Providing Grid Data Access on SRM and LFC to UNICORE

UNICORE Summit 2012

Christian Löschen, Ralph Müller-Pfefferkorn,
TU Dresden
christian.loeschen@tu-dresden.de

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Outline

- Data Management in the Grid
- UNICORE Data Management
- Status of Work
- Outlook

Grid Data Management 1

- Challenge: lots of data owned by many users distributed over many storage resources world-wide accessable by different protocols on different hard- and softwares
  - Transparent user access
  - Reliable access control mechanisms for authentication and authorization
  - Security, scaleability, reliability
  - Transaction and storage mangement

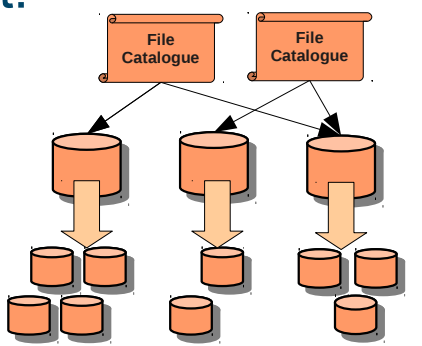
Grid Data Management 2

- Hierarchical data management:

  File Catalogues → LFN

  Storage Management → SURL

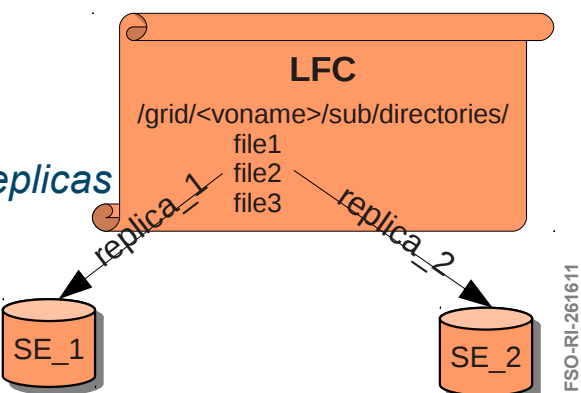
  Storages → TURL



  - allows centralized management services
    - *Automatically cleanups*
    - *Space Token control*
    - *Quotas, etc.*

LFC – LCG File Catalogue

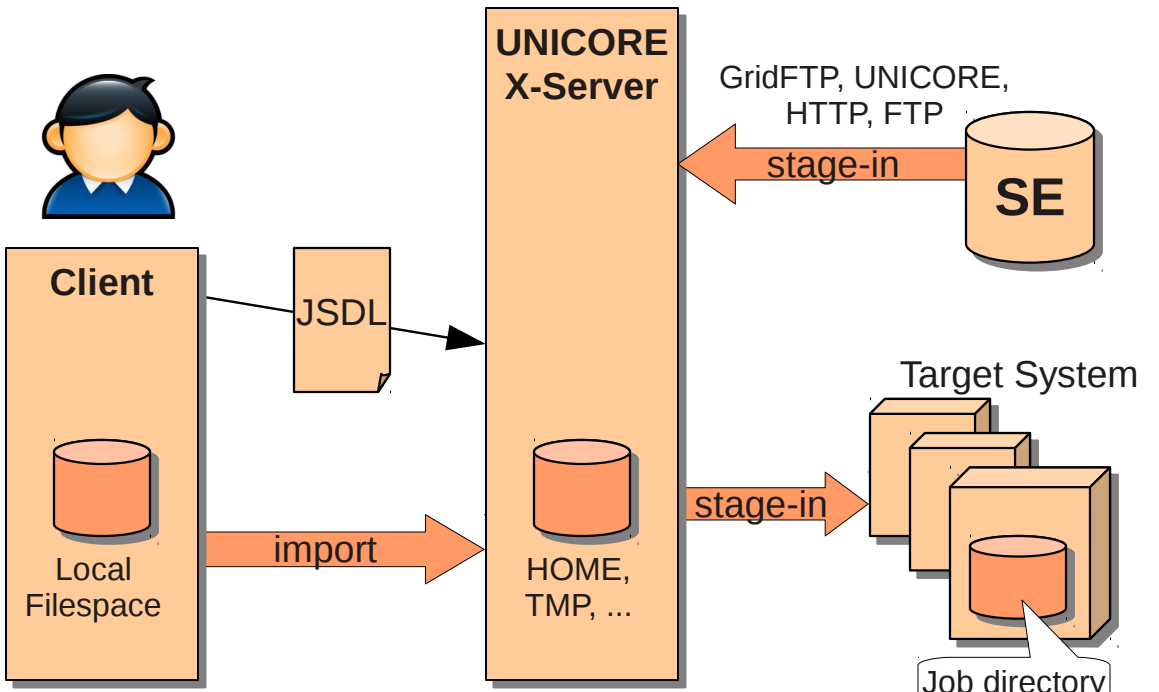
- LCG File Catalogue (gLite)
  - (global) Logical Namespace for files in the Grid
  - Provides logical and physical mappings for file identifiers
  - Logical File Name (LFN):
    - *GUID – unique identifier*
    - *Information on physical replicas*
    - *Metadata (System, user)*
    - *symlinks*



SRM - Storage Resource Manager

- Web Service Protocol for Grid Storage Management
- Storage URL → Transfer URL
- dCache, DPM, StoRM, BeStMan, CASTOR, EOS
- Features: Space Reservation, Space Token support, Retention Policy, Access Latency, bringOnline-requests, etc.
- No file transfer → transfer protocol is negotiated between client & server

UNICORE Data Management 1



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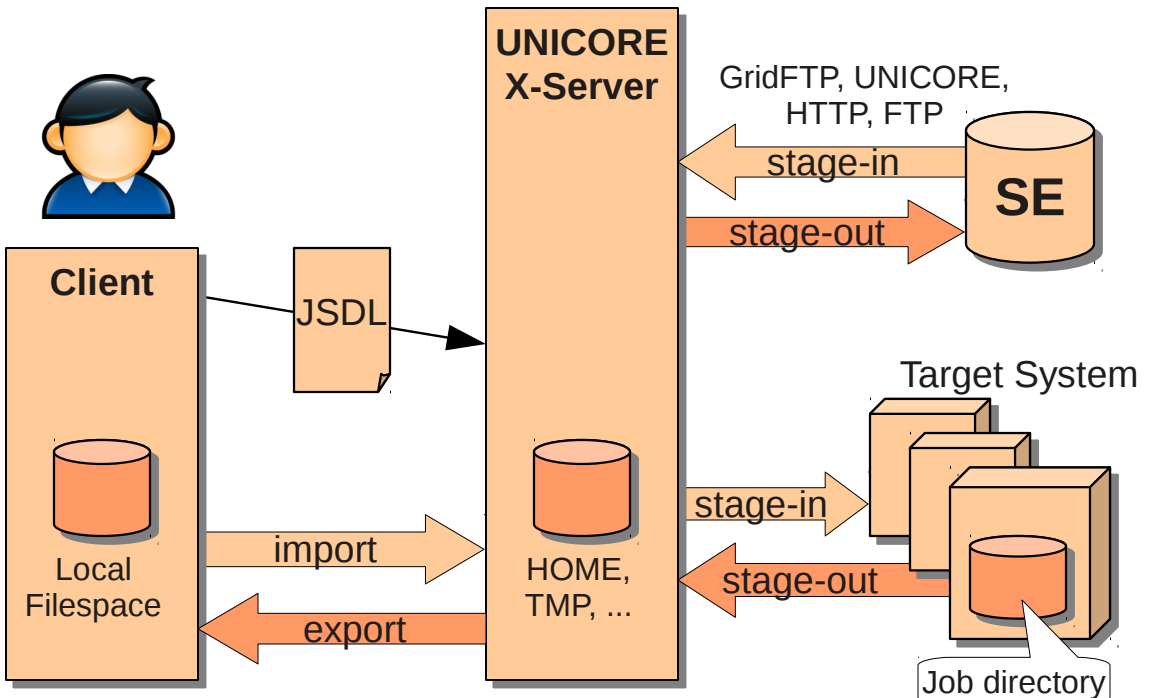
UNICORE Data Management 2



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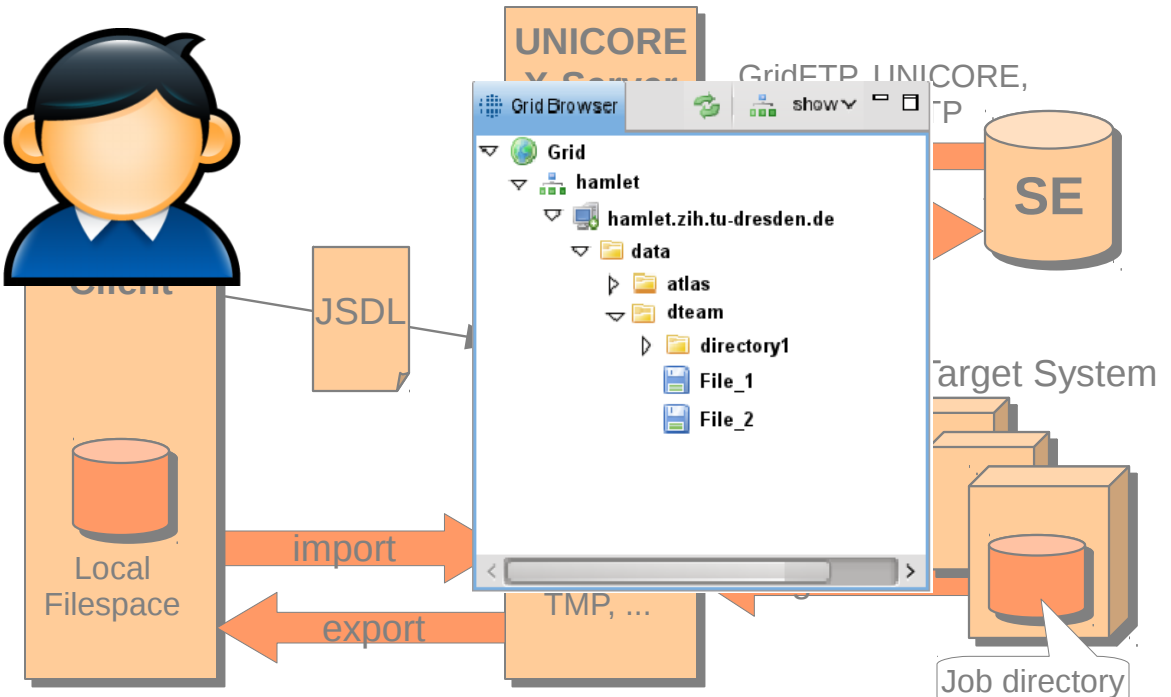
UNICORE Data Management 3



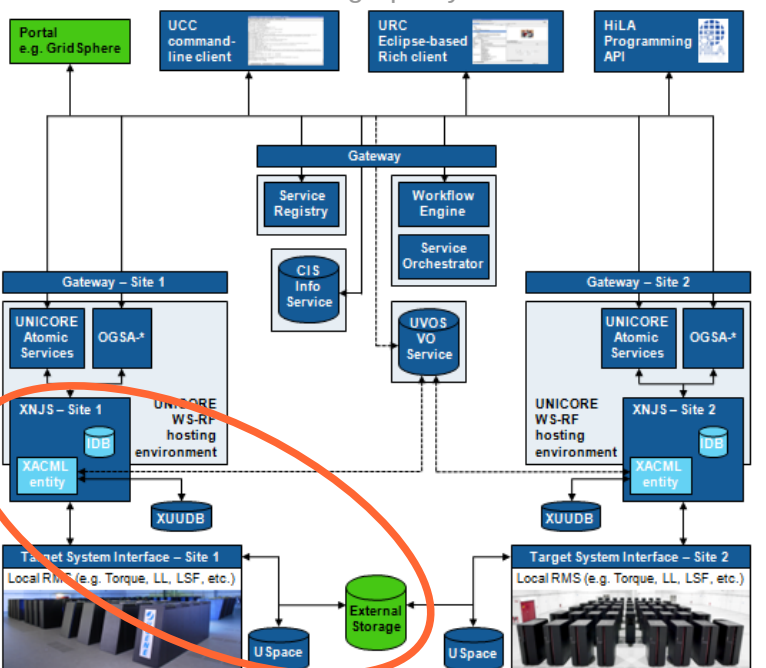
SMS - Storage Management Service 1

client layer

service layer

system layer

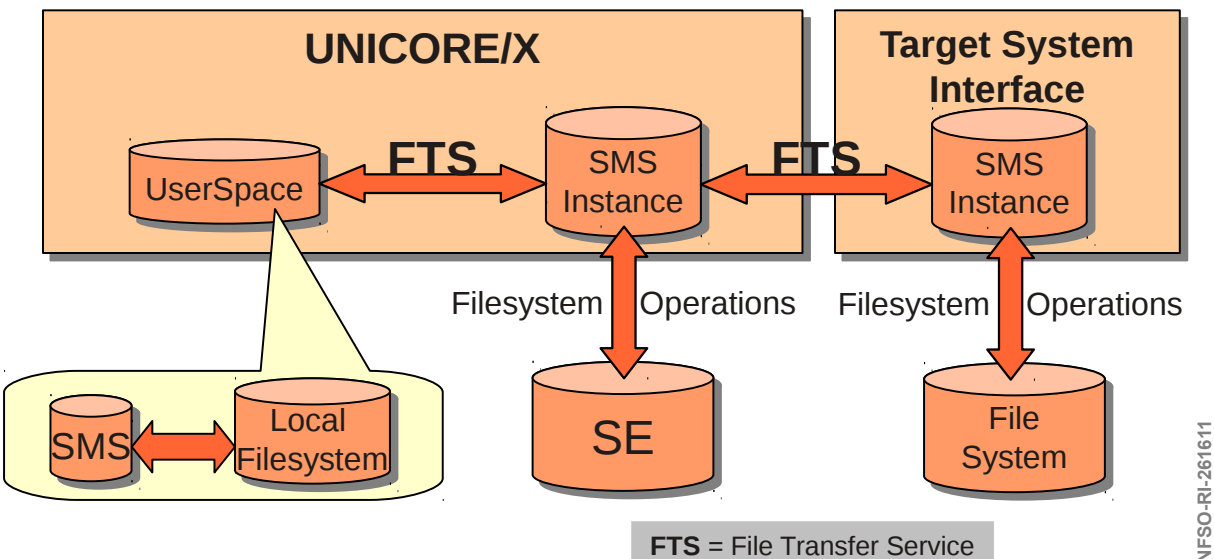
architecture graph by unicore.eu



SMS - Storage Management Service 2

- UNICORE Interface to Storages
- Provides filesystem-like view
- Takes care of all filesystem operations
- Initializes file transfers
- Existing implementations:
  - Filesystem, Hadoop, iRODS

- UNICORE Interface to Storages



- Access to: iRODS, Hadoop, Filesystem
- UNICORE can only access UNICORE storages, but no other EMI SE

EMI Objective: Interoperability

- Access to: iRODS, Hadoop, Filesystem
- UNICORE can only access UNICORE storages, but no other EMI SE

  → Provide UNICORE access to files

  - stored on SRM managed storages and/or
  - indexed by the gLite File Catalogue

SRM Integration

- Implemented an SRM SMS with just a small subset of SRM client functions (due to limited functions of UNICORE SMS interface)
- ls, mkdir, rmdir, get, put, …
- Used the dCache SRM client library
- X.509 proxy certificates necessary
- SRM SMS configured in the uas.config file:

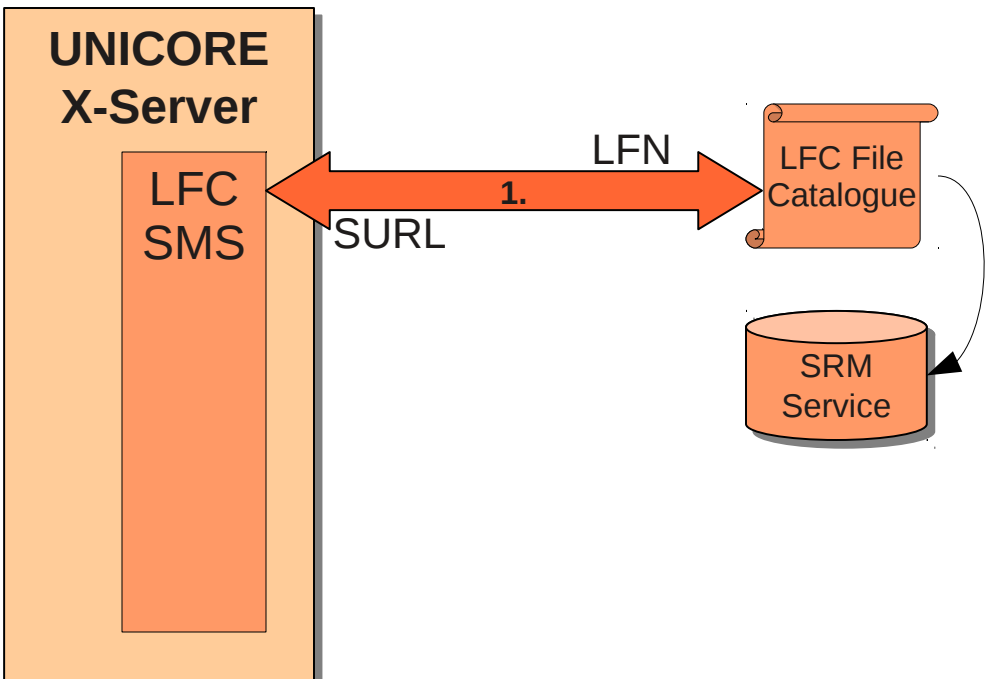
```
uas.targetsystem.storage.2=SRM
uas.targetsystem.storage.2.type=CUSTOM
uas.targetsystem.storage.2.class=eu.unicore.emi.data.SRMStorage
sms.srm.host=ophelia.zih.tu-dresden.de
sms.srm.port=8443
```

LFC Access 1

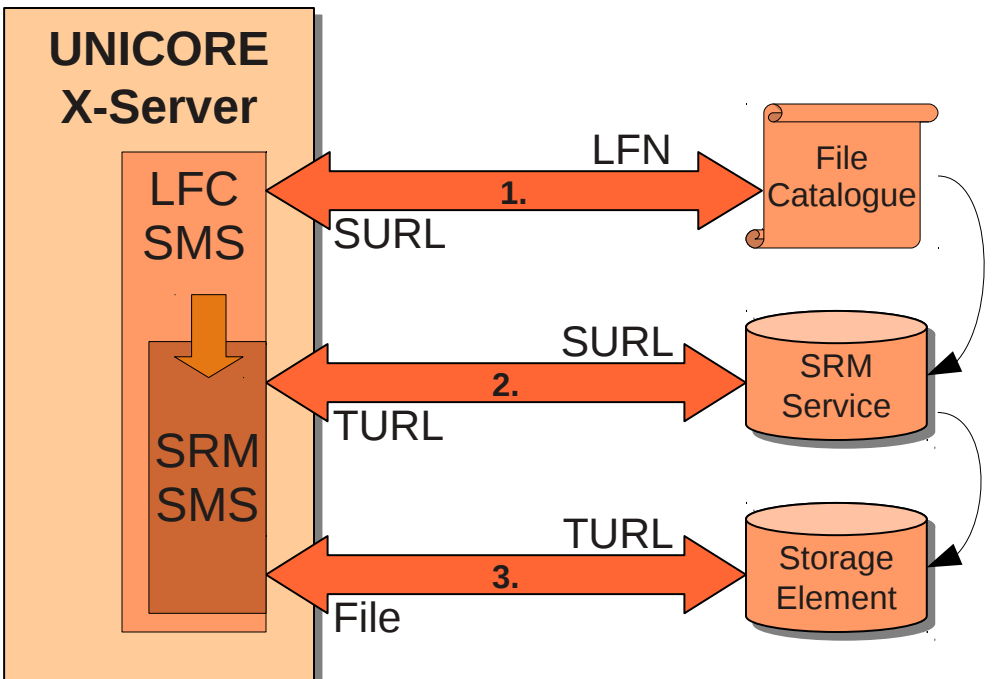
- LFC SMS using the gLite Data Management Library maintained by spanish Cloud Provider maatG
- Only reading operations possible due to UNICORE SMS model
- Automatical resolution of LFN to a Storage URL and file transfer from the SE
- Depends on the SRM SMS for the file transfer
- LFC SMS configured similar to SRM SMS:

```
uas.targetsystem.storage.1=LFC
uas.targetsystem.storage.1.type=CUSTOM
uas.targetsystem.storage.1.class=eu.unicore.emi.data.LFCStorage
sms.lfc.host=grid-lfc.desy.de
sms.lfc.port=5010
```

LFC Access 2



LFC Access 3



Problems

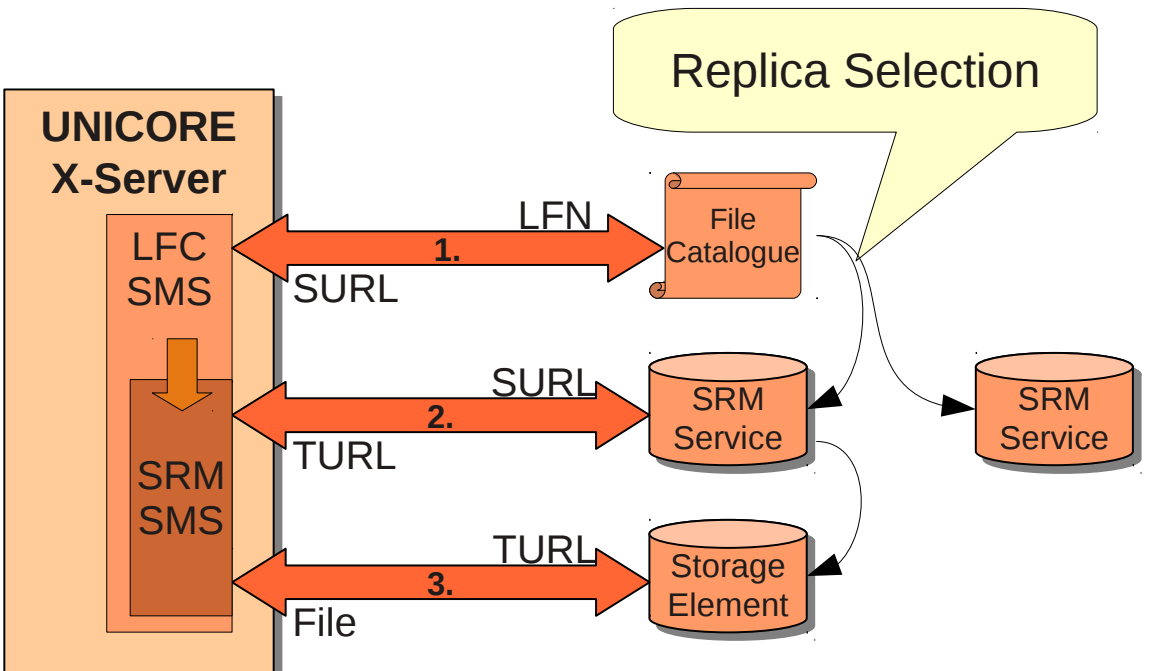
- Dependencies of the used client libraries conflict with UNICORE dependencies, e.g. by different versions of Java libraries and customized globus libraries

  → integration into the EMI 2 release failed
- User authentication → user credential of disconnected user (X.509 proxy certificate) is not available anymore
- Until today no really good solution found for the UNICORE/SRM/LFC user rights mapping
- But everything works fine in testcases! :)

Outlook 1

- Avoid dependency conflicts
  - Implement small SRM client by using the UNICORE webservice stack to substitute the dCache client library
  - Reduce gLite library functions to reduce dependencies, remove unused DPM/DPNS and extract LFC functions
  - Use the GridFTP protocol provided by the UNICORE HiLA for file transfer
- EMI STS – Security Token Service to translate SAML assertions into X.509 proxy certificates in the long term
- SRM by SSL instead of GSI in future?

Outlook 2


Replica Selection
UNICORE
X-Server
LFC
SMS
SRM
SMS
LFN
1.
SURL
File
Catalogue
SURL
2.
TURL
SRM
Service
SRM
Service
TURL
3.
File
Storage
Element

EUROPEAN MIDDLEWARE INITIATIVE

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Thank you!

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