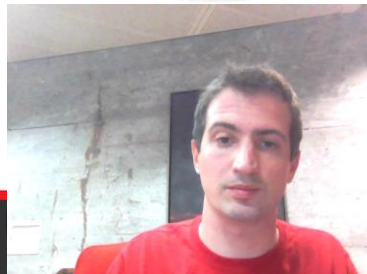
Jump's archive for the next decade

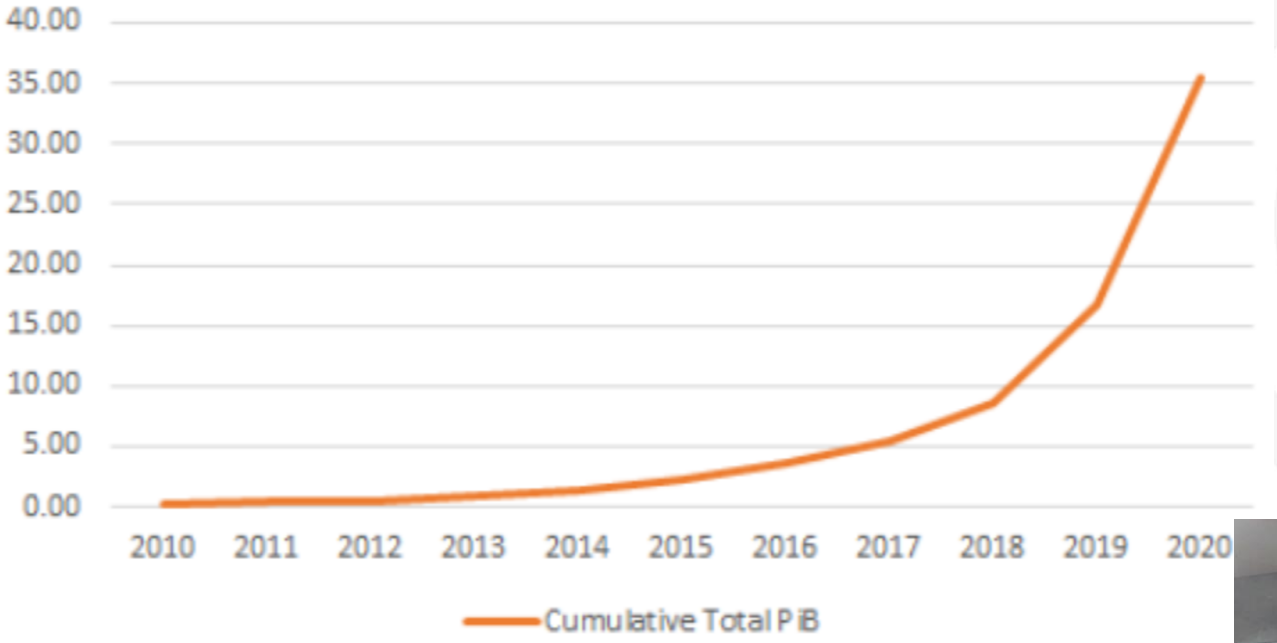
A high performance and scalable POSIX interface to an object store, via CernVM filesystem

jumptrading



HPC at Jump

Ten Years of Archive Growth (for one of several 'archives')



CVMFS for POSIX-like presentation

- CVMFS (CernVM-FS) is a FUSE filesystem developed at CERN by the computational physics community
- Used at Jump for years for internal software distribution
- Read path uses only outgoing HTTP requests
- Metadata stored in SQLite databases
- Data and metadata both easily cached
- Changes presented as filesystem revisions
  - Each revision is an internally consistent view of the archive
  - A host is always on “revision X” or “revision X+1”; never in between

A new design

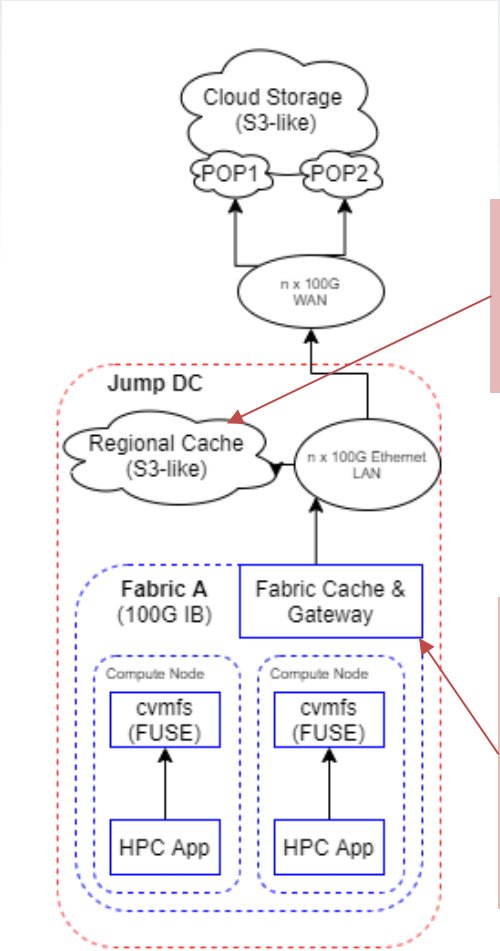
2xPOPs each with 2x100G

100G leaf/spine
Ethernet network

EDR (1 or 200G IB) fabric

CVMFS FUSE mount

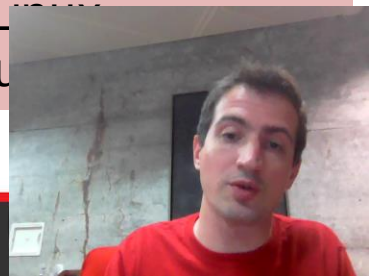
Unmodified application



Google Cloud Storage

~5PB VAST S3 Appliance
Mix of 3D XPoint (fast) and QLC (slow/economical)

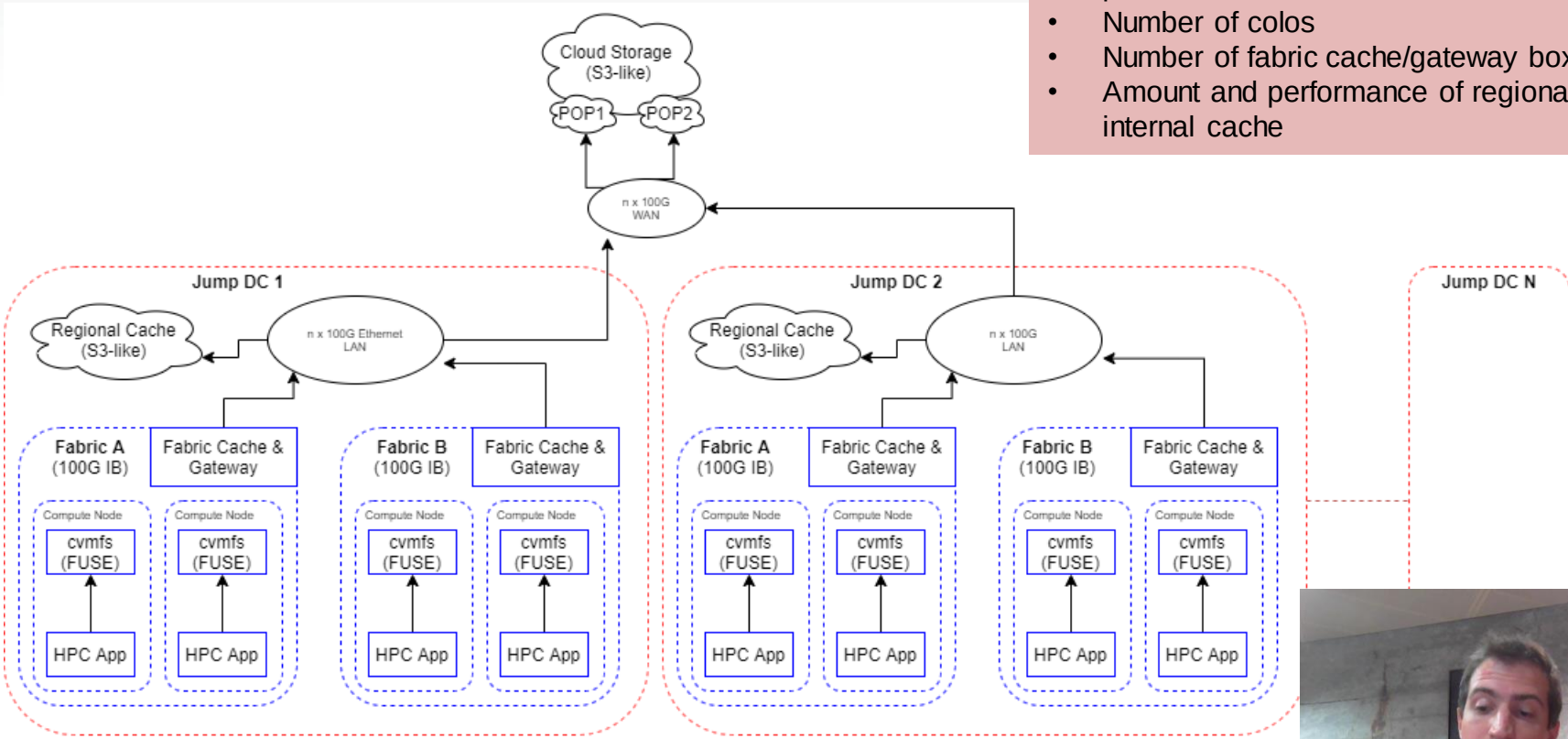
Cache/Gateway box
- Many NICs IB/Eth
- ~40T SSD
- Standard Li
- Varnish Plu

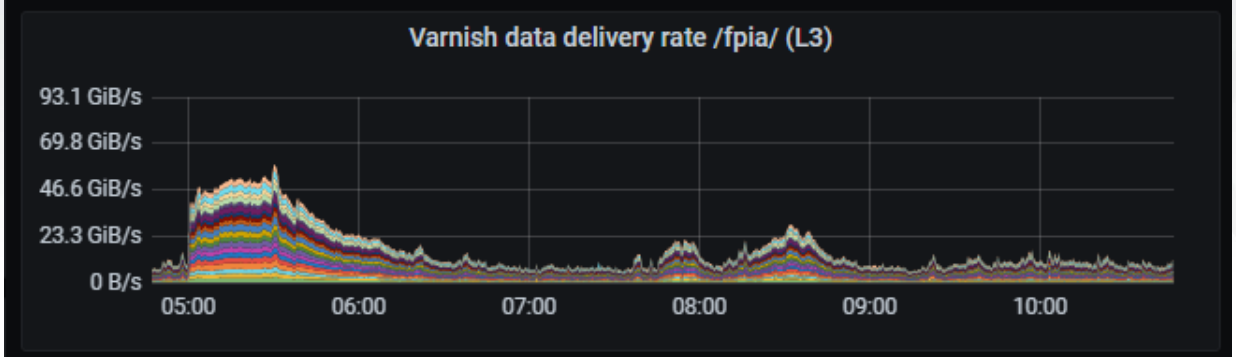


.. for the next 10 years

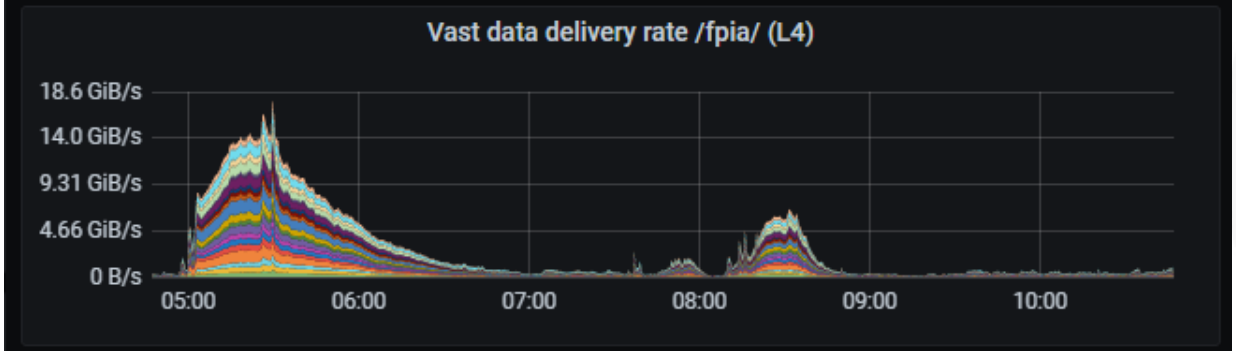
Can scale by orders of magnitude:

- Storage PB
- Network links from a colo to cloud provider
- Number of colos
- Number of fabric cache/gateway boxes
- Amount and performance of regional internal cache

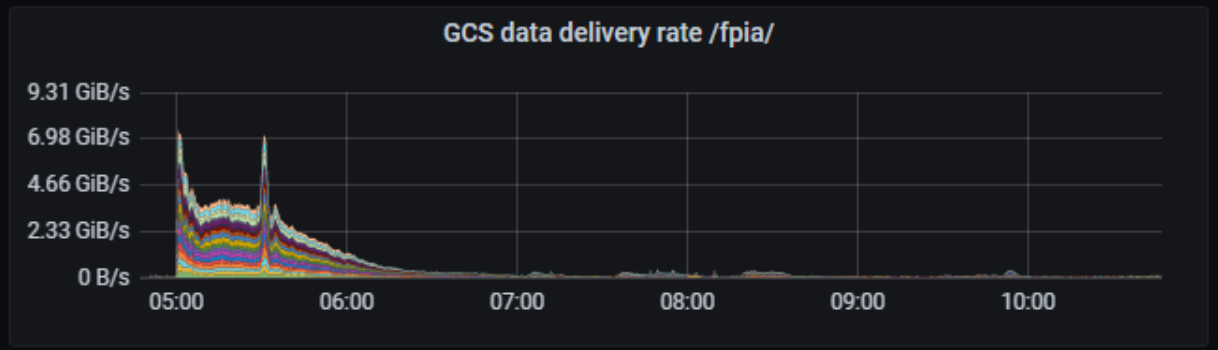


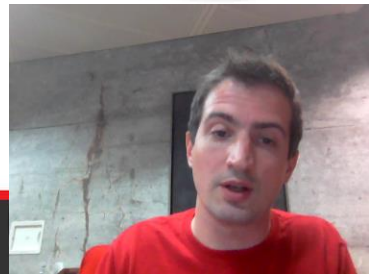


L3
(Varnish)

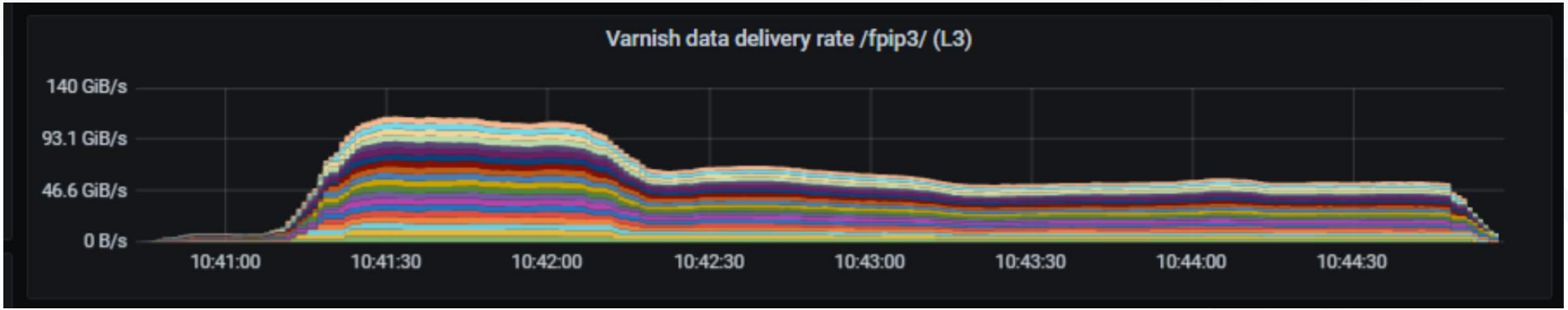


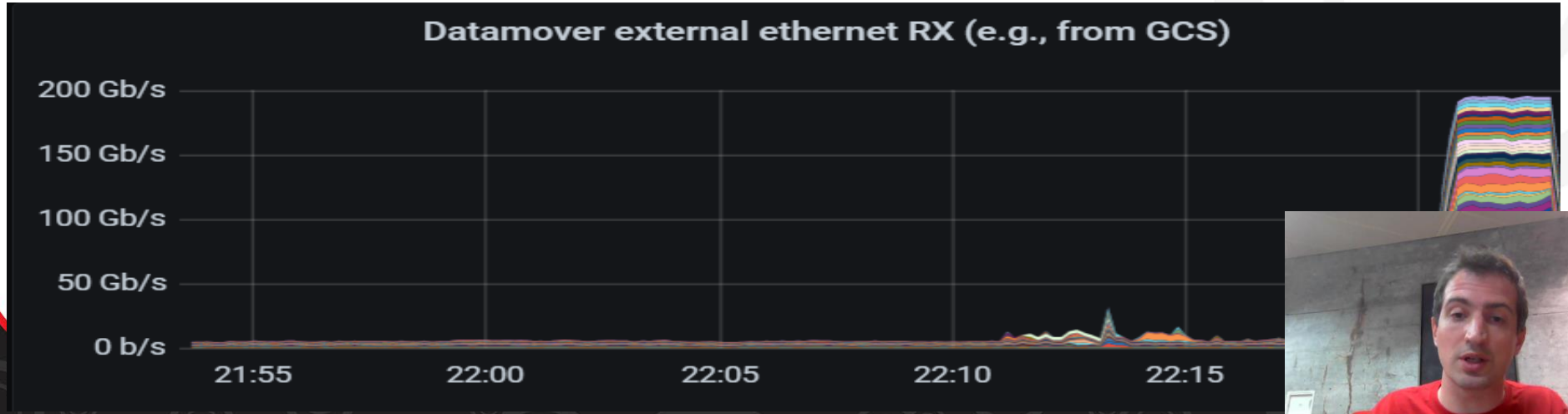
L4
(Vast)



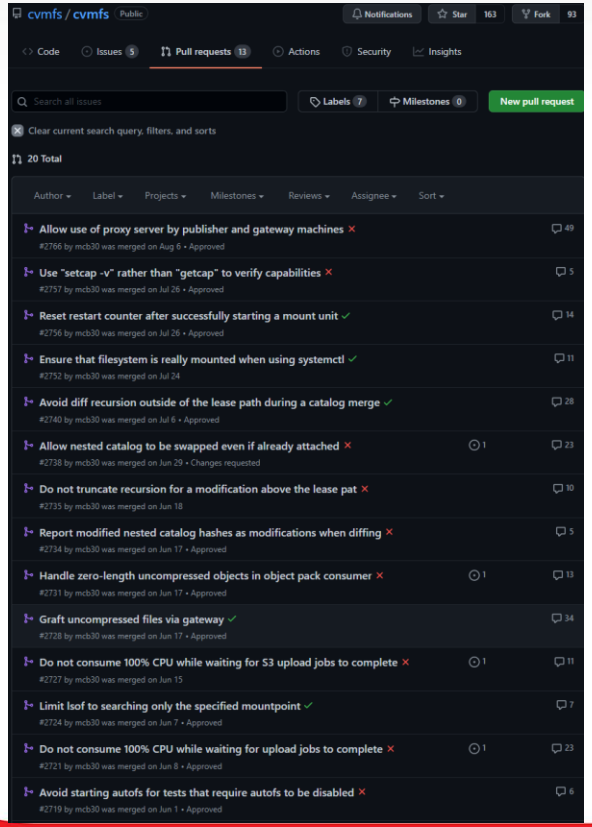


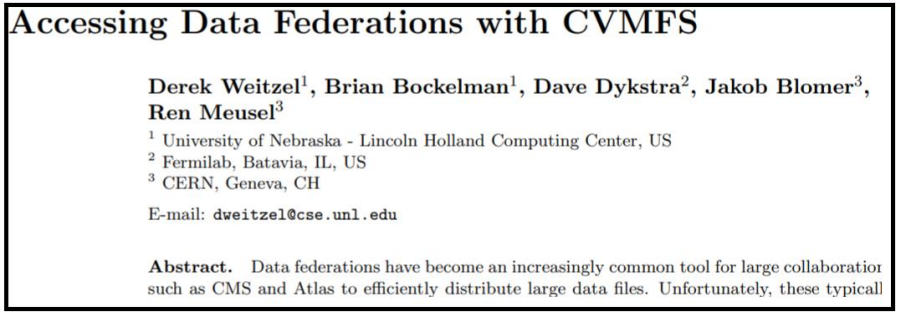
Stress testing





Write path details





Accessing Data Federations with CVMFS

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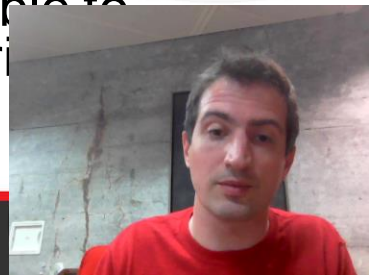
Abstract. Data federations have become an increasingly common tool for large collaboration such as CMS and Atlas to efficiently distribute large data files. Unfortunately, these typicall

Weitzel et. al approach:

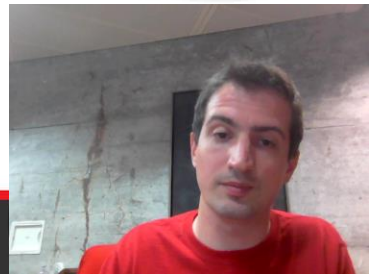
- CVMFS config tweaks to improve write scalability
- CVMFS “grafting” to separate data and metadata write paths
  - Data is uploaded directly to cloud storage
  - Metadata commits are batched together via CVMFS publishers and gateway
- “…more work is needed to be able to generate the graft files in a distri manner”. We took on this task.



Summary

- Moving to object store + caching allows us to scale in all directions for many years
- Using CVMFS to convert a POSIX read path into object store allowed us to keep our existing infra
- Well proven open source software like Varnish and commodity servers allows us to scale to hundreds of gigabytes per second IO

- Sound like fun? Jump is hiring.



Questions?