



# EPIC/iRODS Hands-On

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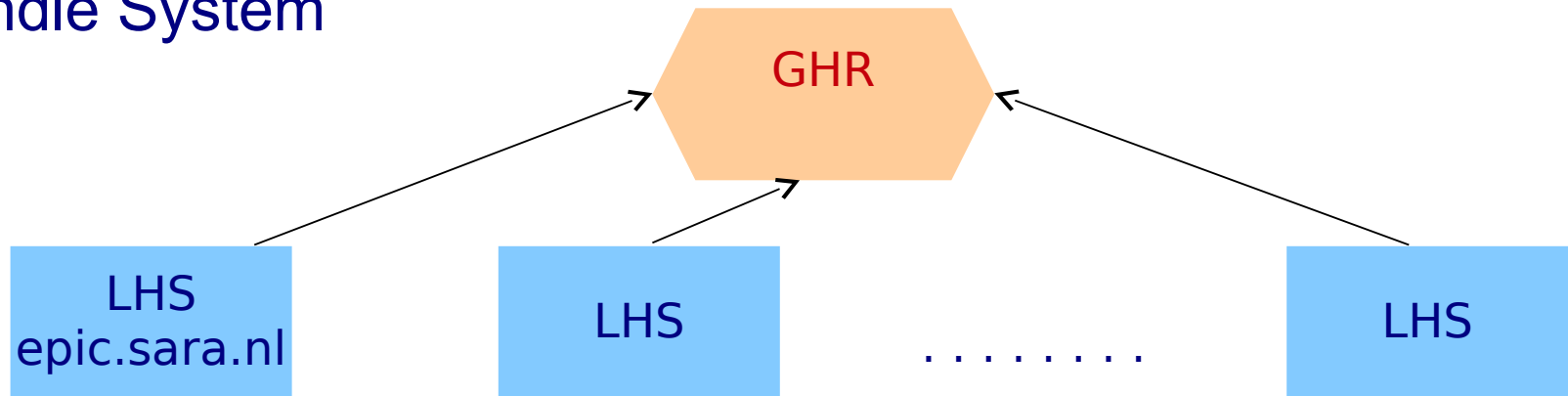
Practice



# I. EPIC API

# EPIC API

- Built on SARA's RESTful Web Service for EPIC PIDs using Handle System



- Data representations: (X)HTML, JSON, plain text
- Name space:
  - `https://epic.sara.nl/v2_test/handles`
  - └ `<prefix>/`
  - └ `<suffix>`
- Methods: HTTP GET, HTTP PUT, HTTP POST

# EPIC API

The screenshot shows a Mozilla Firefox browser window with the title "11226 - Mozilla Firefox". The address bar contains the URL "https://handle-rzg.esc.rzg.mpg.de/epic\_v2/handles/11226/". The page content includes a breadcrumb "home / handles /", a "Contents" section header, and a list of 35 blue hyperlinks, each representing a handle ID. A "Help" button is visible in the top right corner of the page content area.

11226

https://handle-rzg.esc.rzg.mpg.de/epic\_v2/handles/11226/

home / handles /

## Contents

Help

- [00016b4a-1f9a-11e3-8abd-78e7d1c3e51e](#)
- [00049f14-1f99-11e3-8abd-78e7d1c3e51e](#)
- [00063530-1f90-11e3-8abd-78e7d1c3e51e](#)
- [00072918-1f9f-11e3-8abd-78e7d1c3e51e](#)
- [0008c186-1f88-11e3-8abd-78e7d1c3e51e](#)
- [000a0670-1f8f-11e3-8abd-78e7d1c3e51e](#)
- [000a95d0-1f86-11e3-8abd-78e7d1c3e51e](#)
- [000f571c-1f8d-11e3-8abd-78e7d1c3e51e](#)
- [00109fba-1f87-11e3-8abd-78e7d1c3e51e](#)
- [00130e9a-1f8b-11e3-8abd-78e7d1c3e51e](#)
- [0015a408-1f8a-11e3-8abd-78e7d1c3e51e](#)
- [001655ee-1f92-11e3-8abd-78e7d1c3e51e](#)
- [0016708a-1f95-11e3-8abd-78e7d1c3e51e](#)
- [0018fa48-1f9b-11e3-8abd-78e7d1c3e51e](#)
- [001ce6b4-1f85-11e3-8abd-78e7d1c3e51e](#)
- [001d0e0c-1f9c-11e3-8abd-78e7d1c3e51e](#)
- [001e4122-1f84-11e3-8abd-78e7d1c3e51e](#)
- [00203916-1f8c-11e3-8abd-78e7d1c3e51e](#)
- [00248a06-1fa1-11e3-8abd-78e7d1c3e51e](#)
- [0026213a-1f93-11e3-8abd-78e7d1c3e51e](#)
- [002b0a10-1f98-11e3-8abd-78e7d1c3e51e](#)
- [002c97a8-1fa3-11e3-8abd-78e7d1c3e51e](#)
- [00320344-1fa0-11e3-8abd-78e7d1c3e51e](#)
- [00348fae-1f9d-11e3-8abd-78e7d1c3e51e](#)
- [00373114-1f89-11e3-8abd-78e7d1c3e51e](#)
- [00374e80-1f96-11e3-8abd-78e7d1c3e51e](#)
- [003adb7a-1f8e-11e3-8abd-78e7d1c3e51e](#)
- [004774ec-1f99-11e3-8abd-78e7d1c3e51e](#)
- [0048397e-1f83-11e3-8abd-78e7d1c3e51e](#)

# EPIC API

1c8a0062-367c-11e3-a2a3-78e...

← → [https://handle-rzg.esc.rzg.mpg.de/epic\\_v2/handles/11226/1c8a0062-367c-11e3-a2a3-78e7d1c3e51e](https://handle-rzg.esc.rzg.mpg.de/epic_v2/handles/11226/1c8a0062-367c-11e3-a2a3-78e7d1c3e51e) Google

[home](#) / [handles](#) / 11226 /

idx	type	parsed data	data	timestamp	tli	tli type	tli	refs	privs	<a href="#">Help</a>
1	URL	ftp://ftp.rzg.mpg.de/afs/ipp-garching.mpg.de/home/f/fruwl/public/EUDAT/resolver/createPids.py	ZnRwOi8vZnRwLnJ6Zy5tcGcuZGUvYWZzL2lwcC1nYXJjaGluZy5tcGcuZGUvaG9tZS9mL2ZydXdsL3B1YmxpYy9FVURBVC9yZkNvbHJlci9jcmVhdGVQaWRz LnB5	2013-10-16T16:01:13Z	0		86400		rwr-	
2	CHECKSUM	99f9164f84339364ffb22c8eaa5e1206	OTImOTE2NGY4NDMzOTM2NGZmYjlyYzh1YWE1ZTEyMDY=	2013-10-16T16:01:13Z	0		86400		rwr-	
3	10320/LOC	<locations><location href="ftp://ftp.rzg.mpg.de/afs/ipp-garching.mpg.de/home/f/fruwl/public/EUDAT/resolver/createPids.py" id="0"/><location href="file:///afs/ipp-garching.mpg.de/home/f/fruwl/public/EUDAT/resolver/createPids.py" id="1"/></locations>	PGxvY2F0aW9ucz48bG9jYXRpb24gaHJlZj0lZnRwOi8vZnRwLnJ6Zy5tcGcuZGUvYWZzL2lwcC1nYXJjaGluZy5tcGcuZGUvaG9tZS9mL2ZydXdsL3B1YmxpYy9FVURBVC9yZkNvbHJlci9jcmVhdGVQaWRzLnB5IlBpZD0lMCivPjxsb2Nh dGlvb1BocmVmpSJMmWxiOi8vL2Fmcy9pcHATZ2FyY2hpbm cubXBnLmRlL2hv bWUvZi9mcmV3bC9wdWJsaWVvRVVEQVQvcvVzb2x2ZXIvY3JlYXRIUGlkcy5w eSlgaWQ9ljlEILz48L2xvY2F0aW9ucz4=	2013-10-16T16:01:14Z	0		86400		rwr-	
100	HS_ADMIN	<b>adminid</b> 0,NA/11226 <b>adminidIndex</b> 200 <b>perms</b> <b>add_handle</b> true <b>delete_handle</b> true <b>add_naming_auth</b> false <b>delete_naming_a...</b> false <b>modify_value</b> true <b>remove_value</b> true <b>add_value</b> true <b>read_value</b> true <b>modify_admin</b> true <b>remove_admin</b> true <b>add_admin</b> true <b>list_handles</b> false	B/MAAAAKMC5OQS8xMTIyNgAAAMgAAA==	2013-10-16T16:01:13Z	0		86400		rwr-	

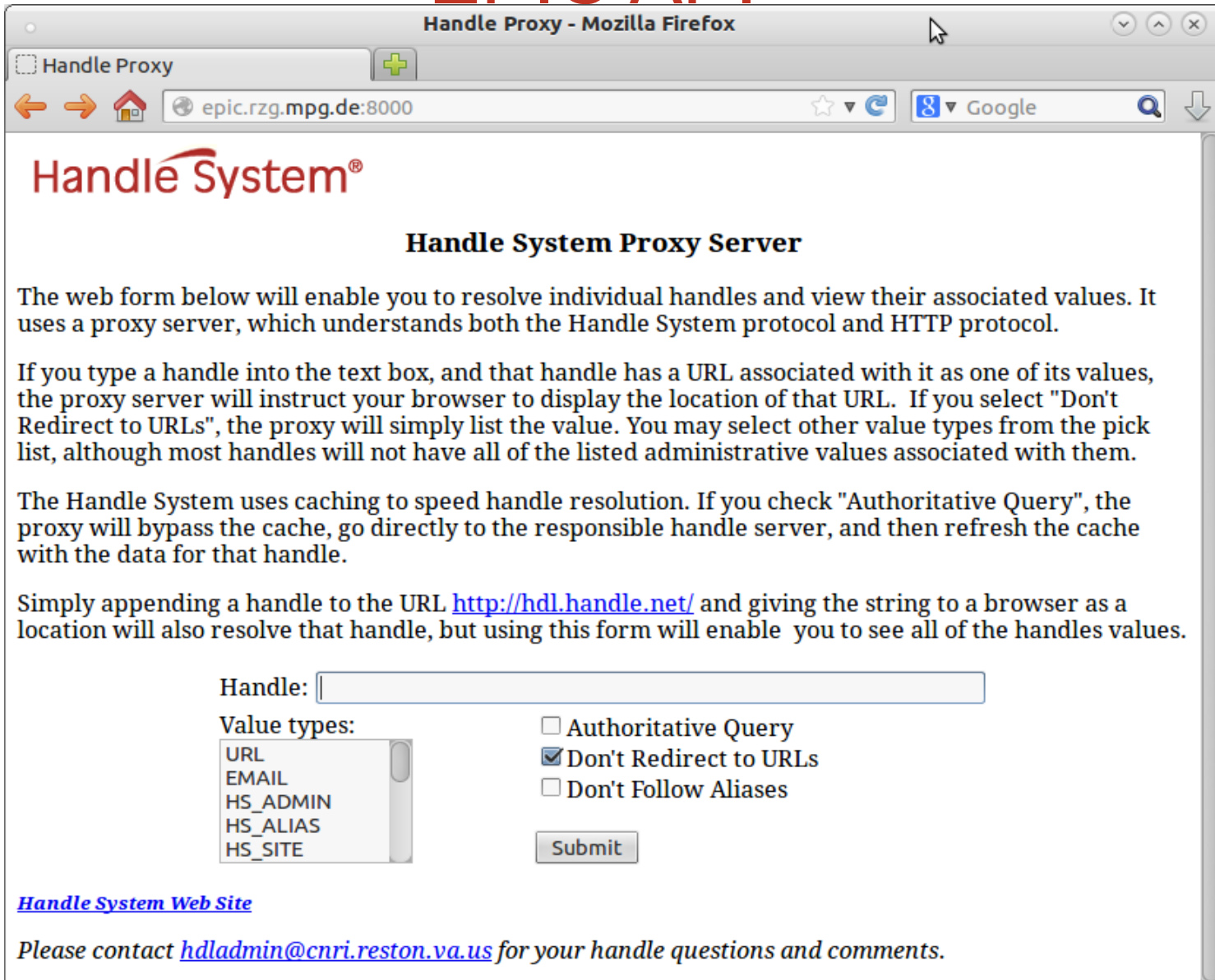
EPIC PID-Service version 2.3

Developed by the EPIC Consortium: CSC, DKRZ, GWDG, and SURFsara

Sponsored by: CATCH+, DARIAH-DE and EUDAT

Powered by Rackful

# EPIC API



The screenshot shows a Mozilla Firefox browser window titled "Handle Proxy - Mozilla Firefox". The address bar contains "epic.rzg.mpg.de:8000". The page content includes the "Handle System" logo, the title "Handle System Proxy Server", and several paragraphs of text explaining the proxy server's functionality. Below the text is a form with a "Handle:" input field, a "Value types:" dropdown menu (showing URL, EMAIL, HS\_ADMIN, HS\_ALIAS, HS\_SITE), three checkboxes for "Authoritative Query", "Don't Redirect to URLs" (checked), and "Don't Follow Aliases", and a "Submit" button. At the bottom, there is a link to the "Handle System Web Site" and contact information for "hdladmin@cnri.reston.va.us".

Handle Proxy

epic.rzg.mpg.de:8000

Google

## Handle System®

### Handle System Proxy Server

The web form below will enable you to resolve individual handles and view their associated values. It uses a proxy server, which understands both the Handle System protocol and HTTP protocol.

If you type a handle into the text box, and that handle has a URL associated with it as one of its values, the proxy server will instruct your browser to display the location of that URL. If you select "Don't Redirect to URLs", the proxy will simply list the value. You may select other value types from the pick list, although most handles will not have all of the listed administrative values associated with them.

The Handle System uses caching to speed handle resolution. If you check "Authoritative Query", the proxy will bypass the cache, go directly to the responsible handle server, and then refresh the cache with the data for that handle.

Simply appending a handle to the URL <http://hdl.handle.net/> and giving the string to a browser as a location will also resolve that handle, but using this form will enable you to see all of the handles values.

Handle:

Value types:

- URL
- EMAIL
- HS\_ADMIN
- HS\_ALIAS
- HS\_SITE

Authoritative Query

Don't Redirect to URLs

Don't Follow Aliases

[Handle System Web Site](#)

Please contact [hdladmin@cnri.reston.va.us](mailto:hdladmin@cnri.reston.va.us) for your handle questions and comments.

# EPIC API

Handle Proxy - Mozilla Firefox

Handle Proxy

epic.rzg.mpg.de:8000

Google

## Handle System®

**Handle:** 11226/1c8a0062-367c-11e3-a2a3-78e7d1c3e51e

**Handle Values for:** 11226/1c8a0062-367c-11e3-a2a3-78e7d1c3e51e

Index	Type	Timestamp	Data
1	URL	Wed Oct 16 201 18:01:13 CES	<a href="ftp://ftp.rzg.mpg.de/afs/ipp-garching.mpg.de/home/f/fruwl/public/EUDAT/resolver/createPids.py">ftp://ftp.rzg.mpg.de/afs/ipp-garching.mpg.de/home/f/fruwl/public/EUDAT/resolver/createPids.py</a>
2	CHECKSUM	Wed Oct 16 201 18:01:13 CES	99f9164f84339364ffb22c8eaa5e1206
3	10320/LOC	Wed Oct 16 201 18:01:14 CES	<locations><location href="ftp://ftp.rzg.mpg.de/afs/ipp-garching.mpg.de/home/f/fruwl/public/EUDAT/resolver/createPids.py" id="0"/><location href="file:///afs/ipp-garching.mpg.de/home/f/fruwl/public/EUDAT/resolver/createPids.py" id="1"/></locations>
100	HS_ADMIN	Wed Oct 16 201 18:01:13 CES	07F3000000A302E4E412F3131323236000000C80000

[Handle System Web Site](#)

Please contact [hldadmin@cnri.reston.va.us](mailto:hldadmin@cnri.reston.va.us) for your handle questions and comments.



# Demo Data Grid

- A virtual machine for the training:
  - `ssh -X eudat@130.183.206.65`
  - `cd ~/pids_handson/`

<b>IP address</b>	<b>hostname</b>	<b>user</b>	<b>password</b>
130.183.206.65	irods2-eudat	eudat	eu25dat

# EPIC API

- EPIC API URL: [https://epic.sara.nl/v2\\_test/handles/843](https://epic.sara.nl/v2_test/handles/843)
- EPIC API prefix: 843
- Credentials: `~/pids_handson/credentials`
- Set: `export EPIC_PASSWORD=...`
- Set: `export IRODSHOME=/home/eudat/iRODS`

# EPIC API

## Get the content using JSON

```
curl --user 843:$EPIC_PASSWORD --header 'Accept: application/json'  
https://epic.sara.nl/v2_test/handles/
```

## This yields:

```
[  
  "0.NA/",  
  "841/",  
  "842/",  
  "843/",  
  "844/",  
  "845/",  
  "846/",  
  "847/",  
  "848/",  
  "849/"  
]
```

# EPIC API

Use curl to

- search a PID:

```
curl --fail --user 843:$EPIC_PASSWORD "  
https://epic.sara.nl/v2_test/handles/843/?URL=*eudat0*"
```

- query a PID:

```
curl --fail --user 843:$EPIC_PASSWORD --request GET  
https://epic.sara.nl/v2_test/handles/843/5390cd6c-30e5-  
11e3-b1bb-020091643932
```

# EPIC API

Use curl to create a PID:

File TEST.json:

```
[
  {
    "type": "URL",
    "parsed_data": "http://www.eudat.eu/events/programme-eudat-2nd-conference"
  },
  {
    "type": "EMAIL",
    "parsed_data": "email@example.com"
  }
]
```

SUFFIX=`uuidgen`

```
curl --user 843:$EPIC_PASSWORD --upload-file TEST.json \
  --header 'Content-type: application/json'
https://epic.sara.nl/v2_test/handles/843/$SUFFIX
```

```
curl --fail --user 843:$EPIC_PASSWORD --request GET \
https://epic.sara.nl/v2_test/handles/843/$SUFFIX
```



## II. EUDAT EPIC Client

# EUDAT EPIC Client

- Python script to manage PIDs

~/pids\_handson/epicclient.py

- Dependencies: python, httplib2, and simplejson

- Classes: EpicClient - class implementing an EPIC client;

LocationType - class implementing a 10320/LOC handle type;

Credentials - get credentials from different storages.

- CLI: search, read, create, modify, delete, relation, test

# EUDAT EPIC Client

## - EpicClient Class Methods:

- searchHandle
- retrieveHandle
- getValueFromHandle
- createHandle
- modifyHandle
- deleteHandle
- updateHandleWithLocation
- removeLocationFromHandle

## - LocationType Class Methods:

- isEmpty
- checkInclusion
- removeLocation
- addLocation

## - Credential Class Methods:

- parse



# EUDAT EPIC Client: Usage

```
credStoreType="os"  
credStorePath=$IRODSHOME"/modules/EUDAT-PID/cmd/credentials"  
EPICAPI="https://epic.sara.nl/v2_test/handles/"
```

## - search:

```
URL="http://www.eudat.eu/events/programme-eudat-2nd-conference"  
PID=`./epicclient.py $credStoreType $credStorePath search URL $URL`
```

## - read:

```
URL1=`./epicclient.py $credStoreType $credStorePath read $PID --key URL`
```

## - create:

```
SUFFIX=`uuidgen`  
PID1=`./epicclient.py $credStoreType $credStorePath create $URL1`
```

# EUDAT EPIC Client: Usage

## - modify:

```
./epicclient.py $credStoreType $credStorePath modify $PID1 EMAIL "example@example.com"
```

## - relation:

```
SUFFIX2=`uuidgen`
```

```
URL2="http://www.eudat.eu/eudat-2nd-conference-plenary-i"
```

```
PID2=`./epicclient.py $credStoreType $credStorePath create $URL2`
```

```
./epicclient.py $credStoreType $credStorePath relation $PID1 $EPICAPI$PID2
```

## - delete:

```
./epicclient.py $credStoreType $credStorePath delete $PID2
```



# III. EPIC and iRODS: Safe Replication

# Demo Data Grids

- iRODS installed in: “~/iRODS”, iEnv files: “~/irods/.irodsEnv”
- Set:
  - export IRODSHOME=\$HOME/iRODS
  - export IRODSZONE=/vzRZGEUDAT
  - export LOCALHOME=/vzRZGEUDAT/home/eudat
  - export REMOTEZONE=/vzRZGE
  - export REMOTEHOME=/vzRZGE/home/eudat#vzRZGEUDAT
- iRODS user account:

<b>iRODS zone</b>	<b>iRODS admin</b>
vzRZGEUDAT	eudat

# icommands

- Make sure the icommands can be found on the PATH
- You can find the icommands in the `$IRODSHOME/clients/icommands/bin` folder

- Add the icommands to the path:

tssh:

```
setenv PATH $PATH:$IRODSHOME/clients/icommands/bin
```

bash:

```
export PATH=$PATH:$IRODSHOME/clients/icommands/bin
```

# icommands

Unix-like	FTP-like	Functional	Metadata	Admin
ils	iinit	ireg	imeta	iadmin lz
ipwd	iput	ibun	iquest	iadmin lr
icd	iget	irepl	idbo	iadmin lu
ichmod	iexit			
irm				
imkdir				
ipasswd				
irsync				
ichksum				
icp				

Directory naming convention:  
/zone/home/user\_name

# iRODS Rule Base

- `$IRODSHOME/server/config/reConfigs/core.re`

```
# iRODS Rule Base
```

```
# The new rule language is used to express all policies
```

```
# Recovery procedures are included for a micro-service after " ::: "
```

```
#
```

```
#Test Rules
```

```
printHello { print_hello; }
```

```
#
```

```
# These are sys admin rules for creating and deleting users and renaming
```

```
# the local zone.
```

```
acCreateUser {
```

```
    acPreProcForCreateUser;
```

```
    acCreateUserF1;
```

```
    acPostProcForCreateUser; }
```

```
acCreateUserF1 {
```

```
    ON($otherUserName == "anonymous") {
```

```
        msiCreateUser ::: msiRollback;
```

```
        MsiCommit; } }
```

```
...
```

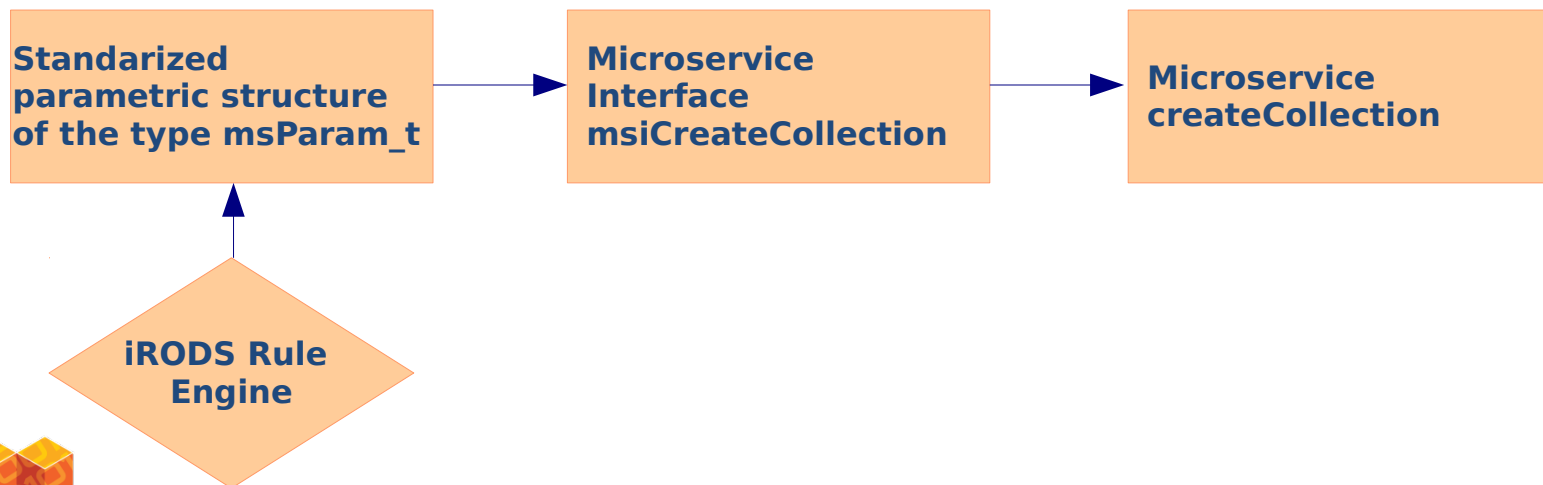
# iRODS Microservices

Micro-services are small, well-defined procedures/functions that perform a simple task

[https://www.irods.org/index.php/iRODS\\_Micro-services](https://www.irods.org/index.php/iRODS_Micro-services)

Examples: `msiCollCreate`, `msiDataObjRepl`, `msiDataObjChksum`, ...

To convert a C function `createCollection` into a microservice, create an interface routine `msiCreateCollection`





# iRODS Rules

- A rule file replicate.r:

```
replicate0 {
```

```
    msiWriteRodsLog("starting replication", *status);
```

```
    msiWriteRodsLog("source = *source", *status);
```

```
    msiWriteRodsLog("collectionPath = *collectionPath", *status);
```

```
    msiDataObjRsync(*source, "IRODS_TO_IRODS", "null", *destination,  
*rsyncStatus);
```

```
}
```

INPUT

```
*source="/vzEudat0/home/rods0/put3.txt",*destination="/vzEudat1/home/rods0#v  
zEudat0/put3.txt"
```

OUTPUT ruleExecOut

# iRODS Log Files

- `$IRODSHOME/server/log/rodsLog.<date>`:

...

Oct 8 19:45:42 pid:31026 NOTICE: Agent process 5775 started for puser=rods0 and cuser=rods0 from 127.0.0.1

Oct 8 19:45:42 pid:5775 NOTICE: rsAuthCheck user rods0#vzEudat0

Oct 8 19:45:42 pid:5775 NOTICE: rsAuthResponse set proxy authFlag to 5, client authFlag to 5, user:rods0#vzEudat0 proxy:rods0 client:rods0

Oct 8 19:45:42 pid:5775 NOTICE: msiWriteRodsLog message: starting replication

Oct 8 19:45:42 pid:5775 NOTICE: msiWriteRodsLog message: source = /vzEudat0/home/rods0/put3.txt

Oct 8 19:45:42 pid:31026 NOTICE: Agent process 5777 started for puser=rods1 and cuser=rods0 from 145.100.57.52

Oct 8 19:45:42 pid:5777 NOTICE: rsAuthCheck user rods0#vzEudat0

Oct 8 19:45:42 pid:5777 NOTICE: readAndProcClientMsg: received disconnect msg from client

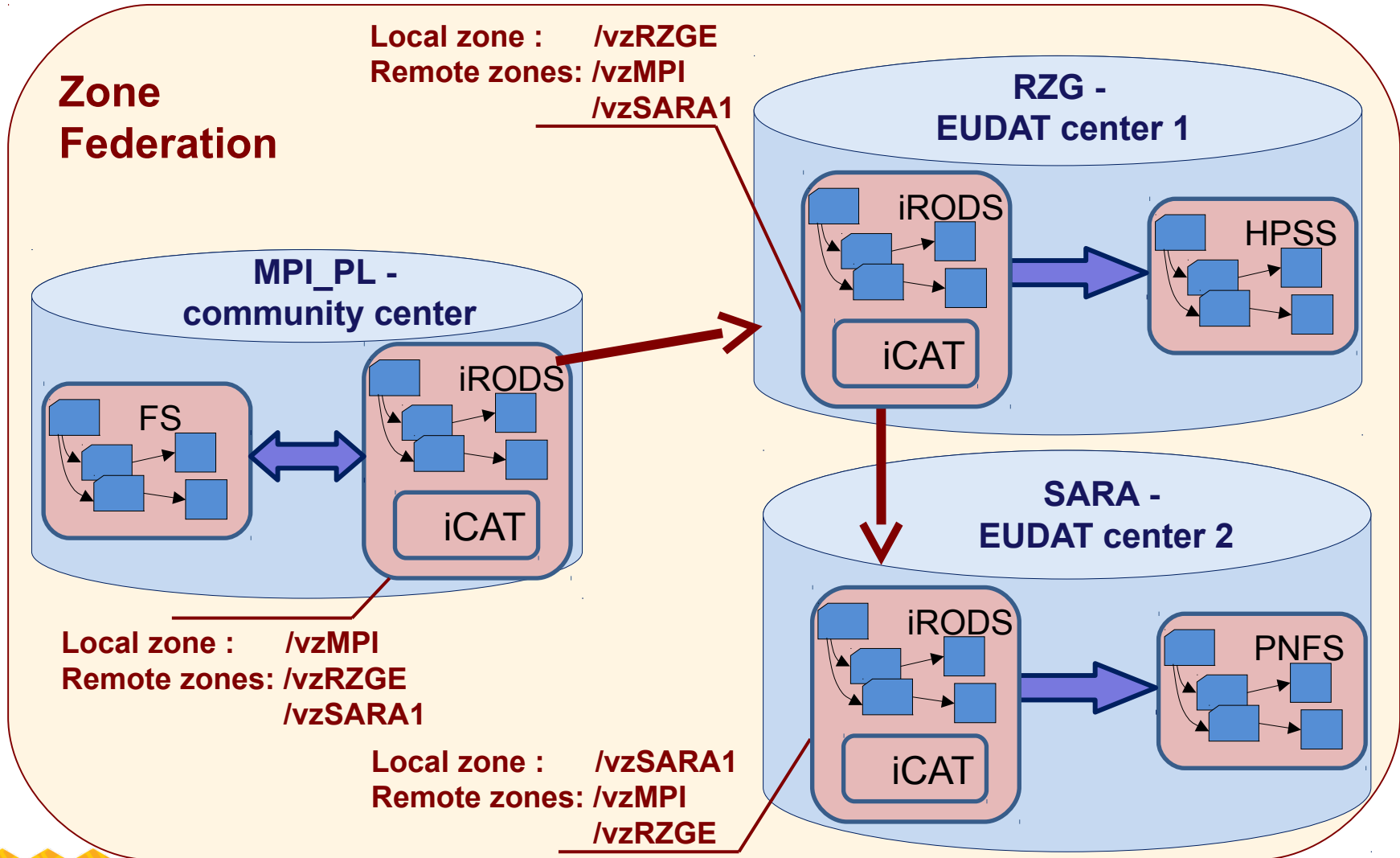
Oct 8 19:45:42 pid:5777 NOTICE: Agent exiting with status = 0

Oct 8 19:45:42 pid:5775 NOTICE: readAndProcClientMsg: received disconnect msg from client

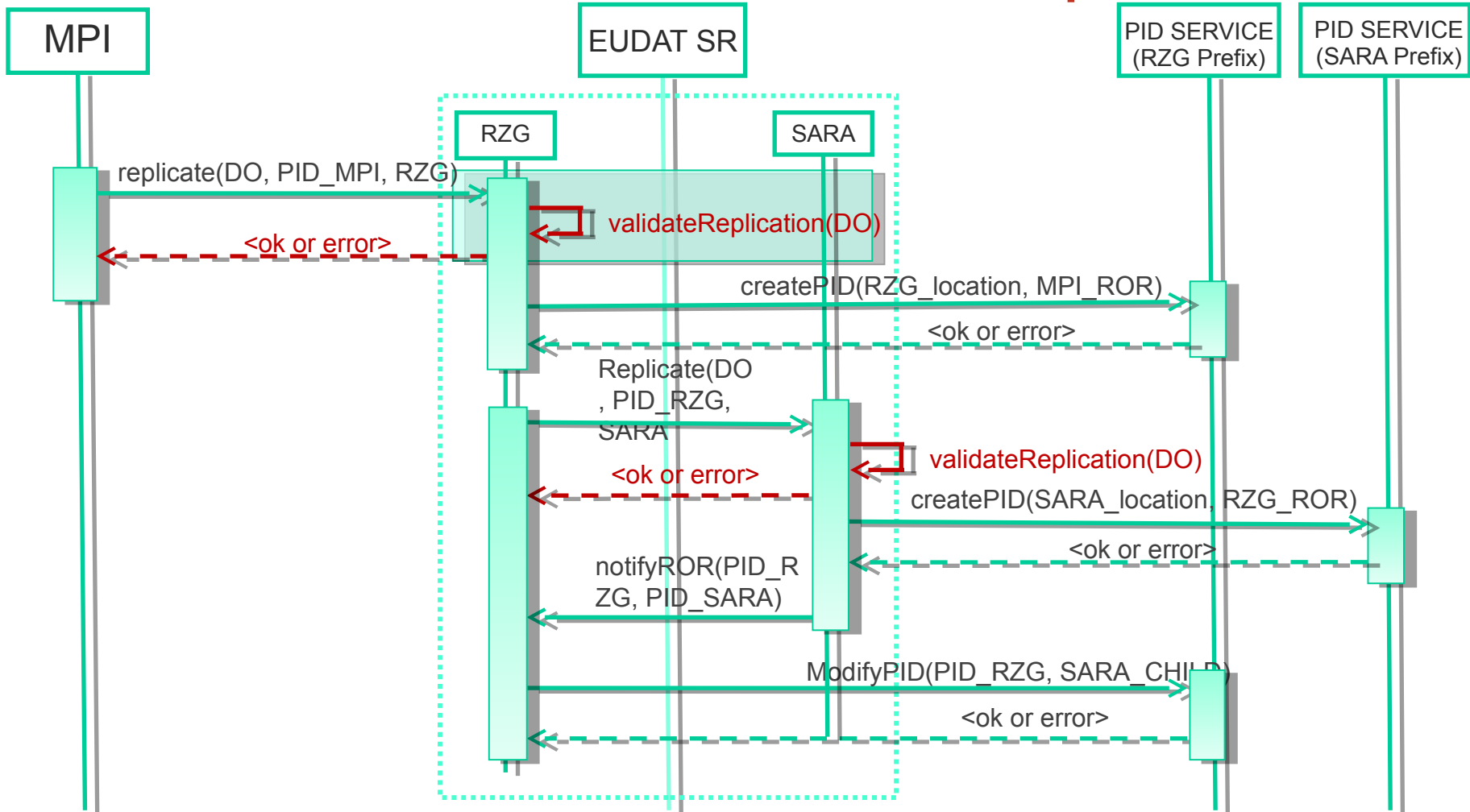
Oct 8 19:45:42 pid:5775 NOTICE: Agent exiting with status = 0

...

# REPLIX-EUDAT Example



# REPLIX-EUDAT Example



# EUDAT PID Module

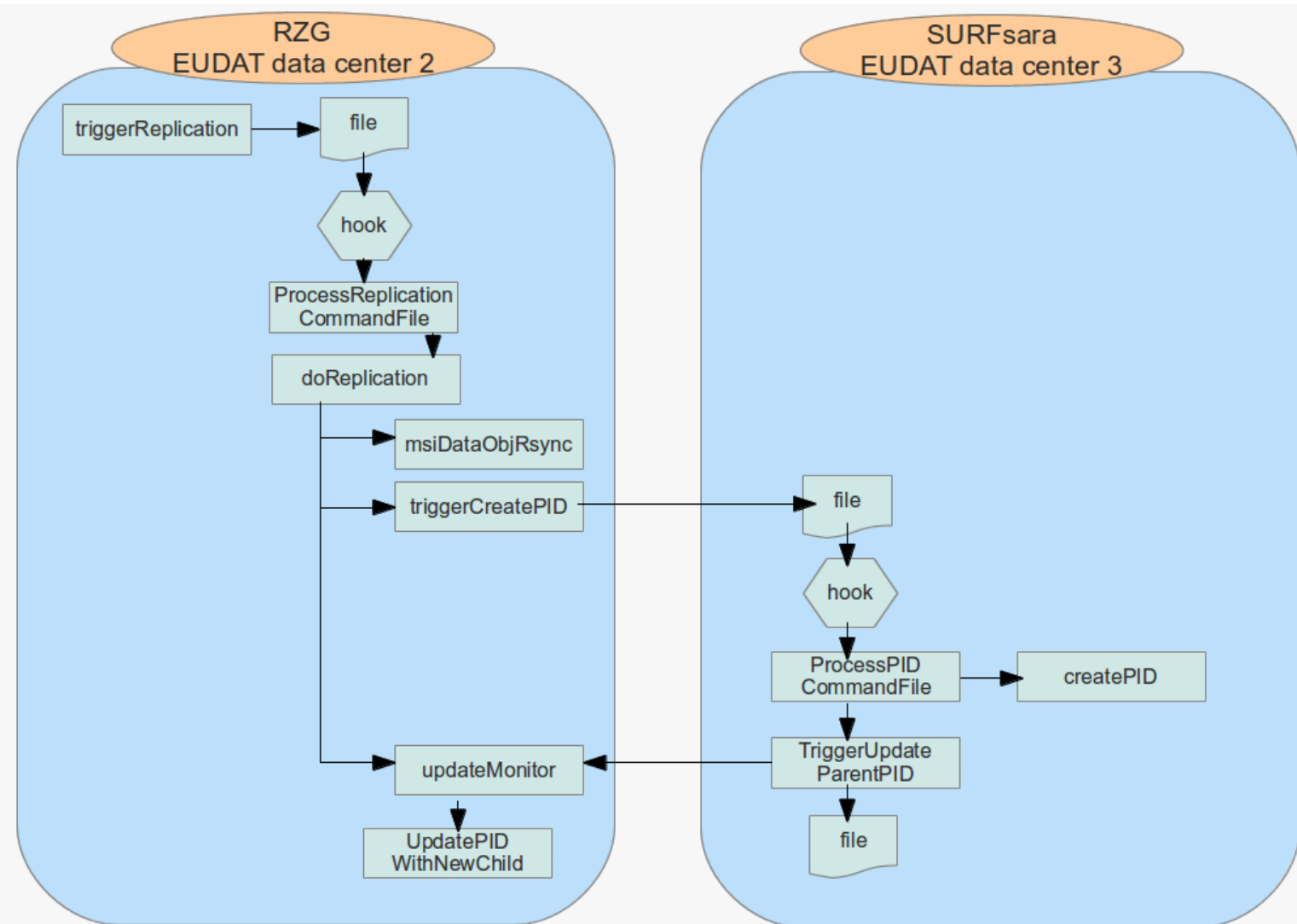
- `$IRODSHOME/modules/EUDAT-PID`
- Python script to interact with EPIC system
- Rule base file to call python methods within irods  
`msiExecCmd("epicclient.py", "*credStoreType  
*credStorePath create *serverID*path", "null", "null",  
"null", *out);`
- Control files `*.replicate`, `*.pid.create`, and `*.pid.update`

# EUDAT PID Rule Base

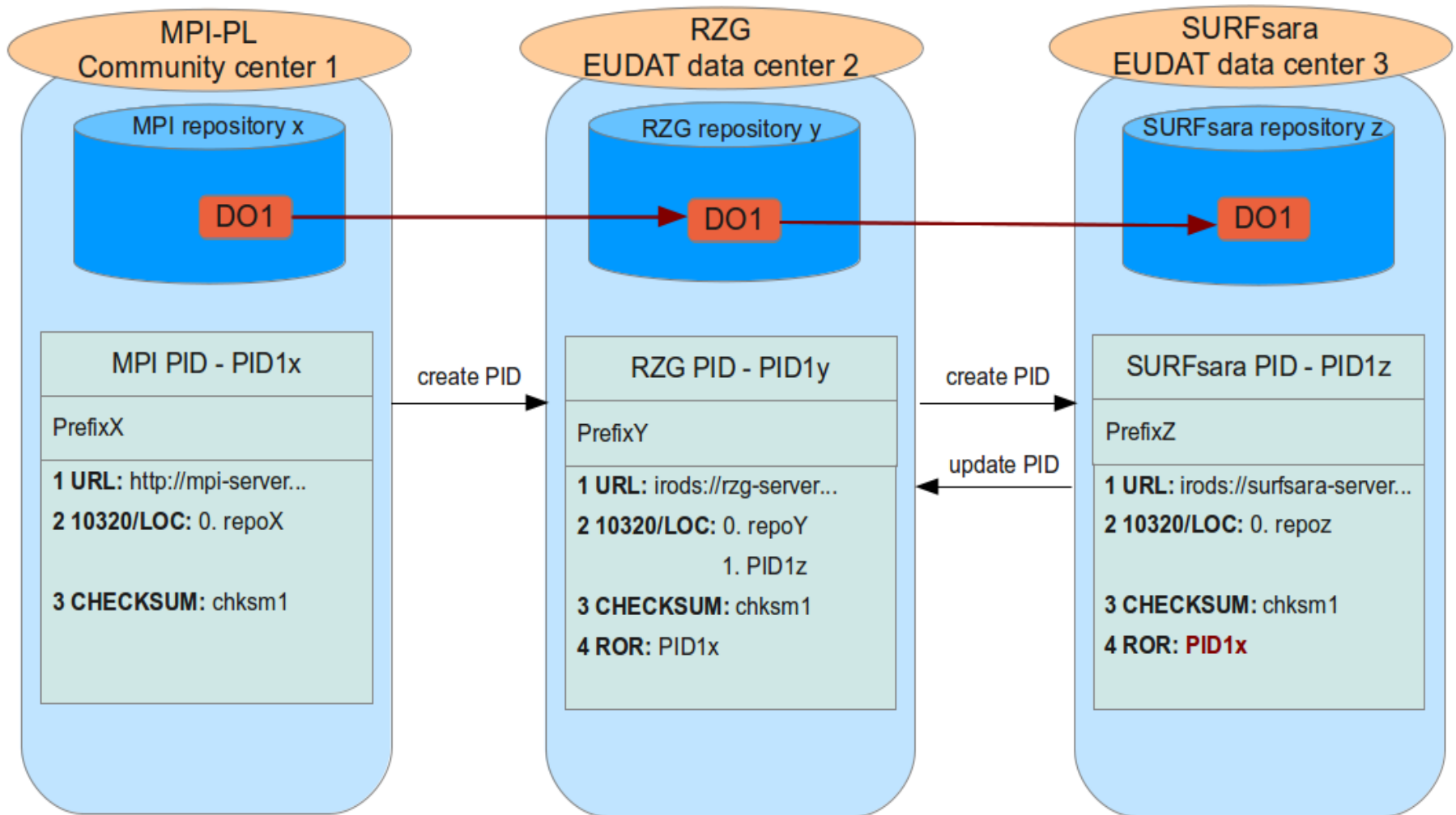
## Rules:

- updateMonitor
- retrieveChecksum
- triggerReplication
- triggerCreatePID
- triggerUpdateParentPID
- processReplicationCommandFile
- processPIDCommandFile
- doReplication
- createPID
- createPIDgriffin
- addPIDWithChecksum
- searchPID
- checkReplicas
- updatePIDWithNewChild
- getRorPid

# REPLIX-EUDAT Example



# REPLIX-EUDAT Example





# Practice

1. Upload a file and create a PID using iRODS hooks	2. Replicate the file using iRODS rule
<ul style="list-style-type: none"><li>- check the iRODS hook<pre>vi \$IRODSHOME/server/config/reConfigs/core.re AcPostProcForPut{}</pre></li><li>- create a file<pre>cd ~/pids_handson/ vi repl_file_&lt;Name&gt;</pre></li><li>- put it to irods<pre>icd icd pids_handson iput repl_file_&lt;Name&gt;</pre></li><li>- check log<pre>cat \$IRODSHOME/server/log/rodsLog.&lt;Date&gt;</pre></li><li>- check the PID on <a href="https://epic.sara.nl/v2_test/handles/843/">https://epic.sara.nl/v2_test/handles/843/</a></li></ul>	<ul style="list-style-type: none"><li>- modify a rule file:<pre>cd ~/pids_handson/ cp check.r check_&lt;Name&gt;.r vi check_&lt;Name&gt;.r</pre></li><li>- replicate a file to a neighbor:<pre>irule -vF check_&lt;Name&gt;.r</pre></li><li>- check the PID on <a href="https://epic.sara.nl/v2_test/handles/843/">https://epic.sara.nl/v2_test/handles/843/</a></li><li>- check log<pre>cat \$IRODSHOME/server/log/rodsLog.&lt;Date&gt;</pre></li><li>- check the file in the remote zone<pre>ils -l \$REMOTEHOME/pids_handson</pre></li><li>- check the PID update in 2 min <a href="https://epic.sara.nl/v2_test/handles/843/">https://epic.sara.nl/v2_test/handles/843/</a><pre>cat \$IRODSHOME/server/log/reLog.&lt;Date&gt;</pre></li></ul>