

dCache Scientific Cloud

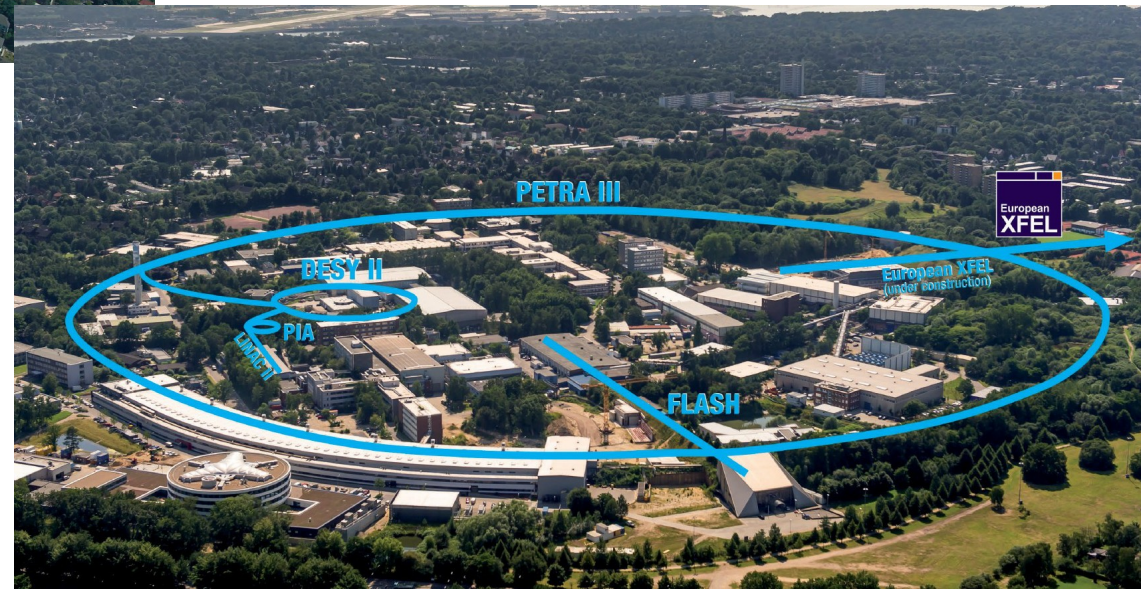
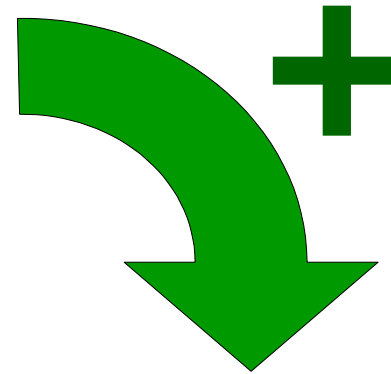
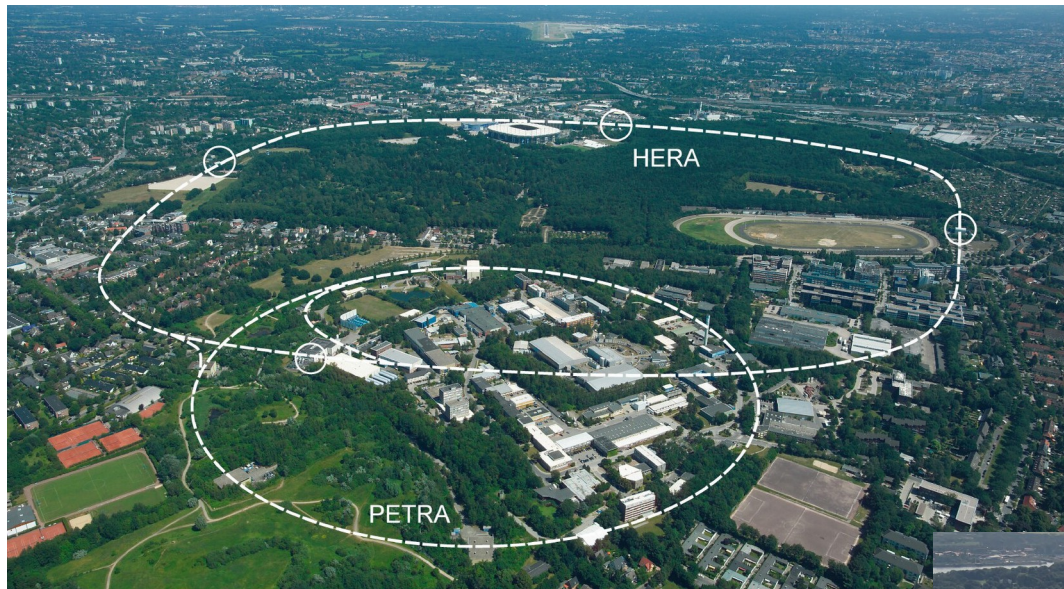
Paul Millar

(on behalf of DESY and dCache team)

Workshop on Cloud Services for File Synchronisation and Sharing, CERN



DESY: a HEP lab, with photon sciences



Need a sync-n-share service at DESY

- Hard **requirements:**

- Easy to use,

- Store everything at DESY,

- Integrate with existing infrastructure.

- Anticipated **future usage:**

- change data between syncing and non-syncing storage,

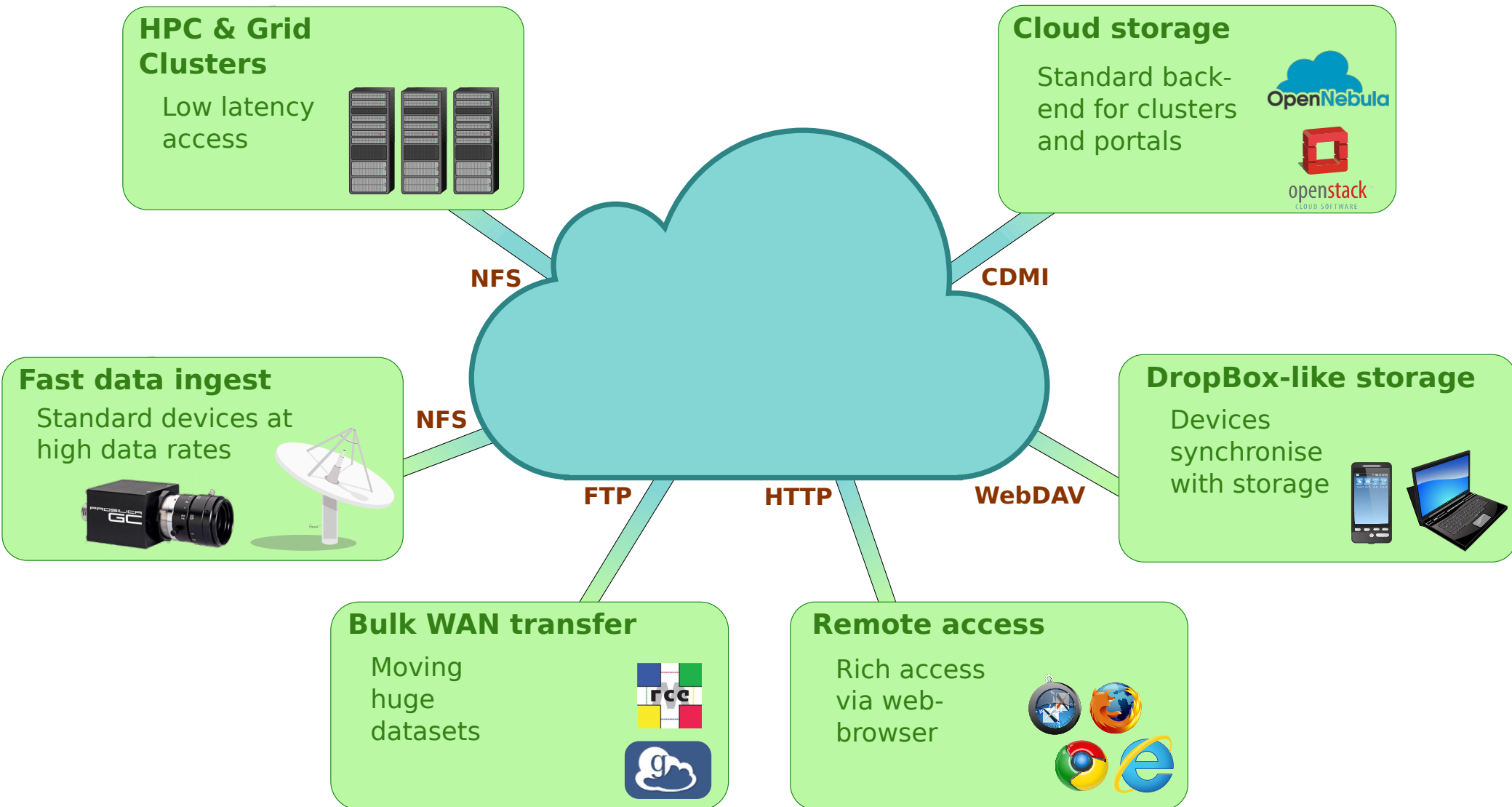
- like Amazon, provide different QoS with different costs,

- share data without syncing,

- 3rd party transfers between sites,

- immediate access to sync space from compute facilities.

A scientific cloud vision

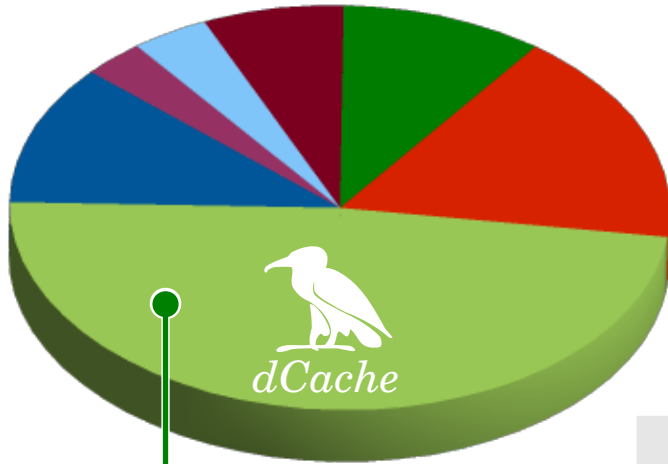


How we solved it at DESY

- Looked around, chose two open-source projects:
 - **dCache: powerful managed storage** system
 - Integration with scientific data life-cycle;
 - “Hot” data can be stored on SSDs, “cold” on cheaper HDDs, “archive” tape;
 - ... but no sync and share facilities.
 - **ownCloud: popular front-end**
 - Our collaborators adopting ownCloud makes it more attractive;
 - ... but assumes storage is managed.
 - Combining these two gives DESY the best of both worlds:
 - dCache is mounted on ownCloud server with **NFS v4.1/pNFS**, running community edition.
 - Integrated with DESY Kerberos, LDAP and Registry.
-

What is dCache?


LHC data stored on each storage system




- dCache (96 PB)
- DPM (34 PB)
- EOS (0 PB)
- StoRM (20 PB)
- CASTOR (14 PB)
- BeStMan (7.6 PB)
- Globus FTP (6.1 PB)
- ARC (0.01 PB)
- xrootd (22 PB)

Source: BDII (2014-11-14)







5 FTEs



2 FTEs



1.5 FTEs




Core team


Student mentor programme

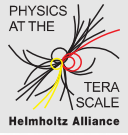



Hochschule für Technik und Wirtschaft Berlin
3 students


Collaborations














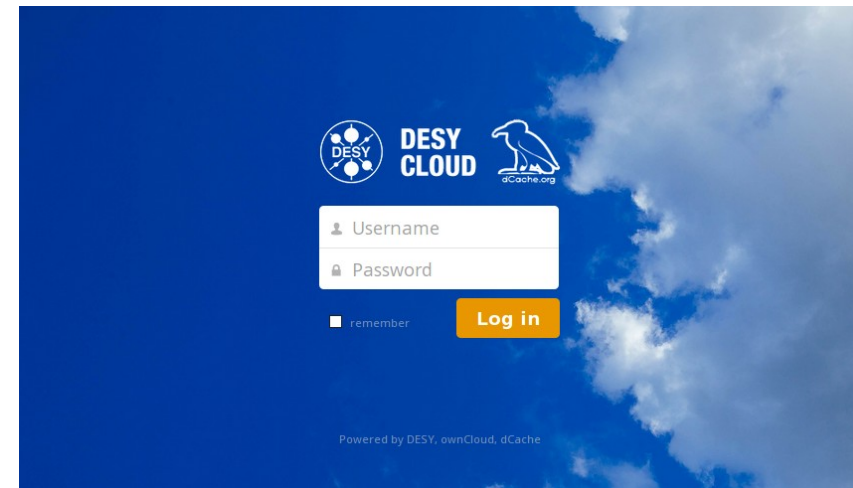




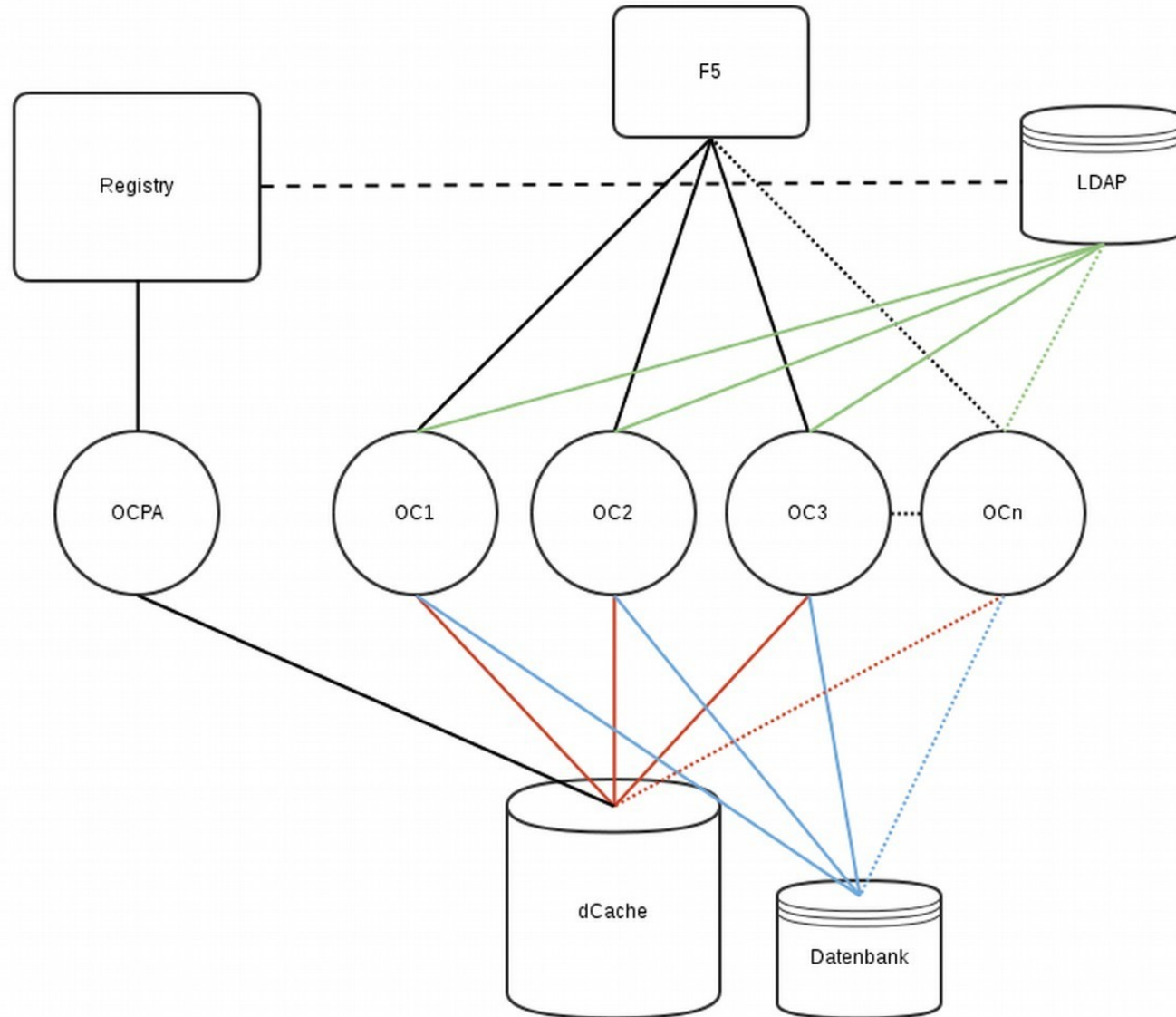


The DESY Cloud service

- Status: **production**, for “friends” in two weeks “by invitation” (selected power-users, -groups); 1st January general availability.
- Required minor **patches** to ownCloud & dCache.
- Changes pushed into dCache:
 - Running **unpatched dCache** release
 - Have a blueprint for **any site** to deploy ownCloud+dCache.
- Changes pushed **upstream to ownCloud**:
 - Not all were accepted for v7, so running patched until v8 is released.



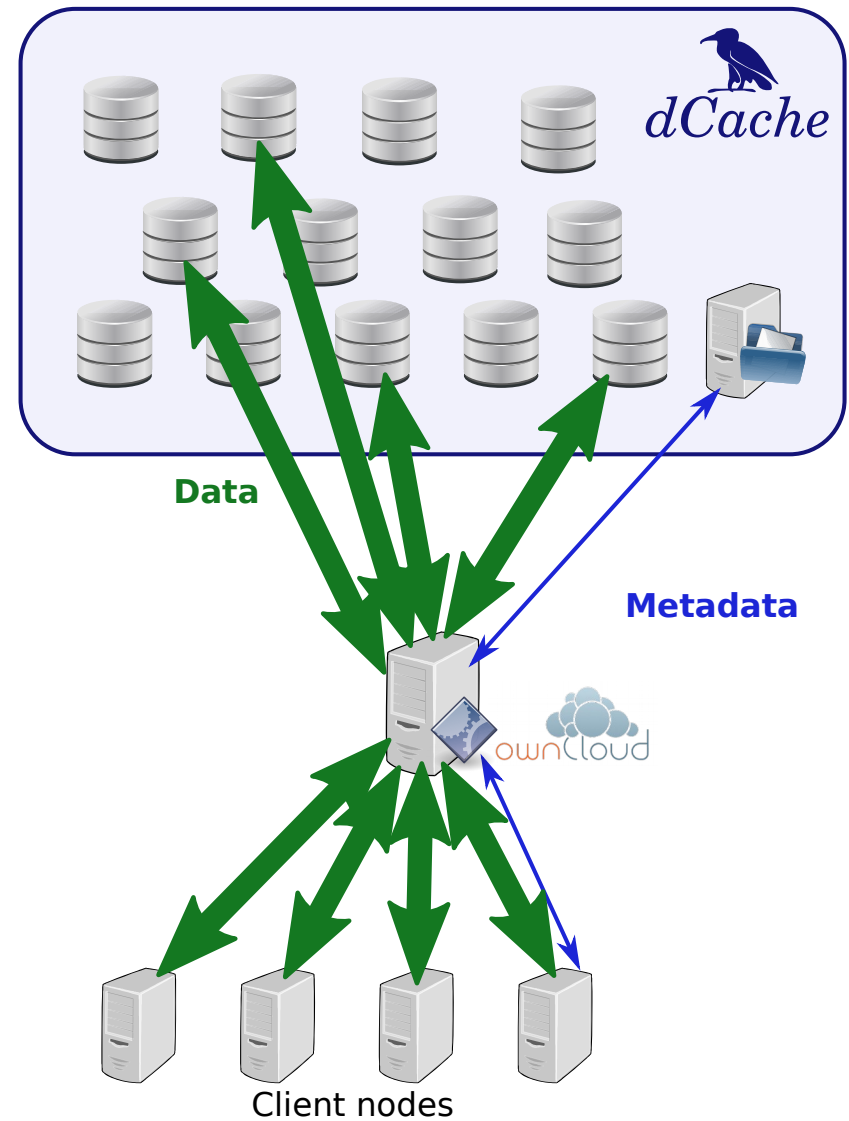
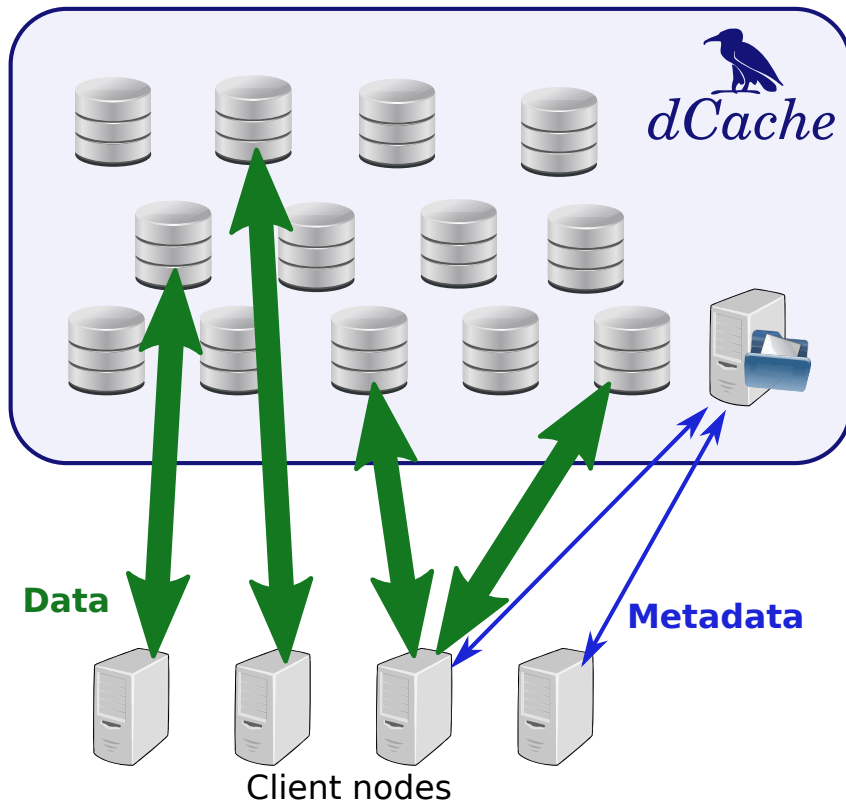
Integration within DESY infrastructure



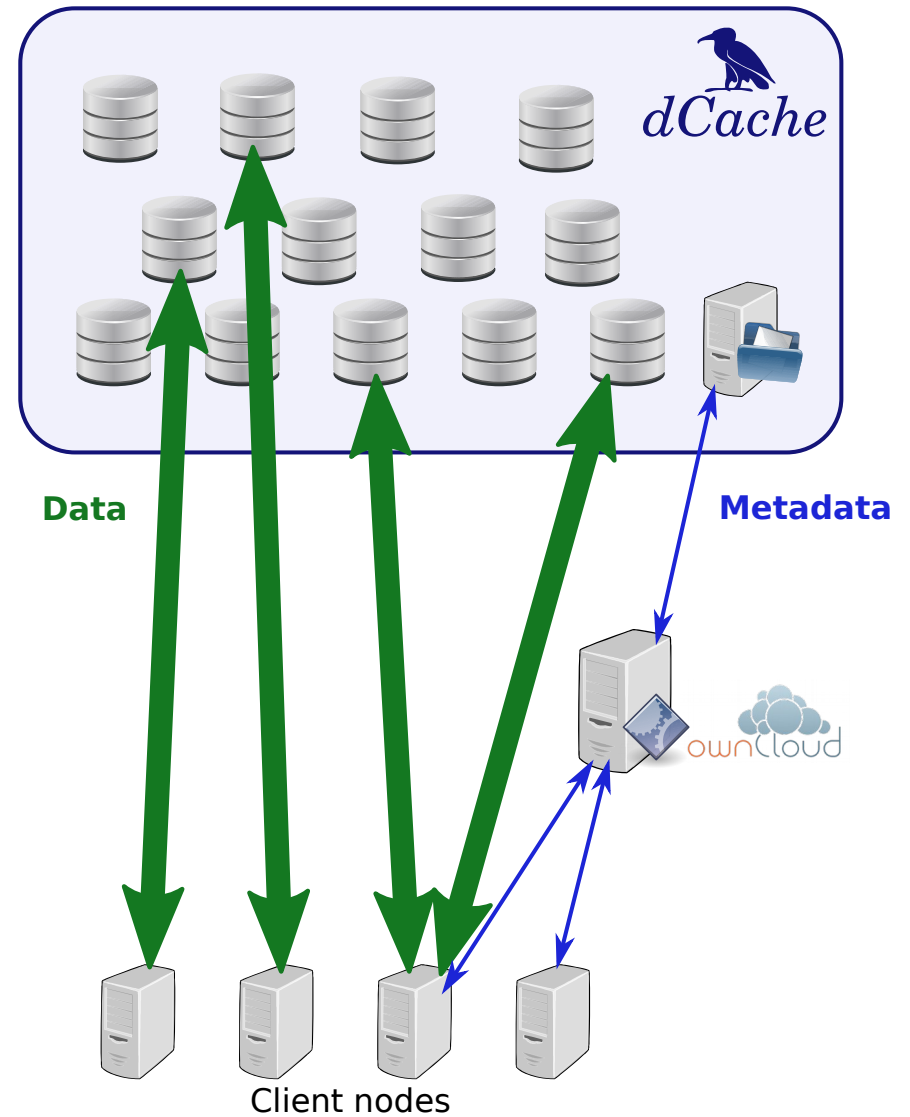
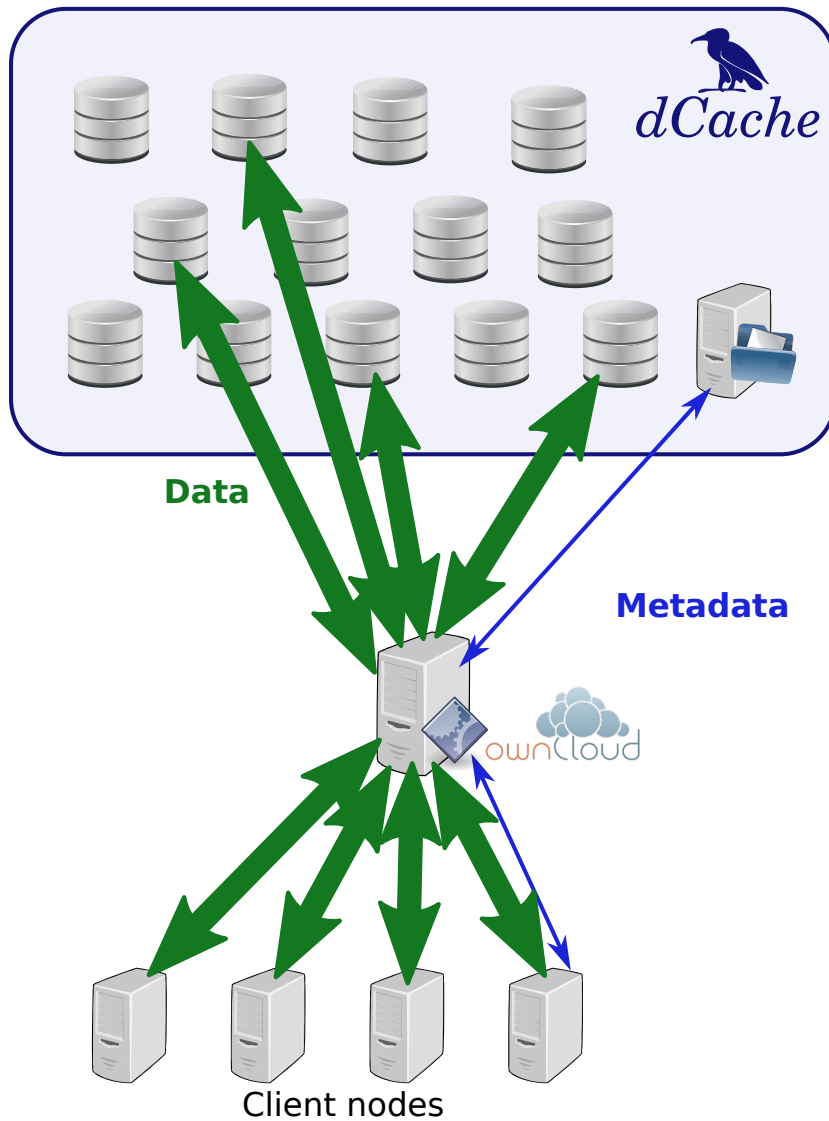
Development and future work

- Files in dCache have **user-ownership**, not ownCloud:
 - Plan to expose files directly from dCache: NFS mount, 3rd party transfers, direct access from any grid worker-node, ...
 - Couldn't fix ownCloud: work-around within dCache
 - **Consistency** between ACLs and shares:
 - dCache ACLs to honour ownCloud shares and vice versa
 - **Integrity**; e.g., propagate and handling checksums,
 - **Notification**: avoid client polling,
 - **Redirection** support for sync-client:
 - ownCloud server proxying data is bottleneck; want syncing to be more efficient by taking data from where its stored.
-

NFS v4.1/PNFS vs ownCloud (currently)



ownCloud: currently vs with redirect



Experience: problems with ownCloud

- If underlying FS disappears, **all sync-clients delete all data.**
 - If underlying FS returns **EIO** on read, sync-client creates 0-length file: **impossible to recover.**
 - Bulk delete through web interface is **unreliable** (under investigation).
 - Rename directory causes client to **delete all files and upload** them again.
 - Admin interface **awkward** with $O(5k)$ users.
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Not just ownCloud ...

- dCache team hosted a **two-day workshop** with project- and technical-lead of DCORE
 - Provides cloud storage with features beyond ownCloud
 - Some “big name” customers
 - Initial “lite integration” by **December 2014**
(includes redirection support)
 - Then providing “tight integration” with shared namespace
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Thanks for listening ... any questions?



Backup slides



Thinking about sync-and-share

- Like other systems, small fraction of data is “hot”
 - SSDs provide better performance, but can't afford only SSDs; nice to have system that places hot data on SSDs, cold data on HDD.
 - Amazon had a smart idea: allow people to choose how much to pay
 - Let users choose between Normal and Glacial QoS; e.g., disable sync for Glacial-like storage but allow access via web interface
-



**DESY
CLOUD**



 Username

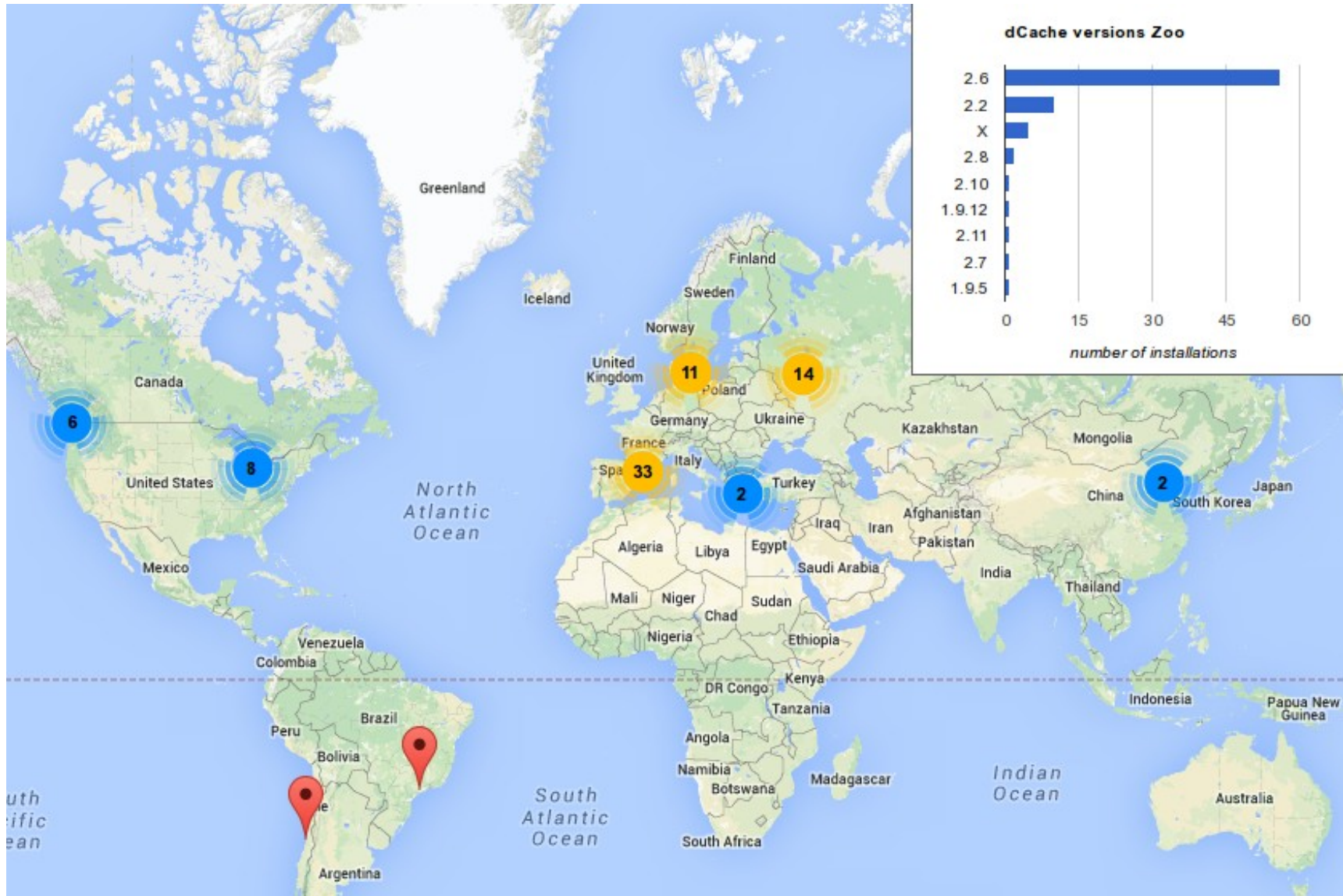
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remember

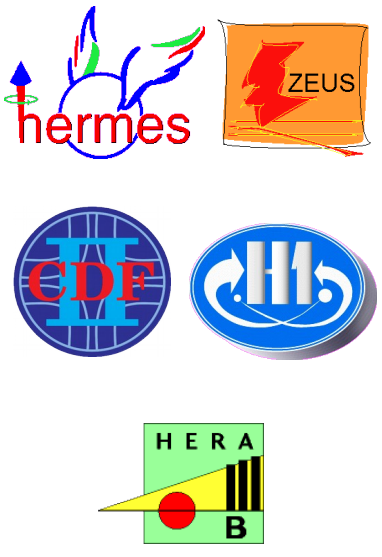



Log in

Powered by DESY, ownCloud, dCache

WLCG dCache instances (only WLCG sites shown)



Over 10 years “Big Data” experience

Era	Disk cache	Grid Storage	Generic Storage	Cloud Storage
Additional Communities				
Additional Authentication	Trusted host	X.509, Kerberos	Username+PW	SAML, OpenID, OAuth, Token, ...