UNICORE

- How it all began

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Original motivation

The first idea about some kind of access software for HPC systems was developed at the European Centre for Medium-Range Weather Forecasts (ECMWF) in 1996, because its 17 Member States were automatically provided with allocations on its computer system for their own use. Since the computing environments of the different services varied considerably, a standard interface had to be considered. In the absence of any suitable system, a new design was undertaken by ECMWF staff, Dr. Jim Almond and Dave Snelling should be mentioned here.

In the autumn of 1996, it became clear that the main „pusher“ was going to move to Germany to join the Deutscher Wetterdienst (DWD) on 1 July 1997. Therefore, it was investigated whether the development of such a system could not be moved as well.
European Centre for Medium-Range Weather Forecasts

The European Centre for Medium-Range Weather Forecasts (ECMWF), Reading, UK
History


- December 1996: Project ideas for UNICORE submitted

- Spring 1997: Project proposal for UNICORE developed and submitted

- August 1, 1997: Start of Project
UNiform Interface to COmputing Resources

- August 1997 – December 1999
  UNICORE project funded by BMBF
  Participants:
  Genias Software GmbH, Pallas GmbH
  DWD, Offenbach; ECMWF, Reading; FECIT, London; debis, Stuttgart
  ZAM, Jülich; RUS, Stuttgart; ZIB, Berlin; LRZ, München; PC², Paderborn;
  RUKA, Karlsruhe
  Hitachi, HP, IBM, NEC, SGI, Siemens/Fujitsu, SUN

- October 1997
  VESUZ – feasibility study on the possible integrated network of
  the German Supercomputer installations
Goals of UNICORE

The goal of UNICORE is to deliver software that allows users to submit jobs to remote high performance computing resources without having to learn details of the target operating system, data storage conventions and techniques, or administrative policies and procedures at the target site. Existing Web-based technologies will be exploited wherever possible.

The user interface will be based on Java and modern browser technology to allow access to UNICORE resources from anywhere in the Internet for properly authorized users and eliminate software distribution.

A Network Job Supervisor (NJS) at each UNICORE site will interpret the Abstract Job Object (AJO) generated by the user interface, manage the jobs and the necessary data. NJS will interoperate with vendor specific batch systems, e.g. Cray NQE, IBM Load Leveler, Codine, etc.
UNICORE architecture

Web Browser
  Job Preparation Agent (JPA)
  Job Monitor Controller (JMC)
  X.509 User Certificate

UNICORE Server
  https Web Server
  User authentication
  Site specific authenticierung
  Gateway (Security Servlet)
  Userid mapping
  Network Job Supervisor (NJS)

Optional firewall

System1 Batchsubsystem1
...
Systemn Batchsubsystemn

Web page, Java Applets
Ressource specification
Local user database

© M. Romberg: BMBF-Projekt UNICORE
The UNICORE Forum e.V. was founded in December 1999 by developers, leading European HPC centres, and supporting hardware vendors as a non-profit association to foster the distribution and use of UNICORE, to publish and maintain the specifications, to coordinate further development, certify implementations and extensions, and to support workshops.

It currently comprises 30 members
(see http://www.unicore.eu/forum/members/)
UNICORE Plus
funded by BMBF

• January 2000 – December 2002
UNICORE Plus project funded by BMBF
Participants:

  Intel GmbH
  DWD, Offenbach; ZAM, Jülich; RUS, Stuttgart; ZIB, Berlin; LRZ, München; PC², Paderborn; RUKA Karlsruhe; ZHR, Dresden

UNICORE Forum e.V. through Technical Advisory Board

• Since 2004, UNICORE available as Open source under BSD license
UNICORE Plus: Goals

The goal of UNICORE Plus is to develop a grid infrastructure together with a computing portal for engineers and scientists to access supercomputer centers from anywhere on the Internet. This has to be done with strong authentication in a uniform and easy to use way. The differences between platforms will be hidden from the user thus creating a seamless interface for accessing supercomputers, compiling and running applications, and transferring input/output data. Research areas in UNICORE Plus are resource modeling, application specific interfaces, data management, job control flow, and metacomputing.
UNICORE Plus architecture

User Workstation

UNICORE Client

HTTP

www.unicore.de

SSL

UNICORE Server

Gateway

Network Job Supervisor

TCP/IP

Target System Interface

Batch SubSystem

UNICORE Site 1

UNICORE Server

Gateway

Network Job Supervisor

TCP/IP

Target System Interface

Batch SubSystem

UNICORE Site n
Some Projects with UNICORE

- More than a decade of German and European research & development and infrastructure projects
- Any many others, e.g.
Current Version

UNICORE 6 Architecture

Gateway

UNICORE Atomic Services
OGSA

Gateway

UNICORE Atomic Services
OGSA

UNICORE WS-RF hosting environment

Service Registry

XACML

XUDB

UNICORE WS-RF hosting environment

ByteIO

JSDL

BES

HPC-P

RUS

UR

UNICORE WS-RF hosting environment

ByteIO

JSDL

BES

HPC-P

RUS

UR

Target System Interface

Local RMS (e.g. Torque, LL, LSF, etc.)

SAML

DRMAA

Local RMS (e.g. Torque, LL, LSF, etc.)

SAML

DRMAA

parallel scientific jobs of multiple end-users on target systems

scientific clients and applications

authentication

emerging standard interfaces

Grid services hosting

job incarnation & authorization

portal client, e.g. GridSphere

command-line client

Eclipse-based client

GPE application client

X.509

SOAP

WS-RF

WS-I

JSDL

UNICORE Summit 2010
## Comparison UNICORE 5 / 6

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<td>USPACE (defined in IDB)</td>
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<td>(located on target system, def. in uas.config)</td>
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<td>(located on the target system)</td>
<td>(located on system running the unicorex, def. in xnjs.xml)</td>
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Outlook

UNICORE is a modern, WS-RF based, OGSA-compliant, standards-conform, ready-to-run Grid technology implemented in Java. UNICORE makes distributed computing, data, network, and software resources available in a seamless and secure way.
Questions ?