

T4.2 report



Data Management for extreme scale computing

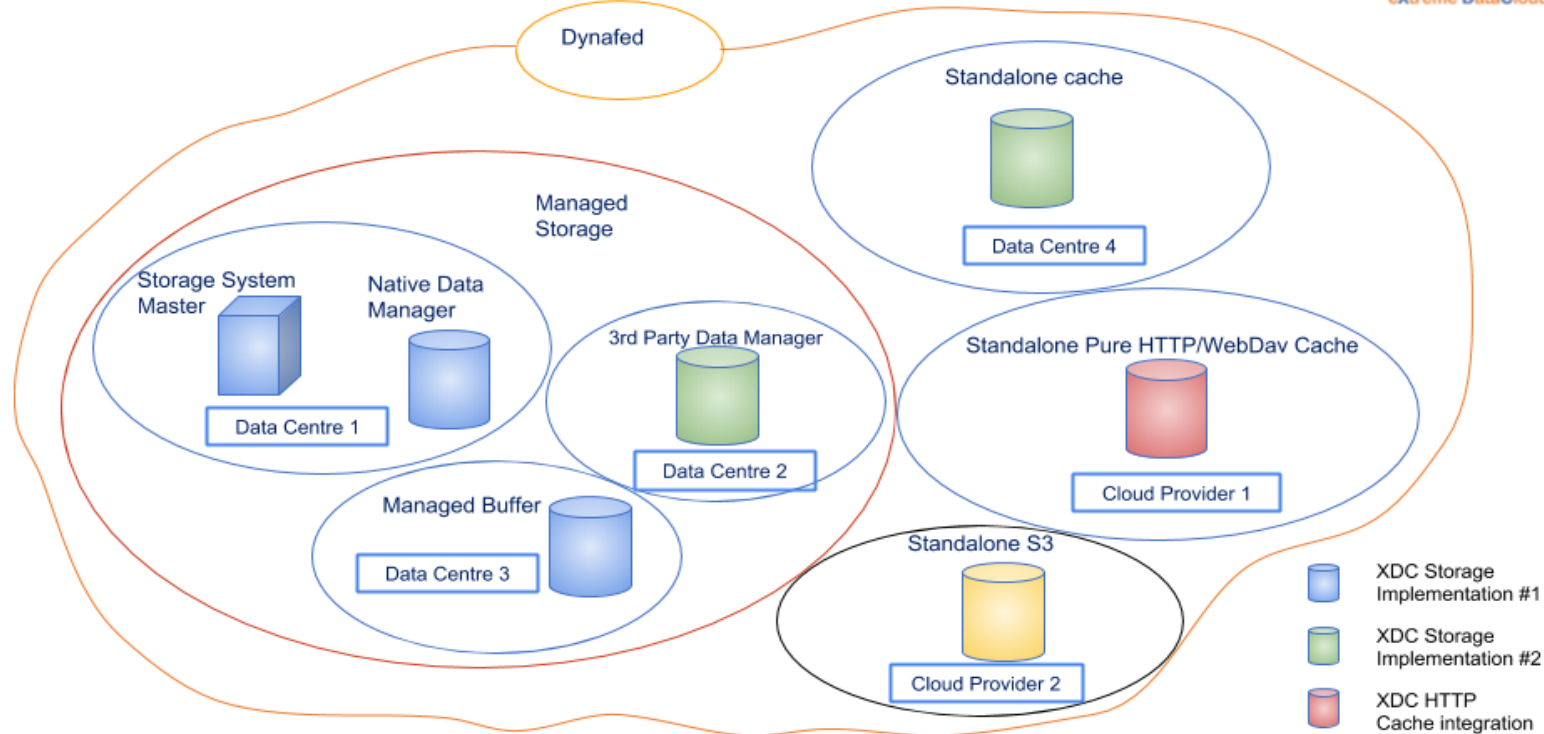


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on behalf of T4.2 participants

T4.2 : “Smart Caching”

- ✗ Goal: maximise the accessibility of data to clients while minimising global infrastructure costs.

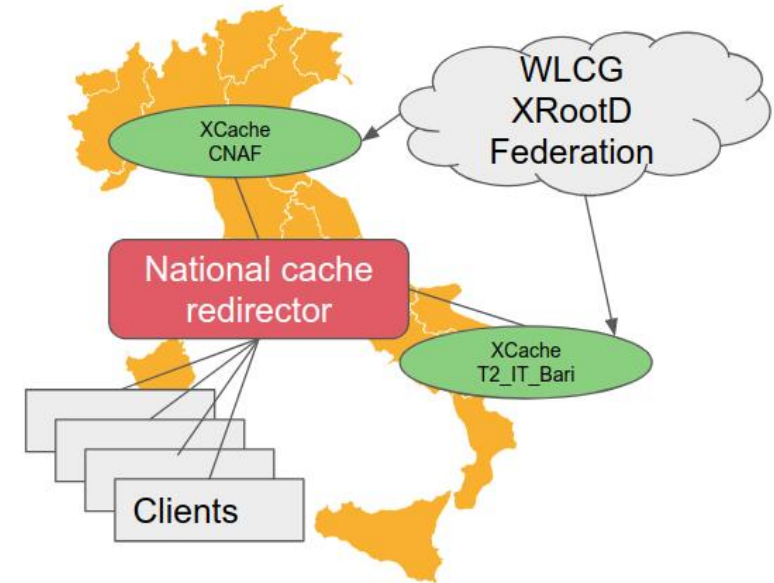
Storage & Caching Architecture



INFN : XCache

✗ National Cache Federation

- Distributed cache federation
 - Currently 2 sites
- Used by sites without local data
- Integrated into CMS
 - metrics being collected
- Next steps
 - increase scale
 - employ a predictive model



✗ Automated Standalone Deployment

- DODAS automated deployment
- Kubernetes and/or Mesos/Marathon orchestration
- Demonstrated with 2k CMS jobs on OpenTelekomCloud

INFN : HTTP(S) Cache

- ✗ HTTP(S) caching solution based on nginx
 - VOMS auth provided by a plugin
 - Upstream endpoint selection based on VO information
- ✗ Client contacts nginx which either retrieves (miss) or serves (hit) the data
- ✗ Cache operates with a service credential
 - No delegation
- ✗ Smarter caching algorithms may be contemplated
 - nginx plugin mechanism

✗ Storage Events (notifications)

- SSE driven notifications have been added to dCache
- Adding storage-event support in storage systems can bring numerous benefits
 - Smart Caching
 - remote parties can learn about changes within a storage system
 - A cache could take pre-emptive action
 - deleting cached data if the parent items are deleted
 - fetching "interesting" data before the client makes a request
 - Storage adoption
 - Running a remote storage system as part of a larger custodial system
 - This would allow the remote system to be accessed independently of the custodial system
 - Orchestrator integration, Federator integration ...

✗ Locality information [forthcoming]

- Do “data lakes” need a data locality interface?
- The use-case : a dataset is stored in "the data lake". The client wants to know to which compute centre(s) it should submit its work to reduce the access latency.

✗ Storage adoption [forthcoming]

CERN : EOS XCache

✗ Integration of XCache as a caching solution for EOS

- ➡ Reference scenario : XCache deployed at a remote centre to accelerate its local CPU. Front end is HTTP/xroot, backend communication is xroot.
- ➡ As EOS is based on XRootD, this offers a number of opportunities for closer integration of the two systems
- ➡ Identity forwarding plugin created whereby the cache can identify on whose behalf it is acting
 - ➡ Upstream storage can respond appropriately
- ➡ Full system deployed on XDC testbed and integrated with VOMS

✗ Evaluation of further developments

- ➡ write support
 - ➡ would be write-through
- ➡ ACL synchronisation

CERN : EOS Storage Adoption

✗ EOS can now adopt

➡ External storage systems

➡ Through an S3 or a WebDAV interface

➡ Demonstrated with dCache/WebDAV

➡ External data

➡ Data already present on a system described above can be incorporated into EOS

➡ It can then be replicated, moved, managed in the usual way

➡ Can even be removed from the original storage while preserving access

✗ At present, EOS takes over management of the storage system

➡ Independent access is... possible but highly discouraged.

➡ This can be addressed through notifications