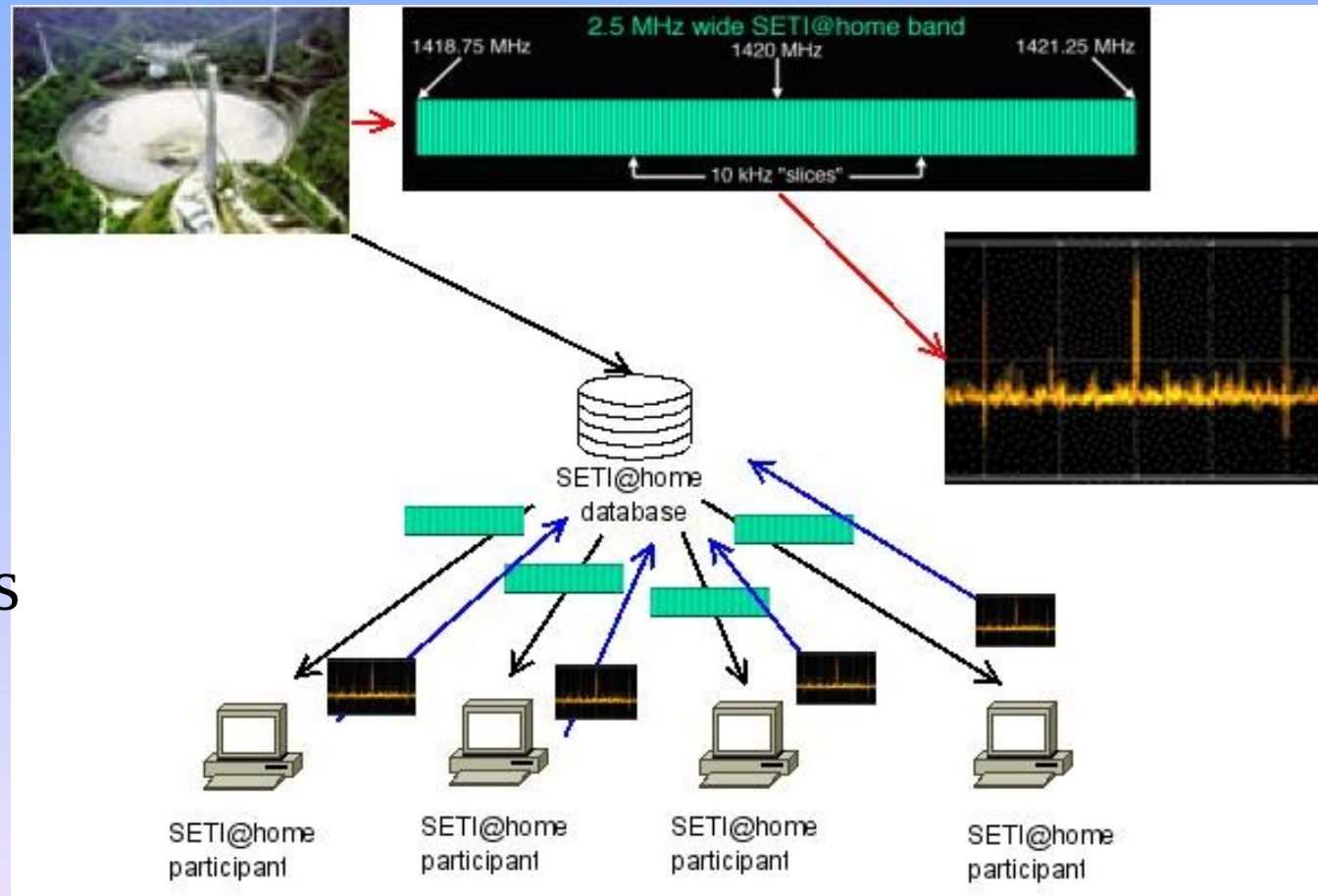


- **First scientific grid computing**

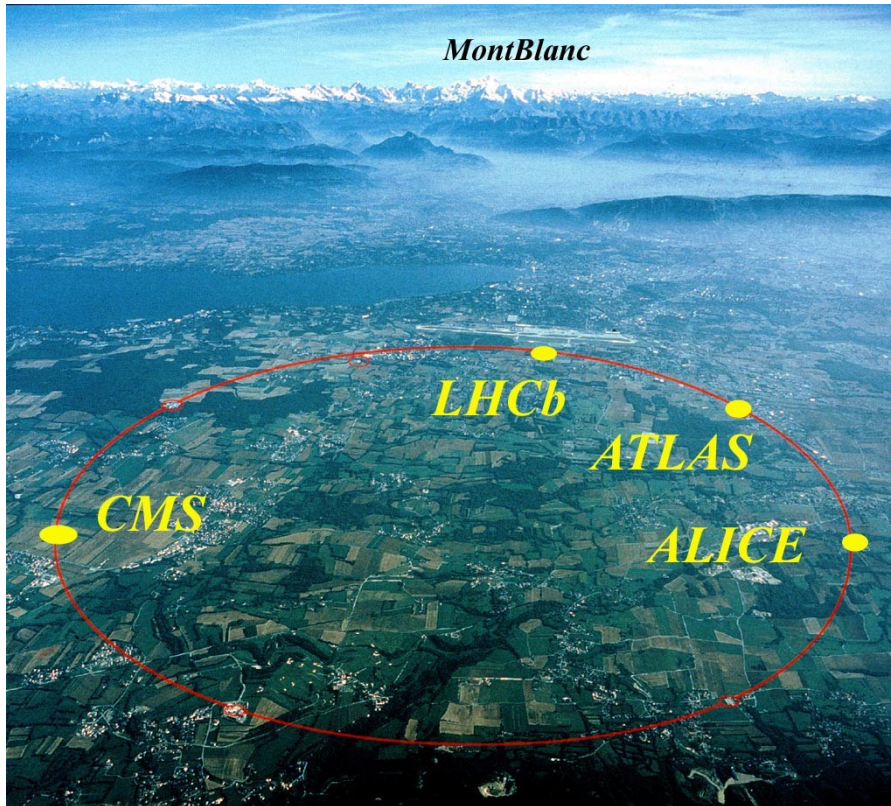
<http://setiathome.berkeley.edu/>

<http://boinc.berkeley.edu>

- Distributed resources
- No central control



# LHC & EGEE



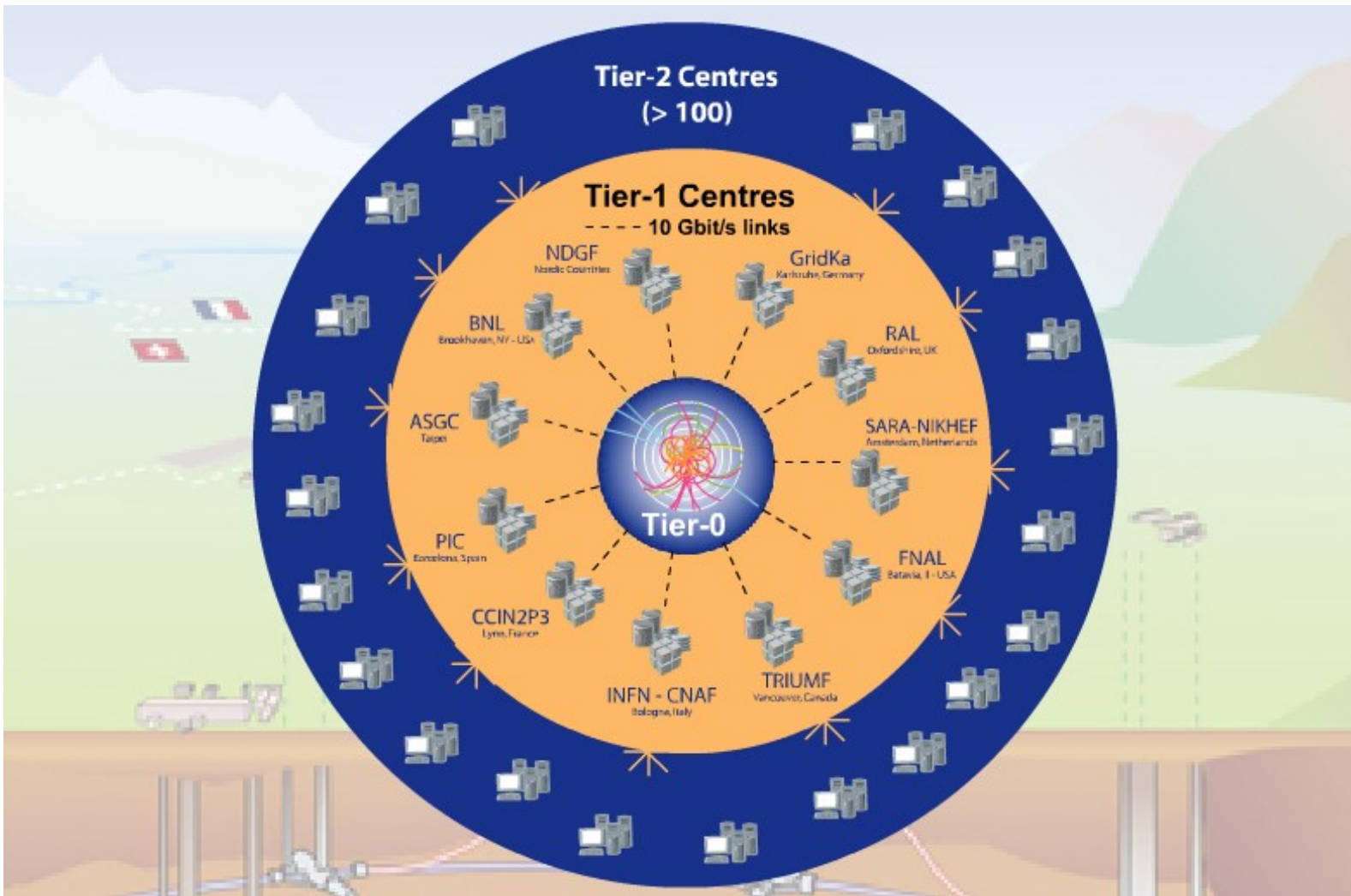
- 15 PB data per year
- grid computing

EGEE: ~250 sites, >45000 CPU



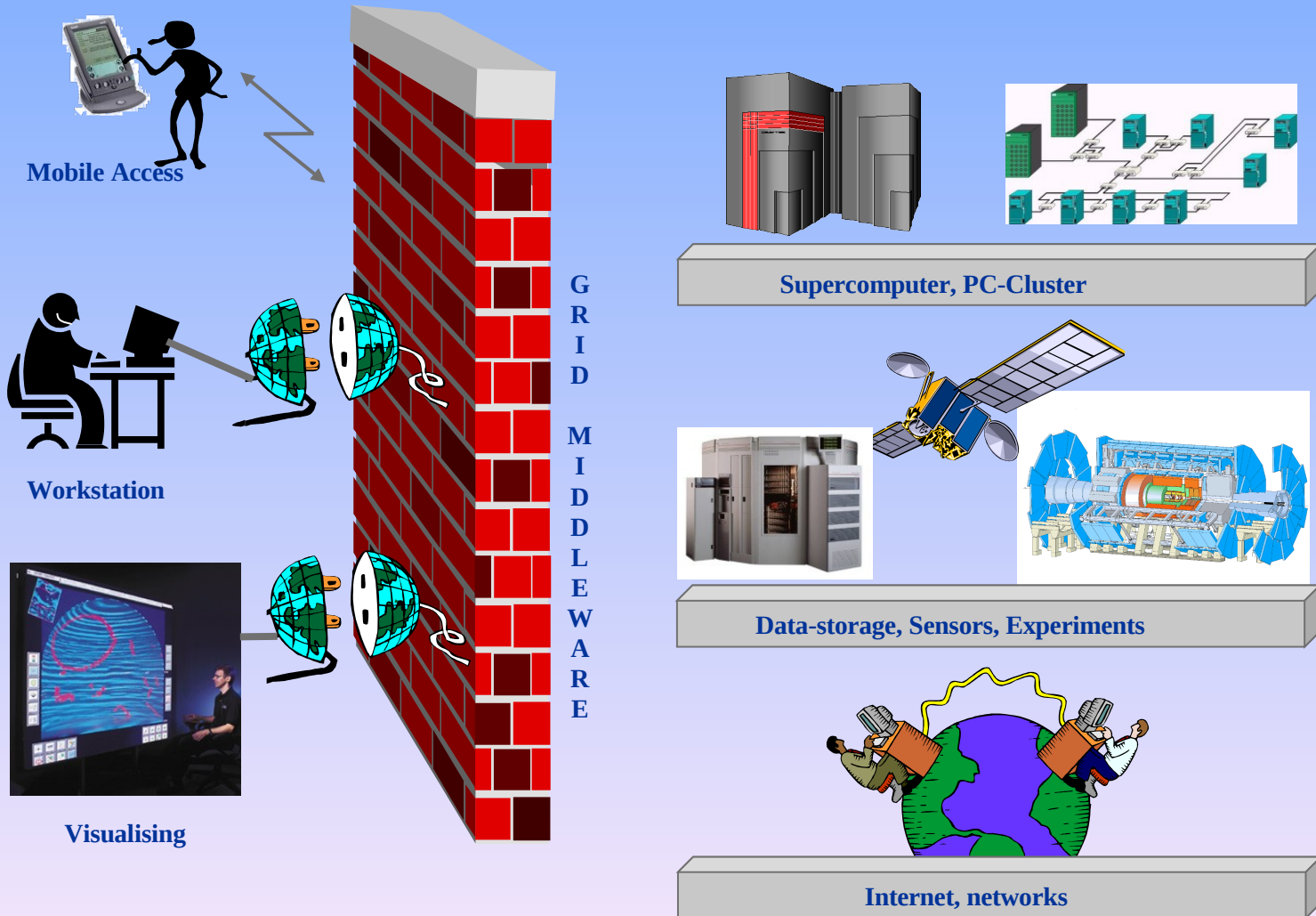
[www.eu-egee.org](http://www.eu-egee.org)  
EGEE-III

# EGEE: Tiers approach



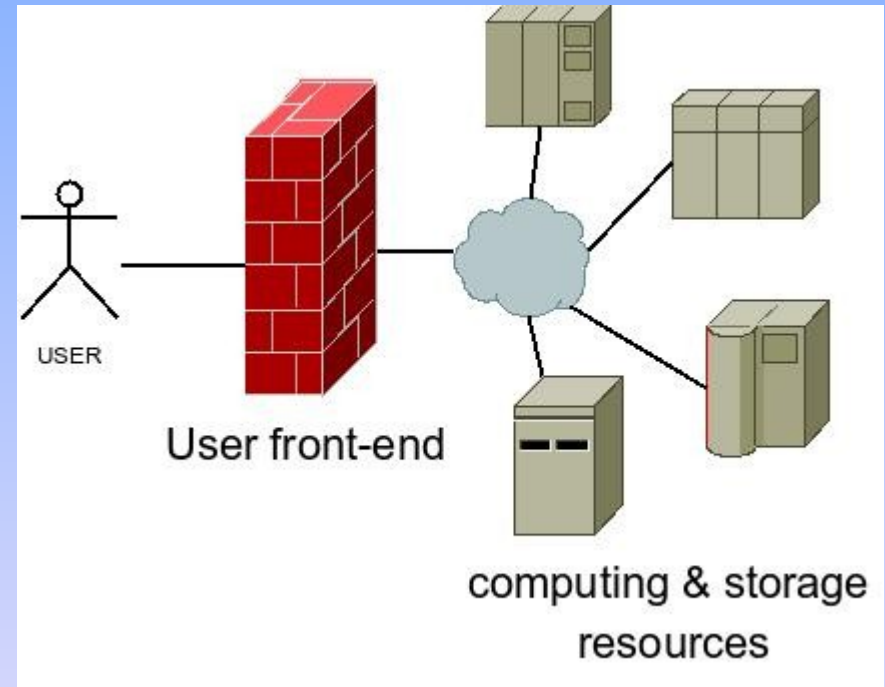
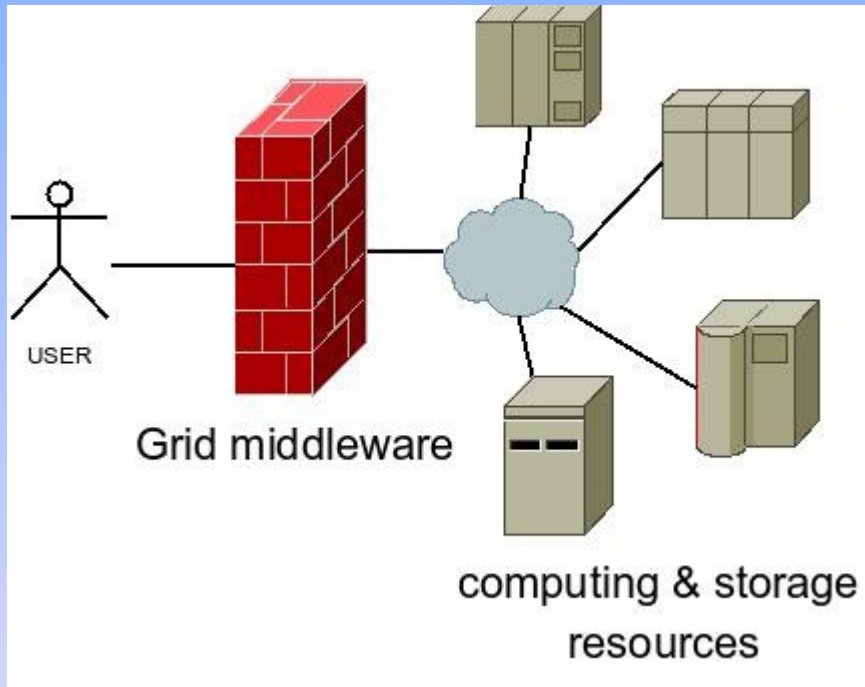


# Grid



# Grid vs Cloud Computing

- Distributed resources in various environment



- Multiple OS on a single resource management system

- Multiple OS on a single resource management system

# Cloud computing

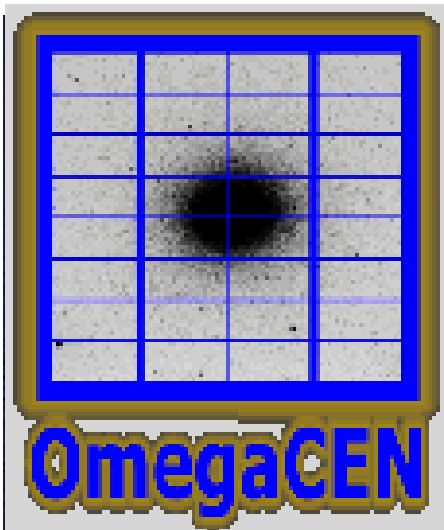
- Amazon web services – Elastic Computing Cloud

<http://aws.amazon.com/>

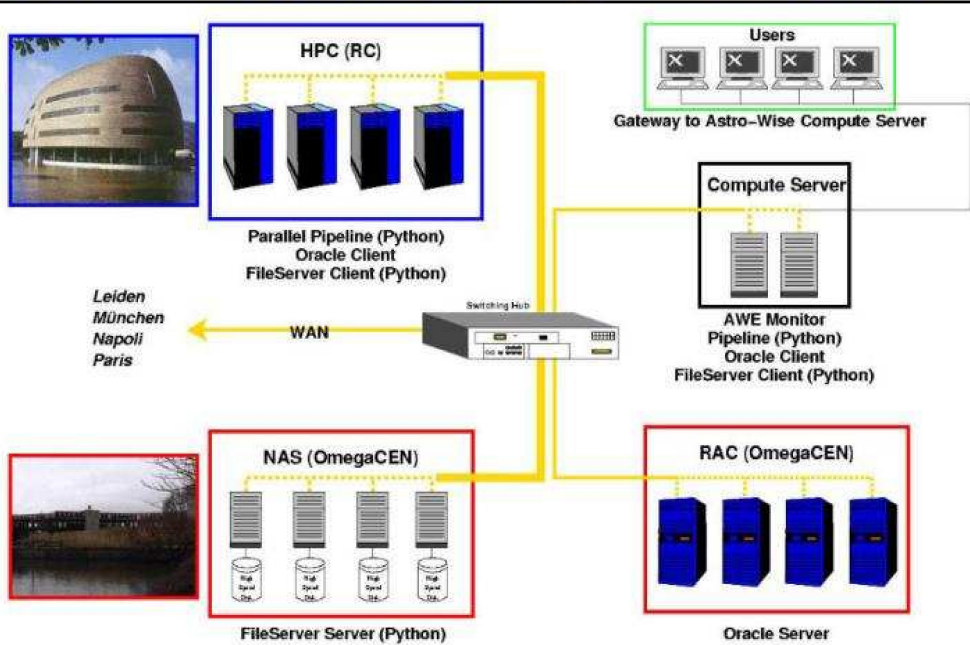
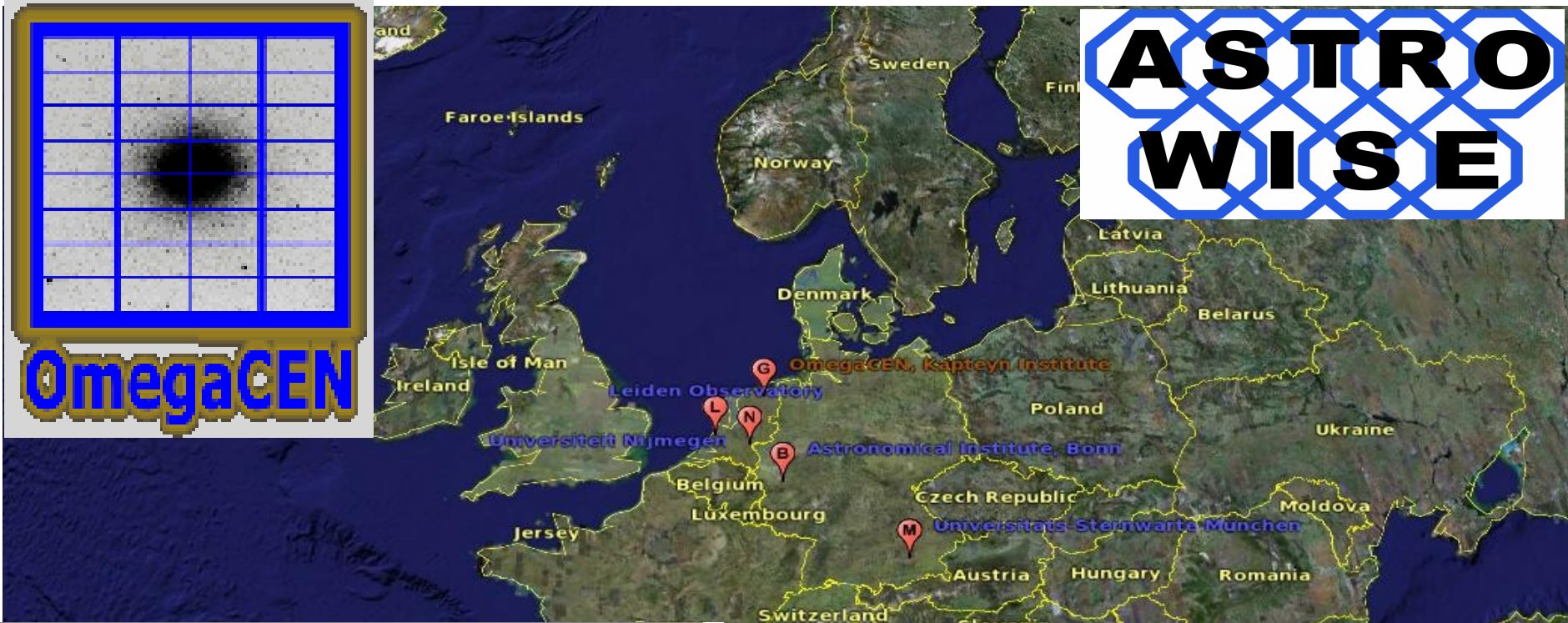
- Google

<http://code.google.com/appengine/>

# Astro-Wise: grid



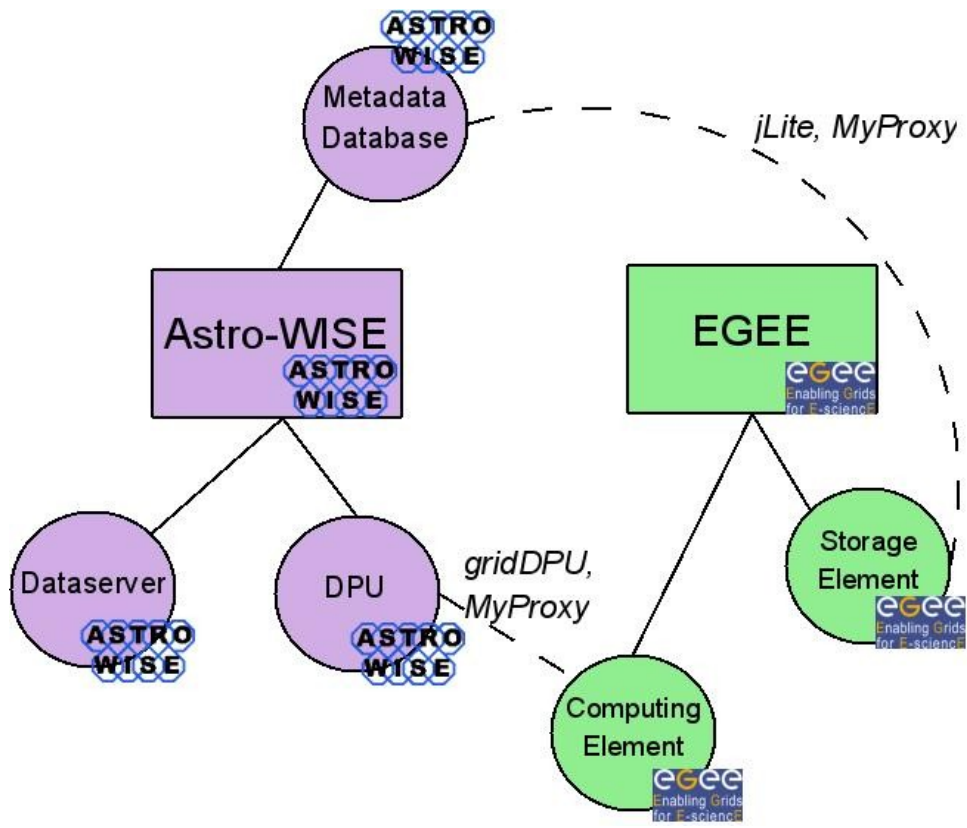
**ASTRO  
WISE**





# Astro-WISE - Grid Integration

- Astro-WISE – Grid integration WG (OmegaCEN: Belikov, Vriend, Boxhoorn; CIT: Dijkstra, Zheng)
- Astro-WISE – EGEE one way full integration (Astro-WISE user can access data stored on EGEE, store data on EGEE, launch Astro-WISE applications on EGEE)
- Authentication & Authorization (Grid certificate+Astro-WISE A&A)
- How-to available on [www.astro-wise.org](http://www.astro-wise.org), howtos, AW Environment



- Link from Metadata database to SRM
- Incorporation of third-party products into Astro-WISE (jLite, MyProxy)
- Use of Astro-WISE data models and data processing for Grid data processing
- Multiple copies of file (dataserver, EGEE Grid)



# Lofar: Science



# LOFAR Superterp





# Lofar-WISE: Data Storage



initial configuration

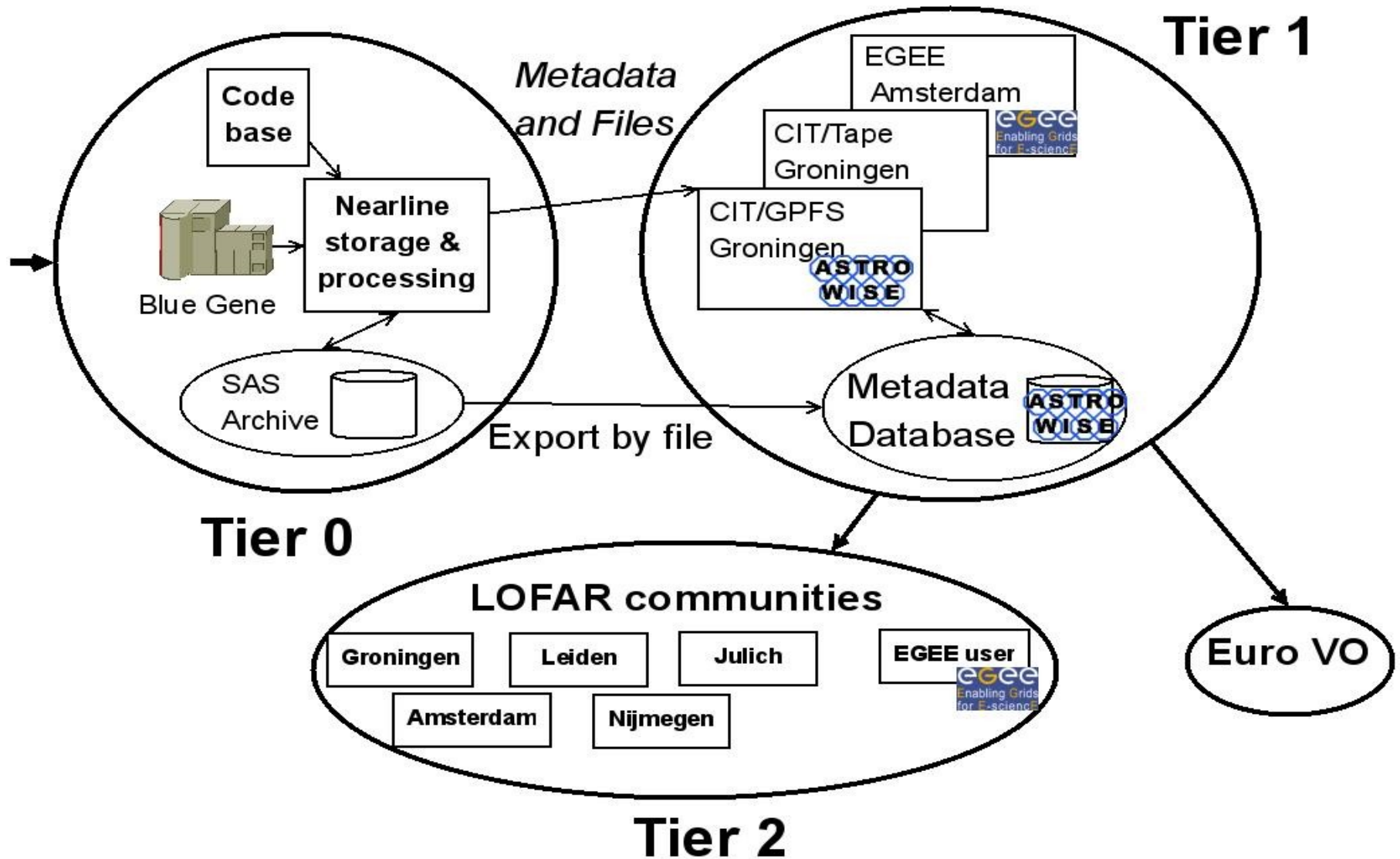
distributed FS & EGEE

Oracle for metadata





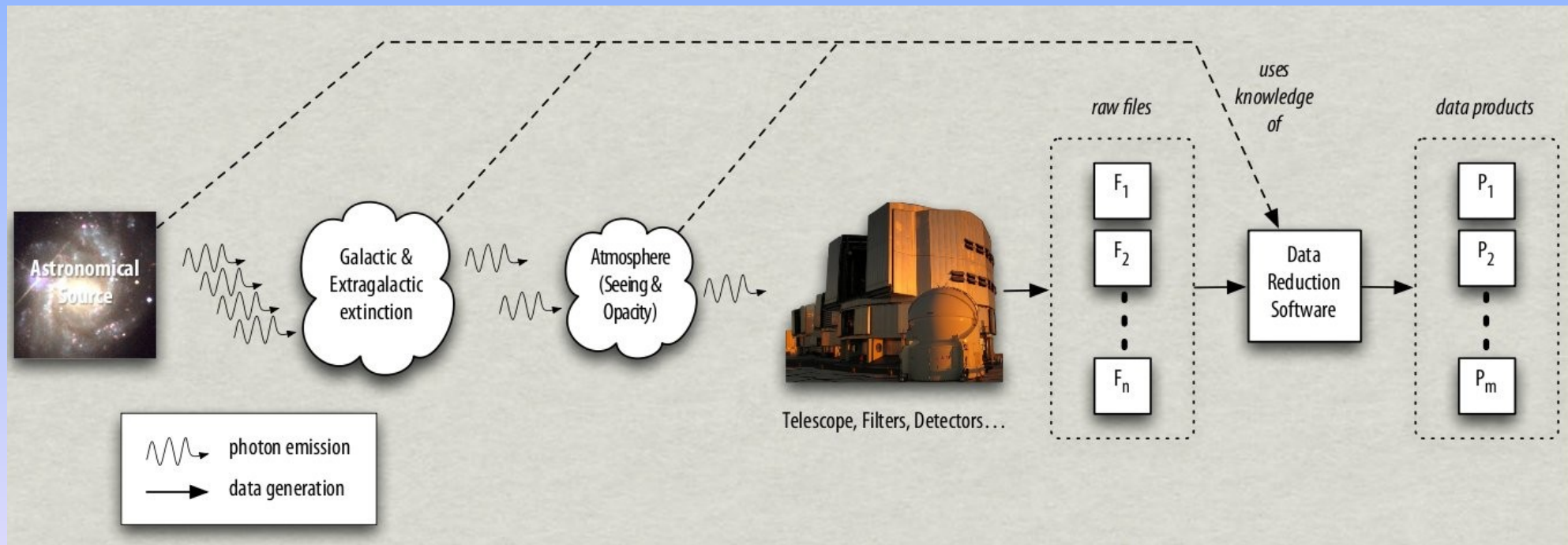
# LOFAR: first user of integration



# VO: Data Provenance

J.Santander, A.Delgado, The case for Data Provenance  
IVOA Interop 2009

<http://www.ivoa.net/cgi-bin/twiki/bin/view/IVOA/InterOpNov2009DM>



Connect data reduction facilities (like Astro-WISE) with telescopes (raw data archive on telescope) and end-user (VO interfaces) by providing complete description of raw data (general data model for raw data).