UNICORE and GRIP: Production Experience

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Uniform Interface to Computing Resources

Development of software for a

- seamless,
- secure, and
- intuitive

access to distributed computing resources

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

http://www.unicore.de

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UNIC●RE Highlights

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

UNIC●RE Deployment

LRZ: SR 8000, VPP, LC*
RUS: SX-5, 2xLC*
FZJ: 2xT3E,SV1, LC*
ZIB: T3E, Sun
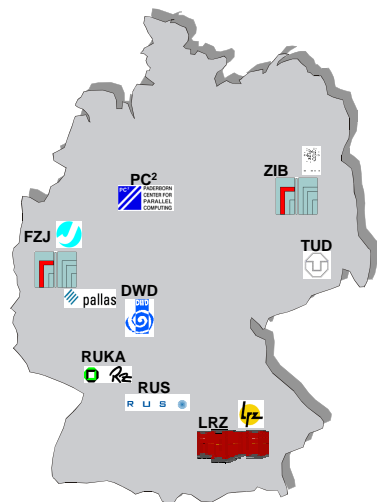DWD: IBM SP, SGI
RUKA: IBM SP
PC²: LC*
TUD: T3E, SGI
Pallas: Sun
Fujitsu: VPP, Sun

*LC = Linux Cluster

UNIC●RE Status

- Project UNICORE Plus successfully completed
- UNICORE in use at partner sites
- UNICORE basis for a German HPC Grid (LRZ, HLRS, FZJ)
- Software available as Open Source for R&D http://www.unicore.org/download
- UNICORE commercially supported by Pallas
- UNICORE used in European Grid projects
- UNICORE selected by Japanese NAREGI project

GRIP Objectives

- Develop software to facilitate the interoperation of UNICORE and Globus combining the unique strength of each system
- To build and demonstrate biomolecular and meteorological inter-grid applications
- To contribute to and influence international grid standards work

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Partners

Forschungszentrum Jülich (FZJ)

pallas *Pallas*

University of Manchester (UoM)

ICM Warsaw (ICM)

Deutscher Wetterdienst (DWD)

University of Southampton (Soton)

Fujitsu European Laboratories

Argonne National Laboratories (ANL)

UNIC●RE Scope of the Grid

- All major resources are accounted for
- Resources are in different administrative and funding domains
- All users have to be identified
- Users belong to different communities
- Strict security and privacy policies are in place

- The Grid has a small (10-20) of compute resources
- It has a larger number of distributed users

UNIC●RE Dynamics of the Grid

- Overlapping virtual organizations
  - Different subsets of available resources are accessible to different groups of users
- Participating organizations remain mostly constant
- Available resources change slowly over time
  - New systems
  - New software
- User communities exist typically for a few years
- Individuals within communities change more frequently
- Different local administrations exist

UNIC●RE Production Experience

- Security
- Authentication
- Grid Information Service
- Management/Coordination
- Support

UNIC●RE Security

- Based on X.509 certificates
- Authenticates Servers
- Authenticates Clients
- Authenticates users
- Encrypts Communication
- Signs Jobs and Actions

Requires operational and efficient PKI

UNIC●RE Authentication

- Certificates provide single sign-on
- Works ideal with single PKI
- Multiple CA are supported in UNICORE
- Strict CA policies are both blessing and curse
  – User's identity is guaranteed
  – Process to obtain certificate is difficult and time consuming
- Today: Mapping certificates to existing userids is necessary
- Tomorrow: Systems will accept certificates directly for authentication and authorization

UNIC●RE Information Services

- Information management is distributed in UNICORE
- Each organization maintains the resources it offers to the Grid users independently
  – Hardware resources
  – Software resources (applications)
- Users have access to the all resources when needed
- Organizations have to agree on syntax, semantic, and conventions
  A Grid Standard would reduce the work

UNIC●RE Management

- Management is distributed in UNICORE
- 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)

UNIC●RE   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 centers

Interoperability issues

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

UNIC●RE Future

- Production of a HPC Grid can be supported by UNICORE – this was the goal of UNICORE
- To support Grid Interoperability additional development based on standards is needed
- OGSA will be the source for these standards
- UNICORE will be extended to support OGSA interfaces as part of the GRIP project