JÜLICH
FORSCHUNGSZENTRUM

Towards UNICORE 8
development directions

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Outline

- New features
  - Python TSI
  - Apache Hadoop
- Plans
  - CDMI
- Current issues towards UNICORE 8

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UNICORE

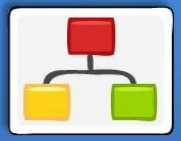
Web

Command line

GUI

API

Clients


Workflows

Jobs

Data Management

Discovery

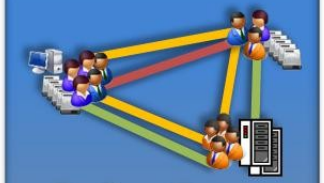
Services

Compute

Storage

Resources

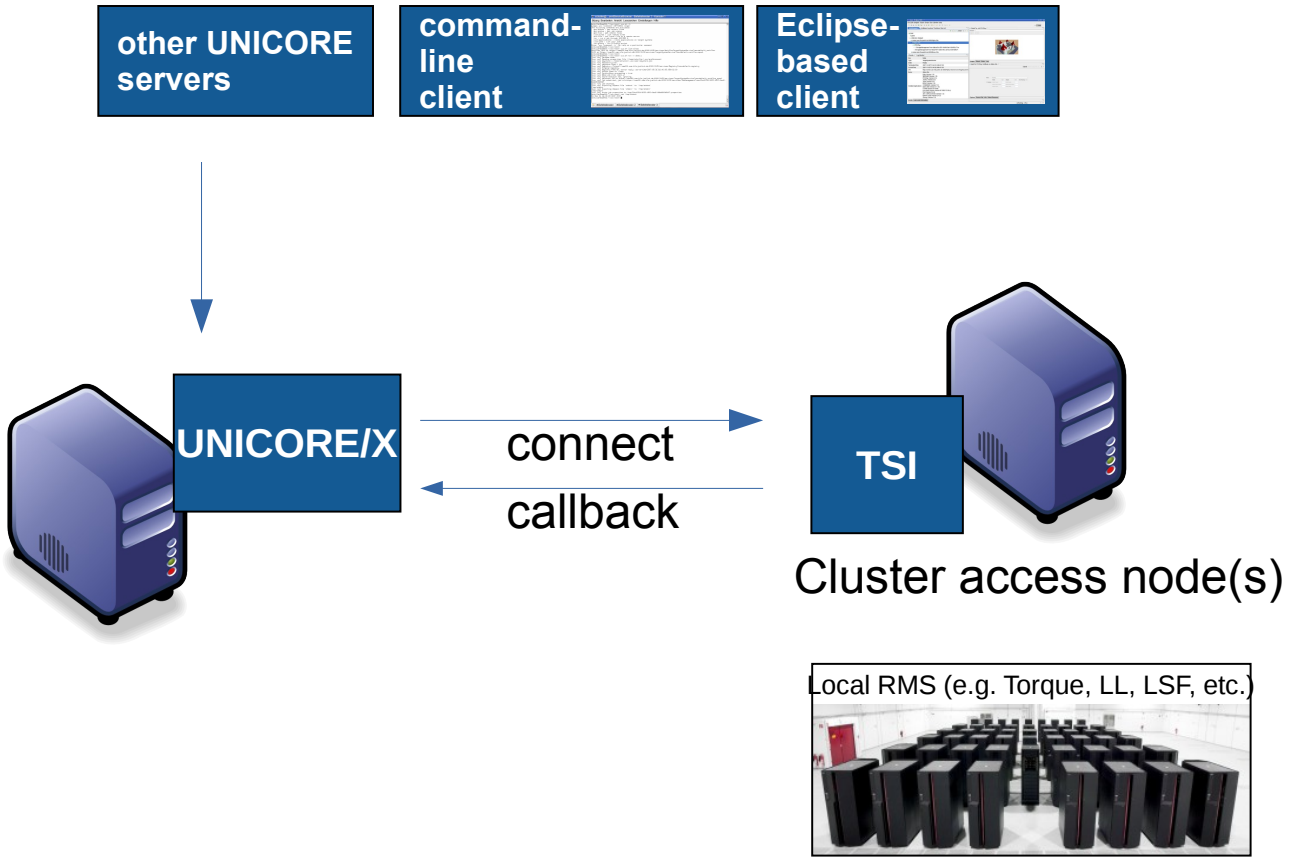
Users


Federations

Policies

Security

The TSI


other UNICORE servers
command-line client
Eclipse-based client
UNICORE/X
connect
callback
TSI
Cluster access node(s)
Local RMS (e.g. Torque, LL, LSF, etc.)

Python TSI - motivation

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- Current Perl TSI
  - basic concepts are (still) very good!
  - well tested in production
- … but
  - Perl code is hard to maintain
  - Next to no unit tests
  - SSL support in Perl is horrible
  - The Perl code's license is kind of unclear

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Python TSI - goals

- Clean re-implementation
  - unit tests
- Keep existing configuration as far as possible
- Improve
  - SSL support
  - Structure and readability
  - Extensibility: adaptation to local should be in one place

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Python TSI: status

- Working
  - both Python 2.7 and 3.x support
  - Nobatch, Slurm and Torque versions
  - Packaging (one package per BSS)
- TODOs
  - SSL certificate pinning (only allow particular XNJSs to connect)
  - SGE version
  - New feature: computing time budget
  - Review documentation

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Apache Hadoop

- Large-scale, distributed „Big Data“ framework
- Both data and compute functionality
  - HDFS (Hadoop Distributed File System)
  - YARN (Yet Another Resource Negotiator)
- Basis for many applications and additional frameworks (e.g. MapReduce, Apache Spark, ...)

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Hadoop - HDFS

- Distributed storage
- Master / slave architecture
  - NameNode for metadata
  - DataNodes stores the data
- Replication, fail-over, etc

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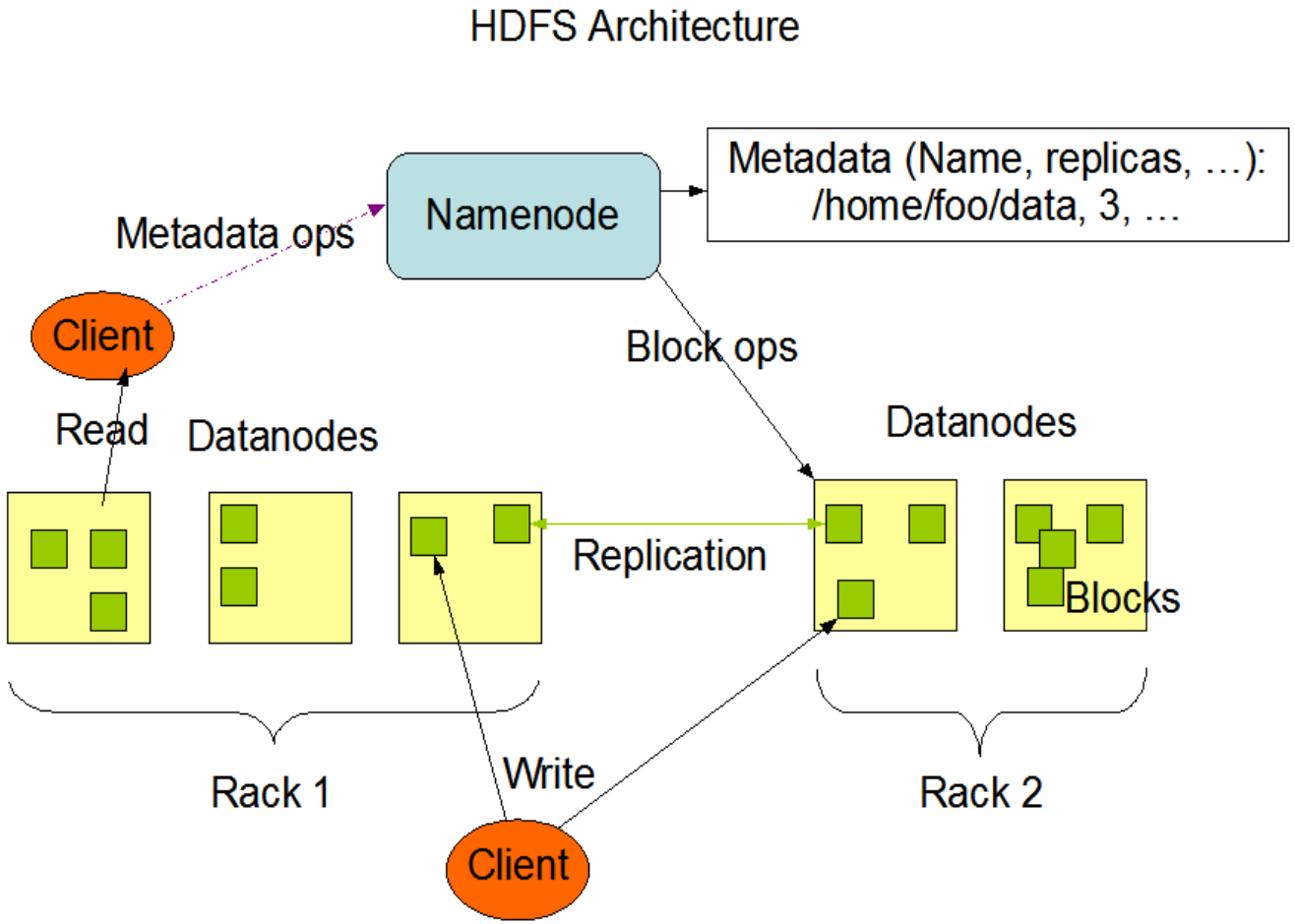
Hadoop - HDFS



http://hadoop.apache.org/docs/current/

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Hadoop - YARN

- Resource management
  - ResourceManager
    - arbitrates resources among the applications in the system
  - NodeManager
    - one per node – monitoring resource usage
- Job management
  - scheduling, starting, monitoring, ...

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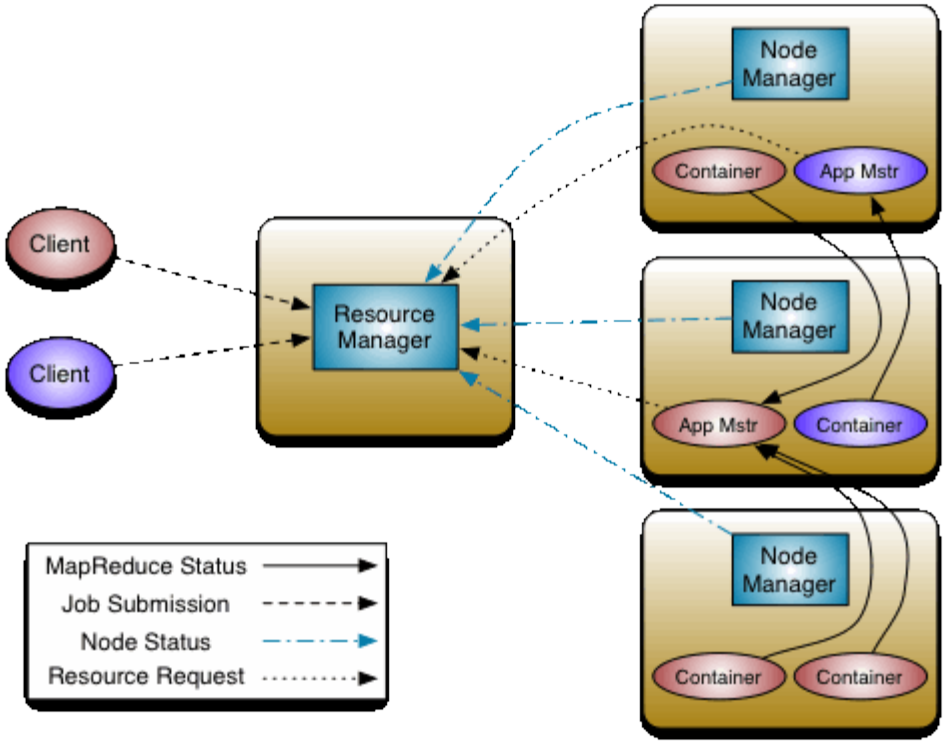
Hadoop - YARN



http://hadoop.apache.org/docs/current/

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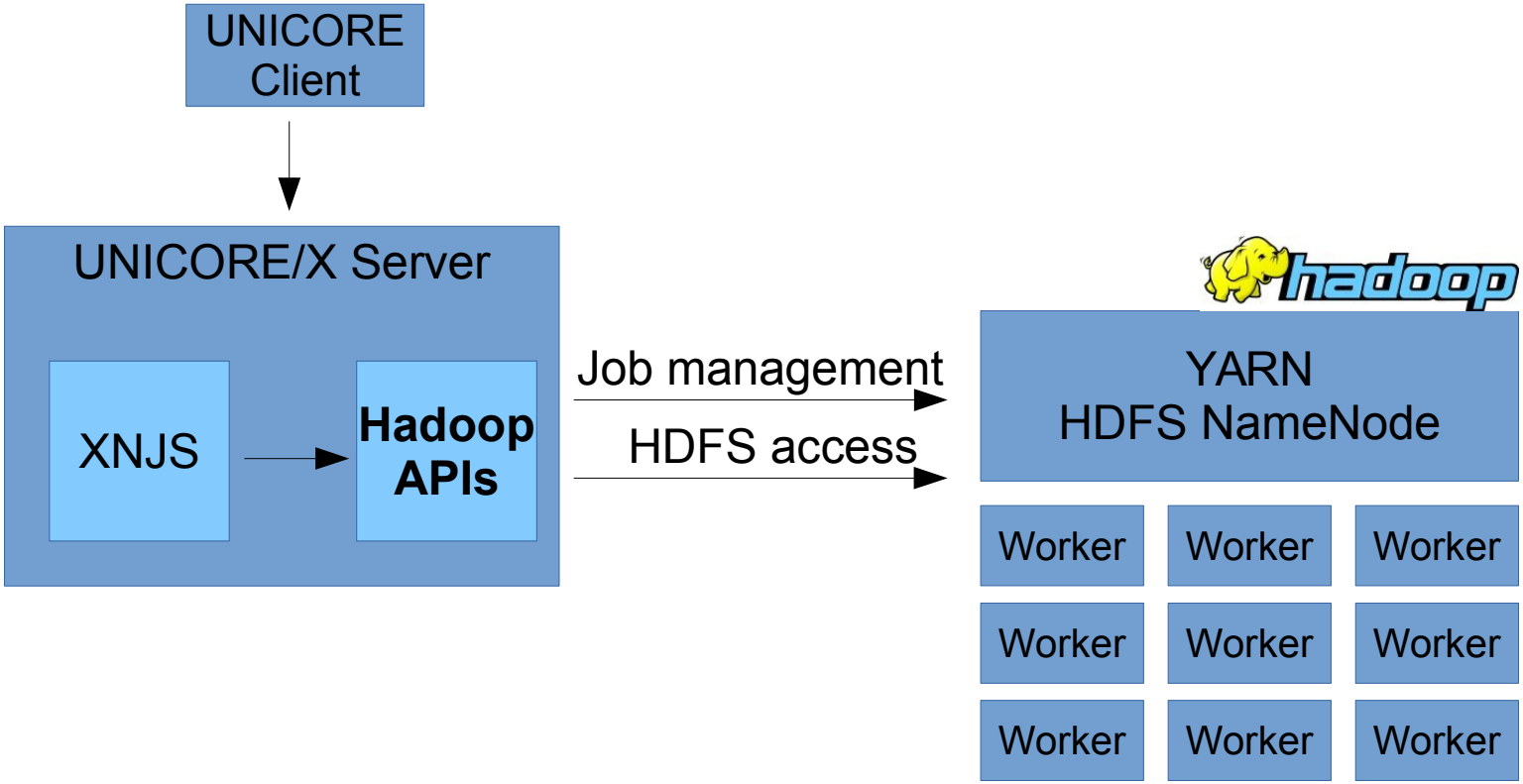
UNICORE / Hadoop integration
(when UNICORE can access the Hadoop services)



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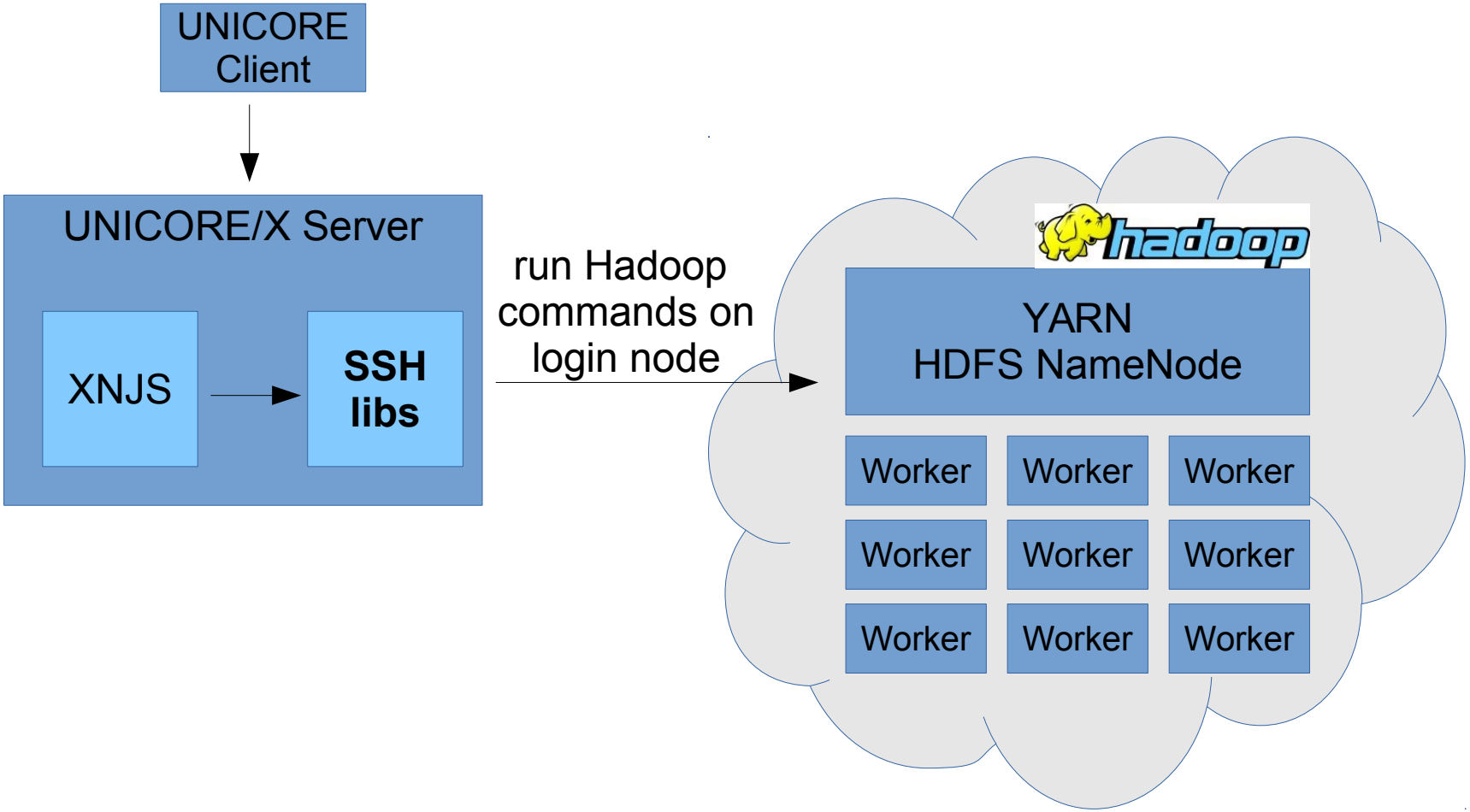
UNICORE / Hadoop integration alternative

(when Hadoop services are not directly accessible via the network)



Hadoop – UNICORE integration: goals

- HDFS as storage backend
  - already done previously, only updates required
- YARN as „batch system“
- „UNICORE-like“ application support
  - IDB, Generic gridbean, portal support, ...

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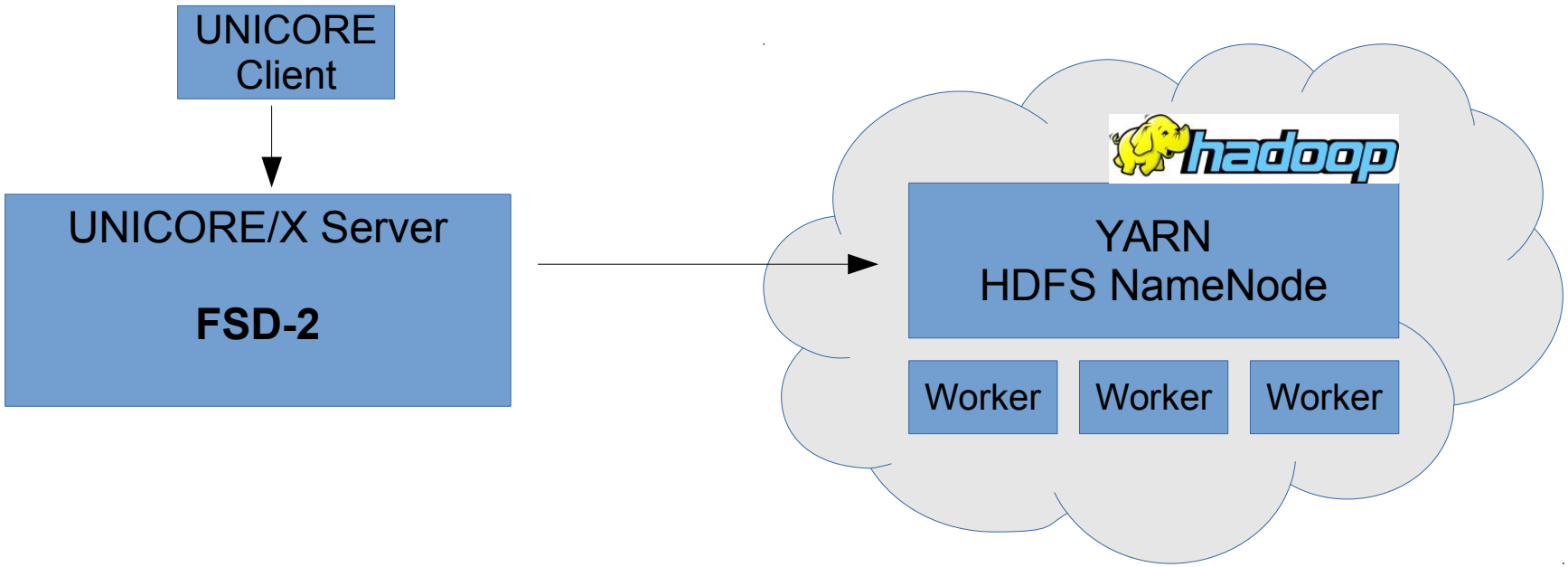
Demo – FSD Testgrid



- HDFS as storage backend
- YARN for running jobs
- Apps configured in IDB

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Hadoop – UNICORE integration: status

- HDFS / YARN work, using latest API v2.7.0
- Unit tests with embedded Hadoop, also tested on FSD cloud testbed
- Features:
  - HDFS can be used as Uspace and normal storage, including storage factory
  - Yarn applications can be defined in IDB
- Target release 7.5.0

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Hadoop – UNICORE integration: TODOs

- File permissions
  - Better way? Multiuser support?
- Documentation
  - Both admin and end-user
- More example apps
  - Implement real life use cases

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CDMI

- Cloud Data Management Interface
- Implement as SMS back-end
- Username/password authentication
- Collaboration with
  - dCache (CDMI server)
  - TU Dresden (use case)
- Not started yet, some old prototype code exists somewhere :-)

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- Remove dependency on XmlBeans?
  - Not maintained any more, upcoming issues might not be solveable
  - Replace by JAXB (part of JDK)
  - Very high effort!
    - SAML code / security library
    - XNJS, JSDL, Brokering
    - WS interfaces (core, workflow, clients, ...)

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Towards UNICORE 8

- Further increase usage of REST API
  - e.g. SOAP/XML to setup a security session
  - use REST API during security session lifetime

- Simple notification mechanism

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Thanks

- Tim Kreuzer (Hadoop integration)

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