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EGI DataHub

Data as a Service – Distributed Data Management

Baptiste Grenier

EGI Foundation



The work of the EGI Foundation

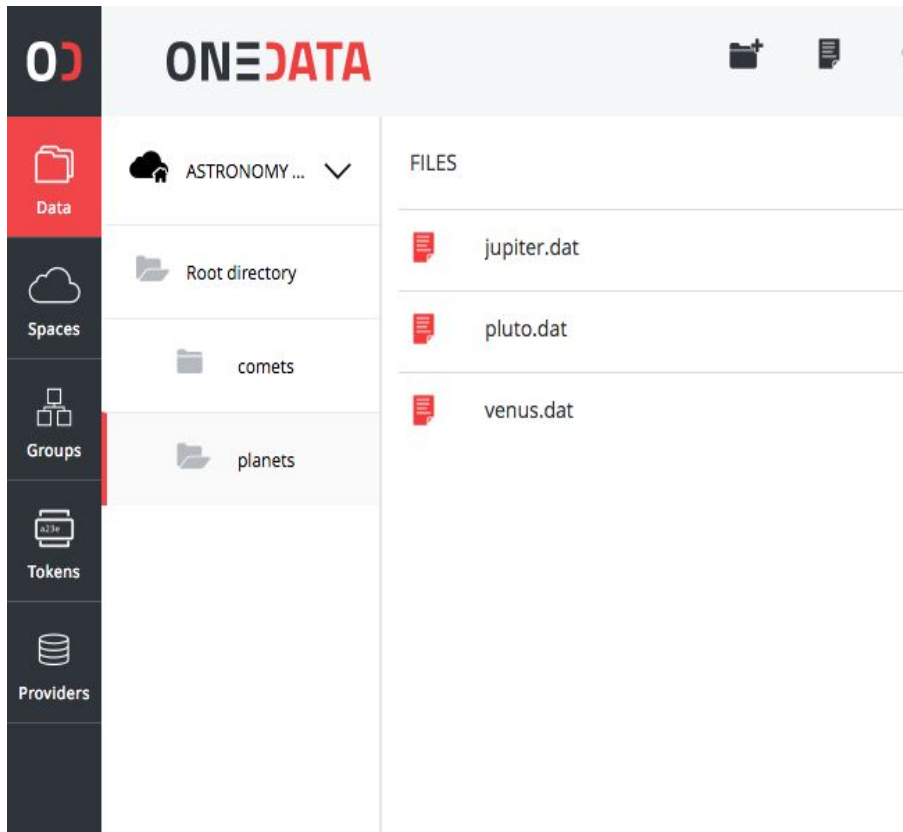
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- Putting up a (scalable) distributed data infrastructure needs specific expertise, resources and knowledge
- No easy way to discover and transfer data
- No easy way of making data (publicly) accessible without transferring it a sharing service
- No easy way of combining multiple datasets from different data providers
- Users need to access data locally and from compute resources

EGI DataHub: components and concepts

- **EGI DataHub:** a **Onedata Onezone**, the **federation** and **authentication** service. SSO with all the connected storage providers (Oneprovider) through **EGI Check-in**
- **Oneprovider:** **data management** component deployed in the data centres, **provisioning data** and **managing transfers**. A default one is operated for EGI by CYFRONET.
- **Space:** a **virtual volume** where **users organize data**. A space is supported by one or multiple Oneproviders
- **Oneclient:** a client providing access to the spaces through a FUSE mount point (**local POSIX access**)
- **Web interfaces** and **APIs** are also available

Web interface and Oneclient on the CLI



The screenshot shows the ONEDATA web interface. On the left is a navigation sidebar with icons for Data, Spaces, Groups, Tokens, and Providers. The main content area displays a file browser for the 'ASTRONOMY ...' directory. It shows a 'Root directory' with subfolders 'comets' and 'planets'. Under 'planets', there are three files: 'jupiter.dat', 'pluto.dat', and 'venus.dat'.

```
[root@1f87c053280e oneclient]# ls
Astronomy Datasets  Big Data Experiment  Cancer Data
[root@1f87c053280e oneclient]# ls -lR
.:
total 0
drwxrwx--- 1 root 1733762 0 Sep 26 19:19 Astronomy Datasets
drwxrwx--- 1 root 1337123 0 Sep 26 19:14 Big Data Experiment
drwxrwx--- 1 root 608582 0 Sep 26 19:18 Cancer Data

./Astronomy Datasets:
total 0
drwxr-xr-x 1 1124656 1733762 0 Sep 26 19:20 comets
drwxr-xr-x 1 1124656 1733762 0 Sep 26 19:19 planets

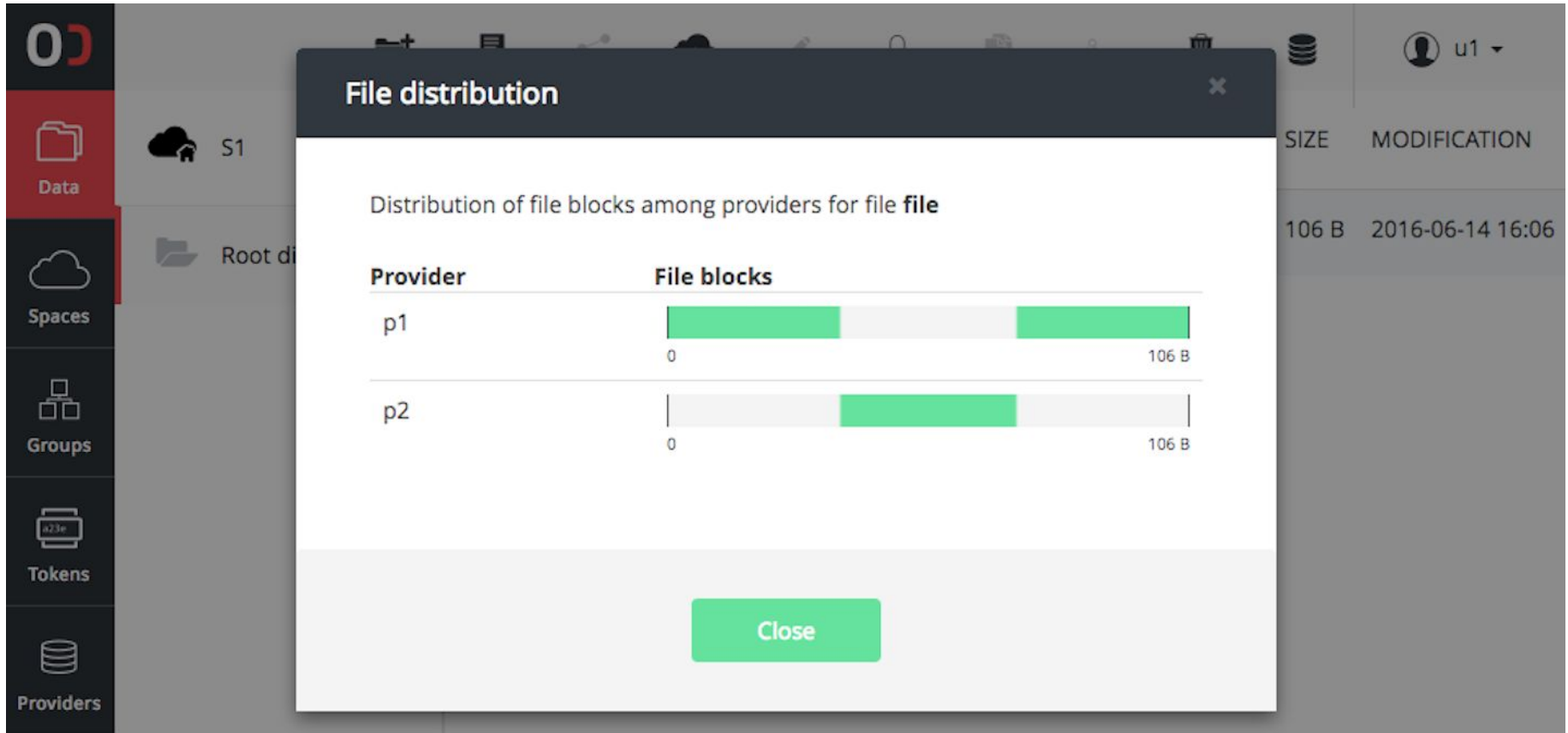
./Astronomy Datasets/comets:
total 0
-rw-r--r-- 1 1124656 1733762 10000000 Sep 26 19:20 enck.dat
-rw-r--r-- 1 1124656 1733762 10000000 Sep 26 19:19 halley.dat

./Astronomy Datasets/planets:
total 0
-rw-r--r-- 1 1124656 1733762 10000000 Sep 26 19:07 jupiter.dat
-rw-r--r-- 1 1124656 1733762 5000000 Sep 26 19:08 pluto.dat
-rw-r--r-- 1 1124656 1733762 2000000 Sep 26 19:08 venus.dat

./Big Data Experiment:
total 0
-rw-r--r-- 1 1124656 1337123 10000000 Sep 26 19:08 cats_images.tgz
-rw-r--r-- 1 1124656 1337123 5000000 Sep 26 19:13 galaxies.img
-rw-r--r-- 1 1124656 1337123 5000000 Sep 26 19:14 spam_mails.tgz

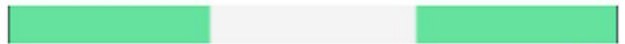

./Cancer Data:
total 0
-rw-r--r-- 1 1124656 608582 5000000 Sep 26 19:15 brain_tumor.zip
-rw-r--r-- 1 1124656 608582 5000000 Sep 26 19:14 duct_cancer.zip
[root@1f87c053280e oneclient]#
```

File distribution across providers



File distribution

Distribution of file blocks among providers for file **file**

Provider	File blocks
p1	 0 ----- 106 B
p2	 0 ----- 106 B

Close

Attaching metadata to files

The screenshot shows the ONEDATA web interface. On the left is a navigation sidebar with icons for Data, Shared, Spaces, Groups, Tokens, and Providers. The main area displays a file browser for 'ASTRONOMY DATASE...' with a table of files:

FILES	SIZE	MODIFICATION
eck.dat	30 MB	2016-10-07 11:10
halley.dat	10 MB	2016-10-07 11:10
new.txt	15 B	2016-10-07 20:10

The 'halley.dat' file is selected, and a metadata editor is open. It has tabs for BASIC, JSON, and RDF. The BASIC tab is active, showing a form with the following fields:

- name:** halley
- type:** comet

At the bottom of the editor are two buttons: 'Save all changes' (green) and 'Discard changes' (grey).

File popularity and smart caching

The screenshot displays the ONE DATA PROVIDER PANEL interface. The left sidebar shows navigation options: CLUSTERS, Nodes, Provider, Storages, and Spaces. The main content area is for the cluster 'krk-n-par-3'. It shows the cluster name, ID, and mount in root status. A donut chart indicates the total storage of 1.9 GiB, split between 'release17060-rc8...' (953.7 MiB) and 'Provider#VIFF-T' (953.7 MiB). The 'Auto cleaning' tab is active, showing settings for cleaning replicated files and boundaries. A progress bar indicates the current cleaning status, with 205.1 MiB of data being processed. Below the progress bar, a table shows cleaning reports.

Storage synchronization | **Files popularity** | **Auto cleaning**

AUTO CLEANING

CLEAN REPLICATED FILES Saving...

Lower size limit: 200 MIB

Upper size limit: MIB

Not opened for: Hours

CLEANING BOUNDARIES

Total space: 953.7 MiB Used space: 384.1 MiB Free space: 569.6 MiB To release: 179 MiB

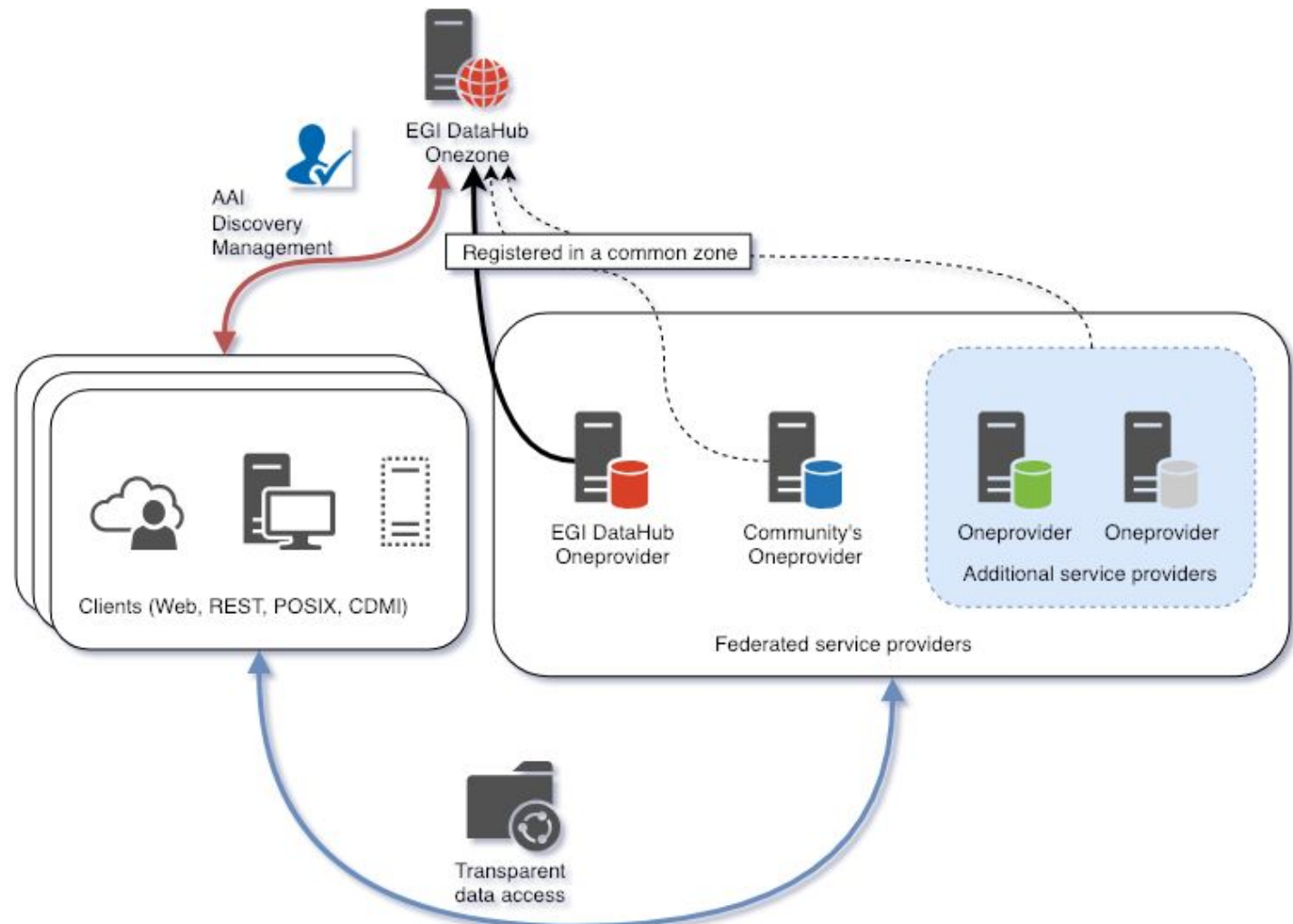
205.1 MiB 711 MiB

CLEANING REPORTS

Start	Stop	Released size	Files number	Status
8 Dec 2017 13:32:13	-	0 B (out of 179 MiB)	0	<input type="checkbox"/>
8 Dec 2017 13:31:53	8 Dec 2017 13:31:55	448 MiB (out of 565.4 MiB)	1	<input checked="" type="checkbox"/>

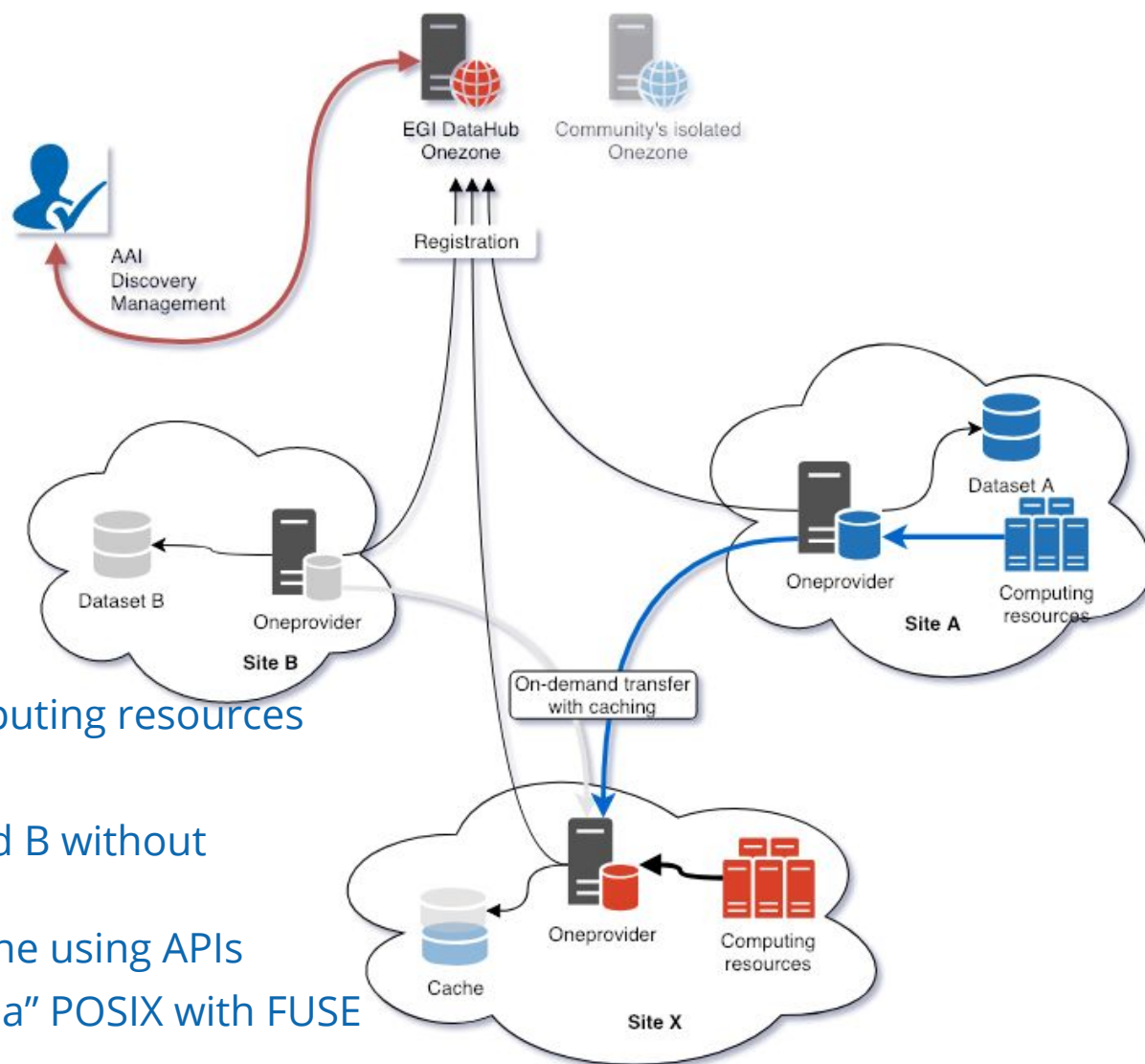
- Transparent data access service
- Doing smart caching of remote storage
- Federating data sources/providers
- Publishing datasets
- Notebooks with DataHub

DataHub for transparent data access



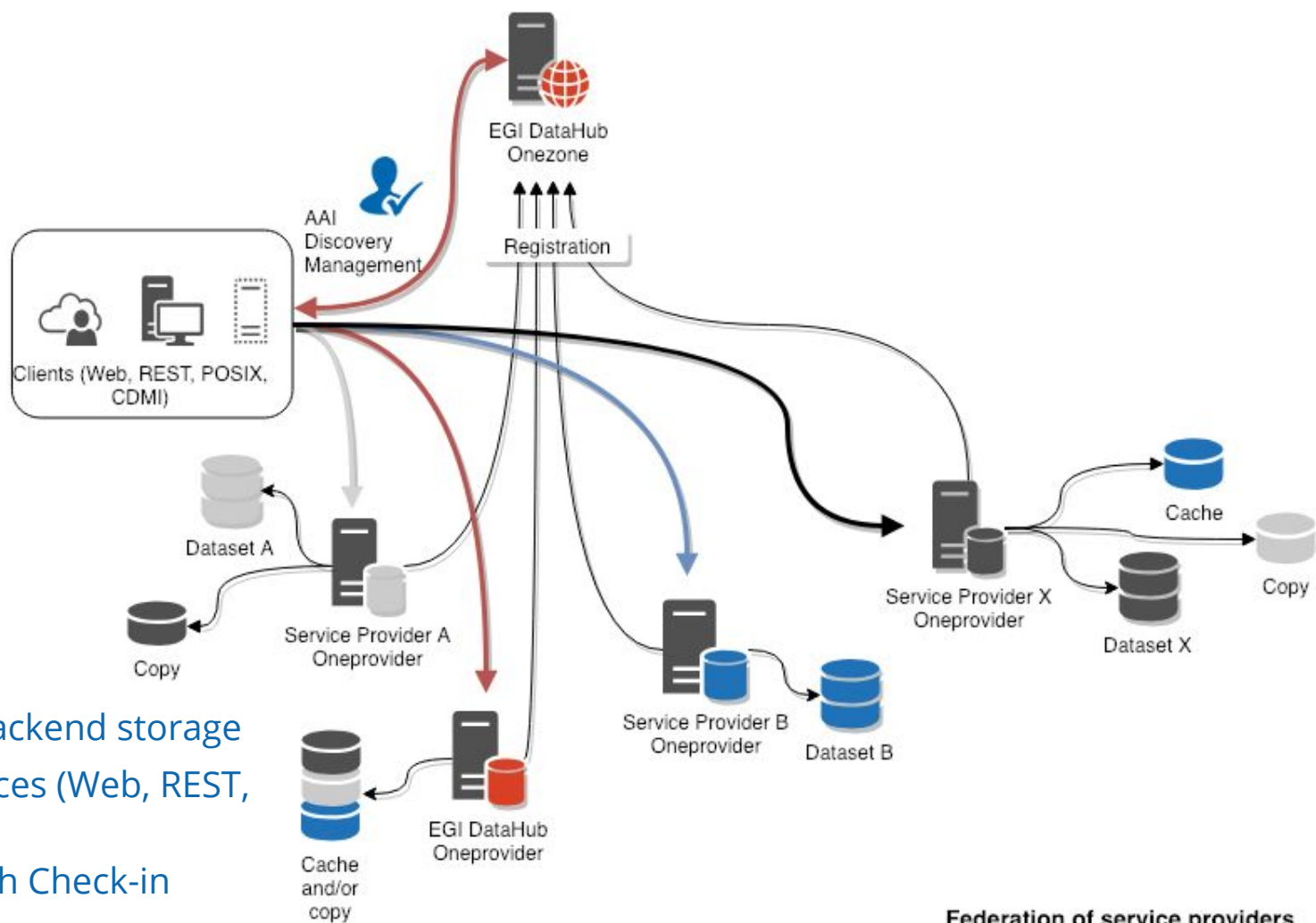
EGI DataHub for transparent data access

- Clients uses one or more providers to access data
- Data can be accessed over multiple protocols



- Site A hosts data and computing resources
- Site B hosts only data
- Site X uses data from A and B without pre-staging
- Pre-staging can also be done using APIs
- Data is accessed locally "à la" POSIX with FUSE

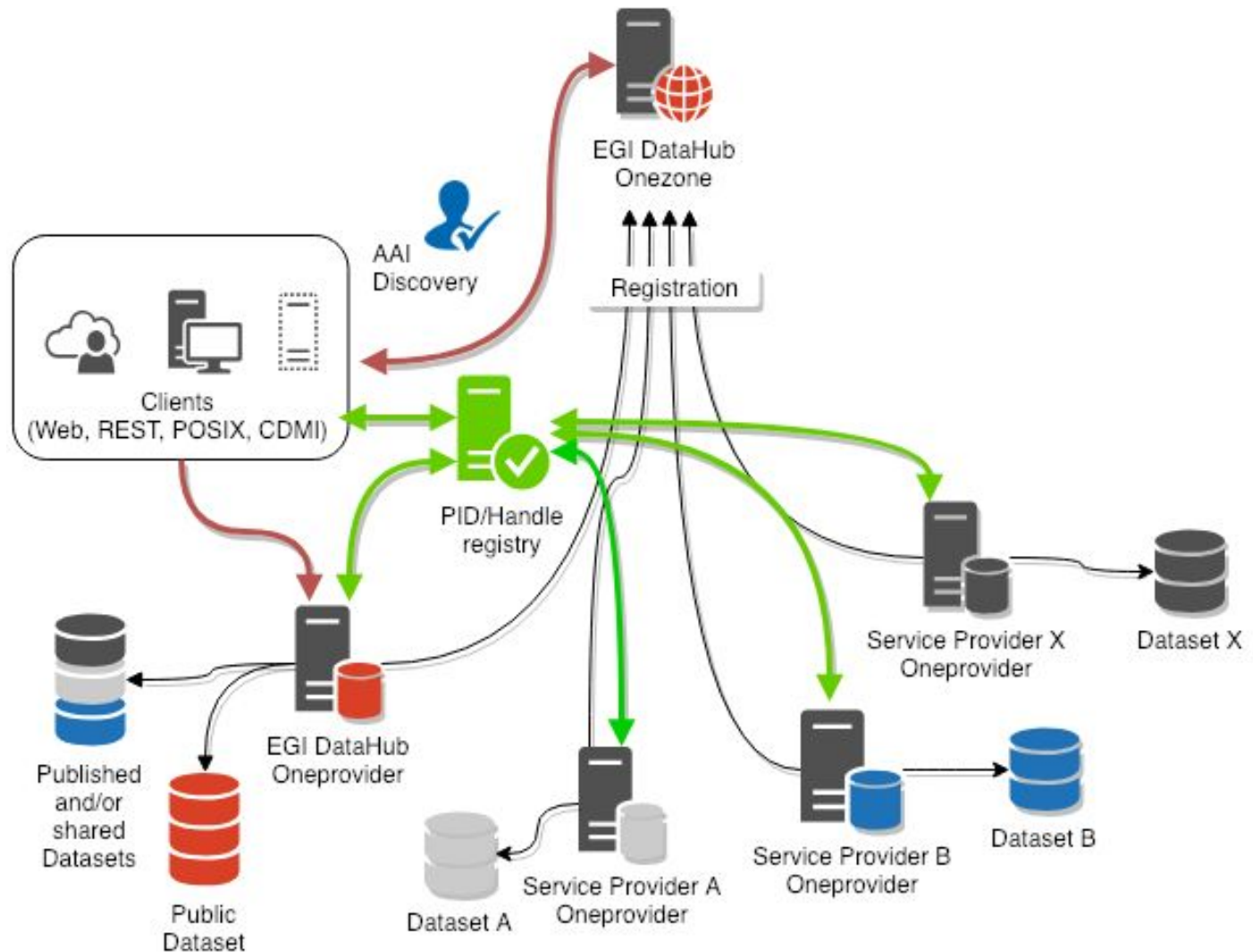
Smart caching



- Heterogenous backend storage
- Common interfaces (Web, REST, POSIX, CDMI)
- Common AAI with Check-in
- Discovery of Datasets in the EGI DataHub

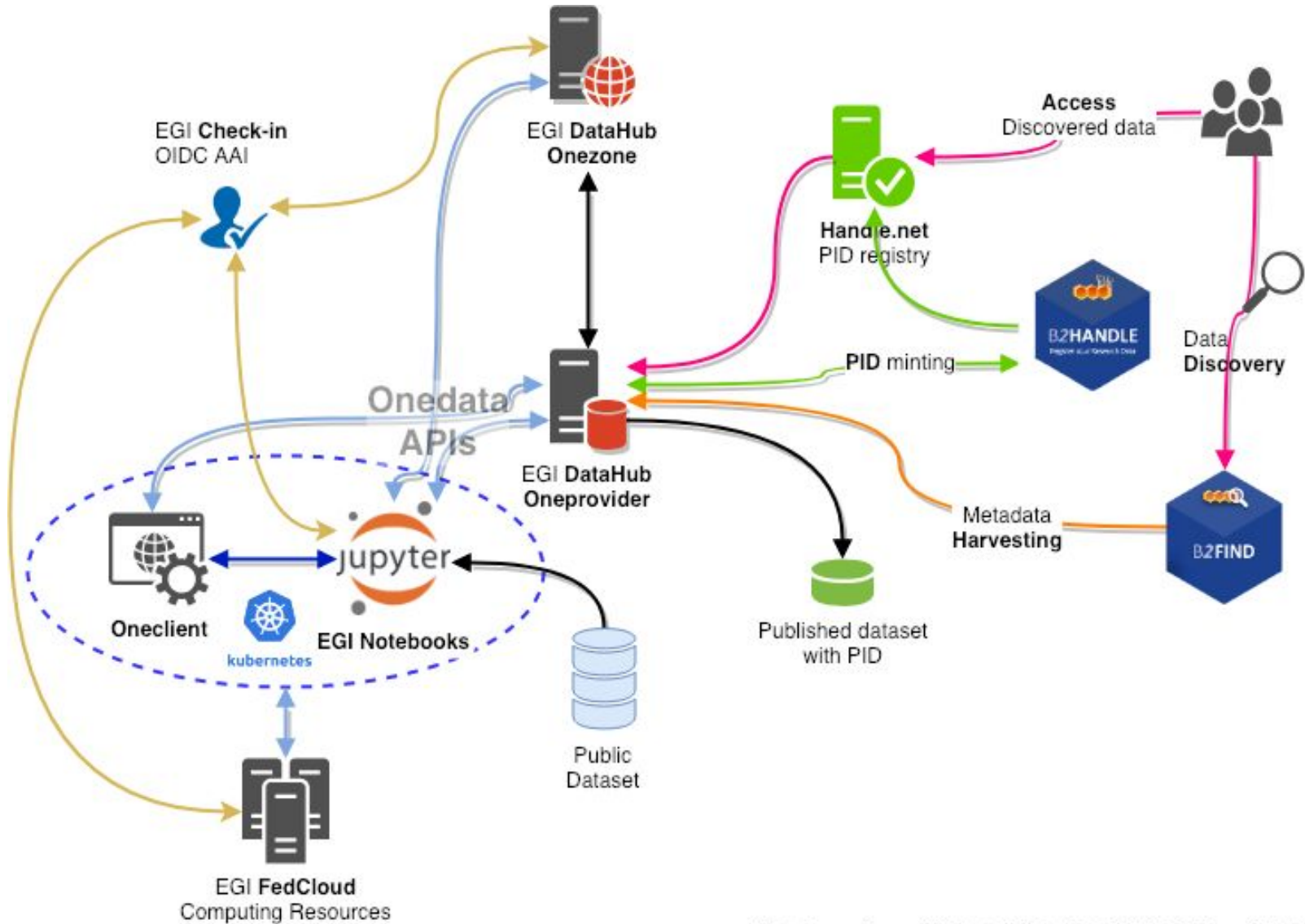
Federation of service providers

Publishing and discovery of datasets



- PID minting
- Publishing, discovery and access to datasets

Publication of datasets

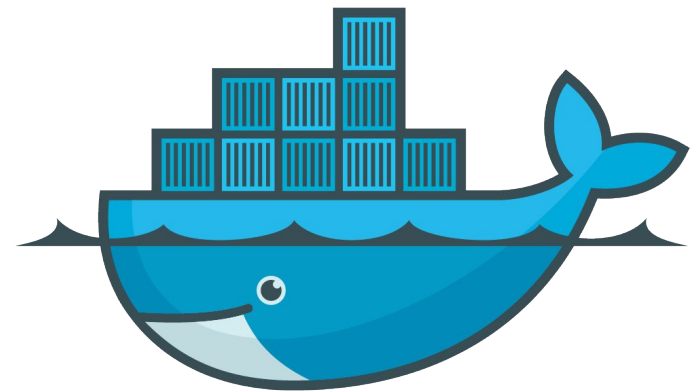


Notebooks with DataHub, B2HANDLE and B2FIND

- Collecting and analysing dataset specificities
 - Number of files
 - Size of files
- Preparing a pilot
 - Designing and validating usage model
 - Integrating Onedata with existing resources
- Validating the pilot
- Deploying a production setup
 - Ensuring hardware requirements are sufficient
 - RAM, CPU, Disk, Network,...
 - Storage backend

- Preferred model: using docker containers
 - Using docker-compose
 - Packages for Ubuntu 16.04 and CentOS 7 also available

ONEDATA



docker

- Powerful-enough Oneprovider
 - RAM: 32GB
 - CPU: 8 vCPU
 - Disk: 50GB SSD
 - To be adjusted for the dataset and usage scenario

- For high IOPS
 - High-performance backend storage (CEPH)
 - Low latency network

- POSIX mounting
 - Oneprovider close to the Oneclient

- EGI DataHub
 - <https://datahub.egi.eu/>
 - <https://community.egi.eu/c/egi-services/datahub>
 - <https://egi-datahub.readthedocs.io/>
 - https://wiki.egi.eu/wiki/EGI_Federated_Data

- System requirements
 - https://onedata.org/docs/doc/system_requirements.html

- Official Onedata documentation
 - <https://onedata.org>
 - <https://onedata.org/#/home/documentation>
 - Getting started
 - <https://github.com/onedata/getting-started>
 - Source code: <https://github.com/onedata>



Thank you
for your attention.

Questions?



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