

Review of Grid activities In Italy

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Summary

- The Italian eInfrastructure evolution
 - The national projects:
 - INFN Grid, FIRB Grid.it,.....
- The INFN Middleware developments
- The c-Omega consortium for open Middleware support
- Conclusions

Early Grid R&D in Italy : The INFN-GRID Project

- National Grid project approved at beg. 2000
 - Focused on the preparation of the INFN LHC comp. infrastructure
- The current size of the project : 25 Ital. Sites, ~90 FTE's
- Successful example of collaboration between physicists, Sw Engineers, Computer Professionals and Computer Scientists (CS Dep. of Universities of VE, PD, BO, CT, TO,...), Research Inst. as CNR, and Italian Industries
 - DatamatSPA and Nice have been major contributors in the joint developments of the Italian middleware components
- INFN Grid has been and is the national container for INFN to coordinate the contribution to all EU, National and International Grid projects, to LHC computing and to GGF standards
- Early R&D in Italy include work done in ISUFI (University of Lecce), Cosenza, Pisa etc
 - ->see S-PACI

The INFN Grid strategy

- Middleware was conceived since the beginning as being of general use and having to satisfy the requirements of other sciences
 - Biology (PD), Astrophysics (PD) and Earth Observation(Esrin-ESA-Frascati)
- Tight collaboration with CERN, as natural coordinator of European Projects for M/W and EU e-Infrastructure developments and other National Projects (UK e-Science...) leveraging from
 - CERN succesful experience in managing large projects
 - CERN as EU excellence lab.
- Strong integration between the National and EU e-Infrastructure (EDG, EGEE/LCG, EGEE-II)
 - "Same" M/W, same services, integrated operation and management
 - National development of complementary or missing services but well integrated in EU M/W Service Oriented Architecture

From INFN Grid to an Italian Grid: grid.infn.it

The FIRB Grid.it Project

launched in 2002 within

FIRB: Government Fund for the Investments in
the Basic Research (Ministry of Education,
University and Research (MIUR))

The Grid.it National Project 11.2M€

CNR & University

HPC, Parallel Programming, Grid computing,
Scientific libraries, Data base and knowledge discovery,
Earth Observation, Computational chemistry,

Image processing, ->ASSIST

INFN & University

Grid infrastructure(INFN-Grid, DataGrid, DataTag) ,
e-science applications: Astrophysics,
Bioinformatics, Geophysics, ...

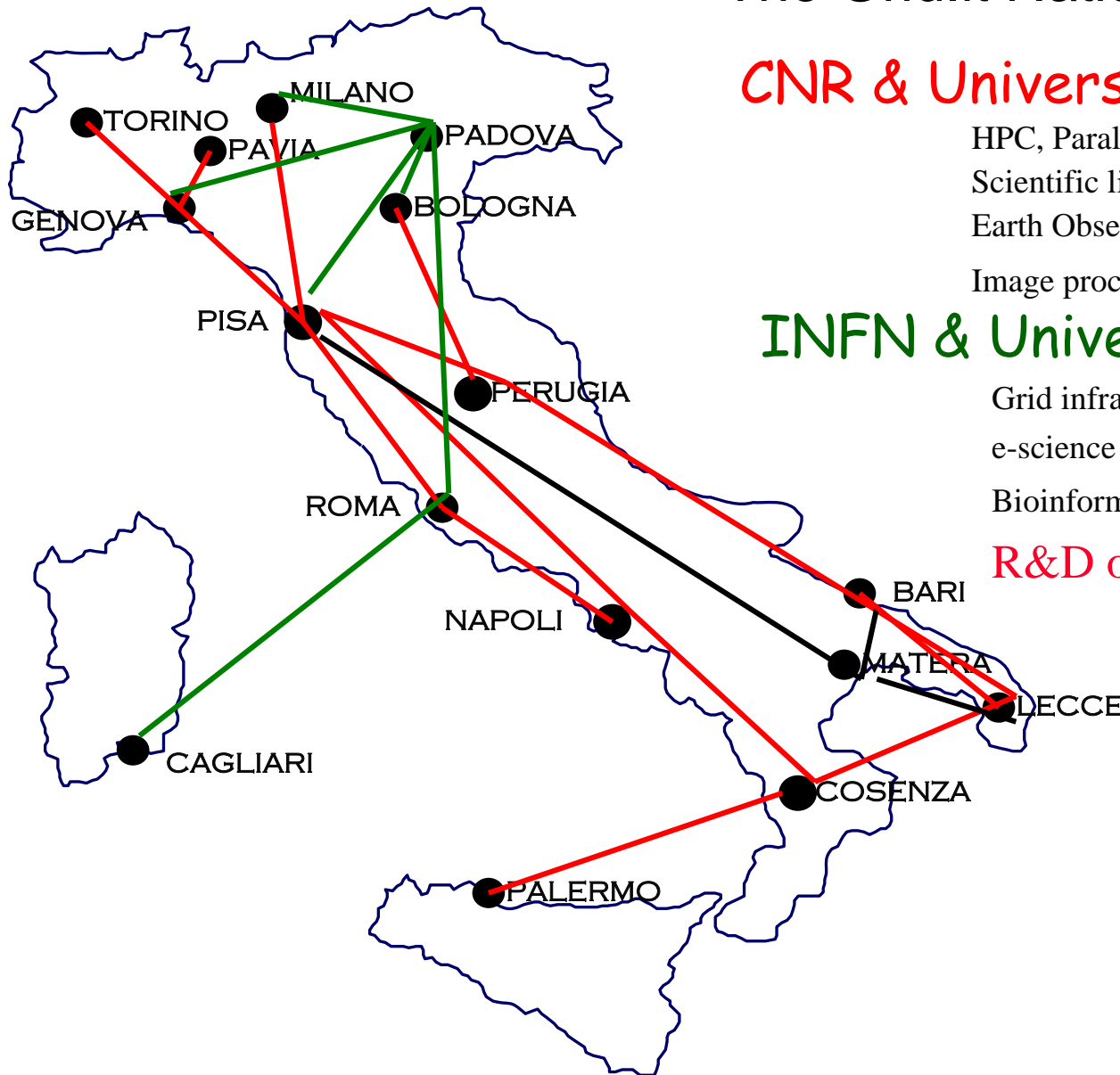
R&D on National eInfrastructure

ASI

Applications of
Earth Observation

CNIT

*R&D on optical
networking*



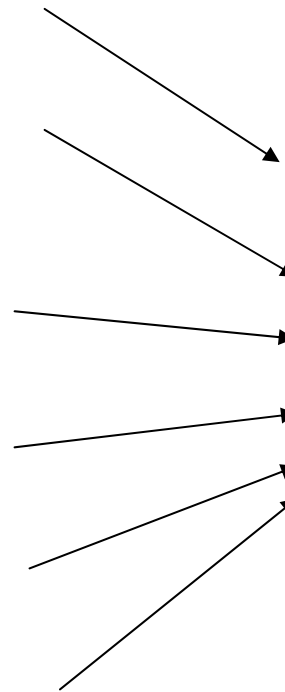
Complete : November 2006

The Grid.it e-Infrastructure

- In Grid.it INFN is completing the R&D phase for a National Grid Infrastructure and for studying and prototyping the services of a national Grid Operation Center (GOC)
 - At CNAF (Bologna) but leveraging contributions from other Italian centers
- The generalization of the infrastructure support to other Sciences from INFN is a model successfully established in the past with the Networking
 - From INFNet to GARR
- The GOC currently support several Italian Research Communities application and the operation of the Italian e-Infrastructure also as part of the LCG/EGEE
 - Astrophysics, Biology, Computational Chemistry, Geophysics, Earth Observation
- But other sciences are continuously joining thanks to new MIUR funds

Grid.IT Production Grid: Operations Portal

- User documentation
- site managers documentation
- Software repository
- Monitoring
- Trouble tickets system
- Knowledge base



The screenshot shows the INFN GRID Operations Portal homepage. At the top left is the INFN GRID logo. Below it is a navigation menu with the following items: News, Organisation (Deployment plan), Access to the grid (Install your UI, Get your certificate, Register to a VO, Submit a job), Manage your site (Installation, Upgrade, Packages lists, CVS repository), Grid status (VO view, Site view), Support (Ticketing System, Knowledge base), Search, Links, and Site map. The main content area has a header: "Welcome to the INFN Production Grid for Scientific Applications !". Below the header is a paragraph: "INFN-GRID is a research project which features solutions and innovations in methodologies and technologies for the implementation and widespread use of large-scale platforms and grids. We participate to several National and International research projects on Grid Computing: We're coordinating our objectives with the strategies of the European Community to build the Next Generation Grid." Below this is a map of Italy with several cities labeled: Torino, Milano, Padova, Trieste, Legnaro (PD), Ferrara, Bologna, Pisa, Roma, Napoli, Bari, and Catania. A legend at the bottom right of the map shows a white circle for "Grid.it" and a green circle for "INFNGrid". At the bottom of the page, there is a link: "Read the latest news from October 31, 2003".

<http://grid-it.cnaf.infn.it>



Access to the grid

Get your certificate

News

Organisation

- ▶ People & tasks
- ▶ Deployment

Access to the grid

- ▶ Install your UI
- ▶ Get your certificate
- ▶ Register to a VO
- ▶ Submit a job

Manage your site

- ▶ Installation
- ▶ Upgrade
- ▶ Testing
- ▶ Releases
- ▶ CVS Repository

Grid status

- ▶ Site view
- ▶ VO view
- ▶ Grid services

Support

- ▶ Ticketing System
- ▶ Knowledge base

Search

Links

Step 2: Get your personal certificate

To access the GRID you need a Personal Certificate (released by a Certification Authority) to be installed in a User Interface where you got an account.

1. Install the **Certification Authority Certificate** on your browser
2. Identify yourself to the **Registration Authority** in your department and ask him for an ID
3. Ask for your **Personal Certificate** using the ID given to you by the RA
4. Install your **Personal Certificate** on your browser (the same browser of step 1). You have to wait for a couple of days to receive a mail with a web link to the page containing your certificate.
5. Export your **Personal Certificate** from your browser
6. Copy your **Personal Certificate** in your home directory of a User Interface where you got an account

All these steps are described in detail in the following document:

- [INFN-GRID personal certificates howto](#) - [\[PDF\]](#) - [\[TXT\]](#)

Go to: [Step 3: Register to a VO](#)

Clear, simple and automated procedure to allow all Italian Institutions to set up a Registration Authority, get INFN CA Certificates and start activities



Access to the grid

Register to a VO

News

Organisation

- People & tasks
- Deployment

Access to the grid

- Install your UI
- Get your certificate
- Register to a VO
- Submit a job

Manage your site

- Installation
- Upgrade
- Testing
- Releases
- CVS Repository

Grid status

- Site view
- VO view
- Grid services

Support

- Ticketing System
- Knowledge base

Step 3: Register to a VO

Using your personal certificate, you can be authenticated by the grid, but not authorized. If not authorized, you are not allowed, for instance, to submit jobs. To be authorized you must belong to a Virtual Organisation which is a kind of user group usually working on the same project and using the same application software on the grid. Your request will be evaluated by a VO manager.

Please note that to proceed with your registration your personal certificate **has to be installed in your browser**: it will be used to authenticate your identity.

- [Click here](#) to subscribe **infngrid**, **theophys** and **virgo** Virtual Organisation
- [Click here](#) to subscribe **gridit**, **bio**, **ingv** and **inaf** Virtual Organisation

Supported VOs

bio	Biology group
ingv	INGV Bologna
inaf	INAF
gridit	General Grid.it Project VO
alice	LHC Alice experiment
atlas	LHC Atlas experiment
cms	LHC CMS experiment

INFN GRID-2.6.0 deployment status: resources

39 Sites; INFN Grid production release based on LCG 2.6

» [Organisation](#) » [Deployment \[260\]](#)

Deployment status of INFN-GRID-2_6_0 *RESOURCES* [UPG]

Site name	Scheduled	Upgraded	Certified for 2_6_0
CNR-ILC-PISA	Sep 12 - 14	2.6.0	YES
ENEA-INFO	New Site!	2.6.0	In Progress...
ESA-ESRIN	To be defined	2.4.0	NO
INAF-Trieste	September	2.6.0	YES
INFN-Bari	Aug 24-26	2.6.0	YES
INFN-Bologna-CMS	Sep 12 - 16	2.6.0	YES
INFN-Bologna	Sep 13	2.6.0	YES
INFN-Cagliari	Sep 06 - 08	2.6.0	YES
INFN-Catania	Sep 12	2.6.0	YES
INFN-CNAF	5-8 Aug	2.6.0	YES
INFN-Ferrara	9-10 Aug	2.6.0	YES
INFN-Firenze	Sep 12 -16	2.6.0	YES
INFN-Frascati	Sep 09 - 13	2.6.0	YES
INFN-Genova	Sep 11 - Oct 10	2.6.0	In Progress...
INFN-Lecce	Jul 27 - Oct 03	2.6.0	YES
INFN-Legnaro	12-17 Aug	2.6.0	YES
INFN-Milano	Aug 29 - 13 Sep	2.6.0	YES
INFN-Napoli	Sep 06 -12	2.6.0	YES
INFN-Napoli-Atlas	Sep 12 - 13	2.6.0	YES
INFN-Napoli-Virgo	To be defined	2.4.0	NO
INFN-Padova	22-23 Aug	2.6.0	YES

INFN-Parma	New Site!	2.6.0	In Progress..
INFN-Perugia	Sep 22 - 26	2.6.0	YES
INFN-Pisa	Sep 02	2.6.0	YES
INFN-Pisa2	Oct 03 - 04	2.6.0	YES
INFN-Roma1	Aug 25 - 31	2.6.0	YES
INFN-ROMA1-CMS	To be defined	2.4.0	NO
INFN-Roma1-Virgo	Aug 26 - 29	2.6.0	YES
INFN-Roma2	Sep 05 - 16	2.6.0	YES
INFN-Roma3	Sep 12 - 16	2.6.0	YES
INFN-T1	Sep 02 - 09	2.6.0	YES
INFN-Torino	9-12 Aug	2.6.0	YES
INFN-Trieste	Sep 12 - 16	2.6.0	YES
SNS-PISA	Aug 11 - 15	2.6.0	YES
SPACI-LECCE-IA64	Sep 05 - 19	2.6.0	YES
SPACI-NAPOLI	24 Aug	2.6.0	YES
SPACI-NAPOLI-IA64	Aug 24	2.6.0	YES
UNIV-PERUGIA	New Site!	2.6.0	YES

gLite 1.3 extensively tested in pre-production
gLite 1.4 extensively tested in certification
By application task forces

INFNGRID-2.6.0 deployment status: services

Deployment status of EGEE COMMON services

DATE	SERVICE	HOST	RELEASE	NOTE
NO	RLS	datatag2.cnaf.infn.it		RLS=>LFC (babar, gridit, infngrid, bio, ingv, inaf, virgo, theophys, lcfgt, cdf, compchem, planck)
11 Aug	LFC	lfcserver.cnaf.infn.it	INFNGRID 2_6_0 (SLC304)	under test
5-8 Aug	MYPROXY	myproxy.cnaf.infn.it	INFNGRID 2_6_0 (SLC304)	All Italian CIC RBs trusted
5-8 Aug	RB - DGAS supported	egee-rb-01.cnaf.infn.it	INFNGRID 2_6_0 (SLC304)	bdii: egee-bdii
3 Aug	BDII CORE	egee-bdii.cnaf.infn.it	ALIAS	alias for egee-bdii-00 and egee-bdii-01
3 Aug	BDII	egee-bdii-00.cnaf.infn.it	INFNGRID 2_6_0 (SLC304)	Resources: fileadmin/bdii/egee-all-sites.conf
5-8 Aug	BDII	egee-bdii-01.cnaf.infn.it	INFNGRID 2_6_0 (SLC304)	Resources: fileadmin/bdii/egee-all-sites.conf
DONE	GRIDICE	gridice2.cnaf.infn.it	GridICE 1.8.2 (SL304)	EGEE view
22 Aug	RB	prod-rb-01.pd.infn.it	INFNGRID 2_6_0 (SLC304)	bdii: prod-bdii-01.pd.infn.it
3 Aug	BDII	prod-bdii-01.pd.infn.it	INFNGRID 2_6_0 (SLC304)	Resources: fileadmin/bdii/egee-all-sites.conf >

INFNGRID-2.6.0 deployment status: services

Deployment status of INFN-GRID services

DATE	SERVICE	HOST	RELEASE	NOTE
DONE	VOMS	voms	SLC304	
DONE	GRIDICE	edt002	GridICE 1.8.2 (SLC304)	INFN Production Grid
3 Aug	RB+BDII+UI	gridit-cert-rb	INFNGRID 2_6_0 (SLC304)	Certification (Resources: fileadmin/bdii/cert-bdii-update.conf)
To define	RB	grid014.ct.infn.it	INFNGRID 2_4_0 (SLC304)	bdii: gridit-bdii-01
5-8 Aug	RB - DGAS supported	gridit-rb-01	INFNGRID 2_6_0 (SLC304)	bdii: gridit-bdii-01
5-8 Aug	BDII	gridit-bdii-01	INFNGRID 2_6_0 (SLC304)	Resources: grid-it.cnaf.infn.it/fileadmin/bdii/gridit-bdii-01.conf

INFNGRID-2.6.0 deployment status: services

Deployment status of EGEE ATLAS services

DATE	SERVICE	HOST	RELEASE	NOTE
5-8 Aug	RB - DGAS supported	egee-rb-02	INFNGRID 2_6_0 (SLC304)	bdii: egee-bdii-02
5-8 Aug	BDII	egee-bdii-02	INFNGRID 2_6_0 (SLC304)	Resources: grid-deployment.web.cern.ch/grid-deployment/eis/experiments/atlas/lcg2-atlas-sites.conf
DONE	GRIDICE	egee006	GridICE 1.8.2 (SL304)	ATLAS view

Deployment status of EGEE CMS services

DATE	SERVICE	HOST	RELEASE	NOTE
5-8 Aug	RB - DGAS supported	egee-rb-03	INFNGRID-2_6_0 (SCL304)	bdii: egee-bdii-cms
5-8 Aug	RB - DGAS supported	egee-rb-04	INFNGRID 2_6_0 (SLC304)	bdii: egee-bdii-cms
5-8 Aug	BDII-CORE	egee-bdii-cms	ALIAS	alias for egee-bdii-03 and egee-bdii-04
5-8 Aug	BDII	egee-bdii-03	INFNGRID-2_6_0 (SCL304)	Resources: grid-deployment.web.cern.ch/grid-deployment/eis/experiments/cms/lcg2-cms-sites.conf
5-8 Aug	BDII	egee-bdii-04	INFNGRID 2_6_0 (SLC304)	Resources: grid-deployment.web.cern.ch/grid-deployment/eis/experiments/cms/lcg2-cms-sites.conf
DONE	GRIDICE	egee005	GridICE 1.8.2 (SL304)	CMS view

New Services: DGAS Web monitor (VO view)

DGAS WEB MONITOR

Select view type

vo

Select query type

List jobs and URS grouped by CE

Submit query

select vo

- alice
- atlas
- babar
- bio
- biomed

select start date

select end date

Submit the query

to CE	Tot Wall time	Tot CPU time	Average Mem	Average Vmem	Number of jobs
gridtce01.na.infn.it	94939	165	3592	11252	49
pccmsgrid08.pi.infn.it	20646801	18148591	581641	1092822	877
pre-ce-01.cnaf.infn.it	92	38	2927	8833	12
prod-ce-01.pd.infn.it	43238731	1740652	800300	1101978	1869
spacim-ce1.dma.unina.it	1682299	1607648	349362	744602	53

Page 3/4

GLOBAL RESULTS

vo	Total WALL Time [s]	Total CPU Time [s]	Average Mem [KB/job]	Average Virtual Mem [KB/job]	Number of jobs
alice	121952890	59986158	587367	895439	6356

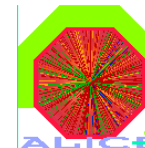
Italian MW activities

- MW components supported and released by INFN include
 - **WMS**: Workload Management Service (with EDG, LCG, EGEE) for distributed scheduling and resource management in a Grid environment
 - Data Management Services
 - **COSTANZA**: Virtual Db replication and Replicas Consistency Service (with Grid.it)
 - **SToRM**: Storage Resource Management Service for Storage allocation and File pinning with SRM interface over Unix file systems (with Grid.it)
 - Portals and Grid User Interface: UI (with Datamat) , **Genius** Portal (with Nice)
 - With PDA and Cellular Phone interface
 - **VOMS**: VO oriented Authentication/Authorization Service (with LCG, EGEE, Grid.it)
 - **GridICE**: General Grid Monitoring Service (with LCG)
 - **DGAS**: Economy based Grid Accounting Service (with EGEE)
 - **G-PBOX**: VO oriented Policy enforcing framework (with Grid.it)
 - VO oriented **User Support** systems (with Grid.it) integrated with GGUS
- Important outcome of Grid.it from CNR and Uni-Pi
 - **Parallel Programming Environments (Assist)**
- All are made available with the general Open Source Licence of EGEE, supported and evolving towards SOA



INFN Catania - Italy

NICE and INFN-Grid collaboration






GENIUS Portal: interfaced to ~100 Grid services

Welcome to the GENIUS INFN GRID Portal - Mozilla [Build ID: 2002121606]

File Edit View Go Bookmarks Tools Window Help

https://genius.ct.infn.it/ Search

Home Bookmarks Instant Message WebMail Calendar Radio People Yellow Pages Download Customize...






Grid Enabled web eNvironment for site Independent User job Submission

Welcome to GENIUS 2.7.1

[Important Notice](#)
[GENIUS User's Guide \(doc, pdf, ps, ps.gz\)](#)
[New Grid Authentication with MyProxy](#)
[GENIUS MyProxy Server Installation](#)
[GENIUS CVS Available](#)
[GENIUS FAQs](#)
[GENIUS Mailing List](#)
[GENIUS Mailing Archive \(Help on Majordomo Commands\)](#)
[GRID MOVIE](#)
[Useful Links](#)
[Credits](#)

This portal is best viewed with Mozilla 1.0.2.
 Netscape (4.79, 4.80, 6 and higher) and Internet
 Explorer (5 or higher) can also be used.
 The use of any other web browsers could induce some
 visualization mismatches and is not currently suggested.
 GENIUS is based on Apache 1.3.27 and OpenSSL 0.9.7b.
 Last update: **Mon 13 Oct 2003**



- File Services
- Security Services
- Job Services
- Data Services
- Info Services
- Monitoring Services
- Interactive Services
- VO Services
- ▶ Statistics
- ▶ Logout

powered by
[EnginFrame 3.2](#)

compliant with
[EDG 2.0](#)
[LCG-1](#)
[GRID.IT](#)

Transferring data from genius.ct.infn.it...

last update

Barbera

GENIUS: PDA version (1)

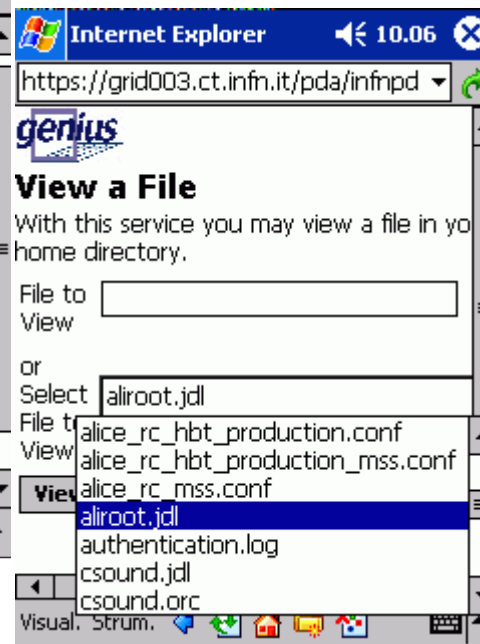
Home Page



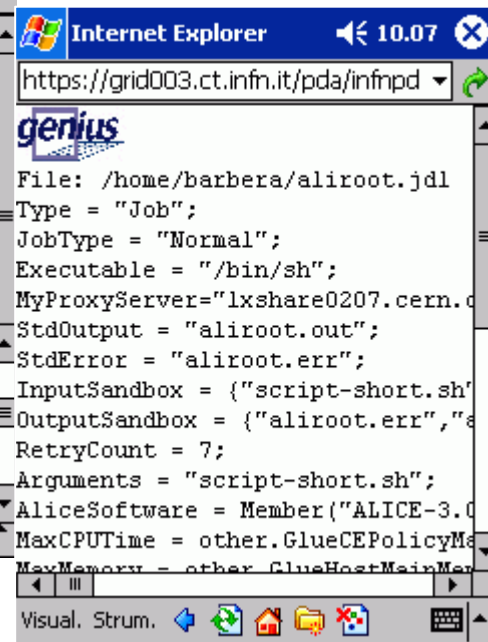
Servizi



Remote file browsing



Remote file inspection



Italian – Grid now *(Site/resource map)*



INFN

- CMS T2 ● T2/3
 - Atlas T2 ● T2/3
 - Alice T2 ● T2/3
 - LHCb T2 ● T2/3
 - Babar
 - VIRGO
- T2 (~150 nodes 50 TB)
T3 (10-15 nodes)
T1 Cnaf (~1000 nodes, 420TB
disk 1600 TB Tape MSS)
- ▲ **grid.it dedicated resources**
 - ▲ INFN (10-25 nodes)
 - ▲ INAF (5-10 nodes)
 - ▲ INGV (NEC computers),
 - BIO (tbd)
- general purpose resources (8-15
nodes)
- Tot. ~ 2500 nodes, 5000 processors
+ S-Paci + ENEA+...

- INFN is the major resource provider for EGEE/LCG together with S-PACI, ENEA and new PON facilities
- The other important components of the Italian e-Infrastructure are the general Computing Facilities as CINECA, Cilea, Caspur part of DEISA



The SPACI Consortium:

a flexible, robust, secure and scalable IT infrastructure

Southern Partnership for Advanced Computational Infrastructure

3 MEuro startup funds by MIUR

SPACI

1.4 Tflops

SPACI infrastructure part
of the EGEE production Grid

DMA/ICAR

Dept. of Mathematics and Applications
University of Naples "Federico II" & ICAR
(Section of Naples)
Director: Prof. Almerico Murli

ISUF/CACT

Center for Advanced Computing
Technologies
University of Lecce
Director: Prof. Giovanni Aloisio

MIUR/HPCC

Center of Excellence for
High Performance Computing
University of Calabria
Director: Prof. Lucio Grandinetti

ENEA CENTRES WITH HIGH PERFORMANCE COMPUTING POWER INSTALLED AND MAIN NETWORK LINKS

ENEA infrastructure part of EGEE

grid0007

ENEA GRID
GigaBit-Link

CNR
Tor Vergata

EGEE

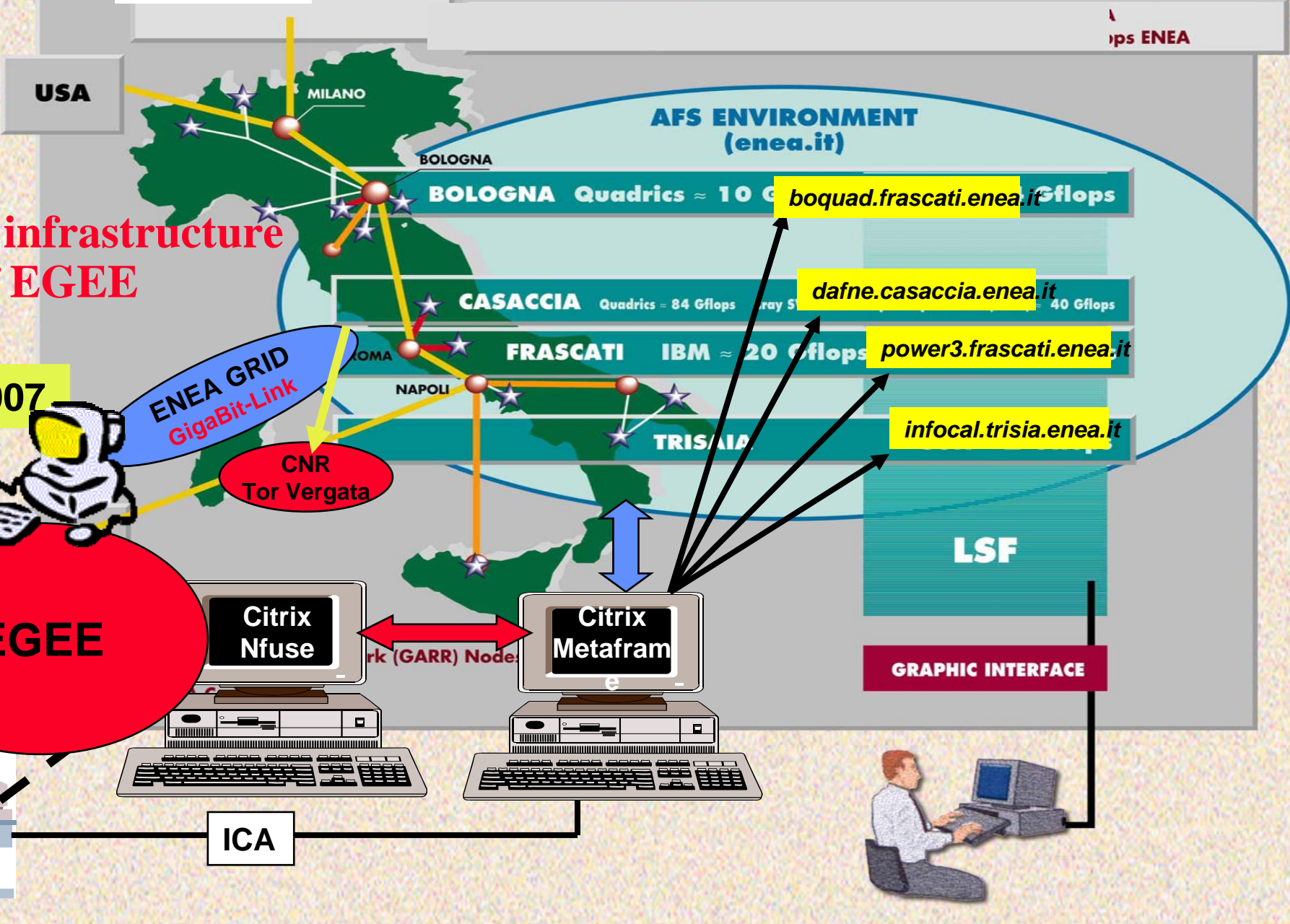
Citrix
Nfuse

rk (GARR) Node

Citrix
Metafram

ICA

last update



ops ENEA

AFS ENVIRONMENT
(enea.it)

BOLOGNA Quadrics ~ 10 Gflops
boquad.frascati.enea.it

CASACCIA Quadrics = 84 Gflops
dafne.casaccia.enea.it

FRASCATI IBM ~ 20 Gflops
power3.frascati.enea.it

TRISIA
infocal.trisia.enea.it

LSF

GRAPHIC INTERFACE

Summary of current Grid activities in Italy

- **Ongoing National Projects**
 - Grid.IT, National project 3 years 12 M€ (2002-06)
 - S-PACI National project 3 years 4 M€ (2002-06)
 - The grid infrastructure in the South of Italy
 - Egrid National project 3 years 3 M€ (2003-06)
 - The Grid for finance
 - LIBI and LITBIO 3 years 7 M€ (2004-2007)
 - The Grid Laboratory for Bio-informatics
 - **NEW:** MIUR recently approved 32 M€ for 4 Grids and Supercomp. Proj. in the South
 - 3 Large Grid Infrastructures in Sicily (INFN Coord), Sardegna and Campania
 - Will be integrated in EGEE-II
- **Participation to major EU projects**
 - EGEE, DEISA, Core Grid
- **EU projects Coordinated by Italian Research Institutions**
 - **Gridcc**, Coord. INFN : grid per real time, control room remota, **4 M€**
 - **Diligent**, Coord. CNR: development of Digital Libraries **6 M€**
 - **GridCoord**: Coord. Univer. of Pisa coordination of R&D on Grid
 - **EUMED Grid**, **EU-China Grid**, coordinated by INFN
 - **BIO-INFO-GRID** coordinated by CNR
 - Important EU contribution on e-Learning by Uni-Salerno
- **Apologies if some are missing....**

The strategy towards innovation and general Grid exploitation: C-OMEGA

- Leverage the large integration and standardization effort of international and national research projects like EDG, LCG, EGEE, Grid.it... to make available and support for end user communities a coherent platform of interoperable "Grid Services" customized for Italian user applications
 - eScience Intitutions: HEP, Biology, Astrophysics, Geophysics and Climate....
 - Early commercial adopters: Stock Exchange Db, Financial risk analysis
- Guarantee evolution and adherence to international standards
- The next step: The Consortium for the Open Mw Enabling Grid Applications (C-OMEGA)
 - Initial participation include all major Italian Research Institutions
 - 5-6 large Italian Companies
 - ~15 SMEs
 - The Italian Computing Consortia
 - Several Service Institutions: Health, Government
- Main goal of c-OMEGA is to support the innovation and exploitation process
 - Delivering and supporting a platform of Grid Services Internationally integrated
 - Supporting pilot exploitation by Industry, Business and Services
- Should profit from recent funds (PNR) made available by MIUR for
- Joint Research and Innovation projects between Science and Industry
- INFN represent c-OMEGA in current EU OMII proposal

Conclusions

- First generation of Grid services in LCG/EGEE production Grid are currently in use in Grid.IT in Italy
- They are still evolving for more functionalities, robustness and security
 - Application as LHC experiments Data Challenges indicate clear directions for the evolution to satisfy those communities
- Some needed services are still new or missing and very important functionalities are required by user communities
 - Catalogs, Reliable Data and Metadata replication services, Policy Framework.....
- Next major step now for INFN and Italy is towards: *Bringing Grid & Web Services Together , developing missing services, progress in standards*
- LHC experiments (~10K people), as other Sciences, need to have a fully operational infrastructure in place for 2007. LCG/EGEE need to provide what is required in time avoiding duplications
- Grid.it and INFN, ISUFI, ENEA, S-PACI Universities etc will contribute to meet such goal
- The Consortium c-OMEGA will favor the transfer of Science Grid achievements to society and will guarantee evolution towards standards