Workshop "GRID & e-Collaboration for the Space Community"
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ENEA-GRID infrastructure

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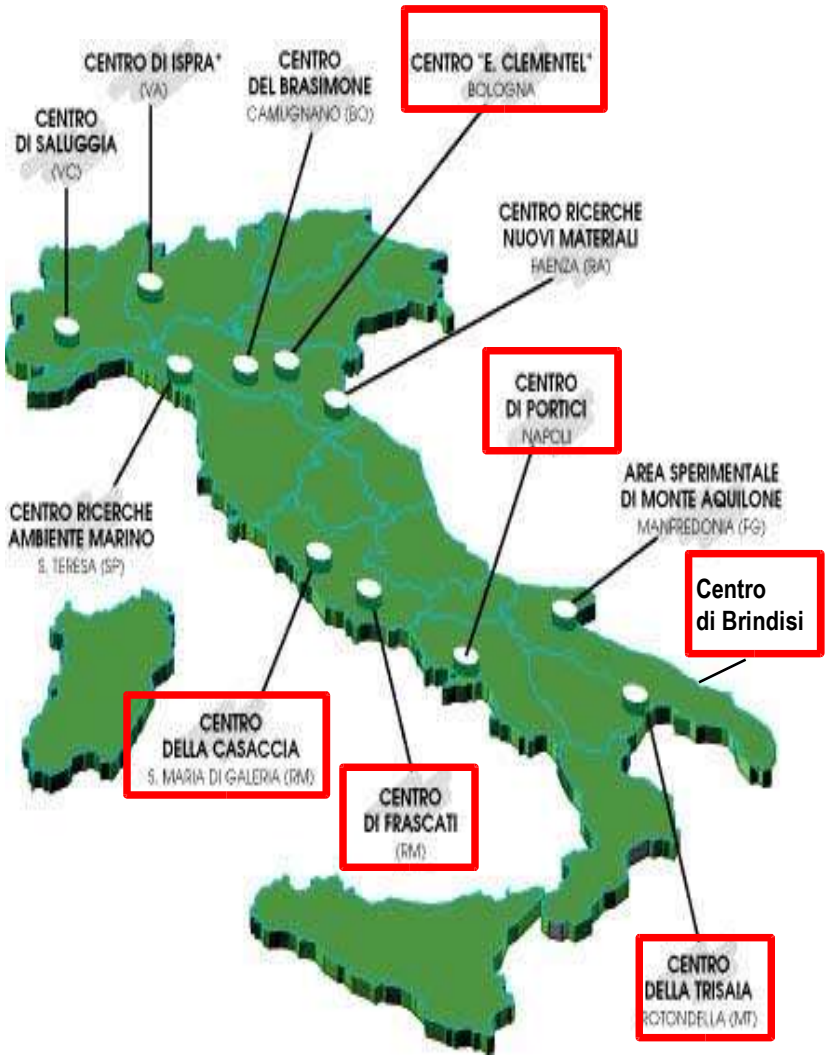
Poster Items

- ENEA-GRID Infrastructure and Resources
- GRID paradigm & ENEA-GRID
- Connection with other GRID projects: DATAGRID, Firb/GRID.IT/WP13 ChemGrid, EGEE

ENEA



Italian Agency for New Technologies, Energy and Environment.

12 research centres in Italy

An ITC and Network Department (INFO)

6 Computer Centres

Casaccia, Frascati, Bologna,Trisaia, Portici, Brindisi

Multiplatform resources for serial & parallel computation and graphical post-processing.

Other computer resources in ENEA: departments & individuals

ENEA GRID

ENEA-GRID has been in development since 1998 and is now an integrated infrastructure:

- offering a production quality, service oriented system
- covering most of the computational resources belonging to ENEA INFO Scientific Computation Service, connected in a Wide Area Network.
- providing a unified user environment and an homogeneous access method for all ENEA researchers irrespective of their location
- implementing tools to facilitate the integration of departments and individual resources and support to experimental facilities

ENEA GRID Services

Services for research activity in ENEA

- Multiplatform Parallel systems:
  - AIX, Linux (Alpha,x86), IRIX, [Unicos (Cray)]
- Graphical simulation & code result post-processing:
  - SGI + 3D immersive facilities
- Software resources:
  - Commercial Codes: Fluent, Gambit, Abacus, Catia, Ansys
  - Research codes: mcpn/x, eranos, fluka,…
  - Elaboration environments: IDL, Matlab, Mathematica, SAS
  - Windows applications

ENEA GRID Computational resources

OS	#cpu	Gflops	
AIX	154	400	Frascati(128), Bologna(8), Portici(18)
Linux x86 32/64	54	100	Frascati(28), Casaccia(14), Portici (4),Trisaia(4), Brindisi(4)
Linux Alpha	80	100	Casaccia
IRIX	26	40	Frascati(8), Casaccia(4), Portici(1), Trisaia(8), Brindisi(1), Bologna(5)
Solaris	8	10	Trisaia(4), Casaccia(2), Bologna(2)
Windows	18	50	Frascati(6), Portici(4),Trisaia(4), Brindisi(4)
Mac OS X	14	60	Frascati(1), Trisaia(13)

Portici, Brindisi & Trisaia resources increased in the framework of **TELEGRID** Project

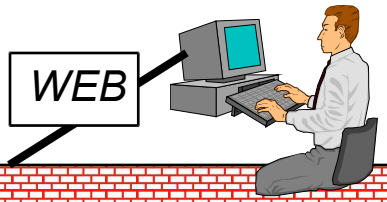
ENEA Network connection

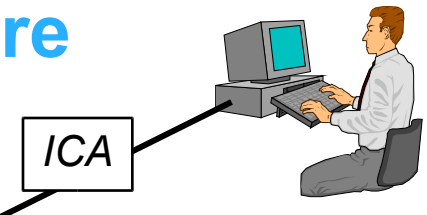
ENEA computational resources are distributed over WAN, connected by GARR, the Italian Academic & Research Network

ENEA-GARR
9 PoP, 4-32 Mbps

Brindisi
Bologna
Casaccia
Frascati
Portici
Trisaia
Palermo
Pisa
Roma Sede

ENEA GRID Architecture





Monitoring service quality

Web Portal Citrix

Graphical User Interface

User programs and commercial codes

LSF multi-cluster as integrator

XTERM

LSF

Load Leveler

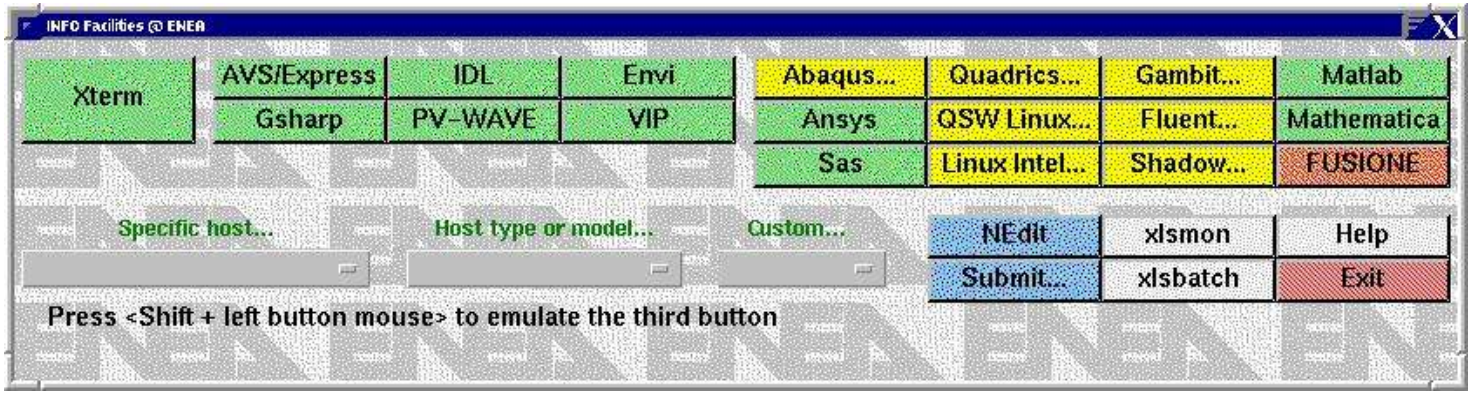
RMS

AFS Geographical multiplatform File System

AIX | SGI | SUN | MacOSX | Win | Linux | Linux Alpha | …

CITRIX

ENEA GRID makes use of Citrix Metaframe to publish an application providing all the available resources and monitoring facilities with a unified GUI interface

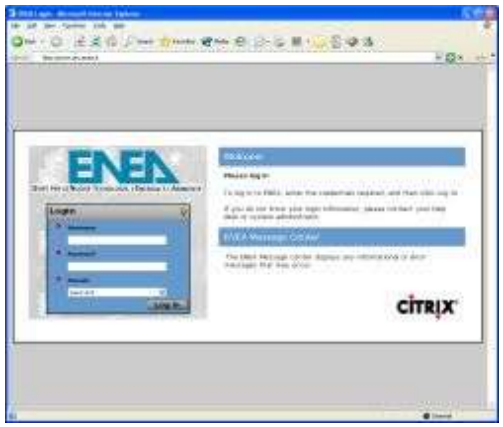


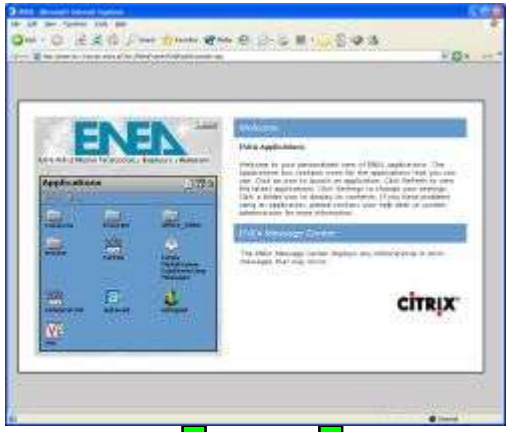
Application components:

- Java (GUI)
- shell scripts
- EnginFrame

CITRIX: ENEA GRID Web Access

http://www.afs.enea.it





Windows services

Unix/Linux Services

ENEA GRID & GRID PARADIGM

"GRID concept: coordinated resource sharing and problem solving in dynamic, multi-institutional virtual organizations (VO)"

Foster & Kesselman, The Anatomy of the Grid, 2001

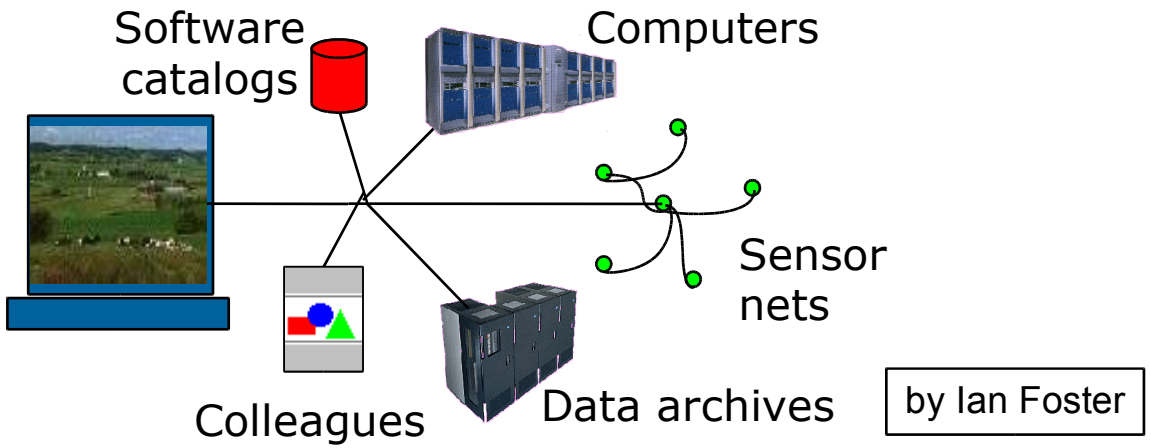
ENEA GRID infrastructure has been designed to provide a multisite resource sharing inside ENEA, both to optimize the utilization of Central Computer Service (ENEA INFO) resources and to integrate the other resources available inside the organization.

VO concept can not be fully developed inside an unique organization but similarities can be found with Project Groups sharing specific resources and ENEA GRID components can provide support to this (AFS groups, LSF resources).

There are cases where ENEA GRID infrastructure has been used to support the collaboration with other institutions (+ other GRID projects)

ENEA GRID & GRID PARADIGM

ENEA GRID architecture answers to many of the challenges posed by the "GRID Problem" : "unique authentication, authorization, resource access and resource discovery", Foster & Kesselman 2001



The choice of **mature components** (LSF & Citrix - proprietary, AFS - opensource project since 2000) reduce the generality of ENEA GRID as a GRID model but improves greatly the reliability and the easiness of update & management: production quality infrastructure.

ENEA GRID EXPERIENCE

Some remarks can be drawn from the analysis of the operation of ENEA GRID infrastructure in the last years.

User acceptance of GRID working mode requires a new cultural approach to the access to computational resources and depends strongly on the service quality:

- "Value" of the accessed resources
- Efficient networking and system faults monitoring
- Support of user customization for GRID environment

The administration of a distributed & integrated resource system is a technical, cultural and organizational challenge in a complex structure such as ENEA.

Connection with other GRID Projects

Each GRID project is characterized by its own architectural design and middleware.

The focus of the participation of ENEA INFO in other GRID projects is GRID interoperability

Access to ENEA GRID through other GRID models should be compatible with ENEA GRID architecture: gateway implementation.

Current GRID projects:

- EGEE [Datagrid]
- FIRB/Grid.it : WP13, Computational Chemistry (CHEMGRID), Perugia Univ., ENEA Casaccia, et al. Globus 3.2 gateway into ENEA-GRID in operation

ENEA GRID and DATAGRID PROJECT

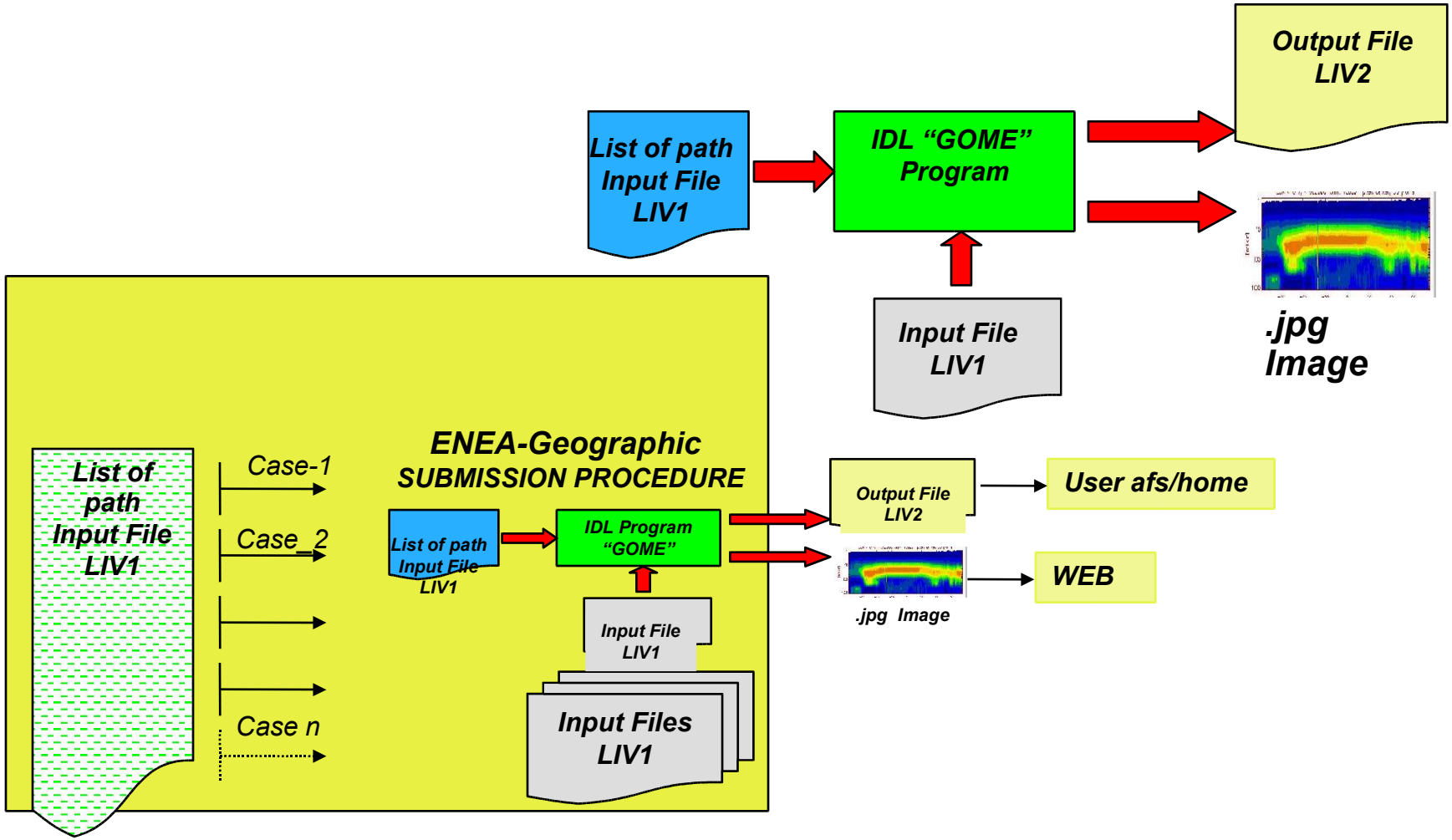
ENEA participated (unfunded) in DATAGRID project (ended 3/2004) through the collaboration with ESA, ESRIN Laboratory in Frascati.

A gateway between DATAGRID infrastructure and ENEA-GRID has been set-up at ESRIN enabling the submission of jobs from DATAGRID to ENEA-GRID

The gateway has been tested running the analysis of data from the GOME satellite (Ozone level) using IDL codes which can be easily run in a multiplatform environment.

The gateway provided a limited integration between the different GRID environment: EGEE should attain a full integration

ENEA GRID/DATAGRID Test case: GOME data analysis



ENEA-GRID and EGEE Project

EGEE (Enabling GRID for e-science in Europe) is a project in the 6th EU framework program, with the mission to deliver production level GRID services [www.eu-egee.org].

ENEA is one of the funded partners in the project, among the Italian participation which is coordinated by INFN.

EGEE project started April 2004

The installation of a small testing environment (7 Linux boxes) with standard EGEE middleware is currently in progress at ENEA Frascati.

The development of a gateway to ENEA-GRID will follow.

Enea commitment: ~100 cpu (at 20%), second half 2005.