

Grid Computing Environments Community Practice (CP) Document

Project Title: UNICORE
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Project URL(s): http://www.unicore.de , http://www.fz-juelich.de/unicoreplus

1. Overview - including:

A. Description & Goals

UNICORE implements seamless, secure access to distributed computing resources, applications, and data. It provides users with a graphical interface to create jobs, submit, monitor, control them, and receive results at the workstation. UNICORE's main objective is to hide system and site specific conventions from the user, thus extending the workstation to include all resources of centers participating in a computational grid.

UNICORE is developed under Grant from BMBF, German's Ministry of Education and Research and extended in a European project funded by the European Commission.

B. Services provided

Creation of system independent., complex, multi-site batch jobs through a graphical client; support for existing legacy batch jobs; job monitoring; job control; interdependent job steps; synchronization of job steps; transfer of data between the user's workstation and UNICORE; transfer of data between different UNICORE sites; transfer of data between UNICORE systems and storage servers; application specific support; support for computational experiments; access to data archives; support for meta-computing applications, performance analysis of grid applications. EUROGRID project extends the services to interactive control, resource brokering, application test beds, accounting, application service providing.

C. Systems/Sites/User Served

UNICORE is designed to be essentially system independent. The client executes on any Windows PC or Unix Workstation that supports a Java run time environment. The UNICORE servers run on Unix systems supporting Java 1.3, presently Sun Solaris, IBM AIX, SGI Irix, and Linux systems have been tested.

Interfaces to the target systems exist for CRAY, SGI, Sun, Fujitsu, IBM, NEC, Hitachi, Siemens. Participating sites are the partners of the UNICORE Plus project and the EUROGRID project. Users are the HPC users of the participating centers.

D. Status

The first version of a second prototype is deployed to all partners and tested by a group of selected users to incorporate feedback.

E. Other

2. Architecture

UNICORE does not rely on any specific implementation of Grid services or software. Its architecture is modular in the sense that components can be exchanged to make use of better ones. The term Grid software/services is taken as a generic term and not referring to a particular implementation.

- A. Define Grid software/services that the GCE currently depends upon and relationship to GF Working Group.

- Security through X509 certificates for authentication of users, servers, and software. (Security)
 - Resource description, resource modeling (GIS, Sched)
 - Data transfer and data management (Data)
 - Scheduling (Sched)

- B. Define Grid software/services that the GCE plans to make use of
Performance, Quality of Service (Accounts)

- C. Define Grid software/services that are needed by the GCE but are not supported by the Grid
User Interface Definitions.

- D. Define software/services used/needed by the GCE that are outside the scope the Grid
Abstraction of actions. UNICORE's Abstract Job Object (AJO) is the key component of UNICORE which allows system independent specification of jobs.

- E. Other

- Administration Management of Grid users and distributed work.

3. Implementation

- A. Commodity technologies/software used (e.g., EJB, JMS, JINI, Perl, XML, databases.)

- UNICORE uses Java as the implementation language for the client, the gateway, and the servers. Perl is presently used for the component that executes on the target hosts, the TSI (target system interface). SSL is used for secure communication over the internet.

- B. Proprietary technologies/software developed that can be shared with others

- UNICORE implements a three tier architecture as shown in the diagram below.

- The client creates Abstract Jobs which are encapsulated as Abstract Job Objects (AJO). Plug-ins are used to support Applications.

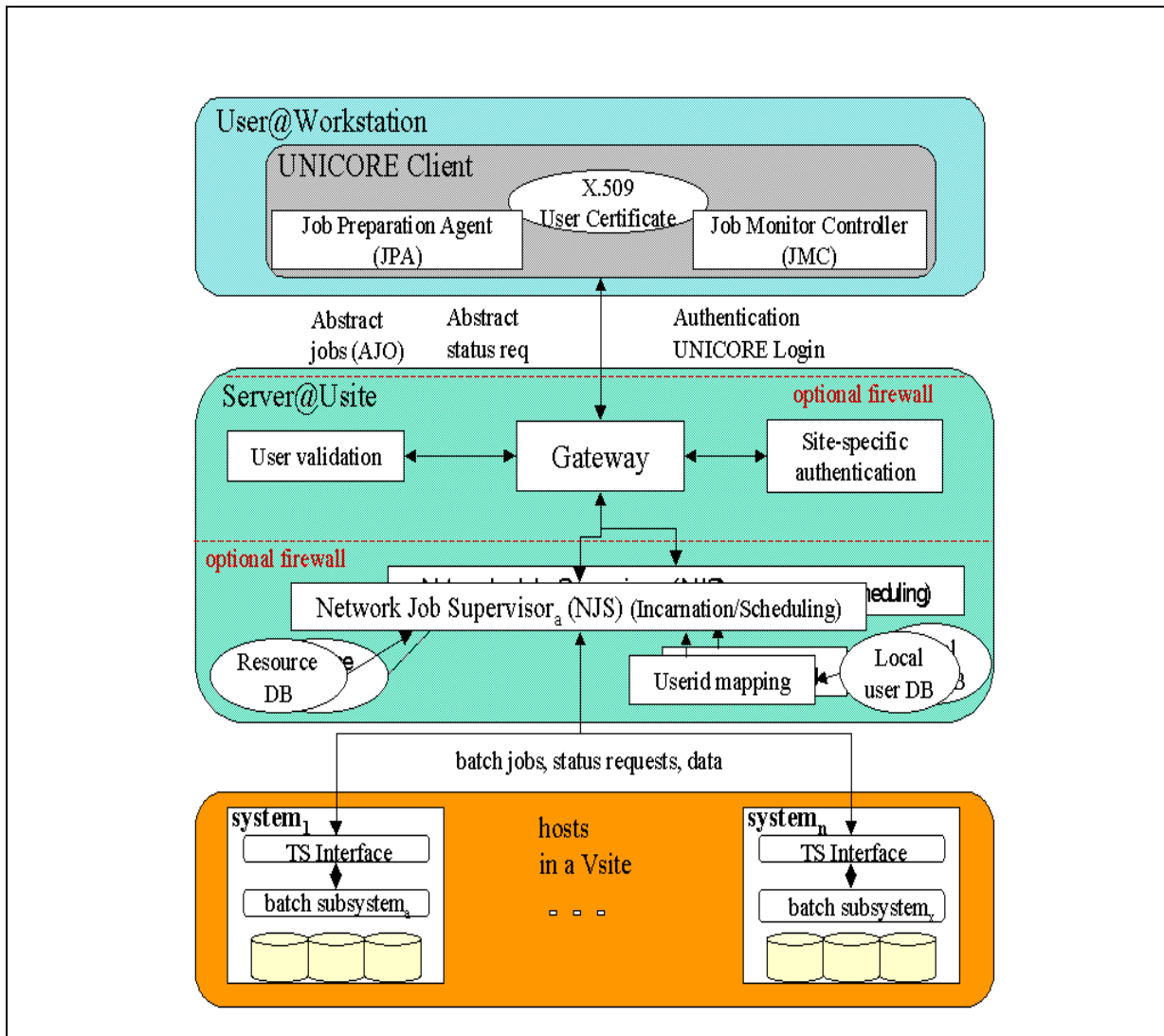
- The Gateway ensures that only valid clients and valid users may access UNICORE resources

- The Network Job Supervisor translates (incarnates) the Abstract Jobs into Target System specific Batch Jobs, or passes sub-AJOs to peer systems, synchronizes the execution of dependent jobs and manages the data transfer between different systems.

- The TSI on the target system interfaces with the operating system and or batch subsystem.

- C. Other

- It is part of the projects objectives to publish the interfaces.



4. Supported Grid Services

- A. Security
Yes, based on X509 certificates and a PKI.
- B. Information services
Yes, maintained at each participating site and available through the GUI.
- C. Scheduling
Yes, performed by NJS for jobs involving interdependent jobs on multiple systems and sites.
- C. Data transfer
Yes, specified by the user and managed by NJS.
- F. Additional Grid services
Application specific support
Extended control over jobs (support for computational experiments)
- G. Other
Performance of Grid Applications (Extensions to Vampir)

5. Project Status and Future Plans

The first production ready release of the UNICORE software is deployed to all partners of the UNICORE Plus and EUROGRID projects for field tests and as the basis for development of additional functions by the partners. Presently, funding is secured till December 2002 for UNICORE Plus, and October 2003 for EUROGRID. Pallas, Brühl, is committed to produce a product based on the results of the project.

6. References

<http://www.unicore.de>

<http://www.fz-juelich.de/unicoreplus>