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open middleware infrastructure institute

Introduction to UNICORE

Morris Riedel, Forschungszentrum Jülich (FZJ), Germany

OMII – Europe Training, Edinburgh, UK

11th July 2007 – 12th July 2007

Information Society Technologies

CINECA Consorzio Interuniversitario

icm

intel

FUJITSU

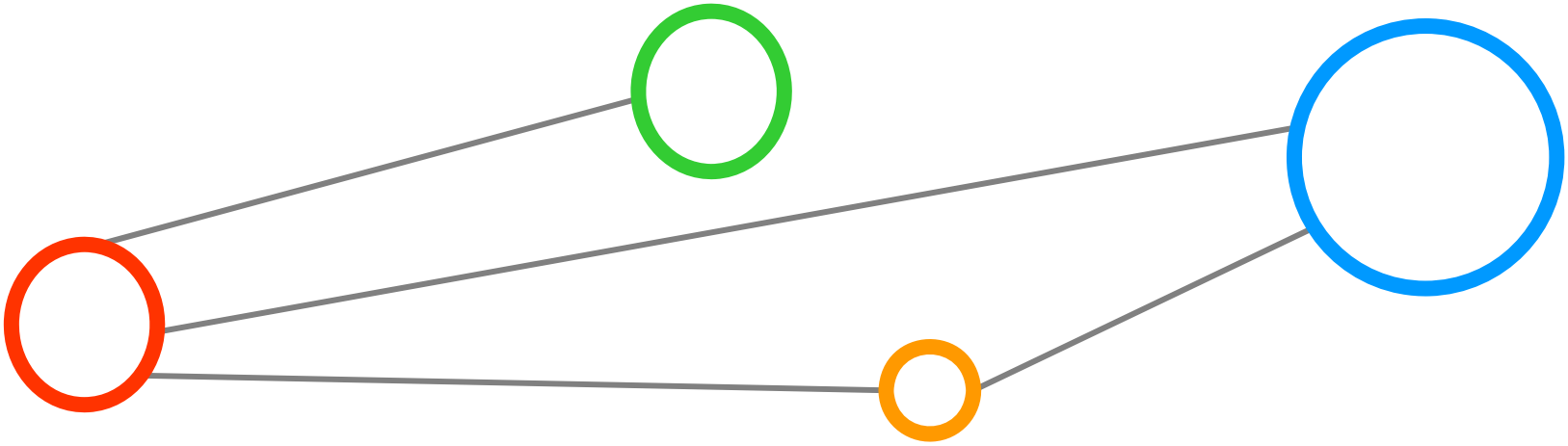
Forschungszentrum Jülich
in der Helmholtz-Gemeinschaft

Outline

- **UNICORE – A European Grid Middleware**
  - Goal/Background: „Grid driving HPC“
  - European and BMBF funded Projects
- **Production UNICORE 5**
  - Features
  - Example deyployments and usage
- **New Open Standards-based UNICORE 6**
  - Open Standards & Web Services Technologies
  - **Roadmap (!)**
  - UNICORE Development Process & Various Clients
- **Conclusions**

UNICORE

A European Grid Middleware



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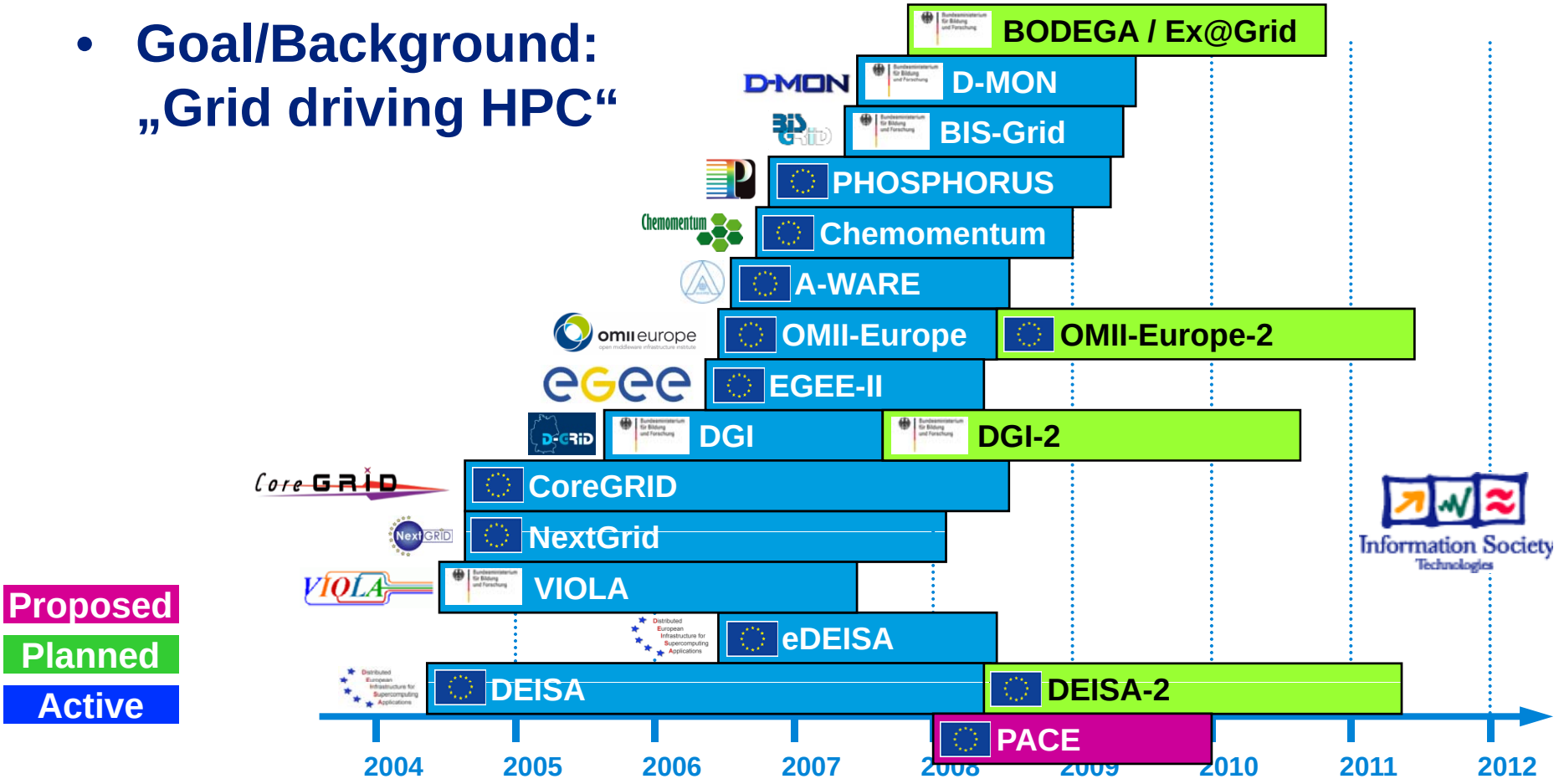
EU project: RIO31844-OMII-EUROPE

Goal/Background: „Grid driving HPC“

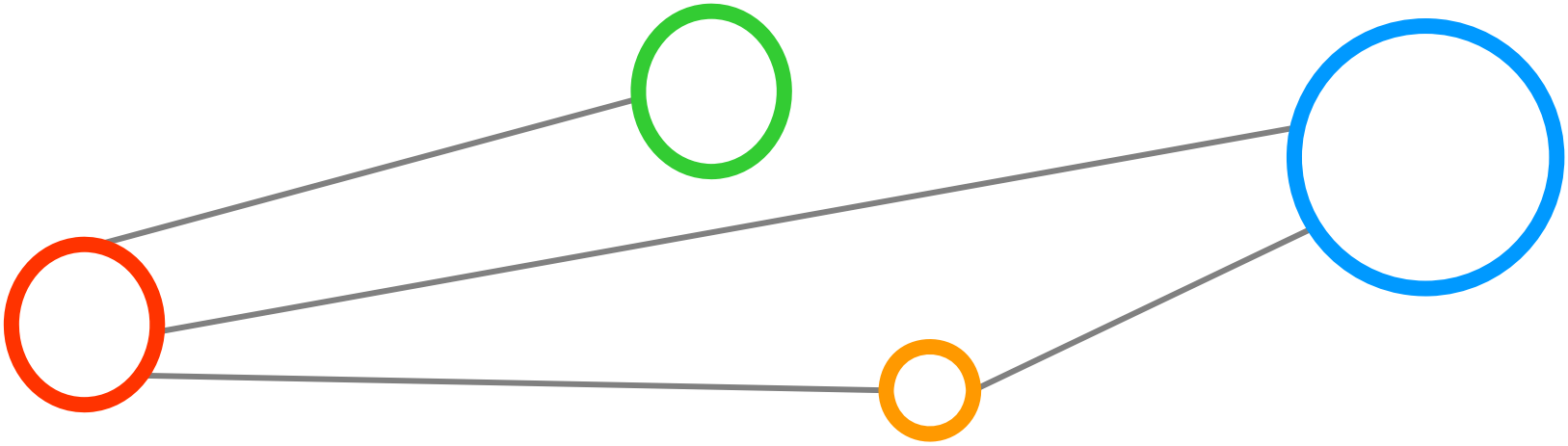
- **UNICORE as middleware supporting the Perspective: *“Driving HPC in the pan-European ecosystem“***
  - Leadership capability computing (tier-0) → “Supercomputers”
  - Entry-level capability computing (tier-1) → “Clusters”
  - Farming-based capacity computing (tier-2) → “PC pools, farms”
- **Partnership for Advanced Computing in Europe (PACE)**
  - Towards multi-core petascale Supercomputing Grids
    - **Near Future: Multi-core-based supercomputers**
    - **e.g. 80 cpus on a chip**
    - **Up to 1 Mil. CPUs at 1 site for each supercomputer**
    - **Future Supercomputing Grids: 1 Mil * n CPUs**

European and BMBF Projects

- **Goal/Background: „Grid driving HPC“**



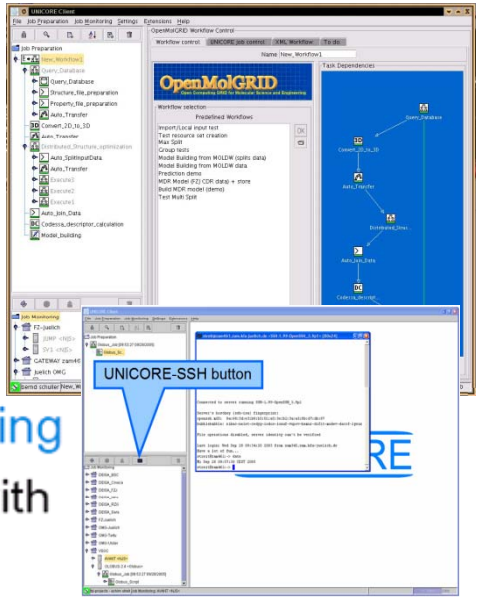
Production UNICORE 5

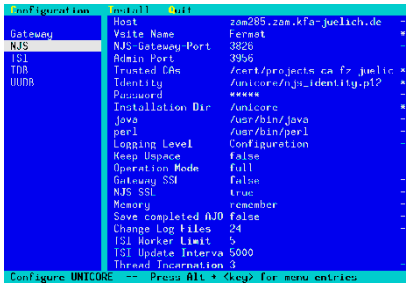


EU project: RIO31844-OMII-EUROPE

Features

- A vertically integrated Grid middleware system
- Provides seamless, secure, and intuitive access to distributed resources and data
- Used in production and projects worldwide
- Features
  - intuitive GUI with single sign-on
  - X.509 certificates for AA and job/data signing
  - only one opened port in firewall required
  - workflow engine for complex multi-site/multi-step workflows
  - extensible application support with plug-ins
  - matured job monitoring
  - interactive access with UNICORE-SSH
  - integrated secure data transfer
  - resource management
  - full control of resources remains
  - production quality, ...





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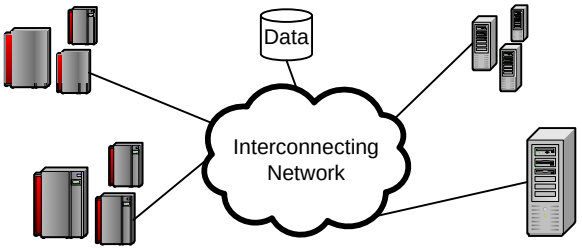
Deployment Example

Distributed European Infrastructure for Supercomputing Applications

Deploy and operate a persistent, production quality, distributed, heterogeneous supercomputing environment…



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Forschungszentrum Jülich
in der Helmholtz-Gemeinschaft
Forschungs-zentrum Jülich, Germany

sara
SARA Computing and Networking Services, The Netherlands

RZG IPP
Rechenzentrum Garching of the Max Planck Society, Germany

CSC
Finnish Information Technology Centre for Science, Finland

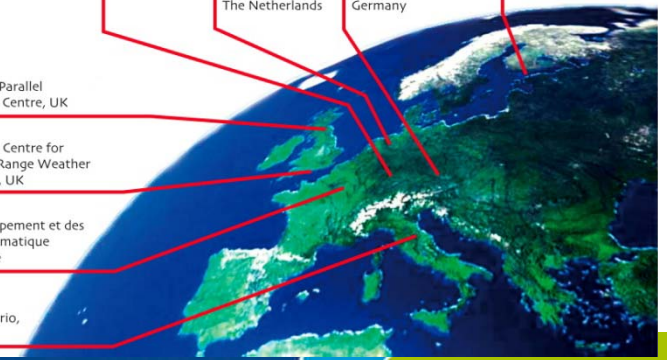
GÉANT

epcc
Edinburgh Parallel Computing Centre, UK

European Centre for Medium-Range Weather Forecasts
European Centre for Medium-Range Weather Forecasts, UK

IDRIS
Institut du Développement et des Ressources en Informatique Scientifique, France

CINECA
Consorzio Interuniversitario
Consorzio Interuniversitario, Italy



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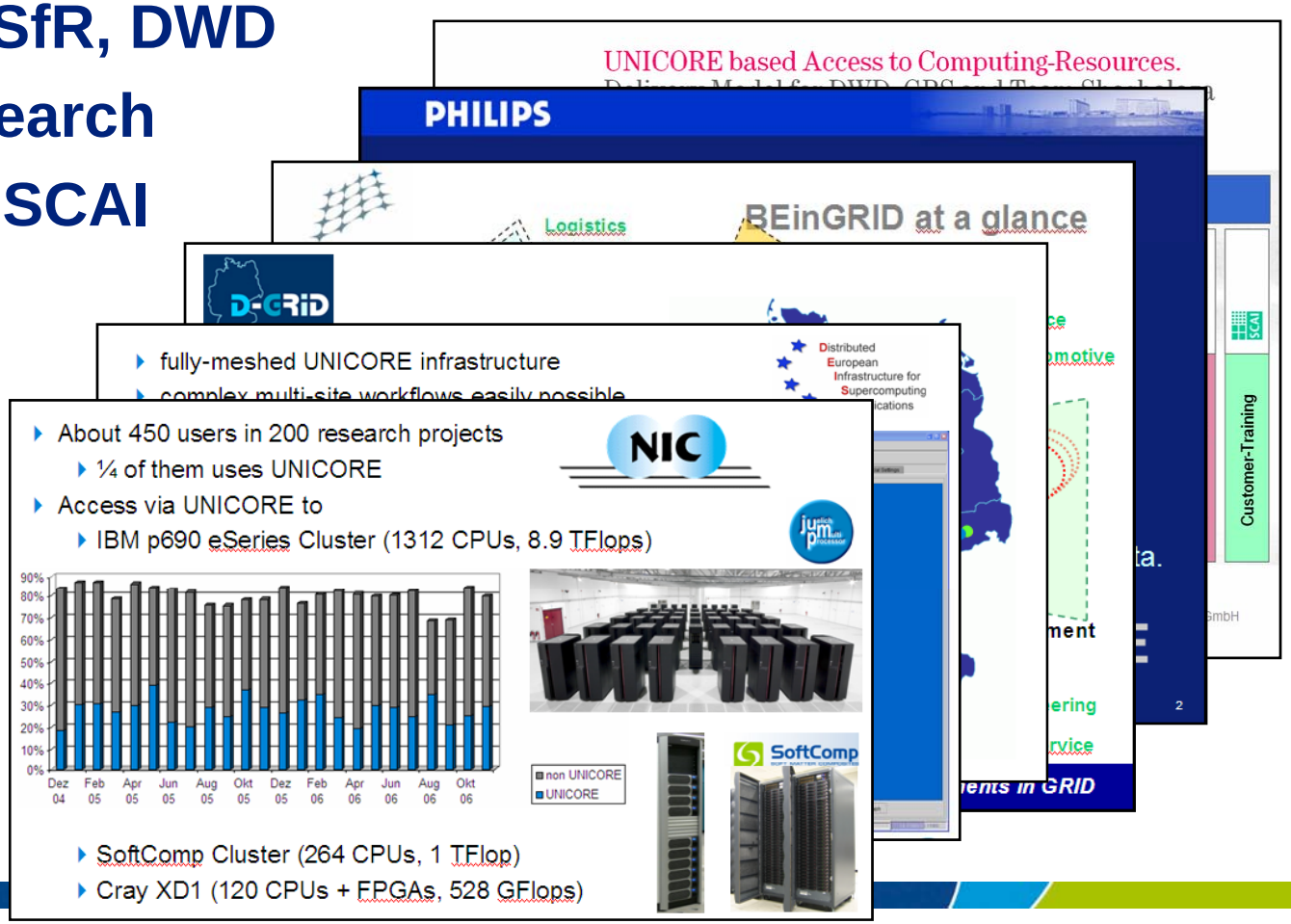
More examples of usage

- **T-Systems SfR, DWD**
- **Philips Research**
- **Fraunhofer SCAI**
- **BEinGRID**
- **D-Grid**
- **DEISA**
- **John von Neumann Institute for Computing**



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UNICORE based Access to Computing-Resources.

Delivery-Model for DWD, GRS and Team Shosholoza

UNICORE in Commercial scenarios

Deutscher Wetterdienst

Unicore Users

User Help Desk

Deutscher Wetterdienst

TI

Service-Management

T-Systems

2nd Level Support

SCAI

2nd Level Support

3rd Level Support by Developpers

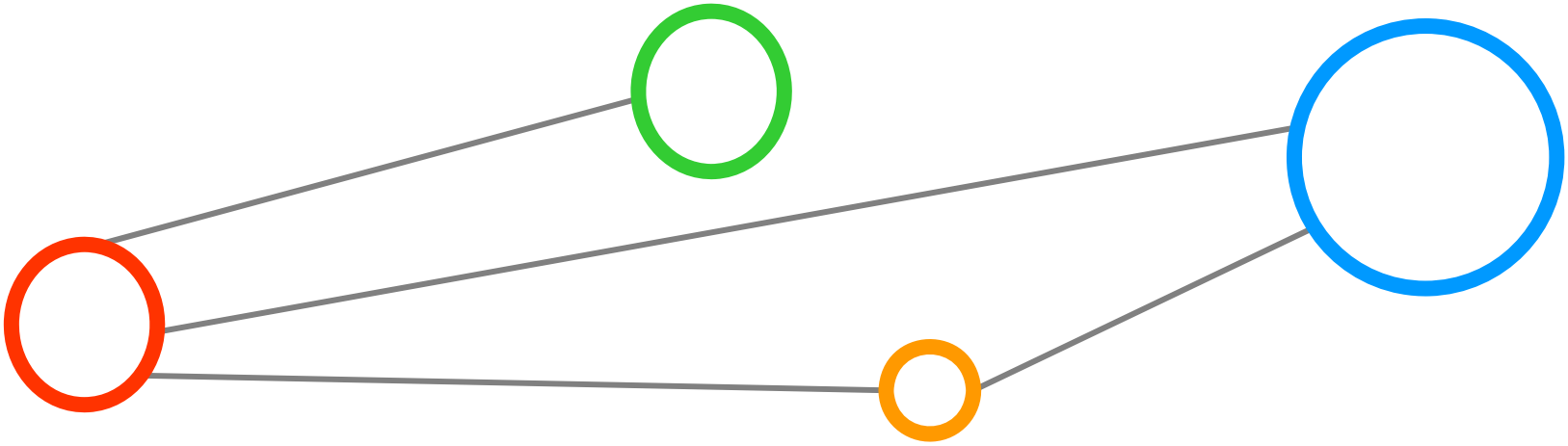
T-Systems

System-Management

SCAI

Customer-Training

New
Open Standards-based
UNICORE 6



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Open Standards and Developments

- **WSRF-compliant and OGSA-based UNICORE 6**
  - Standards: WSRF 1.2 final, WS-I, JSDL 1.0, XACML 1.0, OGSA ByteIO
  - Modern software stack: Java 5, XFire SOAP Stack, XMLBeans, Jetty, …
- **Joint development effort under guidance of the UNICORE Forum Technial Board**
  - Core Partners:

    CINECA Consorzio Interuniversitario, icm, intel, FUJITSU, Forschungszentrum Jülich in der Helmholtz-Gemeinschaft
  - Contributions from numerous others: INFN, RZG, CERN, UEDIN…

UNICORE FORUM

- **Founded by developers, leading EU HPC centres, and supporting hardware vendors as a non-profit association**
- **Foster the distribution and use of UNICORE, organize workshops, support presentations at conferences, publish and maintain the specifications, coordinate further development, certify implementations and extensions**

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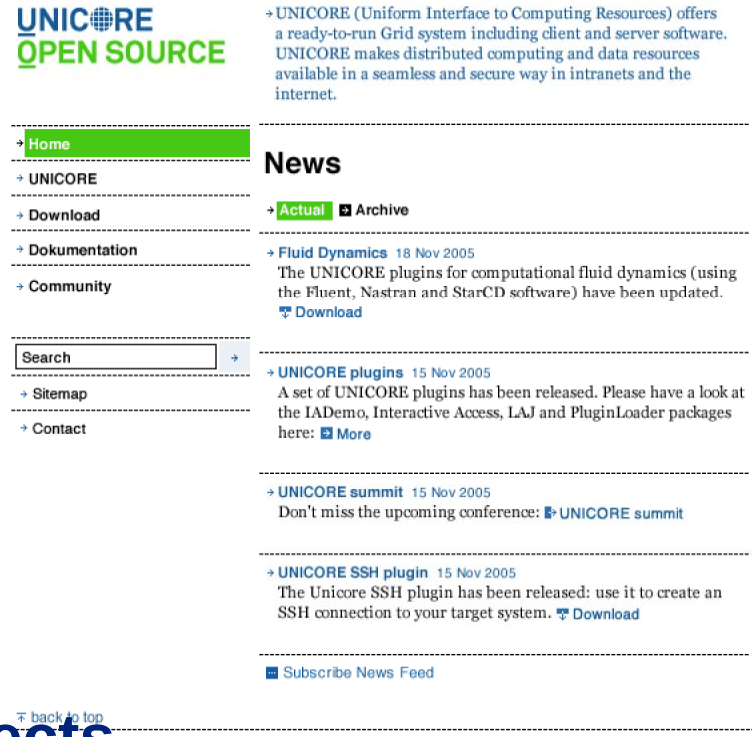
Roadmap

- **Beta version released in April 2007**
- **6.0 final release, July/August 2007, RC available(!)**
  - UNICORE Atomic Services (UAS)
  - Initial workflow support (Multi-site Jobs)
  - Compliant with UNICORE 5 Target System Interfaces (TSIs)
  - Compliant with Intel Grid programming Environment (GPE) 1.4
  - UNICORE Command Line Client (UCC)
- **6.1 release, Q4-2007**
  - Extended workflow support and portals
  - Compliant with Intel GPE 1.5
  - Support for VOMS and OGSA-BES (out of OMII-Europe)

UNICORE OPEN SOURCE

- http://www.unicore.eu
- **Open Source under BSD license**
- **Supported by FZJ**
  - Integration of own results and from other projects
  - Release management
  - Problem tracking, assistance
  - CVS, Subversion, mailing lists, docs
- **Viable basis for many other projects**



Chemomentum D-GRID eGee A-WARE An easy Way to Access grid REsources Distributed European Infrastructure for Supercomputing Applications

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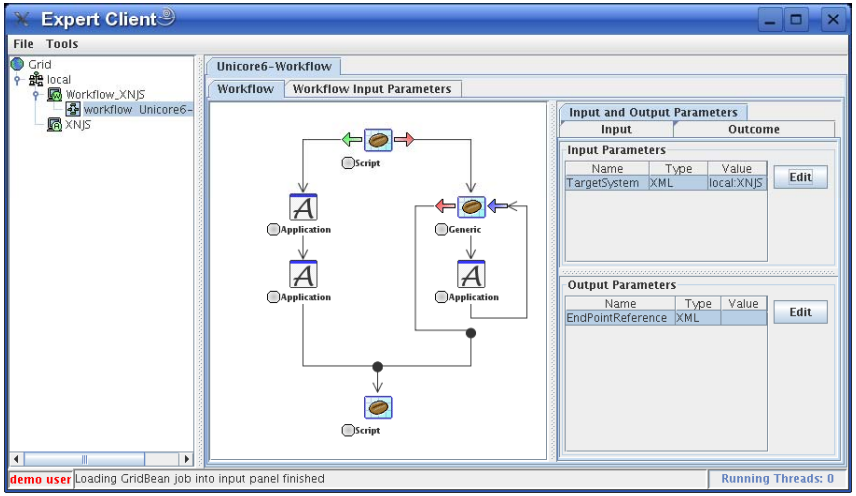
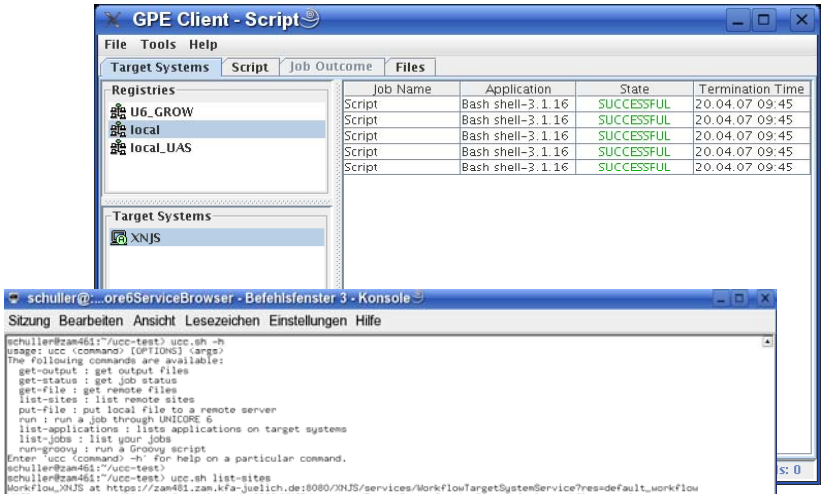
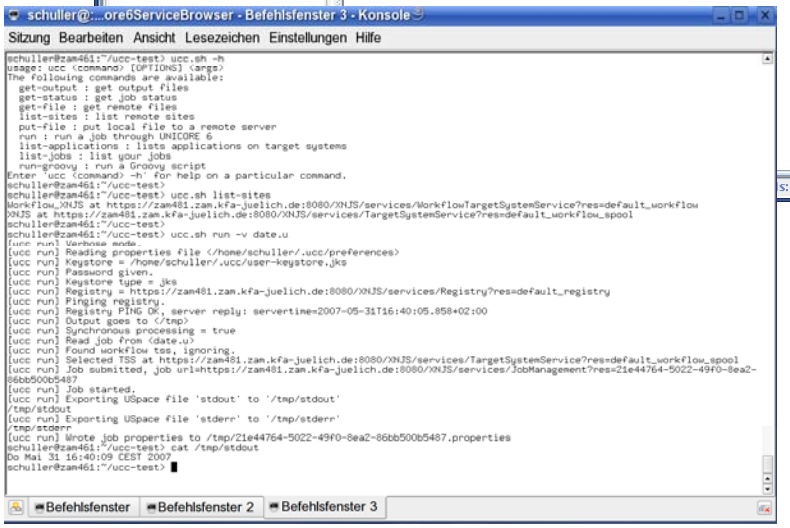
Various Clients

- **GUI clients based on Intel's GPE**
  - Application and expert client
- **Command line client**

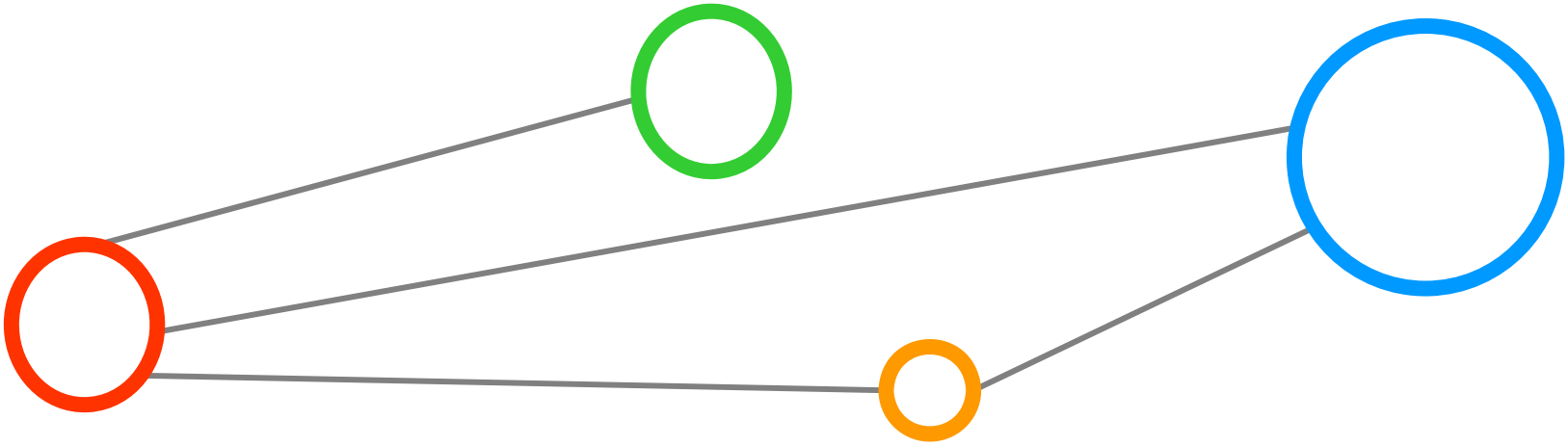






- **Portal (GridSphere, GPE)**
- **Rich Clients (Eclipse)**

Conclusions



Conclusion

- **UNICORE – A European Grid Middleware**
  - Used in numerous EU and BMBF funded Projects
  - UNICORE is used by Commercial partners: T-Systems, Philips,…
- **Open Standards-based UNICORE 6**
  - Based on Web Services Technologies
  - Version 6.0 available at July/August 2007, RC available
  - Version 6.1 will be available at Q4-2007, more features
- **UNICORE is open source software under BSD license**
  - Everybody can contribute/extend to/it for specific use
  - UNICORE 6 available at: http://www.unicore.eu

UNICORE OPEN SOURCE

Outreach

- **Numerous demonstrations at various events (GES, ISC, SC, OGF, …)**
- **Tutorials, training, hands-on, etc.**
  - DEISA Training: Paris (July 2006), Jülich (October 2006), Barcelona (March 2007), Helsinki (May 2007)
  - OMII-Europe Training, Edinburgh, June 2006
  - CoreGRID Summer School, Bonn, July 2006
  - GridKA, Karlsruhe, September 2006
  - NIC User meeting, Jülich, October 2006
  - SoftComp Inauguration, Jülich, November 2006
  - ***OMII-Europe Training, Edinburgh, July 2007***
  - *D-Grid, Jülich, July 2007*
  - *CoreGRID Summer School, Budapest, September 2007*
- **UNICORE Summit**
  - 2006: EuroPar Workshop, Dresden, Germany, August 2006
  - *2007: EuroPar Workshop, Rennes, France, August 2007*

UNICORE SUMMIT

- **28th August, 2007**

- **To be held in conjunction with Euro-Par 2007, Rennes, France, August 2007**
- **Unique opportunity for Grid users, developers, administrators, researchers, and service providers to meet**
- **Call for Papers was published**
- **Join us to get an inside view of UNICORE, share experiences, and discuss future developments & the integration of your work!**
- **http://summit.unicore.org/2007**

EU project: RIO31844-OMII-EUROPE

Acknowledgements

- **Open Middleware Infrastructure Institute for Europe**

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- **ZAM/NIC of Forschungszentrum Jülich (FZJ) in the HELMHOLTZ association**

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in der Helmholtz-Gesellschaft

More information

www.unicore.eu

Technical Support

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