

Towards a common European market for computing and data management

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Computer and networking technology

- The state of computer and networking technology today makes the “Grid Vision” conceivable
- Software toolkits are available for Grid computing (Globus, CondorG, and Unicore)
- A number of projects have demonstrated first results for various aspects of computer Grids
- Europe has achieved a prominent position in this field, in particular for its success in establishing a functional Grid testbed in the context of the European DataGrid (EDG) project

European DataGrid (EDG) project



- 9.8 M Euros EU funding over 3 years (twice as much from partners)
- 90% for middleware and applications (High Energy Physics, Earth Observation, Genomic Exploration)
- Total of 21 partners: research and academic institutes as well as industrial companies
- Three year phased developments & demos (2001-2003)

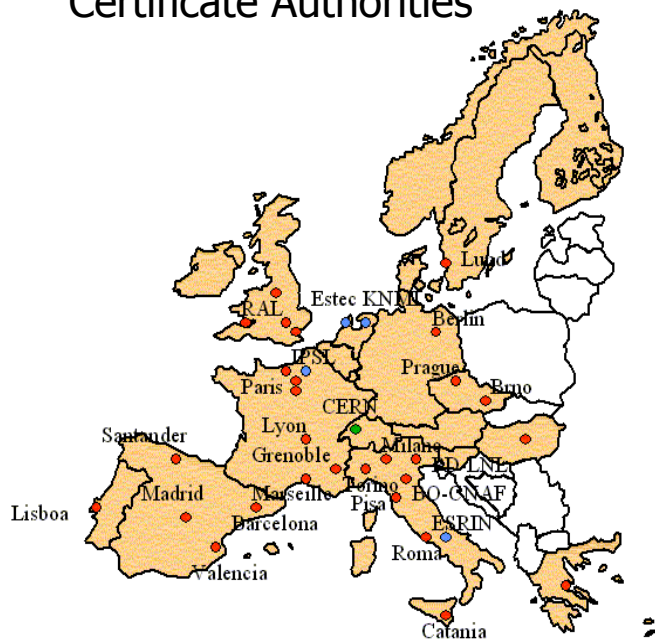
More and more scientists begin to use the EDG middleware and testbed, relying on Grid technology to solve huge data challenges

Since Last Year:

- Improved software (EDG 1.4.3).
- Doubled sites. More waiting...
 - Australia, Taiwan, USA (U. Wisc.), UK Sites, INFN, French sites, CrossGrid, ...
- Significantly more CPU/Storage.

Hidden Infrastructure

- MDS Hierarchy, Resource Brokers, User Interfaces, VO Replica Catalogs, VO Membership Servers, Certificate Authorities



EDG Application Testbed

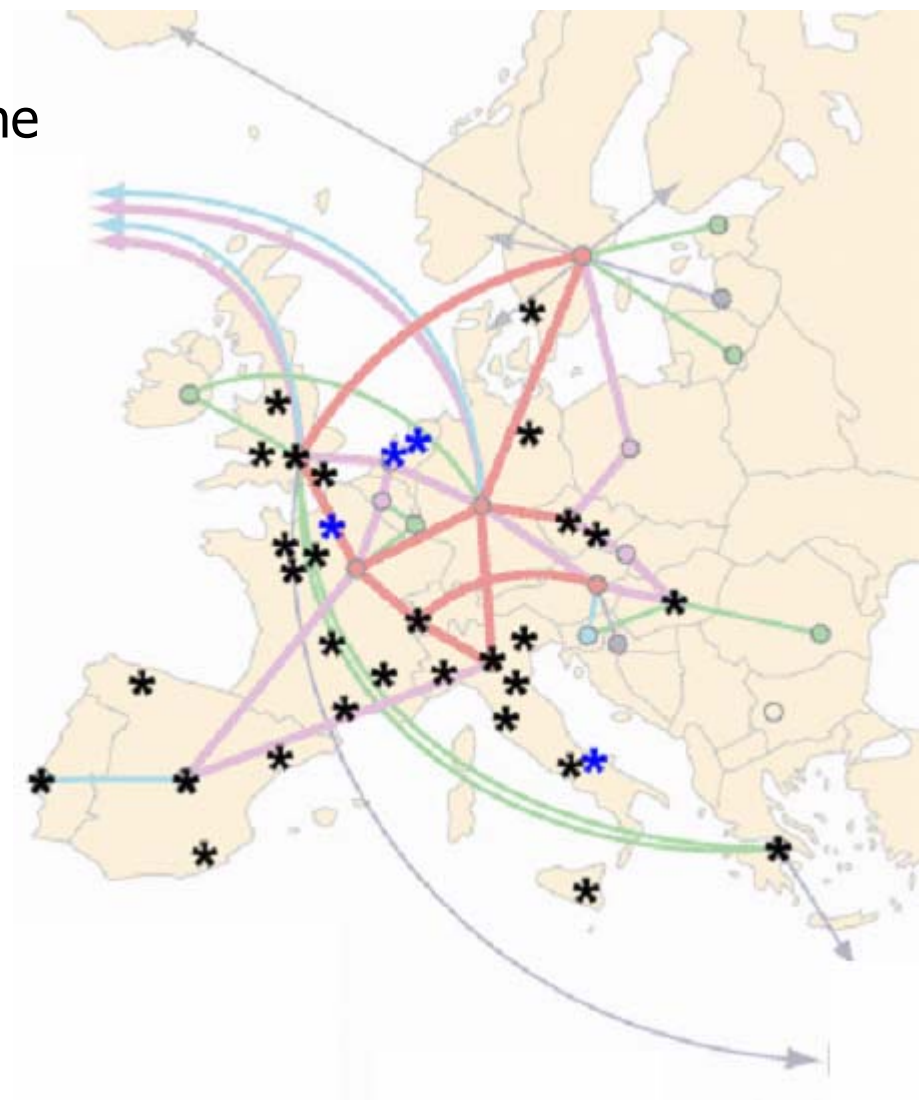
Site	Country	CPUs	Storage
CC-IN2P3*	FR	620	192 GB
CERN*	CH	138	1321 GB
CNAF*	IT	48	1300 GB
Ecole Poly.	FR	6	220 GB
Imperial Coll.	UK	92	450 GB
Liverpool	UK	2	10 GB
Manchester	UK	9	15 GB
NIKHEF*	NL	142	433 GB
Oxford	UK	1	30 GB
Padova	IT	11	666 GB
RAL*	UK	6	332 GB
SARA	NL	0	10000+ GB
TOTAL	5	1075	14969 GB

*also Dev. TB; +200 TB including tape

EDG Application Testbed

- Connections made possible by the EU-funded **GEANT project**
 - connecting more than 30 countries across Europe
 - speeds of up to 10 Gbit/s
 - high data throughput
 - quality of Service

EDG and GEANT: the first major production quality tests of the network



European Grid Initiatives

- EU DataGrid and many EU funded projects and activities (CrossGrid, DataTAG, Grace, GRIDSTART, ...)
- National Grid initiatives such as UK e-Science, INFN Grid, Nordugrid, ...

However

as yet, there are no real production-quality Grids that can offer continuous, reliable Grid services to a range of scientific communities

The Vision

- Integrate current national, regional and thematic Grid efforts, in order to create a seamless European Grid infrastructure
- Exploit Grid expertise that has been generated by EU supported Grid projects and national Grid initiatives
- Provide European researchers in academia and industry with a common market of computing resources, enabling round-the-clock access to major computing resources, independent of geographic location
- Provide a unique tool for collaborative compute-intensive science ("e-Science") in the European Research Area
- Provide interoperability with other Grids around the globe, including the US NSF Cyberinfrastructure, contributing to efforts to establish a worldwide Grid infrastructure

The Obstacles: technical challenges

- Current Grid middleware is often not interoperable
 - Several ongoing activities to remedy this situation:
 - GGF defines standards
 - Community standards (GLUE for HEP)
 - OGSA framework (GGF activity) should allow for easier interoperability
- Local Site policies do not take Grids into account
 - Security policies not uniform and sometimes not flexible enough to accommodate wide area Grid computing (e.g. strict firewalls)
 - Accounting procedures specialised and not interoperable
 - Authentication and Access policies do not allow for 'single-sign-on'
 - Lack of more uniform site policies results in middleware customised to some sites and not deployable at others
 - Need more uniform site policy standards

The Obstacles: political aspects

- No business models to motivate industry, although all major IT companies are making strong statements and showing growing interest
- Perception among traditional computer centres that Grid technology could eventually undermine their customer market
- Role of commercial Telecom operators and national NRENs?
- Standards for seamlessly connecting to the Grid, publishing and bidding for resources are still emerging

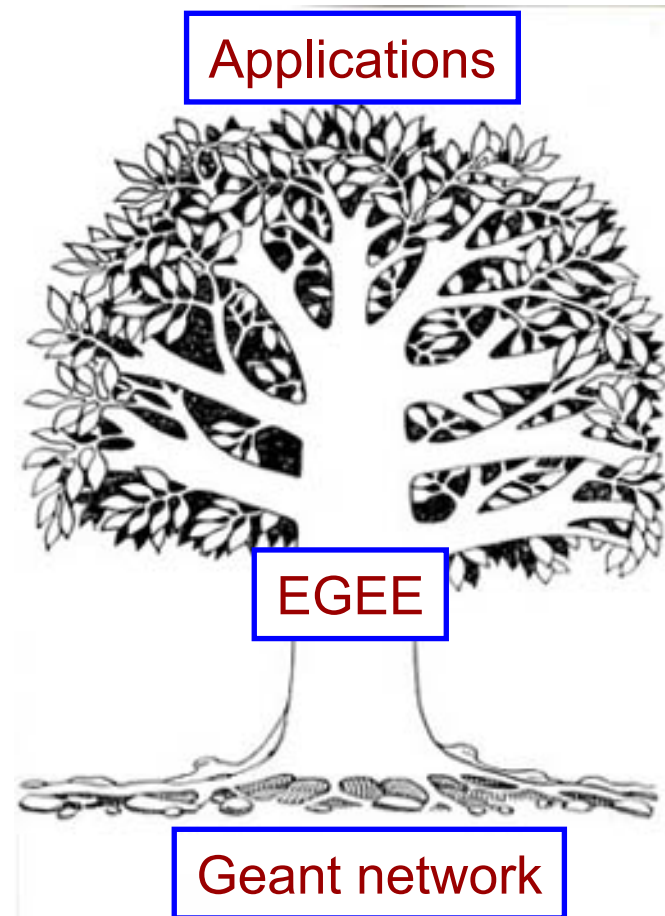
Historical Analogy: the Internet

- Early networks closed and largely non compatible, NFSNET (US) and JANET (UK) decided to provide network connectivity to all organizations that:
 - provided network connections
 - made it available to ALL qualified users
- Large user base exposed security holes and helped define common and acceptable use rules

Need for co-operation and standardization in defining levels of security for VO, finding accounting solutions, managing competing communities

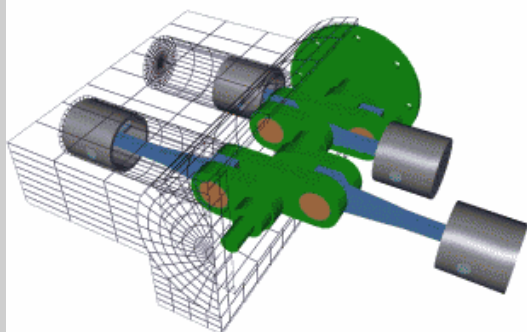
EGEE: Enabling Grids for E-science in Europe

- Goal
 - Create a wide European Grid production quality infrastructure on top of present and future EU RN infrastructure
- Build on
 - EU and EU member states major investments in Grid Technology
 - International connections (US and AP)
 - Several pioneering prototype results
 - Larg Grid development team (>60 people)
- Approach
 - Leverage current and planned national and regional Grid programmes (e.g. LCG)
 - Work closely with relevant industrial Grid developers, NRENs and US-AP projects



Why EGEE? The Societal Impact

- *An international network of scientist will be able to model a new flood of the Danube in real time, using meteorological and geological data from several centers across Europe.*



- *A team of engineering students will be able to run the latest 3D rendering programs from their laptops using the Grid.*

- *A geneticist at a conference, inspired by a talk she hears, will be able to launch a complex biomolecular simulation from her mobile phone.*



Access to a production quality GRID will change the way science and much else is done in Europe

Why EGEE? The Political Context

- Current Grid R&D projects run out within 18 months
- The EGEE partners have already made major progress in aligning national and regional Grid R&D efforts, in preparation for EGEE
- Launching EGEE now will preserve the current strong momentum of the European Grid community, and the enthusiasm of the hundreds of young European researchers already involved in EU Grid projects (>150 in EDG only)



The Actions

- Establishment of a large production European Grid to support a Common European Market for computing and data management
- Creation of an “international board” of senior representatives of all stakeholders:
 - resource providers
 - regulatory national and international agencies
 - major user communities
- This board should discuss, monitor and support the creation of an adequate regulatory framework