UNICORE in the Human Brain Project

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Allows to …

- … use multiple, heterogeneous systems seamlessly,
- … manage job input data and results,
- … across systems, including complex workflows,
- … securely!
Goal: Unified access to the HPC platform

HBP Collaboratory, other applications

1. authenticate
returns token

OIDC server
user login

3.1 validate

3. validate token

OK

Unity

REST API

UNICORE

HBP Molecular Dynamics
Supercomputer

HBP Data Analytics
Supercomputer

HBP Development System

HBP Supercomputer

HBP Cloud Storage
Authentication: integrate with HBP infrastructure for single-sign on

OIDC: HBP services login

Unity: Authentication for UNICORE services
REST APIs

accessing UNICORE services
Job Management

- Torque/PBS
- Slurm
- … (yours)
Example: job submission

```json
job.u:
{
    Executable: "/bin/echo" ,
    Arguments: ["Hello World"],
}
```

```bash
$> curl -X POST -H "Content-Type: application/json"
   --data-binary @job.u -H "Authorization: ...
https://.../HBP_JUQUEEN/rest/core/jobs

HTTP/1.1 201 Created
Content-Type: application/json; charset=ISO-8859-1
Location: https://.../rest/core/jobs/<job_id>
```
Example: job status

$> curl -X GET -H "Authorization: ...
      https://.../HBP_JUQUEEN/rest/core/jobs/<job_id>

{
   "_links": {
      "action:abort": {...},
      "action:restart": {...},
      "workingDirectory": {...}
   },
   "exitCode": "0",
   "status": "SUCCESSFUL",
   "statusMessage": "",
   "submissionTime": "2015-07-14T13:59:51+0200",
   ...
}
Storages and file access

- mkdir, ls, rm, stat, ...
- upload/download
- server-to-server copy

- File systems
- Apache HDFS
- S3
- … (yours)
Example: storage access

```bash
$> curl -X GET -H "Authorization: ..."
https://.../rest/core/storages/schuller-Home/files
```

```json
{
  "owner": "schuller", "group": "zam",
  "unixPermissions": "rwx------",
  "isDirectory": true,
  "_links": { 
    "parentStorage": { 
      "href": "https://.../rest/core/storages/schuller-Home",
      "description": "Parent Storage"
    }
  },
  "metadata": {},
  "children": [ 
    "/.bashrc",
    "/data/",
    ...
  ]
}
```
Example: file access

Download

```
$> curl -X GET -H "Authorization: ..."
   -H "Content-Type: application/octet-stream"
   https://.../files/file.dat
```

(file content)

Upload

```
file.dat
```

```
$> curl -X PUT -H "Authorization: ..."
   -H "Content-Type: application/octet-stream"
   --data-binary @file.dat
   https://.../files/myfile.dat
```
UNICORE Portal

Provide temporary (internal) access to the HPC platform
UNICORE Portal

1. Authentication
   returns signed SAML assertion

2. access UNICORE (job submission, data movement etc)

UNICORE Portal

Unity

OIDC server

BSC
HPC site

CINECA
HPC site

CSCS
HPC site

JSC
HPC site

KIT
Cloud storage
UNICORE Portal: view sites

![UNICORE Portal](https://hbp-portal.fz-juelich.de:9091/portal#!sites - Chromium)

Logged as: **Bernd Schuller**

### Sites Browser

<table>
<thead>
<tr>
<th>Name</th>
<th>Total Number of Processors</th>
<th>Actions</th>
</tr>
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<tbody>
<tr>
<td>CINECA-FERMI</td>
<td>163840</td>
<td><img src="#" alt="View" /> <img src="#" alt="Edit" /></td>
</tr>
<tr>
<td>CINECA-GALILEO</td>
<td>8256</td>
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<td>CINECA-PICO</td>
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<td>HBP-KIT</td>
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<tr>
<td>HBP_JUQUEEN</td>
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<tr>
<td>VIS-CSCS</td>
<td>65535</td>
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</tr>
</tbody>
</table>
UNICORE Portal: manage data
UNICORE Portal: submit jobs
Summary

- Using UNICORE for integrating HPC and other resources into HBP's computing platform
- Authentication and single-sign-on
- REST APIs for easy integration into portals and custom apps
- S3 cloud storage integration
- Access via dedicated UNICORE Portal
Next steps

- Production use of the HPC platform by neuroscientists :-) 

- Investigate data management use cases
  - Many should be realisable via UNICORE!
  - HPC platform data ingest / access

- Setup HPC platform monitoring
Thank you!

UNICORE

- www.unicore.eu
- ISC Booth #553