Current situation of HPC

- High Performance Computing (HPC) systems are a critical resource for research and development
- Operation of HPC systems requires specialised centres
- European HPC centres offer a variety of HPC architectures from different vendors with frequent innovation
- Users want to focus on their science rather than becoming HPC specialists
- European HPC centers and users are connected by high-bandwidth networks
EUROGRID Vision

Build a European Grid infrastructure that gives users a seamless, secure access to High Performance Computing resources and that advances computational science in Europe

EUROGRID Goals

- Support the e-Science concept
- Integrate resources of leading European HPC centres into a European HPC GRID
- Develop new software components for GRID computing
- Demonstrate the ASP model for HPC access (‘HPC portal’)
EUROGRID Partners

HPC Centres
- CSCS Manno (CH)
- FZ Jülich (D)
- ICM Warsaw (PL)
- IDRIS Paris (F)
- Univ Bergen (N)
- Univ Manchester (UK)

Users
- Deutscher Wetterdienst
- EADS
- debis Systemhaus (Assistant Partner)

Integration
- Pallas (Project Coordinator)
- Fecit (Assistant Partner)

Volume: 33 person years, 2 M Euro funding by European Commission Grant No. IST-1999-20247

EUROGRID Geography

[Map of Europe showing EUROGRID Partners locations]
Structure of the Work

- Application GRIDS:
  - application-specific interfaces, evaluation of GRID solutions
    - Bio-GRID
    - Meteo-GRID
    - CAE-GRID

- HPC GRID Infrastructure:
  - connect HPC centers using UNICORE technology

- Development and integration of new components

- Dissemination and exploitation

Bio-GRID

- Operate a GRID for biomolecular simulations

- Develop interfaces to existing biological and chemical codes

- Web site:
  biogrid.icm.edu.pl
**Meteo-GRID**

- Develop a relocatable version of DWD’s weather prediction model
- Goal: ‘Weather prediction-on-demand’ as an ASP solution

**CAE-GRID**

- Coupled simulations of aircrafts (e.g. structure and electromagnetics)
- Goal: internal HPC portal for EADS engineers
CAE-GRID

- Provide HPC portal to engineers at Daimler-Chrysler and partners
- Develop GRID technology for computing cost estimates and billing

HPC-GRID

- Demonstrate a European HPC GRID testbed
- Develop new GRID applications
- Enable sharing of competence and know-how
- Agree on security standards, certification, access policies, ...

- CRAY T3E 900 (32 PE)
- NEC SX4B/2A
- Linux Cluster (4 PE)
- FZJ
- Manchester Computing
- CRAY T3E - 1200 (816 PE)
- FUJITSU VPP300 (8 PE)
- SGI O2000 (128 PE)
- SGI O3000 (256 PE)
- IBM SP3 (8 PE)
- NEC SX5 cluster (40 PE)
- IBM Power4 (256 PE, 1.3 TFLOPS)
- COMPAQ Linux Cluster (24 PE)
**EUROGRID Infrastructure and Components**

- Based on UNICORE system
- Develop additional GRID components
  - efficient data transfer
  - ASP infrastructure
  - resource broker
  - application coupling
  - interactive access
- Integration of new components by Pallas and Fecit

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**UNICORE architecture**

- UNICORE Client
- Insecure Internet
- UNICORE Gateway A
- UNICORE Server (NJS)
  - TSI
  - NQE (Cray T3E)
- UNICORE Gateway B
- UNICORE Server (NJS)
  - TSI
  - PBS (Linux cluster)
UNICORE Security

- Based on the PKA
- Industrial standard X509
- Secure communication
  - Gateway, NJS certificates
  - Gateway, NJS check user certificate
  - Multiple CA accepted
- User certificates
  - User certificate stored in client
  - Public key stored in UUDB database at each site
  - PKA mapped to user account (XLOGIN)
    - more than one certificate can map to xlogin
    - multiple CA allowed
  - Multiple certificates allowed

UNICORE Security - Client

- User certificate
- Trusted CA
UNICORE Client

- Single application
- Job preparation
- Job monitoring
### Current Status

- **First year of project finished** *(Nov./Dec. 2001)*
- Project web site: [www.eurogrid.org](http://www.eurogrid.org)

- **EUROGRID-0** installed *(Feb. 2001)* and tested, requirements from different application areas defined.
  - UNICORE 3.1 software

- **EUROGRID-0.5** installed *(Sept. 2001)*
  - UNICORE 3.5 software
  - UNICORE 3.5.10 client
  - Cooperation with UNICORE Plus project
    - UNICORE test site [www.eurogrid.org](http://www.eurogrid.org)
BioGRID  biogrid.icm.edu.pl

- BioGRID extensions
  - Introduction of IDB entries for site dependent installation.
  - Abstract Job Objects (AJO) for biomolecular packages
    - Gaussian98
    - GROMOS96
    - AMBER
  - AJO independent on site configuration and differences in installation directory
  - Plug-in for job and input preparation
    - preliminary version of Amber plug-in
    - first version of Gaussian98 plug-in (Unicore Client 3.1.4)
  - See biogrid.icm.edu.pl for downloads

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Gaussian plug-in

- BioGRID will developed plug-in’s for various packages

- Gaussian98 plug-in for UNICORE Client 3.1.4

- User specifies input parameters with plug-in

- Job will be submitted through UNICORE client
Gaussian plug-in (cont.)

Gaussian plug-in (cont.)
Gaussian plug-in (cont.)

Gaussian plug-in (cont.)
Schedule and Milestones

2000 2001 2002 2003

EUROGRID-0 Q1/2001 EUROGRID-1 Q3/2002

Events and presentations

- Presentation at Supercomputing Seminar in Heidelberg  
  June 2001
- Presentation at GGF3 in Frascati  
  September 2001
- EUROGRID booth at SC2001 in Denver  
  November 2001
- Presentation at PIONIER 2001 conference  
  March 2001
- Technical workshop (joint with Unicore Plus)  
  May 2001
- Workshop on LM in EUROGRID  
  August 2001
GRIP Project

Extend EUROGRID to cooperativity with globus middleware.
Provide UNICORE users with access to resources available through globus.

GRIP Goals

- Increase UNICORE functionality
- Demonstrate inter-grid operatibility
- Open field to integrate resources of leading European HPC centres (EUROGRID) with US centers.
- Develop new software components for GRID computing
- Increase European activity in world wide grid activities (GGF)
GRIP Partners

- HPC Centres
  - FZ Jülich (D)
  - ICM Warsaw Univ (PL)
  - Univ Bergen (N)
  - Univ Manchester (UK)
  - Univ Southampton (UK)
- Integration
  - Pallas
- Users
  - DWD (D)

Volume: 24 person years, 2 year project (2002-2003)
European Commission Grant Proposal

EUROGRID

- www.eurogrid.org
- biogrid.icm.edu.pl
- www.polgrid.pl