

# UNICORE

## Distributed development

Bernd Schuller ([b.schuller@fz-juelich.de](mailto:b.schuller@fz-juelich.de))

Distributed Systems and Grid Computing division  
Jülich Supercomputing Centre, Forschungszentrum Jülich

EGEE'09 Conference Barcelona, September 21, 2009

# Outline

---

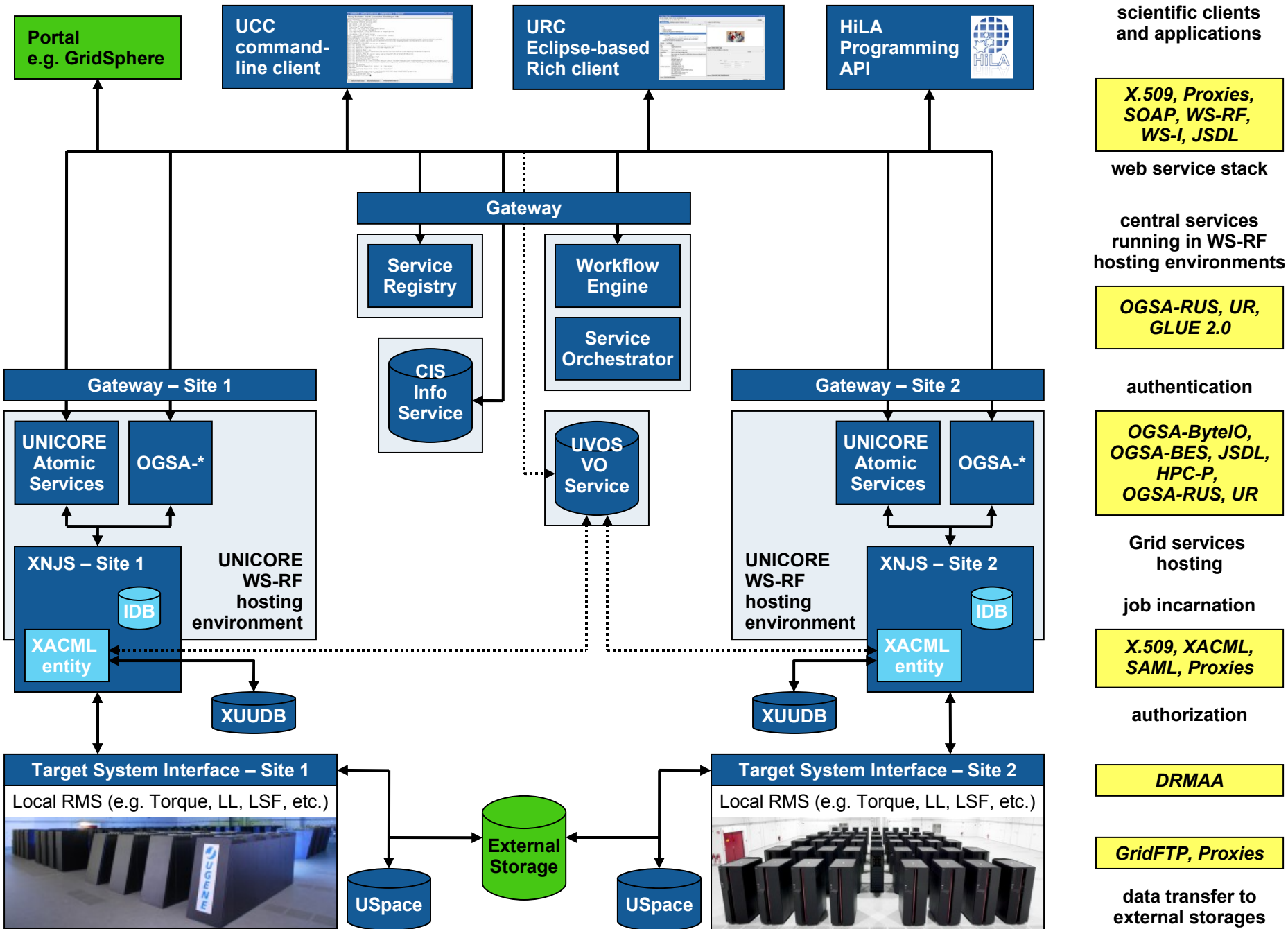
- UNICORE and its community
- Development tools and procedures
- Experiences and lessons learned

- Integrated, complete Grid middleware stack
- Easy to install, configure, administrate and monitor
- Application support, workflow support, graphical clients
- Support common operating and resource management systems
  - OS: UNIXes, MacOS X, Windows, ...
  - RMS: no-batch, Torque, LoadLeveller, LSF, SGE, ...
- Respect autonomy of resource providers
- Implemented in Java and (some) Perl and a tiny bit of C++

# History

---

- UNiform access to COmputing REsources
- Initially two projects funded by German ministry of science
  - UNICORE 1997-1999
  - UNICORE plus 2000-2002
- Uniform access to national HPC resources
  - Jülich, Stuttgart, Munich
- Since 2002 continuous development in several European and German projects
- **Fully open source (BSD licence) since 2004**



# Developer community

---

- SourceForge developers
  - about 60 registered developers
  - about 20 active developers
- Non SourceForge developers
  - Contributions from project work, diploma and master theses, ...
- By site
  - Jülich, ICM Warsaw, CINECA, Fujitsu Labs Europe, Intel Germany, University of Manchester, TU Dresden, Paderborn University, Minsk Informatics Institute, ...

# UNICORE Forum

---

- An open, non-profit association which promotes the development and distribution of the UNICORE Grid system
- 33 member institutions
  - Hardware vendors (such as Cray and IBM)
  - Supercomputing centers (such as BSC)
  - Universities
- <http://unicore.eu/forum>

# UNICORE Technical Advisory Board

---

- Develop the future strategy and roadmap of UNICORE
- Drive and monitor the open source development of UNICORE
- Prepare technical proposals regarding UNICORE
- Evaluate technical proposals regarding UNICORE
- Advise the Board of the UNICORE Forum on request
- 8 members from various institutions



- 
- SourceForge is the world's largest Open Source software hosting site
  - UNICORE is hosted at SourceForge since April 2004
  - Tools and services:
    - SVN, CVS
    - Mailing lists
    - Bug and feature request trackers
    - Download area, release and file lists
    - RSS feeds, project news, Wiki, support pages
  - <http://www.sourceforge.net/projects/unicore>

# SourceForge „Develop“ page

## Code

Programming Languages: [Java](#), [Perl](#)

License: other

### Repositories

SVN [browse code](#), [statistics](#), last commit on 2009-08-24

```
svn co https://unicore.svn.sourceforge.net/svnroot/unicore unicore
```

CVS [browse code](#), [statistics](#)

```
cvscvs -d:pserver:anonymous@unicore.cvs.sourceforge.net:/cvsroot/unicore login  
cvscvs -z3 -d:pserver:anonymous@unicore.cvs.sourceforge.net:/cvsroot/unicore co -P modulename
```

## Links You May Need

[Download UNICORE](#)  
[Get Support for UNICORE](#)  
[Send a request to join this project](#)

### Project Admins

[bjoernh](#)  
[bschuller](#)  
[dmallmann](#)

## Our Numbers

[Bugs](#) (14 open / 240 total)  
[Support Requests](#) (0 open / 3 total)  
[Patches](#) (2 open / 17 total)  
[Feature Requests](#) (44 open / 146 total)  
[Public Forums](#) (0 messages in 0 forums)  
[Mailing Lists](#) (5 total)  
[CVS Repository](#) (40 commits, 3,971 reads)  
[Browse CVS](#)  
[SVN Repository](#) (5,113 commits, 16,700 reads)  
[Browse SVN](#)

## What's happening? Show:

**UNICORE**  
[bschuller](#) committed revision [5282](#) to the [UNICORE](#) SVN repository, changing 1 files.  
2009-08-24 14:45:39 UTC by [bschuller](#)

---




**UNICORE**  
[bschuller](#) committed revision [5281](#) to the [UNICORE](#) SVN repository, changing 1 files.  
2009-08-24 14:09:20 UTC by [bschuller](#)

## Newest Members

[nlamla](#)  
[wnoor](#)

# Version control

- SVN
- Mailing list is notified of each commit
  - Including detailed diff

 <a href="#">metrx/</a>	<a href="#">4921</a>	5 weeks	uaivanay	A mock-up component for testing purposes.
 <a href="#">ogsabes/</a>	<a href="#">3914</a>	7 months	bschuller	move ogsabes-types to unicorex
 <a href="#">ogsarus/</a>	<a href="#">3036</a>	15 months	mri1706	Initial import.
 <a href="#">optional/</a>	<a href="#">5105</a>	2 weeks	bschuller	new version 2.6.1
 <a href="#">persistence/</a>	<a href="#">5230</a>	4 days	bschuller	use TimeUnit.SECONDS since minutes/hours do not yet exist in Java 1.5
 <a href="#">quickstart/</a>	<a href="#">4964</a>	5 weeks	bschuller	updates for 6.2.1
 <a href="#">securityFramework/</a>	<a href="#">5249</a>	3 days	bjoernh	only register mbean server if configured
 <a href="#">simpleworkflow/</a>	<a href="#">5130</a>	13 days	bschuller	do not append ":::0" to iteration ids
 <a href="#">tools/</a>	<a href="#">4598</a>	3 months	rbreu	DNs now compliant with RFC 2253
 <a href="#">tsj/</a>	<a href="#">5270</a>	8 hours	bschuller	add possibility to export environment variables to the job's environment
 <a href="#">ucc/</a>	<a href="#">5273</a>	3 hours	bschuller	fix typo; change workflow command names in emacs mode
 <a href="#">ugsf/</a>	<a href="#">3014</a>	15 months	golbi	added scalability test and fixed divby 0 error in normal file test
 <a href="#">unicorex/</a>	<a href="#">5282</a>	51 minutes	bschuller	remove duplicate (?) test, seems the same as TestUCC in the "functional" package
 <a href="#">uvos/</a>	<a href="#">5216</a>	5 days	golbi	fixed typo in docs: log4j prefix
 <a href="#">workflow/</a>	<a href="#">5266</a>	42 hours	bschuller	callback methods are void now; add storage EPR property
 <a href="#">wsrfite/</a>	<a href="#">5268</a>	27 hours	bschuller	do not change service def file
 <a href="#">xnjs/</a>	<a href="#">5277</a>	2 hours	bschuller	next version
 <a href="#">...</a>	<a href="#">4828</a>	7 months	bschuller	single XUCB...

# Build automation

- Apache Maven
  - Project descriptor file
    - Dependencies
    - Build details
  - Dependencies available for download from public repositories (UNICORE specific dependencies maintained in a repository at Jülich)
  - No libs in source control!
- Apache Ant
  - For building the server packages
  - Building the (Eclipse based) UNICORE Rich client



# Example dependency tree (excerpt, generated by Maven)

```
[INFO] eu.unicore:uas-core:jar:1.2.2
[INFO] +- eu.unicore:uas-types:jar:1.2.2:compile
[INFO] | +- de.fzj.unicore:jsdl-xmlbeans:jar:1.3:compile
[INFO] | \- de.fzj.unicore:wsrflite:wsrflite:jar:1.8.15:compile
[INFO] +- de.fzj.unicore:wsrflite:wsrflite:jar:1.8.15:compile
[INFO] | +- log4j:log4j:jar:1.2.14:compile
[INFO] | +- xmlbeans:xbean:jar:2.2.0:compile
[INFO] | +- xmlbeans:xbean_xpath:jar:2.2.0:compile
[INFO] | +- org.codehaus.xfire:xfire-xmlbeans:jar:1.2.6:compile
[INFO] | | \- org.codehaus.xfire:xfire-aegis:jar:1.2.6:compile
[INFO] | |   \- net.java.dev.stax-utils:stax-utils:jar:20040917:compile
[INFO] | +- xfire:xfire-jsr181-api:jar:1.0-M1:compile
[INFO] | +- org.mortbay.jetty:jetty:jar:6.1.19:compile
[INFO] | +- org.mortbay.jetty:jetty-sslengine:jar:6.1.19:compile
[INFO] | +- hsqldb:hsqldb:jar:1.8.0.10:compile
[INFO] | +- net.sf.ehcache:ehcache:jar:1.2.4:compile
[INFO] | \- eu.unicore.security:xfire-secutils:jar:1.3.3:compile
[INFO] |   +- org.codehaus.xfire:xfire-core:jar:1.2.6:compile
[INFO] |   \- eu.unicore.security:securityLibrary:jar:1.5.1:compile
[INFO] |     \- pl.edu.icm.saml:samly2:jar:1.2.1:compile
[INFO] |       +- org.apache.santuario:xmlsec-java6:jar:1.4.2:compile
[INFO] |       +- pl.edu.icm.unicore.security:SAMLtypes:jar:1.1:compile
[INFO] |       \- eu.unicore.security:crl-checking:jar:1.0-rc1:compile
[INFO] |         \- bouncycastle:bcprov-jdk15:jar:140:compile
[INFO] +- de.fzj.unicore:xnjs-module-core:jar:1.2.2:compile
[INFO] | \- de.fzj.unicore:persistence:jar:0.5:compile
[INFO] +- de.fzj.unicore.xuudb:xuudb-common:jar:1.2.1:compile
[INFO] +- net.sourceforge.sunxacml:sunxacml:jar:1.2:compile
[INFO] \- eu.unicore.security:xfire-secutilsWithDSig:jar:1.3.3:compile
[INFO]   +- org.apache.ws.security:wss4j:jar:1.5.8-pre-20090717:compile
```

# Integration with ETICS – build and test on multiple OS

The screenshot displays the ETICS Web Portal in a Mozilla Firefox browser window. The address bar shows the URL `https://etics.cern.ch/eticsPortal/#legBs`. The browser's toolbar includes various icons and a search bar. The page header features the ETICS logo and navigation tabs for **My ETICS**, **Configuration**, **Repository**, **Administration**, and **Requests**. The user's identity is identified as **Andre Giesler**.

The main content area is titled **Submit Remote Build for 'unicore.wsrflite.wsrf\_types\_trunk\_1.5.0'**. It is divided into several sections:

- General**: Includes a **logging** checkbox set to **verbose**.
- Checkout**: Features an **environment** dropdown set to **unicore\_6.1.3** and a **checkout** dropdown set to **possibly**.
- Build Execution**: Includes an **execution** checkbox for **Do not stop on errors**.
- Packaging & Repository**: Includes a **repository** checkbox for **Publish artefacts to Volatile Area**.
- Host**: Includes a **host selection** dropdown menu with the following options:
  - CERN Scientific Linux 3 (ia32) with gcc 3.2.3
  - CERN Scientific Linux 4 (ia32) with gcc 3.4.6** (selected)
  - CERN Scientific Linux 4 (ia64) with gcc 3.4.6
  - CERN Scientific Linux 4 (x86\_64) with gcc 3.4.6
  - Debian Linux 4.0 (ia32) with gcc 4.1.2
- Submission Parameters**: Includes fields for **platforms** (slc4\_ia32\_gcc346), **checkoutOptions**, **submitOptions**, and **requirements**.

The left sidebar shows a **Project** tree with a tree view of the repository structure, including folders like **unicore**, **wsrflite**, and **wsrf\_types**. A **Workspace** view shows the local file system structure, with **wsrf\_types\_trunk\_1.5.0** selected. Below the workspace, a **Configurations** search box shows two results: **unicore.wsrflite\_HEAD** and **unicore.wsrflite\_trunk**.

The bottom status bar of the browser shows the website `etics.cern.ch`, the current time `Jetzt: Bewölkt, -1° C`, and weather forecasts for **Di: 4° C**, **Di: -1° C**, and **Mi: 3° C**.

# Continuous integration

- Atlassian Bamboo
  - Builds components when code in the repository changes
  - Runs unit tests (which developers sometimes do not :-)
  - Success/failure notifications to mailing list (and individual developer)
  - Web frontend

Dashboard - Atlassian Bamboo for UNICORE - Mozilla Firefox

http://zam544.zam.kfa-juelich.de:8085/start.action

Log in | Signup | Help

### Atlassian Bamboo for UNICORE

All Plans | Current Activity | Collapse All | Expand All

<input type="checkbox"/> CRL Checking	✓ Default > CRLCHECKING-TRUNK-4	Ran: 4 weeks ago   Updated by <a href="#">Björn Hagemeier</a>   Duration: 6 seconds   Tests: 6 passed
<input type="checkbox"/> PersistenceFramework	✓ TRUNK > PERSISTENCE-DEF-4	Ran: 5 days ago   Updated by <a href="#">Bened Schuller</a>   Duration: 18 seconds   Tests: 12 passed
<input type="checkbox"/> UNICORE 6 Gateway	✓ Trunk > UEGATEWAY-TRUNK-16	Ran: 1 hour ago   Updated by <a href="#">gabi</a>   Duration: 31 seconds   Tests: 18 passed
<input type="checkbox"/> UNICORE Service Orchestrator	✓ Trunk > SO-TRUNK-37	Ran: 2 days ago   Manual build by <a href="#">Bened Schuller</a>   Duration: 1 minute   Tests: 7 passed
<input type="checkbox"/> UNICORE Workflow engine	✓ Trunk > WORKFLOWENGINE-TRUNK-47	Ran: 2 days ago   Updated by <a href="#">Bened Schuller</a>   Duration: 1 minute   Tests: 56 passed
<input type="checkbox"/> UNICORE X	✓ Trunk > UNICOREX-TRUNK-92	Ran: 2 days ago   Updated by <a href="#">Bened Schuller</a>   Duration: 10 minutes   Tests: 82 passed
<input type="checkbox"/> UNICORE XNJS	✓ Trunk > XNJS-TRUNK-37	Ran: 3 weeks ago   Updated by <a href="#">Bened Schuller</a>   Duration: 4 minutes   Tests: 98 passed
<input type="checkbox"/> WSRFlite	✓ Trunk > WSRFLITE-TRUNK-55	Ran: 4 days ago   Updated by <a href="#">Bened Schuller</a>   Duration: 7 minutes   Tests: 95 passed
<input type="checkbox"/> WSRFlite Types	✓ Trunk > WSRFTYPES-DEF-12	Ran: 4 weeks ago   Updated by <a href="#">Bened Schuller</a>   Duration: 22 seconds   Tests: No tests found

Successful builds are green, failed builds are red.

Feed for all builds or all failed builds.

View plans in status summary screen.

Powered by a free Atlassian Bamboo open source license for UNICORE. Try Bamboo - The Zen of Continuous Integration.

Powered by Atlassian Bamboo version 2.2.1 build 1206 - 17 Mar 09

[Report a problem](#) | [Request a feature](#) | [Contact Atlassian](#) | [Contact Administrators](#)

# UNICORE 6 release schedules

---

- Core servers, workflow servers, major clients
  - „point releases“ e.g. 6.2.2
    - Approximately every 2-3 months
    - Bug fixes, minor new features
  - Major releases
    - Approximately once a year
    - Major changes and new features
- Other components as appropriate
  - UVOS VO Service
  - CIS information service



# UNICORE 6 component release procedure

---

- The component is built and tested thoroughly by the developers and any additional “in-house” testers
- **Release candidate** of a component is made available for download
- **Announced** on development mailing list (and to other stakeholders, e.g. projects)
- 10 working days “**voting period**”
- If no objections or critical bugs have been raised, the software is released.

# Experiences and lessons learnt

---

- Learn from big open-source projects (e.g. at Apache, at SourceForge)
- Inter- and intra-team communication and transparency is crucial for distributed development to succeed
- Notifications of code changes (SVN check-ins)
- Clear, automated dependency management is a life-saver
- Continuous integration is very beneficial. Most useful if various deployment platforms can be used for testing (ETICS)
- More work needed:
  - More „real“ integration tests (full stack)
  - Multiple platforms (both client and server)

# Thanks!

---

- Questions?