



UNICORE and EUROGRID: Grid Computing in EUROPE

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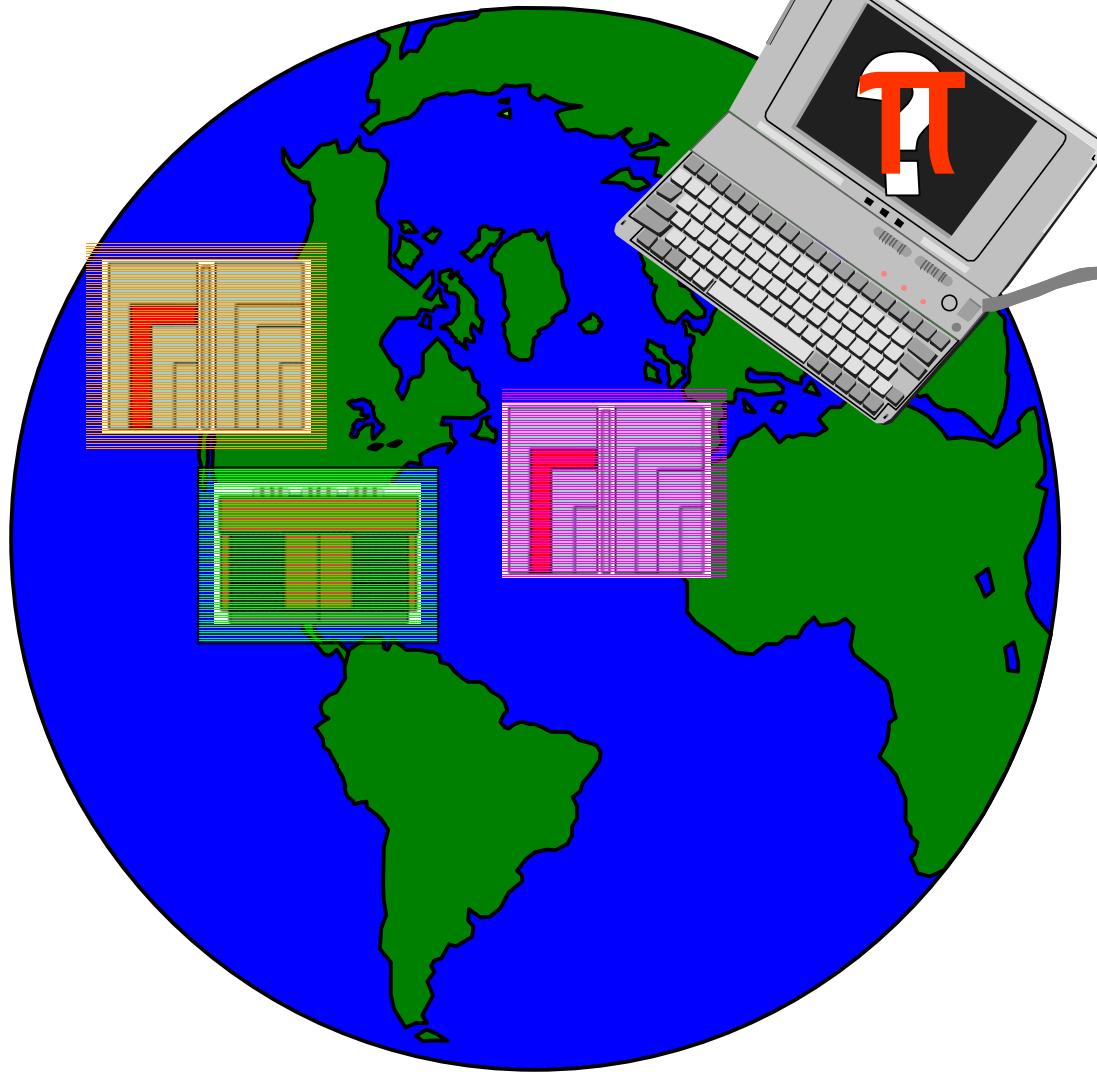
The vision of the Grid

The challenges of Grid Computing

Two projects: UNICORE and EUROGRID

Quo vadis clathri?

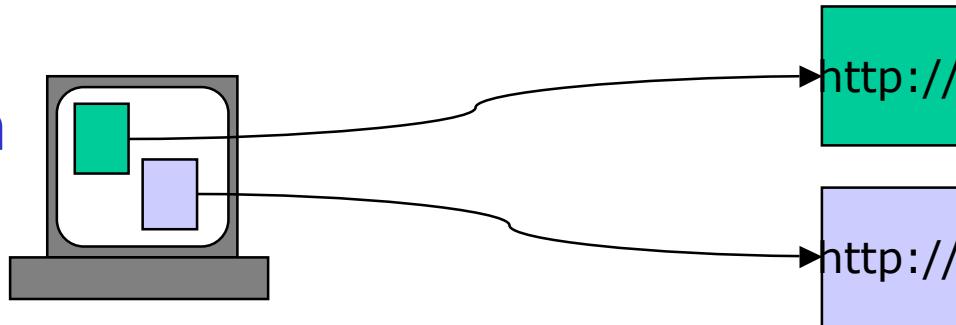






The Web and

Web: Uniform
access to
HTML
documents

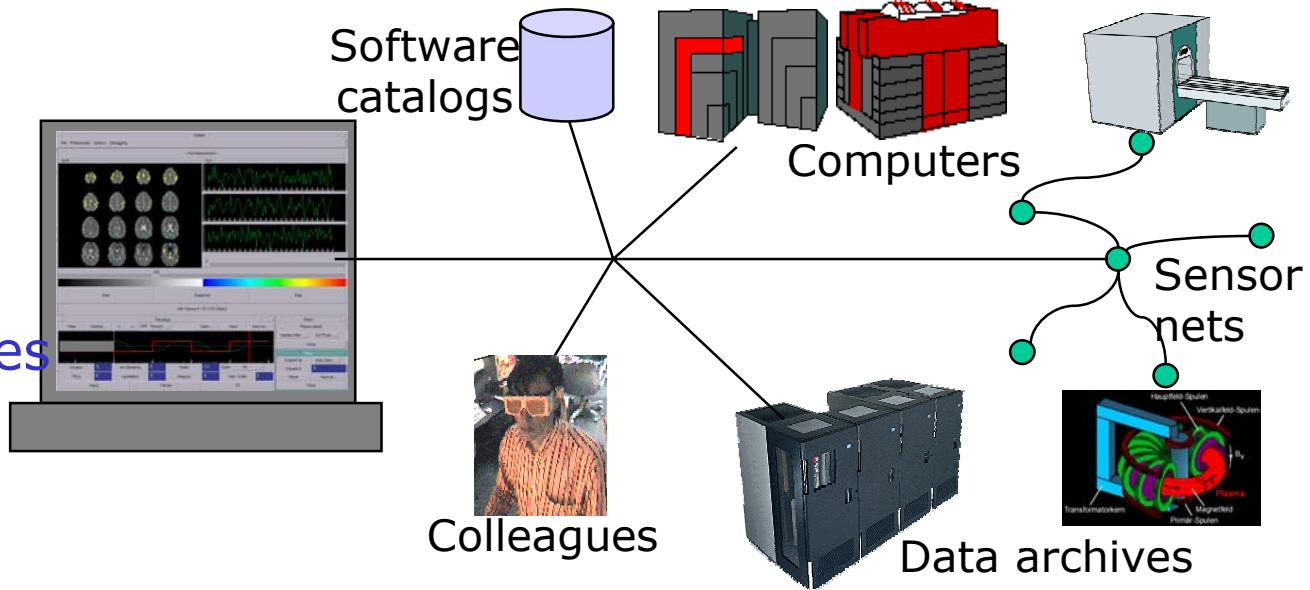


Adapted from Ian Foster



... the Grid

Grid: Flexible,
high-performance
access to all
significant resources



On-demand creation of powerful virtual computing systems



The Challenge of the Grid

- Architecture and implementation
- Security
- Applications
- Deployment and use
- Standards



Challenge: Architecture

Different, complementary approaches exist:

- horizontal - vertical
- toolkits - integrated

Examples: Globus - UNICORE

Different projects explore different ideas and create novel solutions



Challenge: Security

- Authentication
- Authorisation
- Integrity

Grid Security relies on X.509 certificates, but ...

- multiple CAs
- different policies

Standards alone are not enough



Challenge: Applications

- No (at best few) grid-aware applications exist
- Cost of development and migration
- Incompatibility of underlying systems
- Portals may help

Demonstrator application are important



Challenge: Deployment

Installation of Grid software requires effort

- at participating centers
- on user's workstation
- by application service providers

Opportunities for new business models



Challenge: Standards

Grid solutions use open standards:

- X.509
- ssl, https, ...

Grid projects define specific protocols

- Abstract Job Objects (AJO) in UNICORE

Global Grid Forum works on Grid Standards



Two European Grid Projects

UNICORE Plus is funded in part by BMBF, the German Ministry of Education and Research under grant

01-IR-001 (January 1, 2000 - December 31, 2002)

EUROGRID is funded in part by EU under grant

IST-1999-20247 (November 1, 2000- October 31,2003)



UNICORE Goals

- UNICORE develops a

seamless
secure
intuitive

software infrastructure to access HPC resources

- UNICORE creates a High Performance Grid Computing Environment in Germany



UNICORE delivers

- Consistent batch access to different remote systems
- Hiding the **seams** created by
 - different hardware architectures
 - incompatible system software
 - historically grown computer center practices



UNICORE delivers

- Support for **multi-system** and **multi-site** applications for one job
 - use of the optimal system for the given problem
 - best utilisation of expensive resources
 - use of special hardware
 - use of remote data



UNICORE delivers

- Exploitation of existing and emerging technologies
 - communication via Internet
 - Web techniques, Java
 - security X.509 certificates



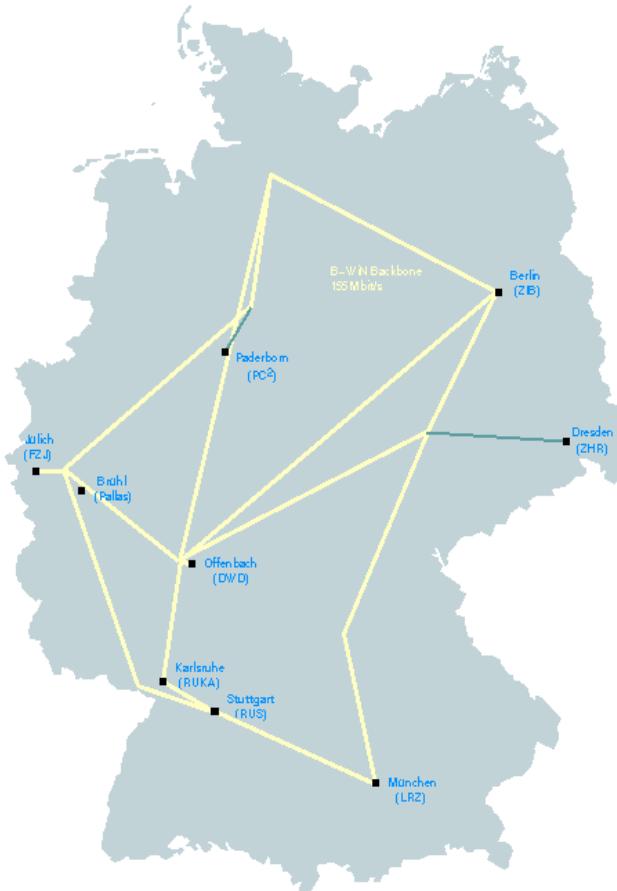
UNICORE delivers

- Minimal intrusion into the centres
 - interface to existing batch systems
 - no changes to established user names and Unix uid/gids
 - support for local security measures (firewalls, DCE,)



UNICORE Plus Project Partners

FZ Jülich, Jülich
Pallas, Brühl
DWD, Offenbach
RUS, Stuttgart
ZIB, Berlin
Univ. Karlsruhe
LRZ, Munich
PC², Paderborn
ZHR, Dresden





UNICORE Functions

- System independent definition of jobs (AJO)
- Interactive creation of batch jobs (GUI)
- Submission to different platforms at different locations without changing the job definition
- Interdependent multi-site jobs



UNICORE Functions

- Automatic control of job flow
- Automatic staging of data
- Full job control by the user through a GUI
- Secure access to remote data
- Reuse of existing jobs
(restrictions to portability)



UNICORE Functions

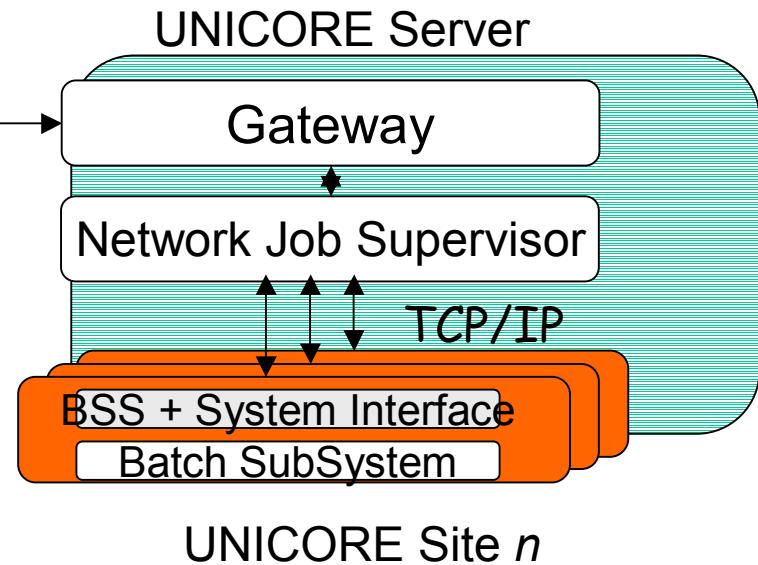
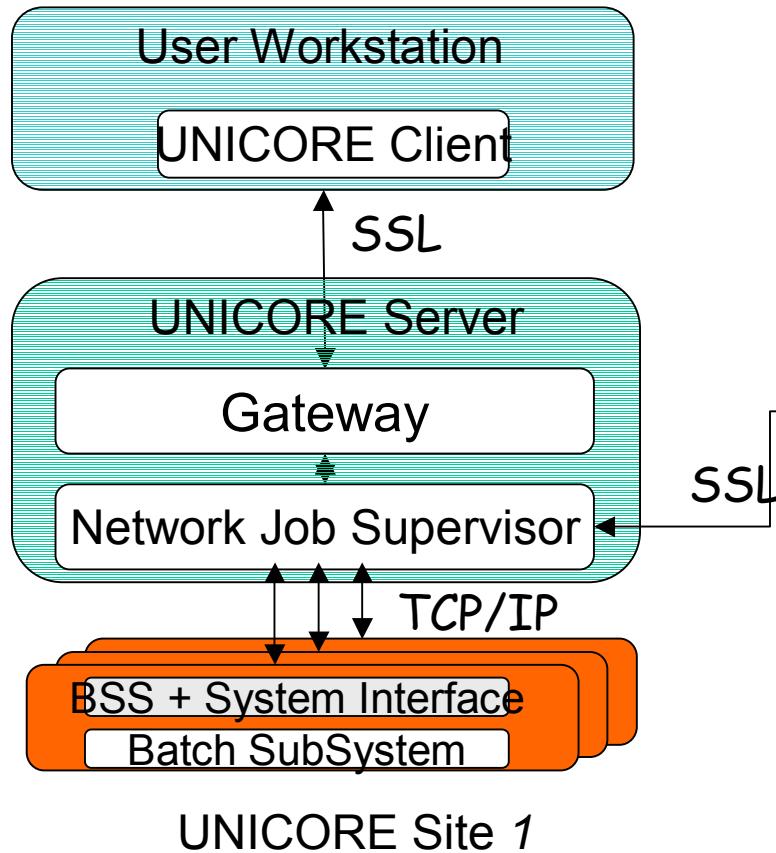
- Authenticate user once through UNICORE certificate (X.509)
- Map to existing user identification at target site
- Authorize at target site
- Respect site policies



UNICORE Functions

- Support automated computational experiments
- Application specific interface techniques
(CMPD, Nastran, Fluent, Star-CD)
- Metacomputing
- Access to archives

UNICORE Architecture





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 Partners

HPC Centres

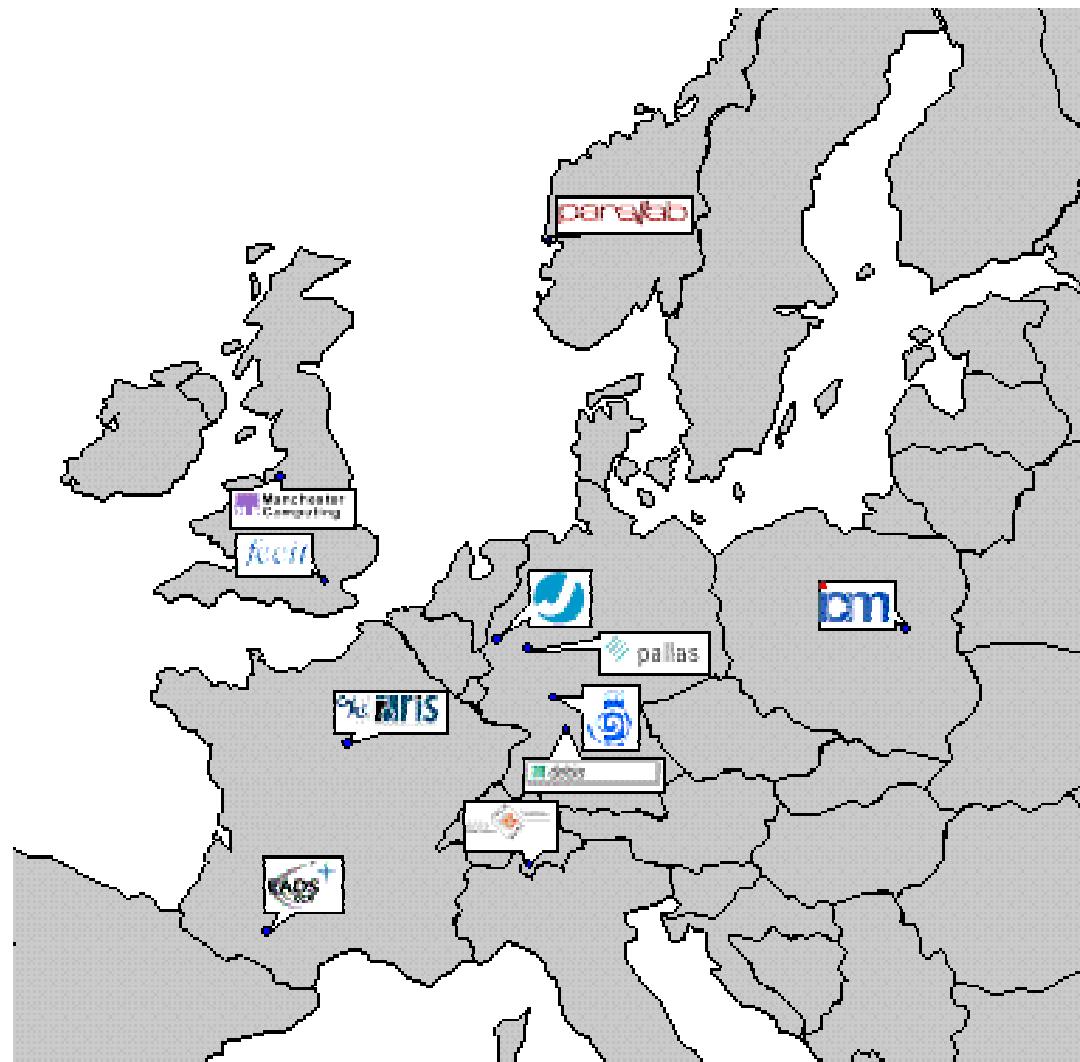
- CSCS Manno (CH)
- FZ Jülich (D)
- ICM Warsaw (PL)
- IDRIS Paris (F)
- Univ Bergen (N)
- Univ Manchester (UK)

Users

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

Integration

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





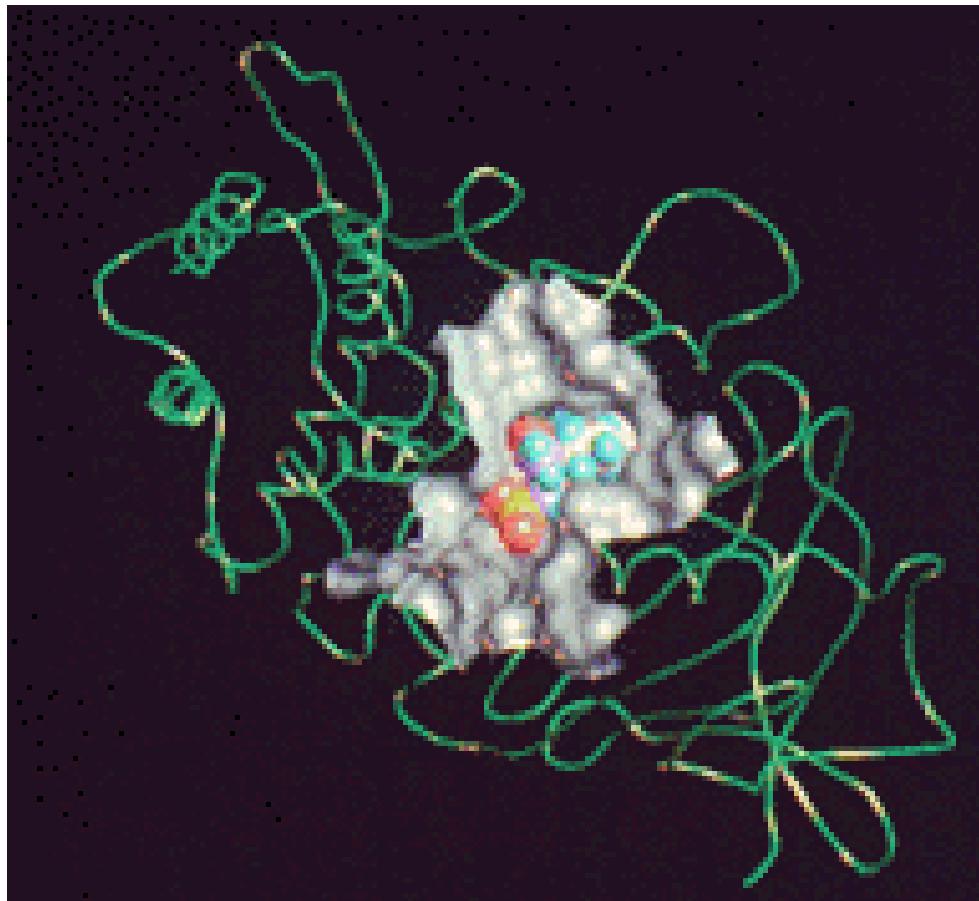
EUROGRID delivers

- Application GRIDS:
application 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
(interactive access, steering, ASP)
- Dissemination and exploitation



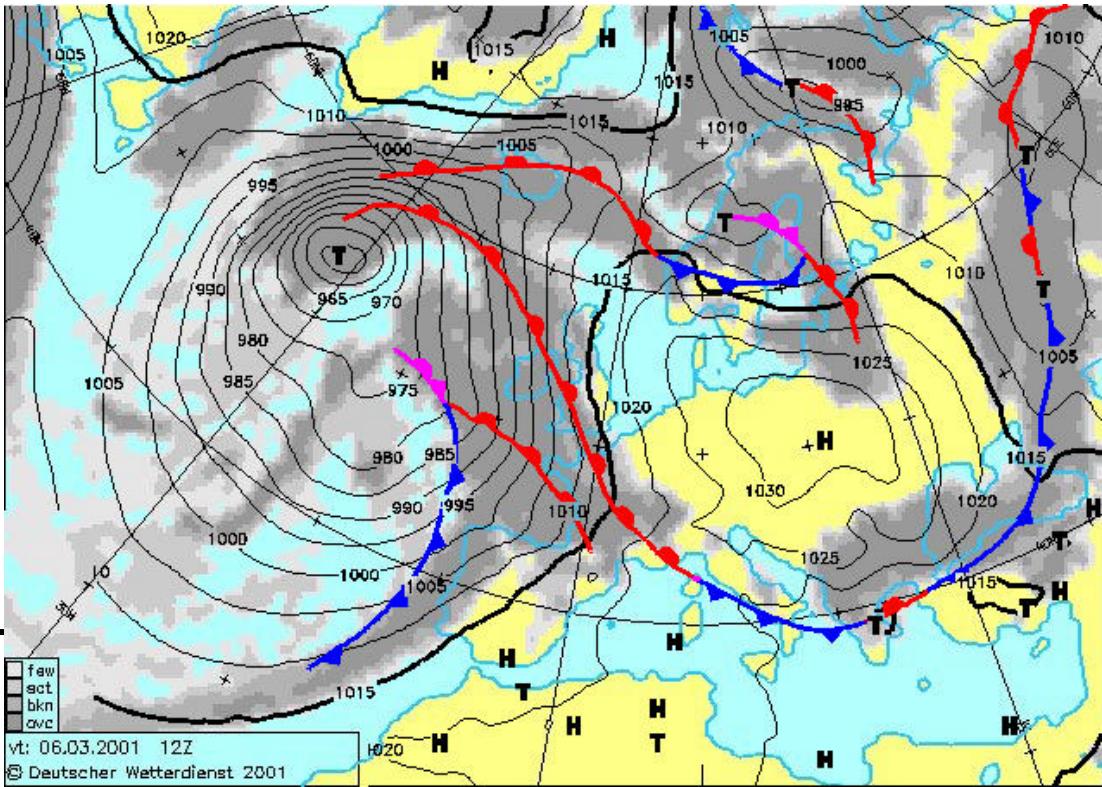
Bio-GRID

- Operate a GRID for biomolecular simulations
- Develop interfaces to existing biological and chemical codes



Meteo-GRID

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





CAE-GRID

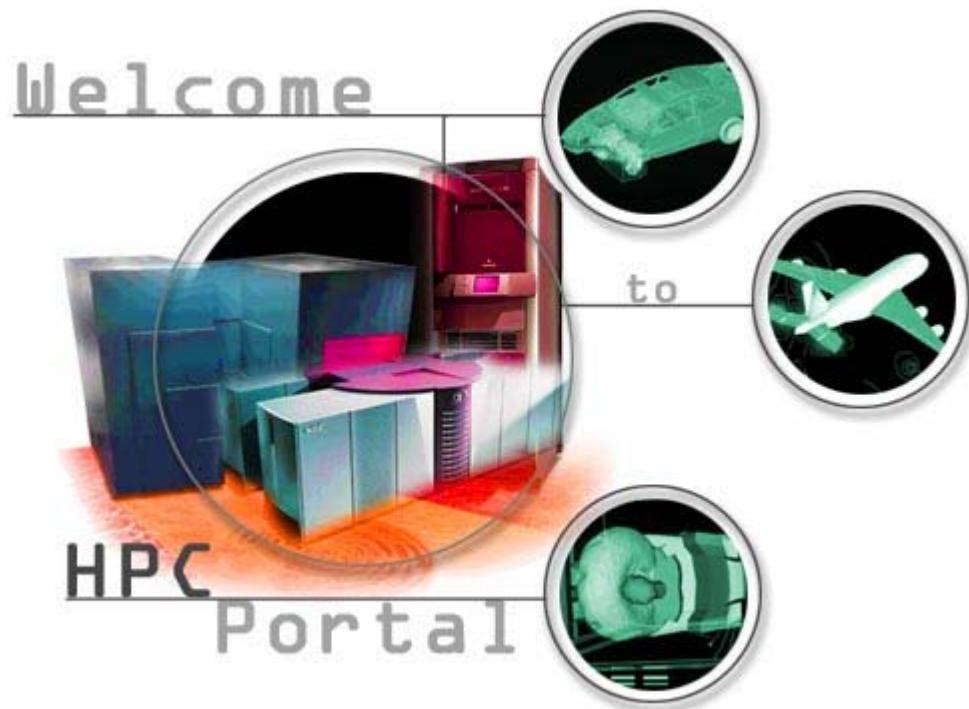
- Coupled simulations of aircrafts (e.g. structure and electromagnetics)
- Goal:
internal HPC portal for EADS engineers





CAE-GRID

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





In Summary

UNICORE and EUROGRID address

- Architecture and Implementation
- Security (X.509)
- Selected Applications
- Deployment and use (in Germany and Europe)
- Standards (new project proposal)



Quo vadis clathris?

To realize the vision of Grid Computing requires:

- collaboration of computer scientists,
developers, and users - in progress
- collaboration between projects - under way
- managing expectations - most difficult

