Adoption of the UNICORE middleware amongst ICM users

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Motivation

- Growing need for use of CPU intensive applications in new user community
- Distributed resources available
- Requirement for seamless access
- Web portal as preferred access method
- Existing web portals are complicated, difficult to install and maintain
- Requirement for strong security
  - processing of medical data (images, NGS, etc).
- Uniform offer for different types of users
  - PL-Grid community
  - ICM users
- HPC center providing computer resources to the Polish scientific community
  - More than 300 active grants
- Multiple HPC systems:
  - Cray XC40
  - Heterogenous PC cluster
    - Different types of processors
    - Some nodes equipped with GPU cards
  - IBM Power6
- Different access methods:
  - traditional (ssh)
  - grid type (via PL-Grid)
- National Grid Initiative
- Partners:
  - Polish supercomputer centres:
  - Cyfronet, ICM, PCSS, WCSS, TASK
- Project aims:
  - Build and operate Polish National Grid
  - Provide training and user’s support
  - Provide support for application deployment on the grid
- ICM role in PL-GRID
  - Operate UNICORE access to the resources
UNICORE 7 Architecture

Client Layer

Gateway

HTTPS

HTTPS / HTTP

UNICORE Hosting Environment

SECURITY

User DB

Policies

Execution Manager

Registry

Atomic Services

WSRF Container

Other Services

Target System Interface

Computational Resources

Files

Data Storages Databases

Target System

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UNICORE Client framework

- Eclipse-based rich client
- Eclipse based workflow editor
- Command line client
- Web client
- UNICORE Portal
UNICORE infrastructure at ICM

ICM UNICORE Central Services

UNICORE Gateway

UNICORE Registry

Workflow Engine

Service Orchestrator

UNICORE Rich Client (URC)

UNICORE Commandline Client (UCC)

Web Browser

UNICORE Portal

PLGrid UNICORE Central Services

PLGrid Infrastructure

UOICORE Portal

Unity

Unity IDM

unicore.ocean.icm.edu.pl (ICM-OKEANOS)

UNICORE TSI

UNICORE/X

UNICORE Gateway

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Okeanos (Slurm)

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Hydra (Slurm)
UNITY IDP

- **Authentication**
  - who is who
  - wide range of mechanisms & security levels

- **Federations**
  - where do they come from?

- **Authorization levels**
  - The relying system must be able to decide easily who has an access granted

- **Privacy**
  - from none to paranoid

- **Identity management as a service**
  - Could be used for grids and clouds
UNICORE – UNITY Integration

Users Domain

- User access UNICORE Portal
- User chooses authentication method and log in

UNICORE Portal Server Domain

- User selects authentication facility

Unity Domain

- User redirection to Unity logging page
- Unity checks user credentials (translation profile)
- Application of Unity rules against user LDAP attributes
- Respond with Trust Delegation if user is privileged

PLGrid Central Database Domain

- Binding to PLGrid central LDAP
- Collecting user's LDAP attributes and groups

Web-based access to UNICORE resources
Unity IDM Request Diagram (ICM and PLGrid)

Client Tier

- Request about grid identity based on X.509 certificate or login credentials

Unity IDM Tier

- Based on endpoint path redirect request data to specific authethicator (verifier and retrieval)
- Request data passed to LDAP verifier after credential retrieval
- Binds to verifier's LDAP server to check credentials and perform the search

LDAP Tier

- Search LDAP entity based on retrieved identity credentials or certificate
- NO
- YES
- exists?
- Answer with failure response

- Execute translation profile to convert LDAP attributes and groups to Unity's internal structure
- Obtain LDAP entity and groups attributes
Execute translation profile to convert LDAP attributes and groups to Unity's internal structure
- Create Unity identities
  - Assign result entity to appropriate groups
  - Set result entity's Unity attributes (xlogin, role, ...)

Obtain LDAP entity and groups attributes

Store result entity locally in Unity IDM database

Process Unity statements in order to collect requested identity data for specific VO

Collect identity attributes and groups for further processing

Respond with requested identity result Unity's attributes and groups
UNICORE usage

Number of UNICORE submitted tasks

2015

2016
UNICORE usage (2006, daily)

CPU core-hours – daily usage

2016-01-02 2016-02-02 2016-03-02 2016-04-02 2016-05-02 2016-06-02 2016-07-02 2016-08-02 2016-09-02 2016-10-02
UNICORE usage profile

Job size - mean number of cores used

2015

2016
#1 CPU usage: PCJ-Blast

http://pcj.icm.edu.pl
Conclusions

- Grid technology became mature enough to offer reliable, high-quality services designed to suit requirements of different scientific communities.
- UNICORE Portal offers web interface and automation of the processing of selected applications.
- The users can focus on science instead of write complicated scripts, transferring the files and mastering complicated IT infrastructure.
- With the UNICORE Portal creation of the application and domain specific solution become simple and straightforward.
- The software stack necessary to build full-featured gateway is now small and easy to handle.
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