KU LEUVEN

02.Introduction to iRODS

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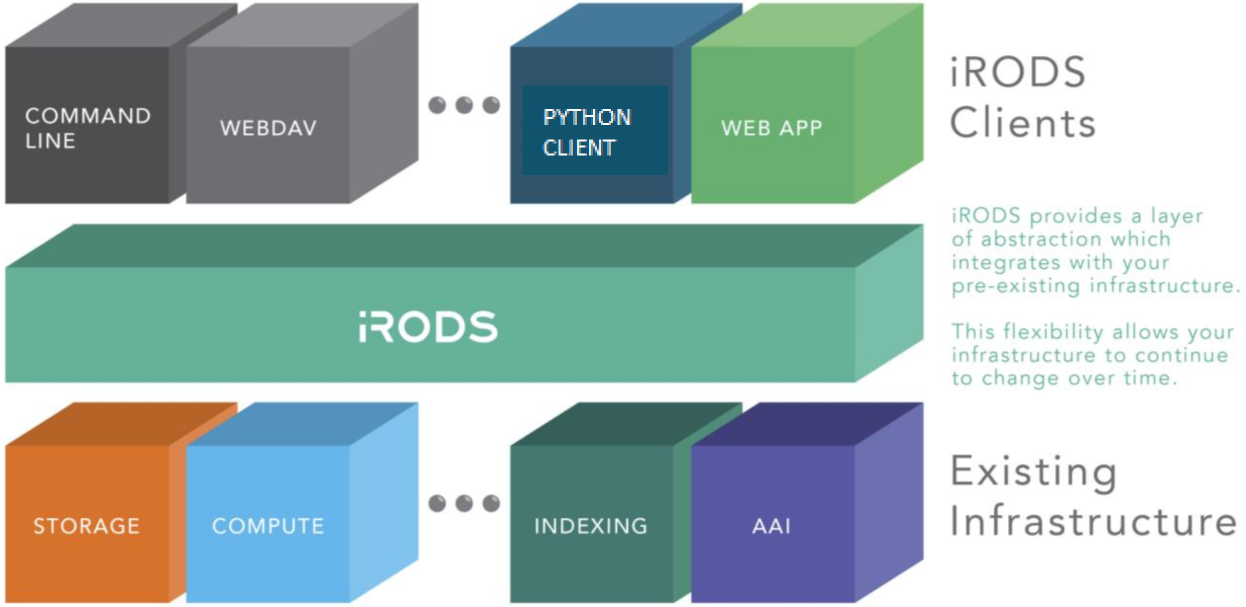
What is iRODS?

- iRODS (integrated Rule-Oriented Data System)
- Open Source distributed data and storage management system
- Configurable data management policies and workflows
- Scalable
- A flexible framework for the abstraction of infrastructure

Our Membership

Integration layer



iRODS provides a layer of abstraction which integrates with your pre-existing infrastructure.

This flexibility allows your infrastructure to continue to change over time.

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KU Leuven is part of the iRODS consortium – Sustained member

iRODS architecture

Clients	Provides access to iRODS
Catalogue Service Consumer – Storage server	Provides access to storage and other resources
Catalogue Service Provider – iRODS server	Provides access to the Catalogue
Metadata catalogue (iCAT) Postgres/Mysql/Oracle	Where everything is written down

iRODS Core competencies

Unified Storage Namespace

Data virtualization of distributed storage systems

Automation

Rule Engine to enforce data policies

Data Discovery

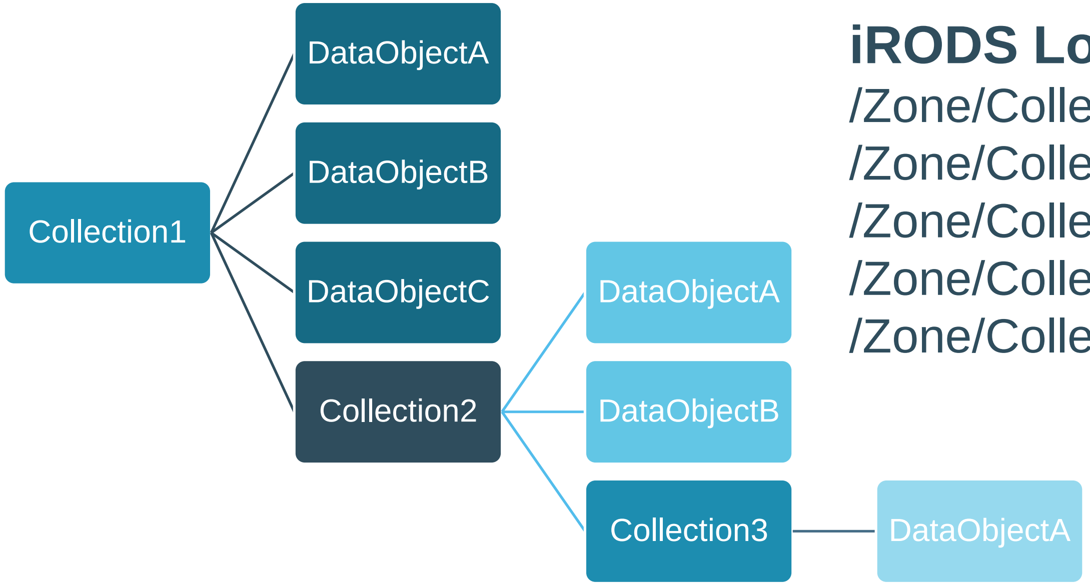
Rich Metadata for collections and data objects (System metadata and user-defined metadata)

Secure collaboration

Three mechanisms: Permissions, Tickets and Federation

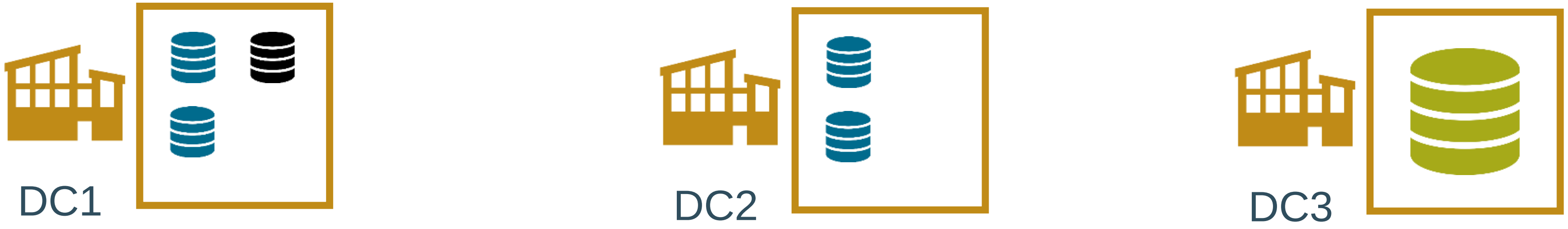
Data virtualization in iRODS

Logical representation



iRODS Logical Namespace
/Zone/Collection1/
/Zone/Collection1/DataObjectA/
/Zone/Collection1/Collection2/
/Zone/Collection1/Collection2/DataObjectA
/Zone/Collection1/Collection2/Collection3/DataObjectA

Physical representation

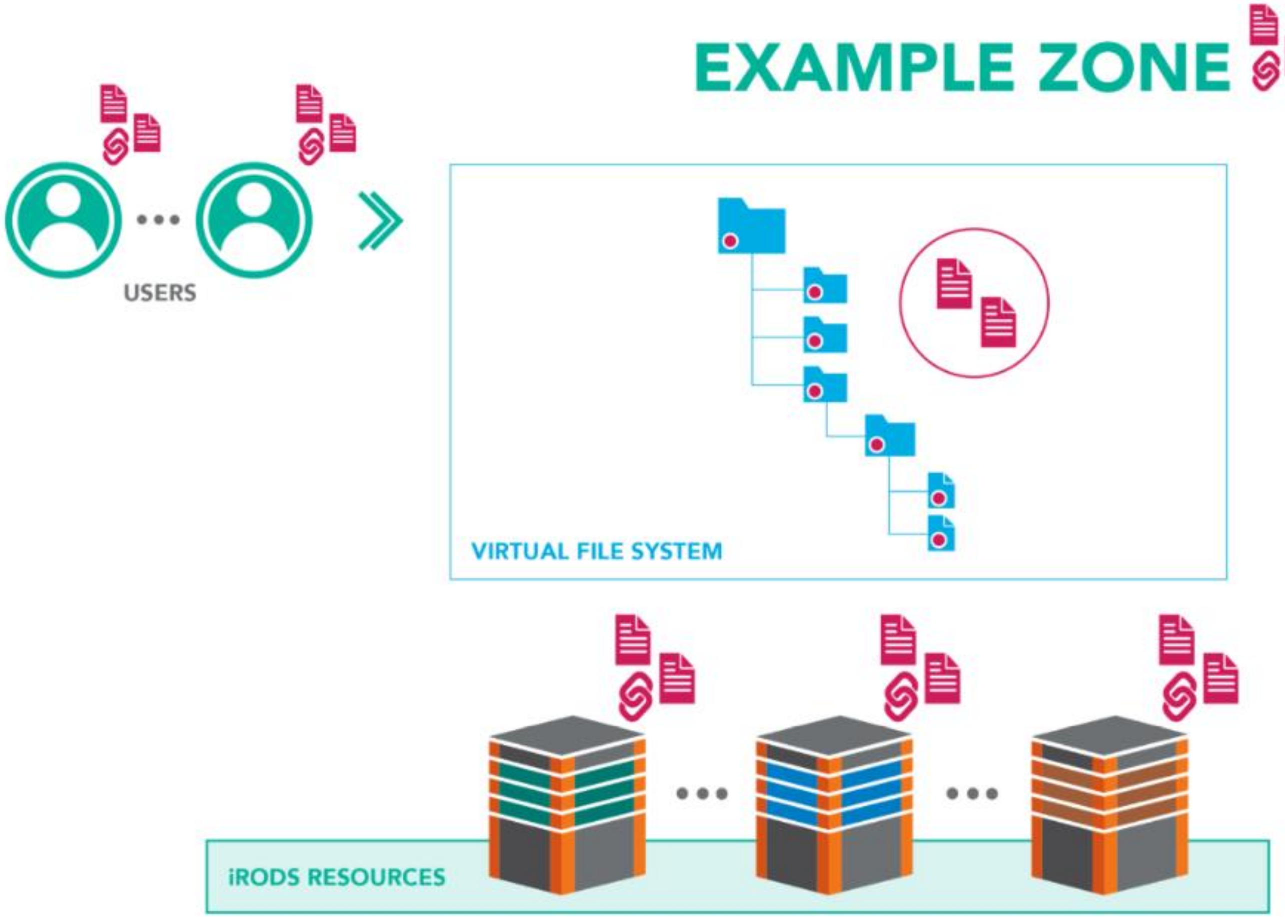


/irods1/s1/Collection1/DataObjectA
/irods1/s2/Collection2/DataObjectA
/irods/s3/Collection2/collection3/DataObjectA

/irods2/Collection1/DataObjectA

/irods3/Collection1/DataObjectA

Data discovery: Metadata everywhere



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System Metadata:

- filename, file size, creation date …

User Metadata:

- Manual introduction - AVU
- Metadata templates
- Automation (rules/microservices)

Automation

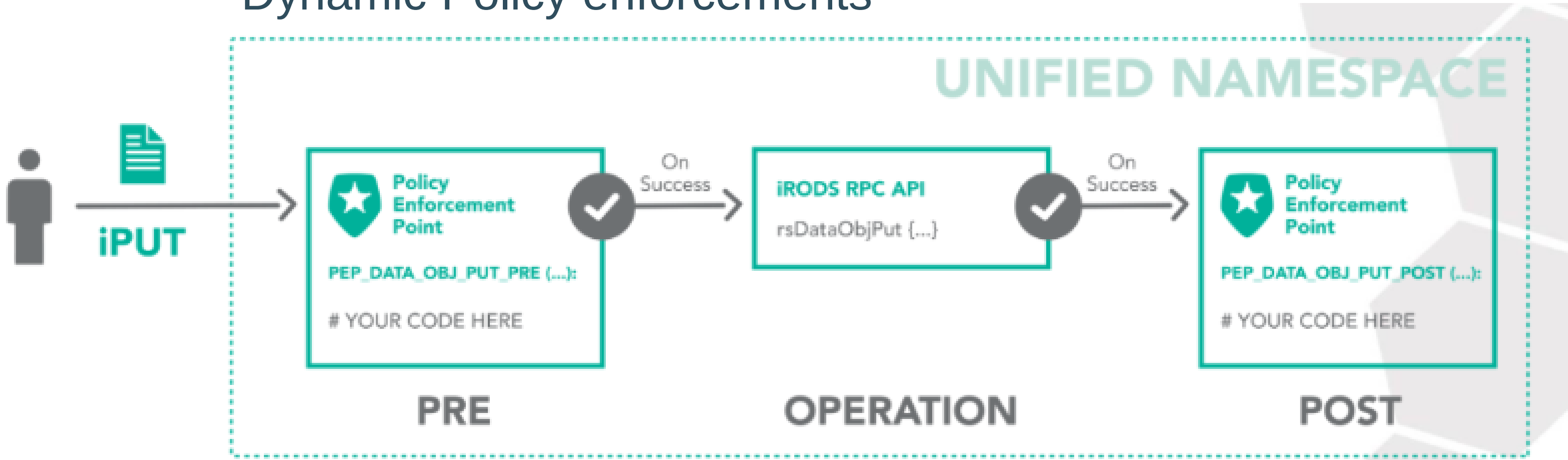
Integrated policy engine can be triggered by any operation:

- Authentication
- Storage Access
- Database Interaction
- Extensible RPC API

Delay rules to do repetitive works - periodically:

- execution time
- execution frequency

Dynamic Policy enforcements



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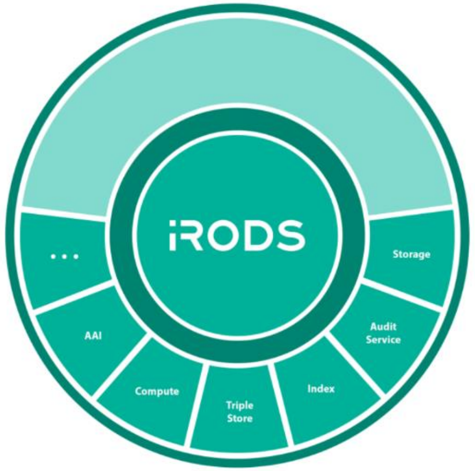
The iRODS rule may:

- workflow automation – event based
- restrict access
- log for audit and reporting
- provide additional context
- send a notification
- execute a process on the file

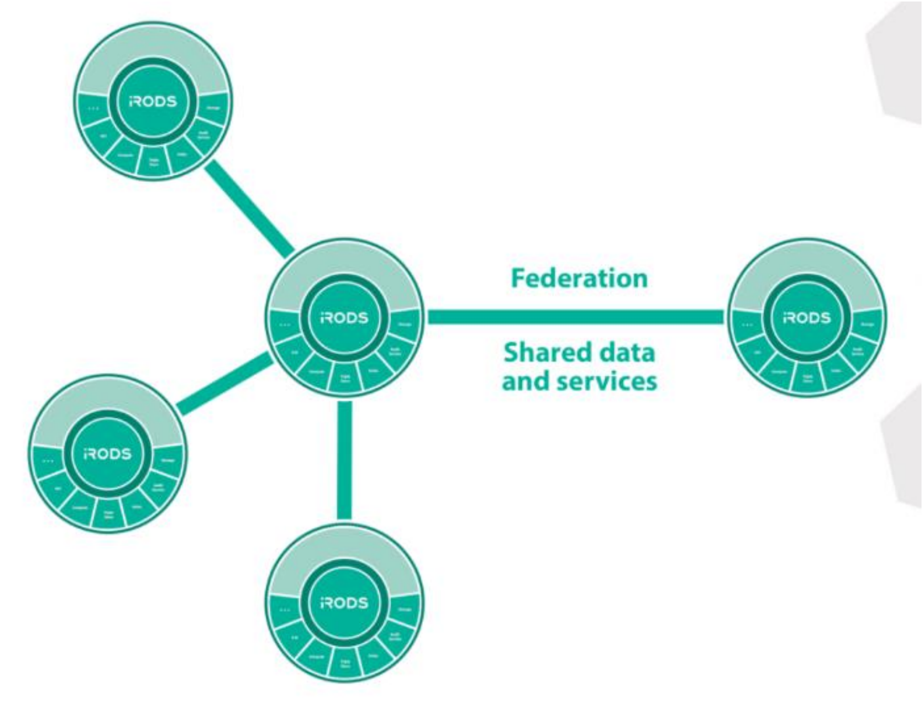
Secure collaboration

Inside a zone

- ACL (users, groups)
- Tickets:
  - Temporary access
  - No iRODS account needed



Between zones: federation



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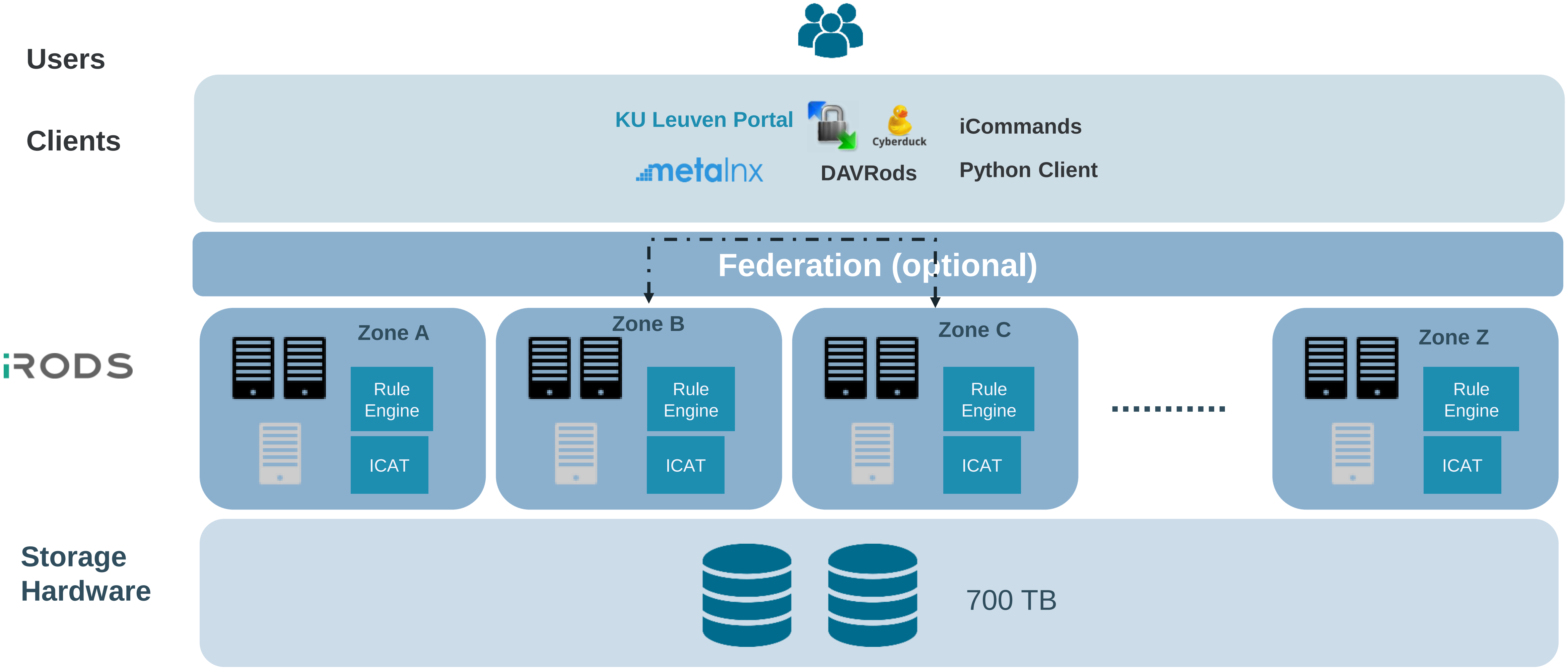
KU Leuven iRODS architecture



Clients

metalnx

Cyberduck

PRC-Python API

KU Leuven Portal

DAVRods

Cadaver client – DAVRods

iCommands

CentOS7
Ubuntu16
Ubuntu18

PRC-Python API

metalnx

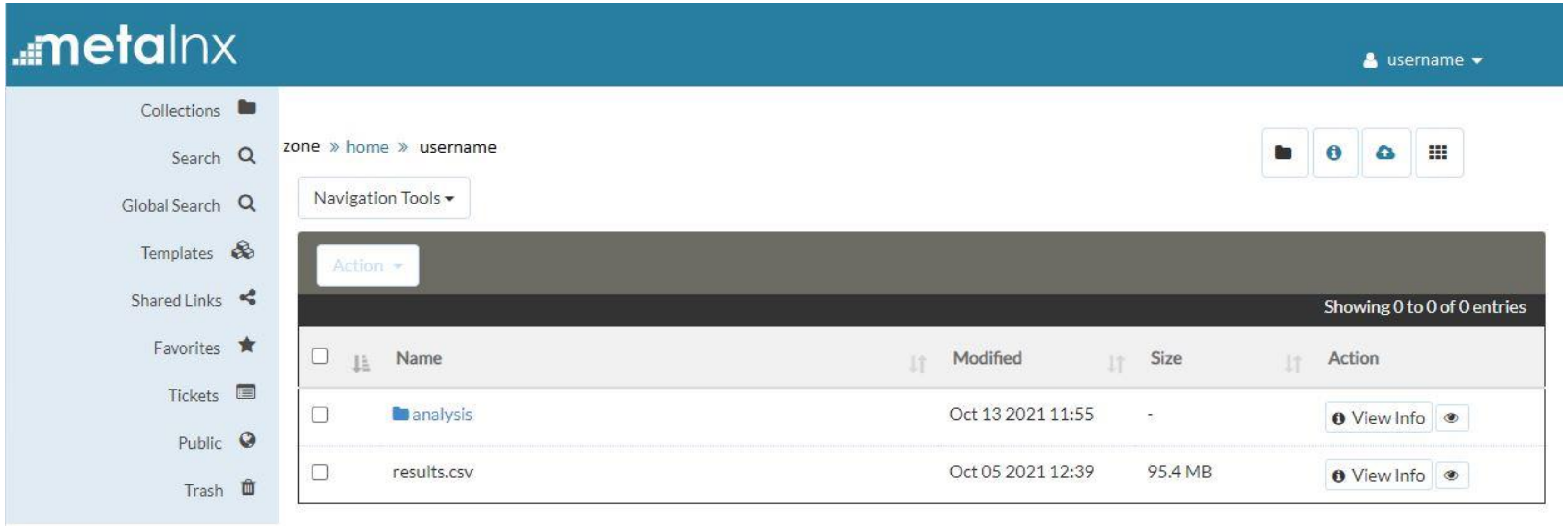
KU Leuven Portal

References:

KU Leuven portal: https://{yourZone}.irods.icts.kuleuven.be
Metalnx: https://{yourZone}.icts.kuleuven.be/metalnx/
Cyberduck: https://cyberduck.io/
WinSCP: https://winscp.net/eng/download.php
Cadaver client: http://www.webdav.org/cadaver/
Icommands: https://irods.org/download/
Python iRODS Client (PRC) : https://github.com/irods/python-irodsclient

Metalnx

- graphical user interface easiness
- working with data objects/collections
- adding metadata to data objects/collections
- downloading/uploading data objects/collections
- permission management



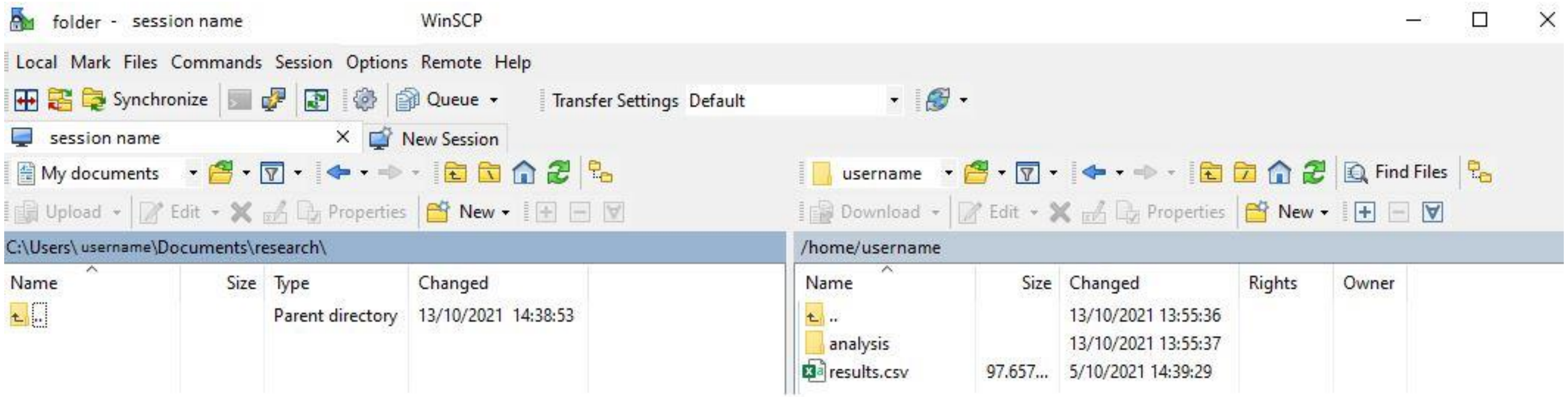
zone » home » username

Showing 0 to 0 of 0 entries

□	Name	Modified	Size	Action
□	analysis	Oct 13 2021 11:55	-	View Info
□	results.csv	Oct 05 2021 12:39	95.4 MB	View Info

WebDav client

- graphical user interface easiness
- browsing data objects/collections
- downloading/uploading data objects
- read and edit easily



Transfer Settings Default

C:\Users\ username\Documents\research\

Name	Size	Type	Changed
..		Parent directory	13/10/2021 14:38:53

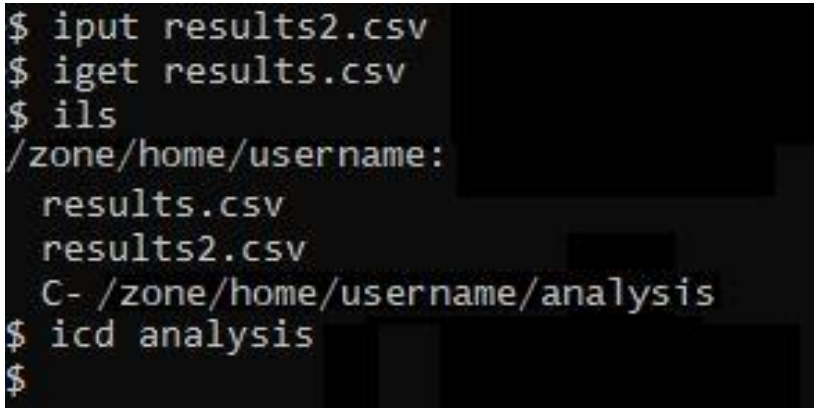
/home/username

Name	Size	Changed	Rights	Owner
..		13/10/2021 13:55:36		
analysis		13/10/2021 13:55:37		
results.csv	97.657...	5/10/2021 14:39:29		

icommands

```
iput – iget- irsync –imeta...
```

- uploading/downloading data
- adding metadata to data objects/collections
- querying based on metadata
- deleting data objects/collections
- synchronization of data
- Permission management

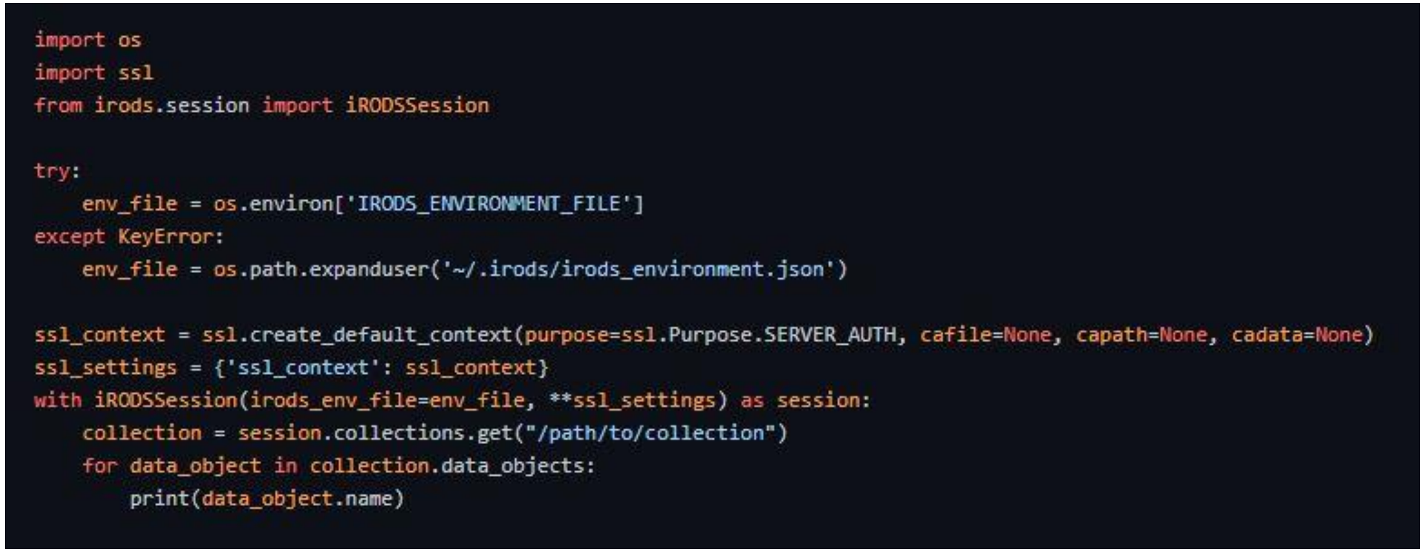


```
$ iput results2.csv
$ iget results.csv
$ ils
/zone/home/username:
  results.csv
  results2.csv
  C- /zone/home/username/analysis
$ icd analysis
$
```

Python iRODS Client (PRC)

`Python3, python-irodsclient`

- scripting to manage data
- working with data objects/collections
- adding metadata to data objects/collections
- permission management
- listing the disk usage



```python
import os
import ssl
from irods.session import iRODSSession

try:
    env_file = os.environ['IRODS_ENVIRONMENT_FILE']
except KeyError:
    env_file = os.path.expanduser('~/.irods/irods_environment.json')

ssl_context = ssl.create_default_context(purpose=ssl.Purpose.SERVER_AUTH, cafile=None, capath=None, cadata=None)
ssl_settings = {'ssl_context': ssl_context}
with iRODSSession(irods_env_file=env_file, **ssl_settings) as session:
    collection = session.collections.get("/path/to/collection")
    for data_object in collection.data_objects:
        print(data_object.name)
```

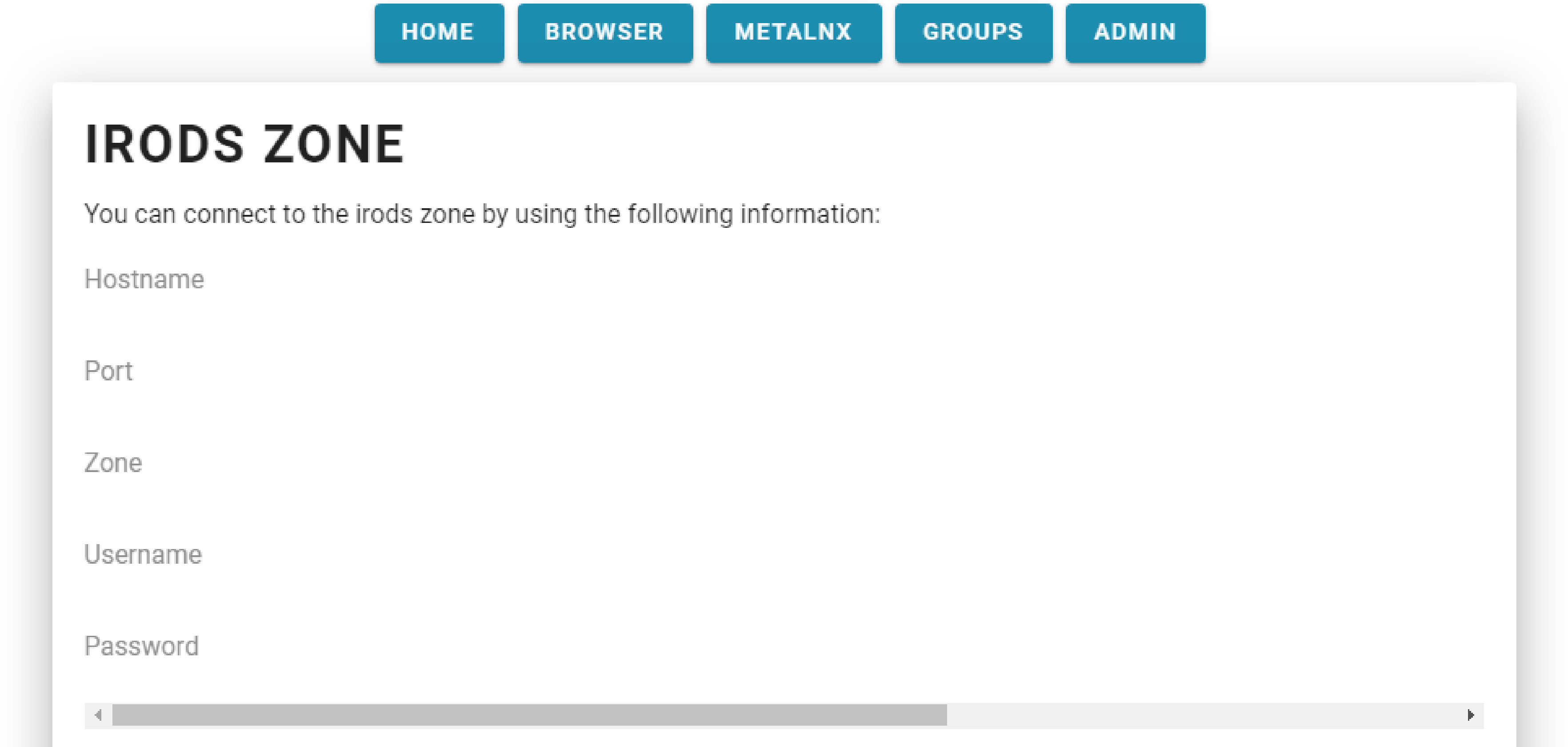
Hands-on

Connecting to your zone

Connecting to iRODS

- Go to: https://{yourZone}.irods.icts.kuleuven.be
- Authenticate using your u-account:
  - You will be sent to the KU Leuven login page
- You are in!

Login portal



IRODS ZONE

You can connect to the irods zone by using the following information:

Hostname

Port

Zone

Username

Password

Hands-on

- Demo of the functionalities of the Login Portal
- Explore the demonstrated functionalities
  - Navigate to your home
  - Create a new folder
  - Upload a file
  - Download the file
  - Add a metadata attribute value to the file
  - Look at the metadata
  - Delete the file