

Grid Activities in Greece and the role of GRNET

Fotis Karayannis

GRNET Infrastructure Planning and Development Manager
HellasGrid Scientific Coordinator

fkara@grnet.gr



Presentation Outline

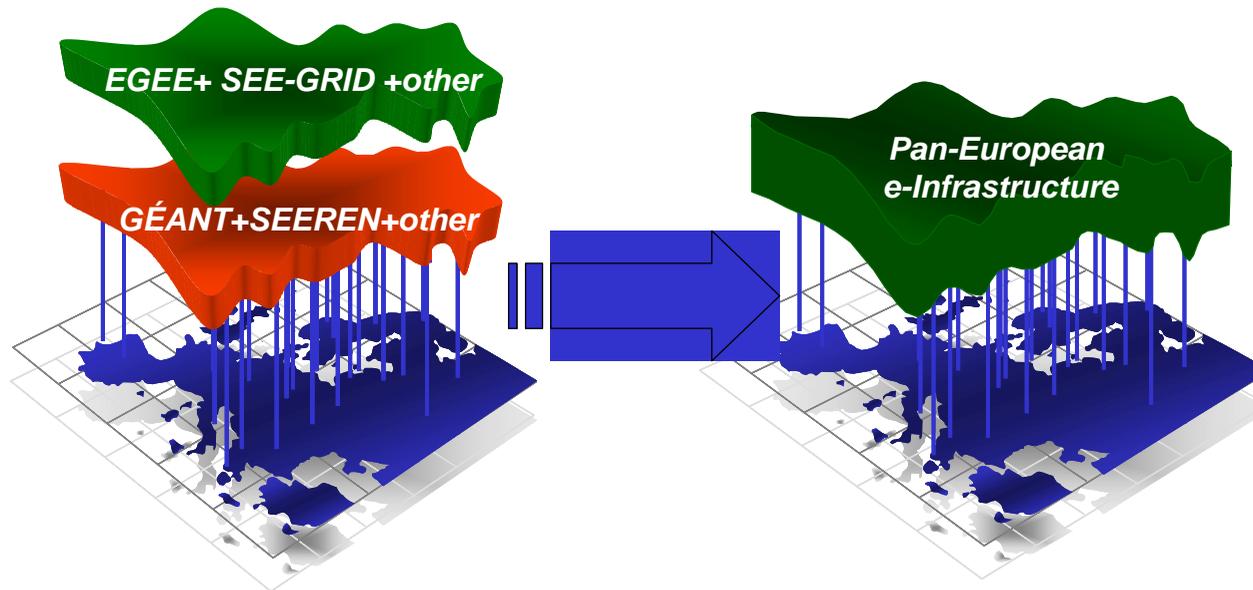
- GRNET mission and overall activities
- Grid Activities
- National Activities:
 - The HellasGrid National Initiative
- Regional Activities
 - South Eastern European Grid-enabled eInfrastructure Development (SEE-GRID)
 - EUMEDGRID- empowering eScience across the Meditteranean
- European Activities
 - Enabling Grids for Escience (EGEE)
- The role of the Greek NREN - GRNET
- Conclusions

GRNET mission statement

- Provides high-quality infrastructure services to the Greek academic & research community to support their research and educational activities
 - International and national advanced networking services
 - Greek National Research and Education Network (NREN)
 - Grid infrastructure services (computing, storage, visualisation)
 - Greek National Grid Initiative coordinator
 - Promotes and disseminates the use of ICT in the public and private sector towards an eGovernment, eLearning and eBusiness environment.
- * GRNET is a state-owned organization under the supervision of the Ministry of Development (General Secretariat of Research & Technology).

GRNET eInfrastructure

- GRNET has adopted the EU eInfrastructure initiative (www.e-infrastructures.org) :
 - Offering integrated networking and grid services



GRNET overall activities

- GRNET interconnects academic and research institutions (around 85 today), primary and secondary schools (around 10.000) strengthening communication and cooperation. A total of up to 1.000.000 end-users
 - Continuously upgrades the NREN backbone (currently 2.5 Gbps), institutions access (currently up to 1 Gbps), and schools access (to Mbps)
- Provides Grid infrastructure and middleware services
- Cooperates with Greek and international research and academic institutions through European and national projects for the development of innovative networking and Grid services
- Operates the Athens Internet Exchange (AIX), peering of Greek commercial ISPs
- Promotes the adoption of the Information Society

Grid Activities - Background

- National setting at the end of 2002:
 - Numerous Greek participations in FP5 GRID projects, many GRID expert groups
 - GRNET DWDM research networking infrastructure available
 - There was no national body to coordinate Grid activities in Greece
 - No clear grid priority in the Greek Operational Programme for the Information Society (funding body)
- GRNET (the Greek NREN) proposed to the Greek government the formation of HellasGrid Task Force
 - Extending the Research Infrastructures from networks to Grids (computing, storage, etc.)
 - Implementing the EU eInfrastructures vision
 - Being infrastructure-oriented and application-neutral serving all user eScience communities

The “HellasGrid” Initiative - Organisation

- Initiated by GRNET, under the auspices of the Secretary for the Information Society, Ministry of Economy and Finance
www.hellasgrid.gr
 - First meeting in December 2002 – ratified in January 2003
- Main group (Task Force)
 - 28 Members from the Academic and Research Community– (Rectors, Research Centres Directors, Professors) – political body (decision taking)
- Scientific Committee (Technical Body)
 - 11 expert Members in broadband networking, cluster computing, HPC infrastructure, middleware and eScience applications)

HellasGrid - Members

■ Coordinator

- National Research and Education Network, GRNET – www.grnet.gr

■ Universities (10)

- Aristotle University of Thessaloniki, AUTH www.auth.gr
- Athens University of Business, AUEB www.aueb.gr
- National Technical University of Athens, NTUA www.ntua.gr
- University of the Aegean www.aegean.gr
- University of Athens, UoA www.uoa.gr
- University of Crete, UoC www.uoc.gr
- University of Ioannina, UoI www.uoi.gr
- University of Macedonia, UoM www.uom.gr
- University of Patras UPATRAS www.upatras.gr
- University of Piraeus UNIPI www.unipi.gr

■ Research Centres (8)

- Research and Academic Computer Technology Institute, CTI www.cti.gr
- Centre for Research and Technology Hellas, CERTH www.certh.gr
- Institute of Computer Science – FORTH, www.ics.forth.gr
- Institute of Accelerator Systems and Applications, IASA www.iasa.gr
- Institute of Communication and Computer Systems, ICCS www.iccs.ece.ntua.gr
- National Meteorology Service, EMY www.emy.gr
- National Observatory of Athens, NOA www.noa.gr
- Research Centre Demokritos, DEMOKRITOS www.demokritos.gr

HellasGrid Phases

- Phase I
 - HellasGrid Task Force Strategy Report and GRNET Pilot Infrastructure installation
 - (64 CPUs, 10 TB SAN, 12 TB Tape Library)
 - Participation in EGEE - Integration of central Grid node
- Phase II
 - HellasGrid project implementation
 - Extension of Grid infrastructure (768 CPUs, 30TB disks, 60TB tape libraries) – Integration in EGEE
 - Further application support
 - Investigation for further support - training

Timeline 2003 – Phase I

- First Year (2003):
 - 9 **Scientific Committee** meetings
 - 6 **Plenary** meetings (Task Force + Scientific Committee)
- Draft version of **strategy document**: **June 2003**
- Signature of Hellas Grid **MoU**: **October 2003**
- Final version of **strategy document** : **November 2003**
- Hellas Grid **Workshop**: **Athens 16th December 2003** combined with European **DataGrid** (EDG) project training
 - Presentation of Hellas Grid Strategy Document
 - Open consultation with the Greek community
- **Submission** of Hellas Grid **Proposal**: **December 2003**

Timeline 2004 – From Phase I to Phase II

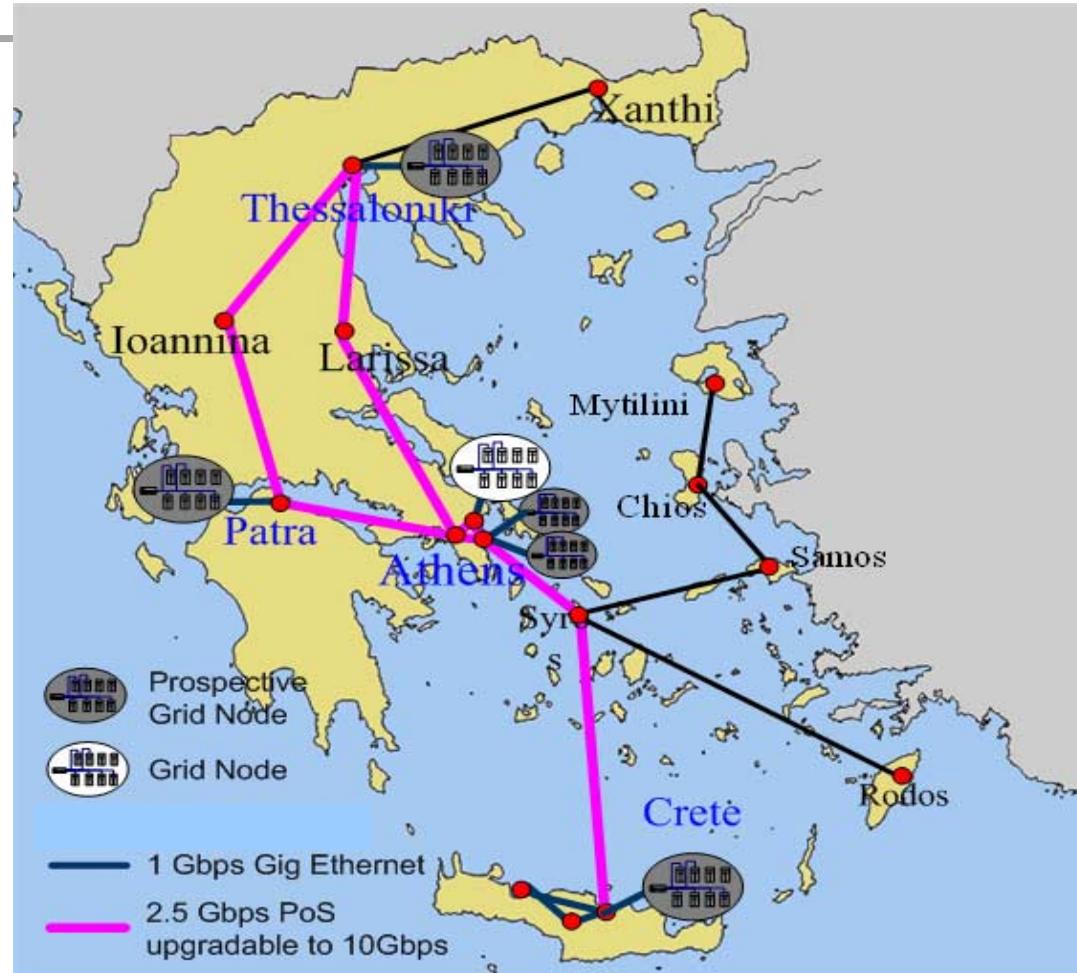
- **EGEE** project kick-off: Participation of GRNET & Hellasgrid: **April 2004**
- Grid Forum in the framework of World Congress for the Information Technology- **WCIT** : **May 2004**
- Inauguration of the first **pilot GRNET Grid Node** @ Demokritos (64 CPUs, 10 TB SAN, 10 TB Tape Library): **May 2004**
- 1st EGEE **Training** Course : **May 2004**
- **Approval** of the Hellas Grid Proposal: **November 2004** (PHASE II)
- Preparation of a tender for extended infrastructure: **December 2004**

Timeline 2005 –Phase II

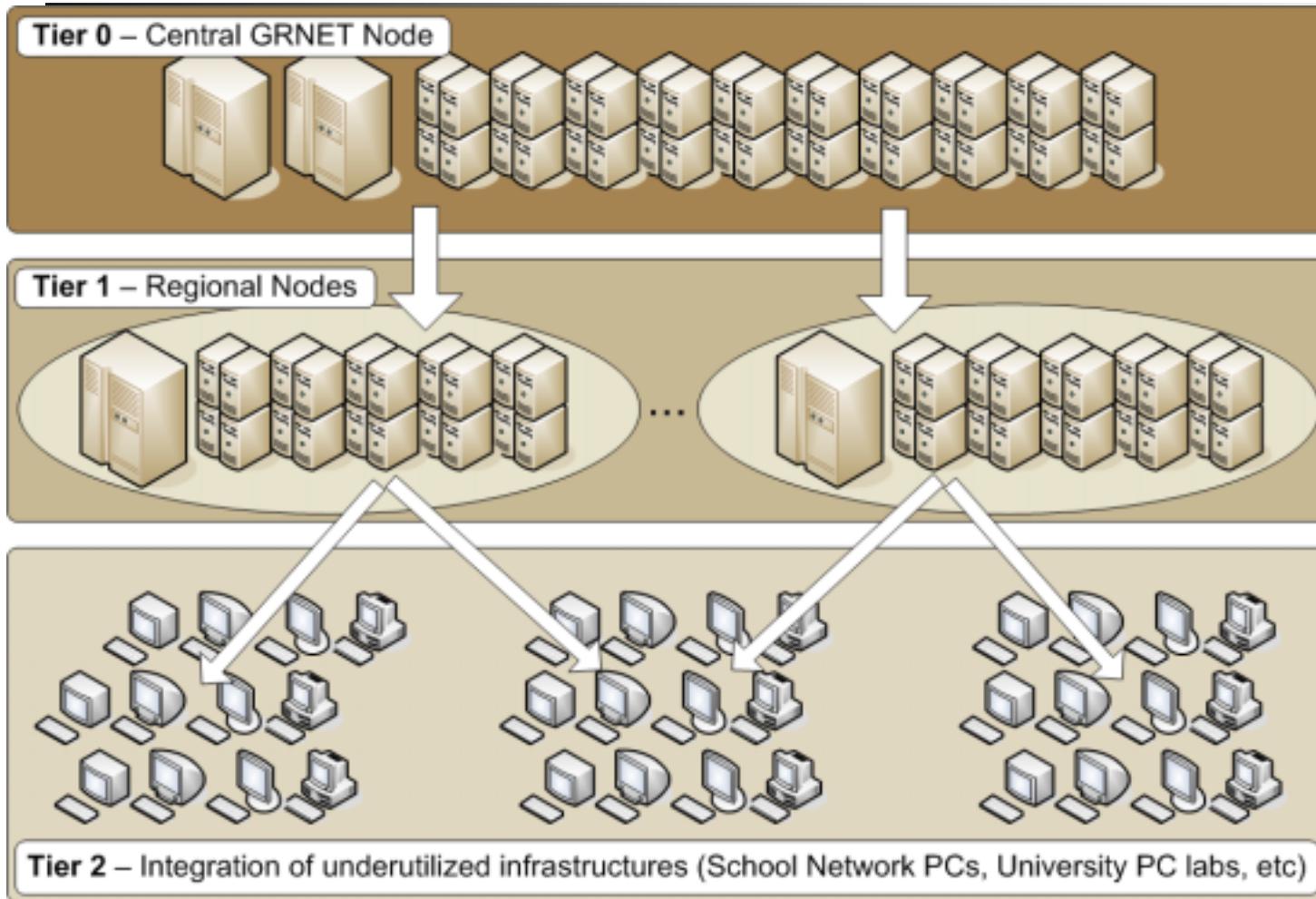
- Hellasgrid project **tender** published: **April 2005**
- GRNET hosted **3rd EGEE project conference**
<http://public.eu-egee.org/conferences/3rd/>
- Grid **applications call** announced by the General Secretariat of Research and Technology (GSRT): **May 2005**
- Grid apps proposal **submissions**: **June and October-November**
- Hellasgrid extended infrastructure **installed**: **July-August 2005**
- Hellasgrid extended infrastructure integrated to EGEE:
~ September 2005

GRNET/Hellasgrid eInfrastructure

- **Exploitation of GRNET DWDM network**
 - 2,5 Gbps backbone available
- Collocation of Grid Nodes in Research / Academic centres
- **Creation of a human network**
 - Scientific community served by GRNET: 85 Institutes
- **Use of Access Grid**
 - for collaboration and management of GOCs



Implementing the HellasGrid Infrastructure



Computing Power,
Disk/Tape Storage,
Core Grid Services

Computing Power,
Disk Storage,
[Core Grid Services]

Computing Power
Disk Storage

Infrastructure details

- **1st phase ("proof of concept"):**
GRNET node (Demokritos) already integrated with EGEE pan-European infrastructure
 - 64 CPU, 10TB on-line storage (FC), 12 TB Tape Library
 - Running LCG-2.3 Middleware in Scientific Linux Platform
- **2nd phase ("big rollout", ready by 3Q 2005):**
 - 6 site installations connected with 2,5 Gbps GRNET2 network:
 - 96 CPU nodes NTUA
 - 96 CPU nodes IASA-UoA
 - 128+64 CPU nodes Demokritos (GRNET)
 - 128 CPU nodes AUTH (Thessaloniki)
 - 128 CPU nodes CTI (Patras)
 - 128 CPU nodes ICS-FORTH (Heraclion-Crete)
 - Additional 6 x 4 TB on-line storage in local sites
 - Additional 50 TB Tape Library in Demokritos (GRNET)
 - 4 Access Grid nodes
- Integration of other University or Research Centres' clusters and other underutilised infrastructures

32bit Architecture



64bit Architecture

Applications

- High Energy Physics (HEP)
 - VO already supported
 - Bio-informatics
 - VO already supported
 - Further extensions – SEE VO operational
 - Meteorology
 - Health
 - Chemistry
 - Life Sciences
 - Engineering
- In parallel: Promote Grids for eBusiness, eGovernment needs

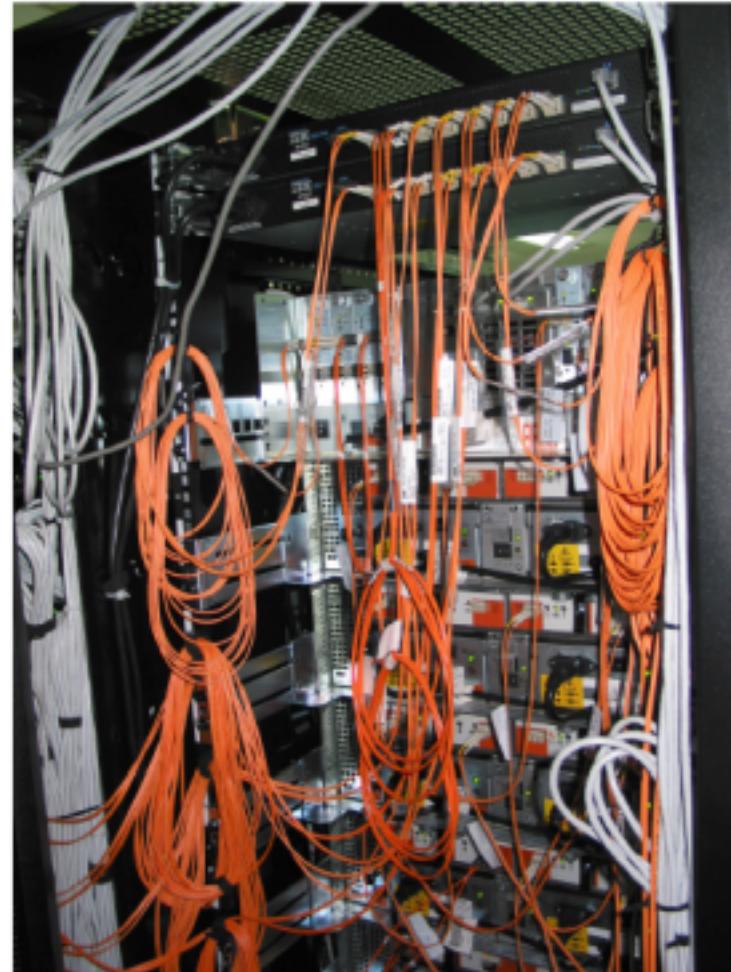
Funding

- 0.6M€ (1st phase) + 1.8M€ (2nd phase) for Infrastructure + GOCs and middleware deployment
 - Operational Programme for the Information Society / Ministry of Economy and Finance (OPIS/MNEC)
- 0.5M€ for gridifying existing apps – OPIS/MNEC

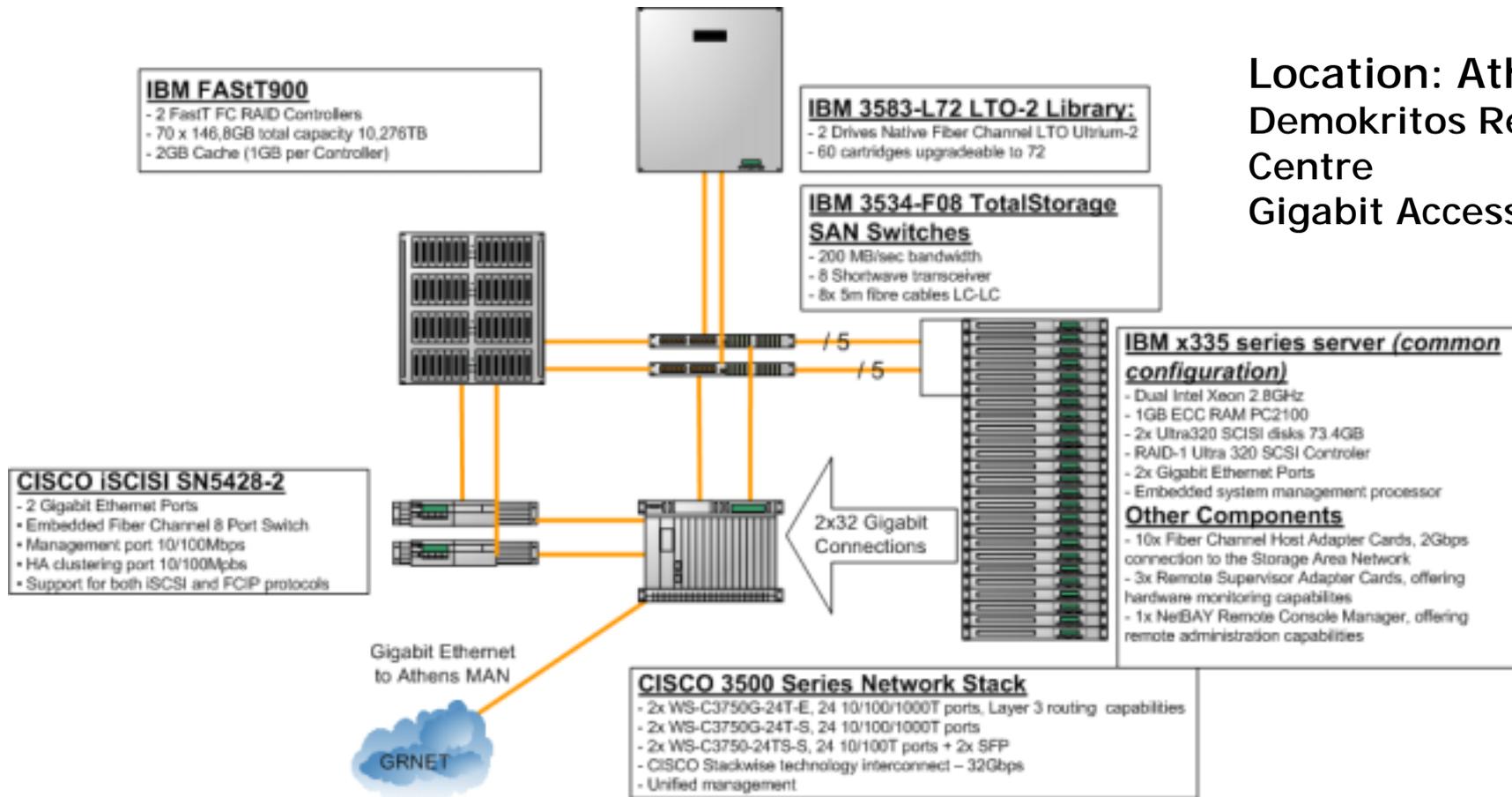
TOTAL : ~3M€

- Further support sought by General Secretariat for Research and Technology / Ministry of Development + OPIS/MNEC

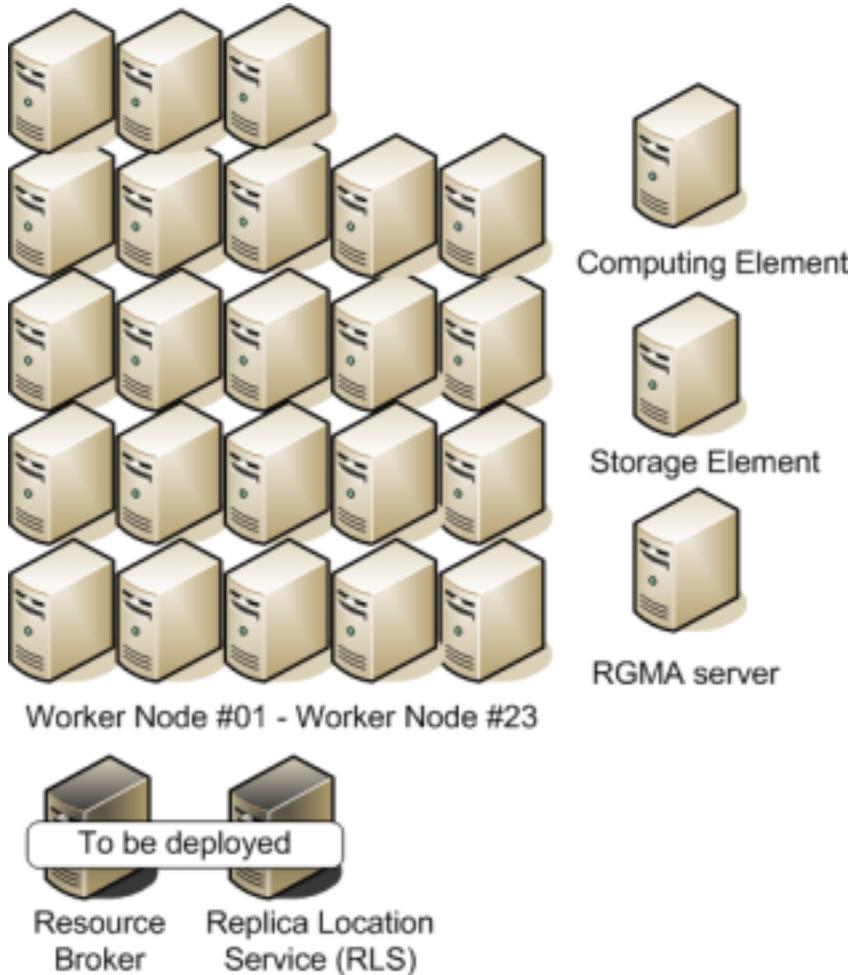
GRNET Central Node – Tier 0 (1/4)



GRNET Central Node – Tier 0 (2/4)

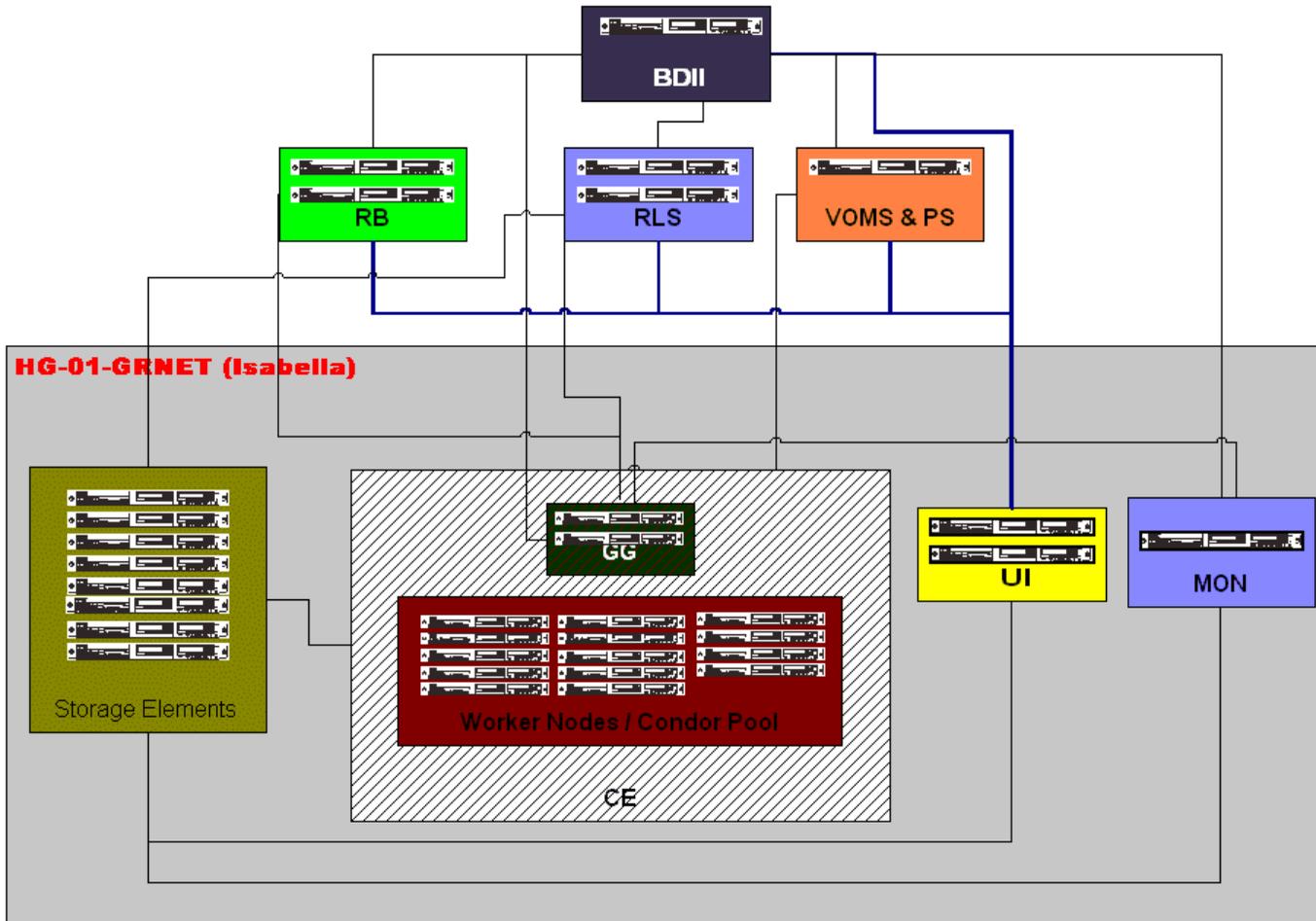


GRNET Central Node – Tier 0 (3/4)



- The operating system is **Scientific Linux**
- The installed middleware is **LCG-2**
- All worker nodes, computing and storage element share a common and distributed filesystem **IBM GPFS**. (Installed version 2.2.0)
- For cluster administration IBM software is used:
 - o IBM Director
 - o IBM Cluster System Management (CSM)
 - o IBM Remote Supervisor Adapter (RSA)
 - o IBM NetBAY Remote Console Adapter
 - o IBM Tivoli Storage Manager

GRNET Central Node – Tier 0 (4/4)



Computing Element (CE)
 Storage Element (SE)
 Monitoring Element (MON)

Integration with other platforms

e.g. existing "legacy" resources (storage, clusters)

CSLAB@NTUA, ICS@FORTH, AUTH etc. (over 400 nodes)



Linux clusters
+
Storage

Regional Activities

■ SEE-GRID

- South Eastern European Grid-enabled eInfrastructure Development (SEE-GRID)



Microsoft
PowerPoint Presentation

■ EUMEDGRID

- empowering eScience across the Meditteranean

European Activities: EGEE

- GRNET and Hellasgrid **Third parties** participating in EGEE (as a Joint Research Unit – JRU)
- Hellasgrid **infrastructure** is currently used in EGEE – another 5 clusters to be added this year (total ~700 CPUs / 10 TB)
- Representing **South East Europe** in the Executive Committee (Project Management Board-PMB)
 - SEE Federation: **Bulgaria, Cyprus, Israel, Greece, Romania**
- Participating in **training, policies, operation and network provision** activities
- Coordinating the SEE Grid Regional Operations Centre (**SEE ROC**)
- Coordinating **training** activities in the region
- Link with the NRENs - GEANT community and SEE-GRID
- GRNET hosted 3rd EGEE Conference in Athens

The role of GRNET (1/2)

- Bonding link at National, Regional and European Level
 - Hellasgrid **coordinator**
 - EGEE **partner** – link with Hellas Grid Task Force
 - Use of Hellas Grid partners as **EGEE Third Parties**
 - SEE-GRID project coordinator
 - EUMED GRID proposal partner
 - Organization of 1st **eInfrastructure** event in Athens
www.einfrastructures.org
 - Active in the **eInfrastructure Reflection Group (eIRG)**
www.e-irg.org

The role of GRNET (2/2)

- Participates in global fora – following technology evolution (iGrid2002 Virtual Ancient Olympia demo, GGFs, Supercomputing 2003-2004, iGrid2005)
 - Strong collaboration with CERN
 - Mainly in the framework of EGEE and SEE-GRID projects
 - Technology diffusion to its 85 interconnected institutes
- *GRNET has adopted the EU eInfrastructure model and is successfully implementing it*

Conclusions

- Greece is actively participating in European Grid initiatives
- Grid is collaborative by definition:
 - Need for user participation and collaboration at all levels (networking, M/W, applications)
- There is **eagerness** for participation and European teamwork!