

GRIP – Creating Interoperability between Grids

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Moving towards THE GRID:

- Standardization
- Interoperability layer
- Applications

➡ Interoperation between UNICORE and Globus combining the unique strength of both systems



UNICORE Status

Uniform **I**nterface to **C**omputing **R**esources

- Project UNICORE Plus (funded by BMBF, grant: 01 IR 001) successfully completed
- UNICORE Pro software marketed and supported by Pallas
- Software available as Open Source for R&D projects: <http://www.unicore.org/download>
- Basis for a German HPC Grid
- Used in several EC funded Grid projects
- Selected by Japanese NAREGI project



- System-independent creation and control of jobs
- Support for multi-system and multi-site jobs
- Dynamic flow control
- Integrated security using X.509 certificates
- Access to remote file systems and archives
- Extensible support for scientific & commercial applications
- Minimal intrusion into site autonomy



Globus Status

- Globus Toolkit (GT) 2.4 and 3 beta
- Many GT 2.x based solutions available (IBM Grid Toolbox ...)
- Software is available as Open Source at <http://www.globus.org/gt2.4/download.html>
- GT is used in projects & testbeds worldwide (DataGrid, NASA IPG ...)



Globus Highlights



- Set of extensible services and corresponding APIs
- Collection of commands to access services
- Services are Grid Security Infrastructure (GSI) enabled
- Commodity Grid Kits (CoG Kits) to build Grid portals
- First OGSI compliant Grid implementation



Objectives of GRIP

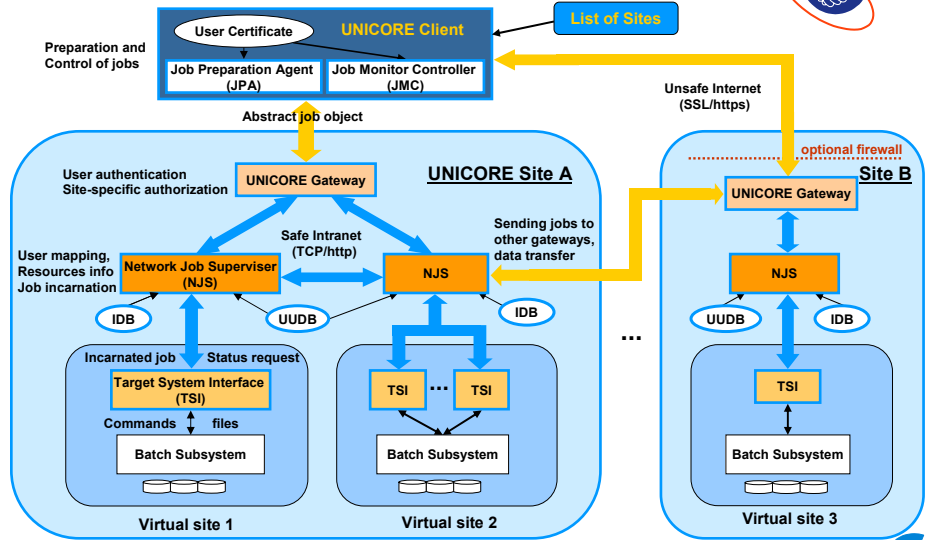


Grid Interoperability Project: EU grant IST-2001-32257

- Make Globus controlled resources available to UNICORE users
- Develop software to enable the interoperation of UNICORE and Globus
- Cross-Grid information brokerage
- Build and demonstrate biomolecular and meteorological inter-Grid applications
- Contribution to standardization efforts
- Evolve towards a service oriented Grid



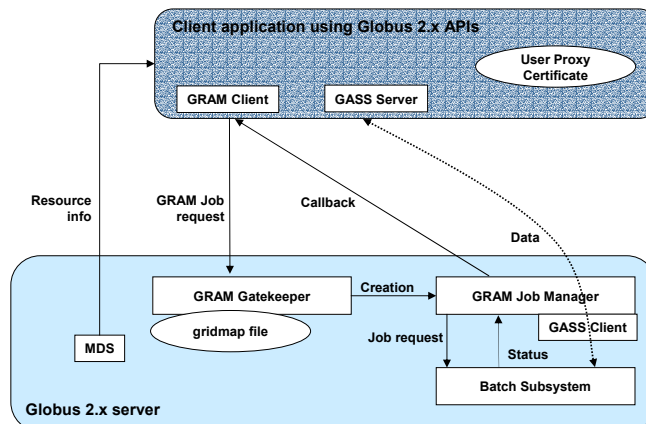
UNICORE Architecture



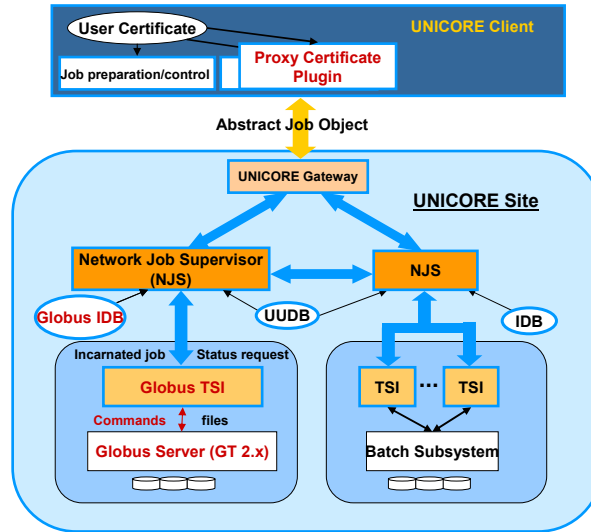
Globus Architecture



Components relevant for GRIP



GRIP Architecture



Interoperability Components



Discussed in this presentation:

- Security
- Resource provisioning & brokerage
- Applications support

Others:

- Resource description mapping
- Job submission & monitoring
- Data transfer



Security



- Both systems use PKIs utilizing X.509 certificates
- UNICORE
 - End-to-end security
 - Certificates for user & server authentication and signing of jobs
 - Authorization entity: UNICORE user database
- Globus
 - Proxy delegation
 - Proxies are used for user & server authentication
 - Authorization entity: gridmap-file



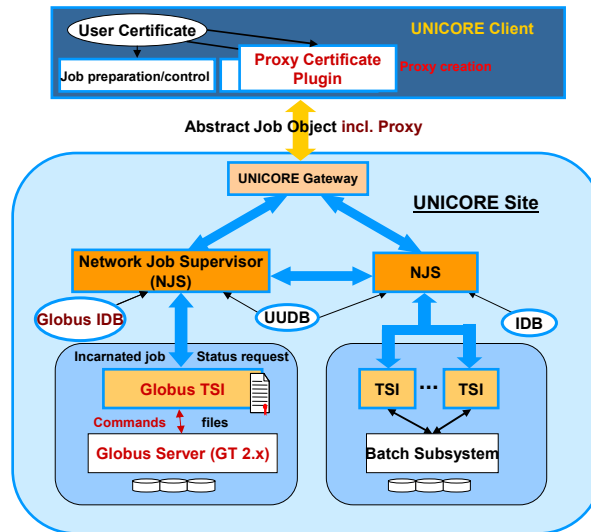
Security (cont)



- GRIP
 - Client generates proxy certificates automatically
 - Proxy transferred via SSL within job (signed), not stored in between
 - Proxy stored in user's filesystem
 - Proxy is removed after job execution
 - Proxies are signed by GRIP CA
 - Globus site must trust GRIP CA



Security (cont)



Resource Management



➤ UNICORE

- Distributed database (IDB) for each target system
- Resource info automatically provided to client
- Software is also a resource in the database

➤ Globus

- Monitoring & Discovery Service (MDS) using LDAP
- Client API to query MDS
- No software resources



Resource Management (cont)



- GRIP:
 - Initially manual & static mapping of Globus resource description to UNICORE database
- Work in progress:
 - Cross-Grid resource broker
 - Ontology to translate resource descriptions automatically
 - Extensible broker architecture



Applications



- UNICORE:
 - Plugins and Software Resources to support user written and commercial applications
 - No source needed
- Globus:
 - Globus library calls in application
 - Requires source
 - Usage of CoG Kits to build portals



Applications (cont)

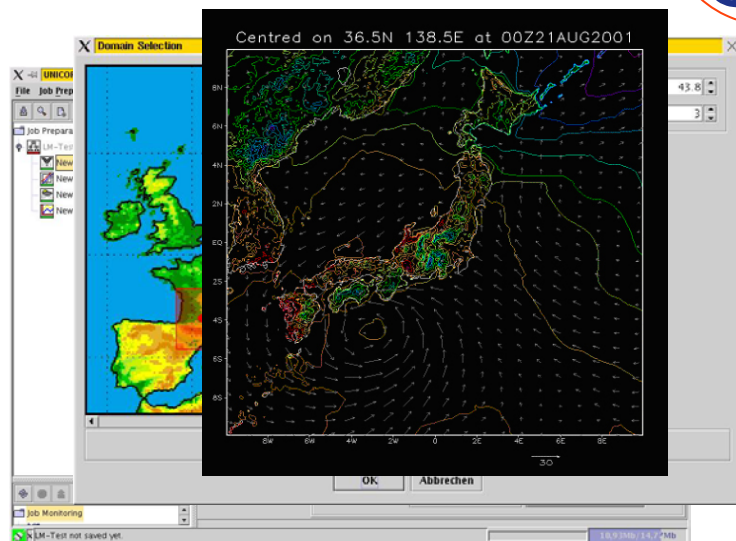


➤ GRIP:

- Wrappers for applications to allow them to execute transparently either on Globus or on UNICORE
- No source needed
- Hopefully only a temporary solution till applications become Grid Services



Applications (cont)



GRIP Issues & Challenges



- Administration
- Management
- Support
- Interoperability Challenges



Administration



- No major additional administration for UNICORE & Globus sites
- Maintain UNICORE user database to authorize access to Globus Virtual site
- Globus site installs a Globus TSI on a dedicated system or the target system
- Enable GSI to use GRIP CA signed proxies



Management



- Management is distributed in UNICORE and GRIP
- Organizations retain their autonomy
- Coordination is a must
 - Acceptance of CAs
 - Expiration of certificates (esp. for servers)
 - Management of user mappings
 - Interoperability between software versions
 - Dependency on other software (e.g. Java version)
- Additional: Dependency on Globus versions and policies



Support



- Professional support and enhancements are essential for production
- Pallas is providing this for UNICORE for administrators and second level support for users
- Open Source is necessary but not enough
- User support through HPC centers



Interoperability Challenges



- Interoperability between UNICORE and Globus is technically solved
- Different security models needed additional work
 - UNICORE: end-to-end
 - Globus: proxy certificates
- Resource models are not fully compatible
 - Software resources missing in Globus
 - Different semantics
- Standards are needed



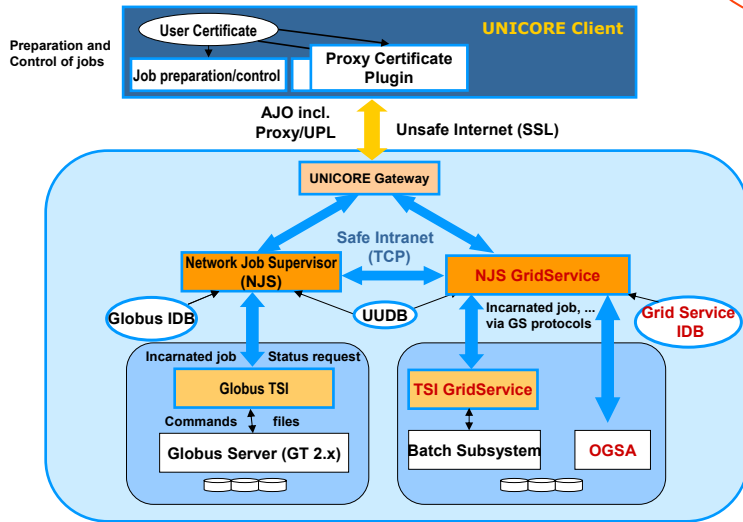
GRIP and OGSI/A



- UNICORE is extended implementing internal/external OGSI interfaces
- Re-factorization of UNICORE/GRIP specific components to become Grid Services
- TSI Grid Service to interface with GTK 3
- OGSI is not enough, standards needed for protocols, languages ...
- Web Service security needs a closer look



GRIP and OGSI/A (cont)



Links



- GRIP: <http://www.grid-interoperability.org>
- UNICORE: <http://www.unicore.org>
- Globus: <http://www.globus.org>
- Paper on GRIP PGM soon available

