CTA at DESY

Year 2 in Production

Mwai Karimi,
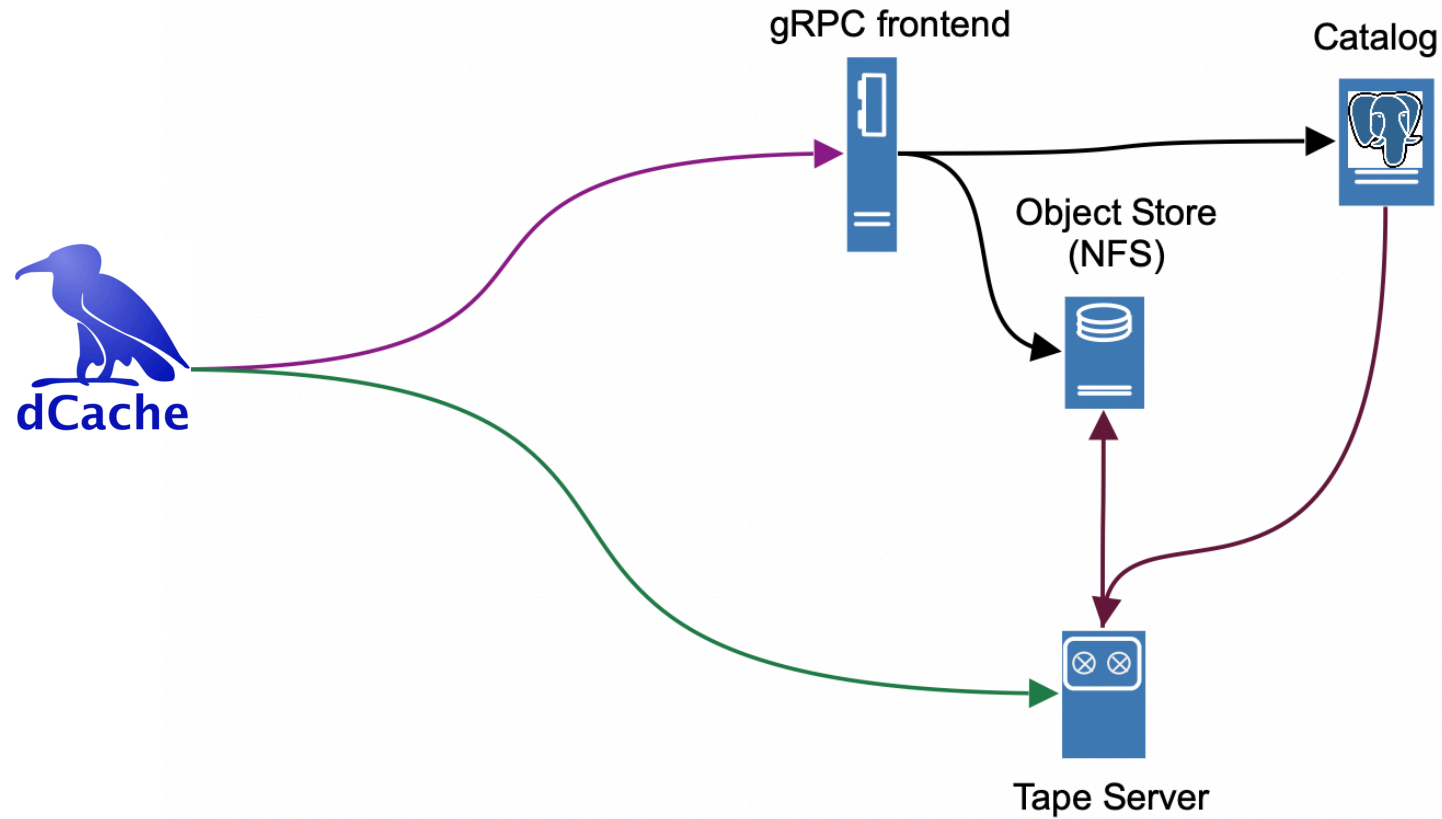dCache Workshop, 2025

HELMHOLTZ

Introduction

- Recap

- 2 years in production

- Focus areas:

  - Operational Optimisations

  - Challenges & Lessons

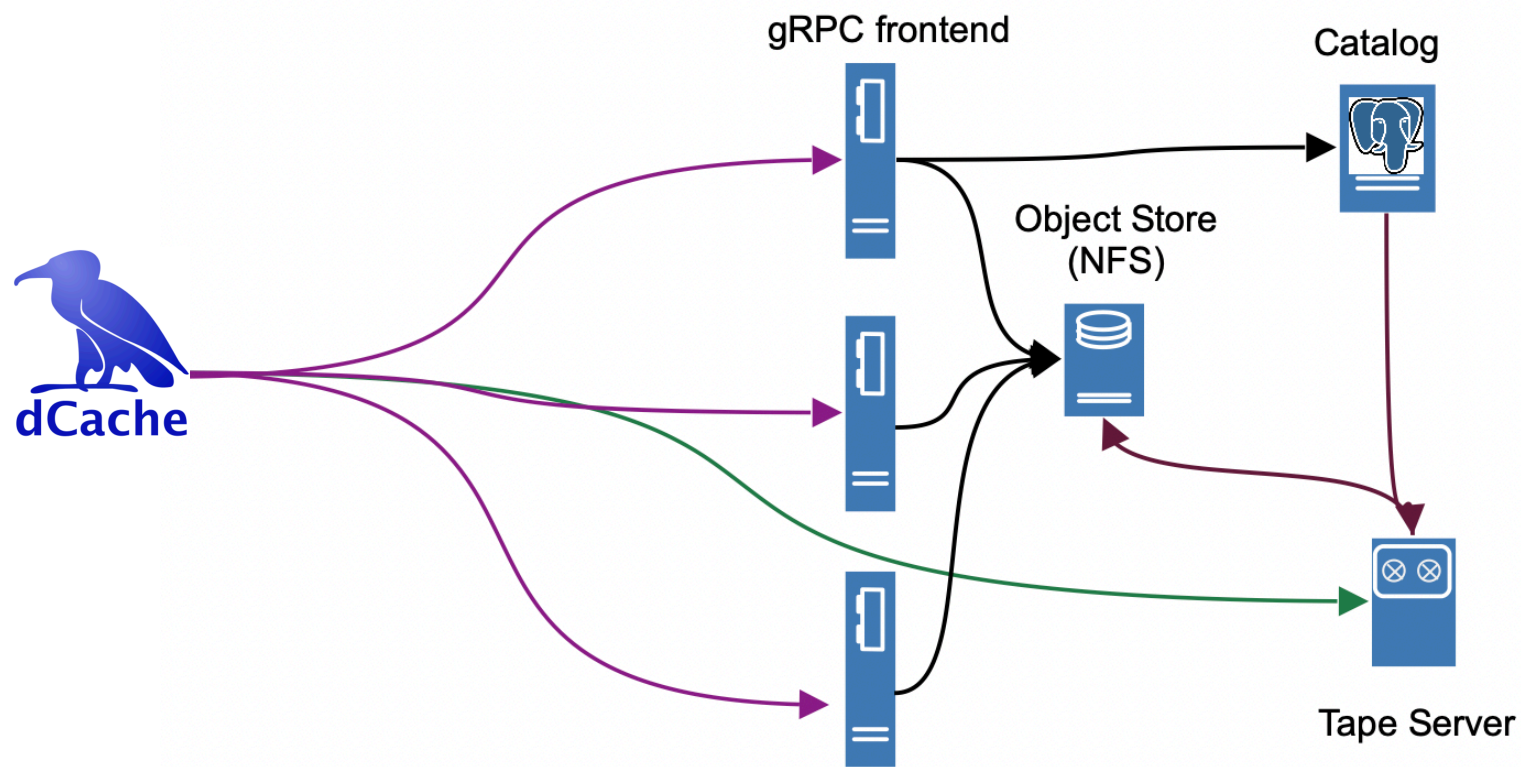# Key Changes Over The Last Year

- Moved to Alma 9

  - Only issue: I/O error on tape devices

- Multiple drives per host support

  - Config flexibility

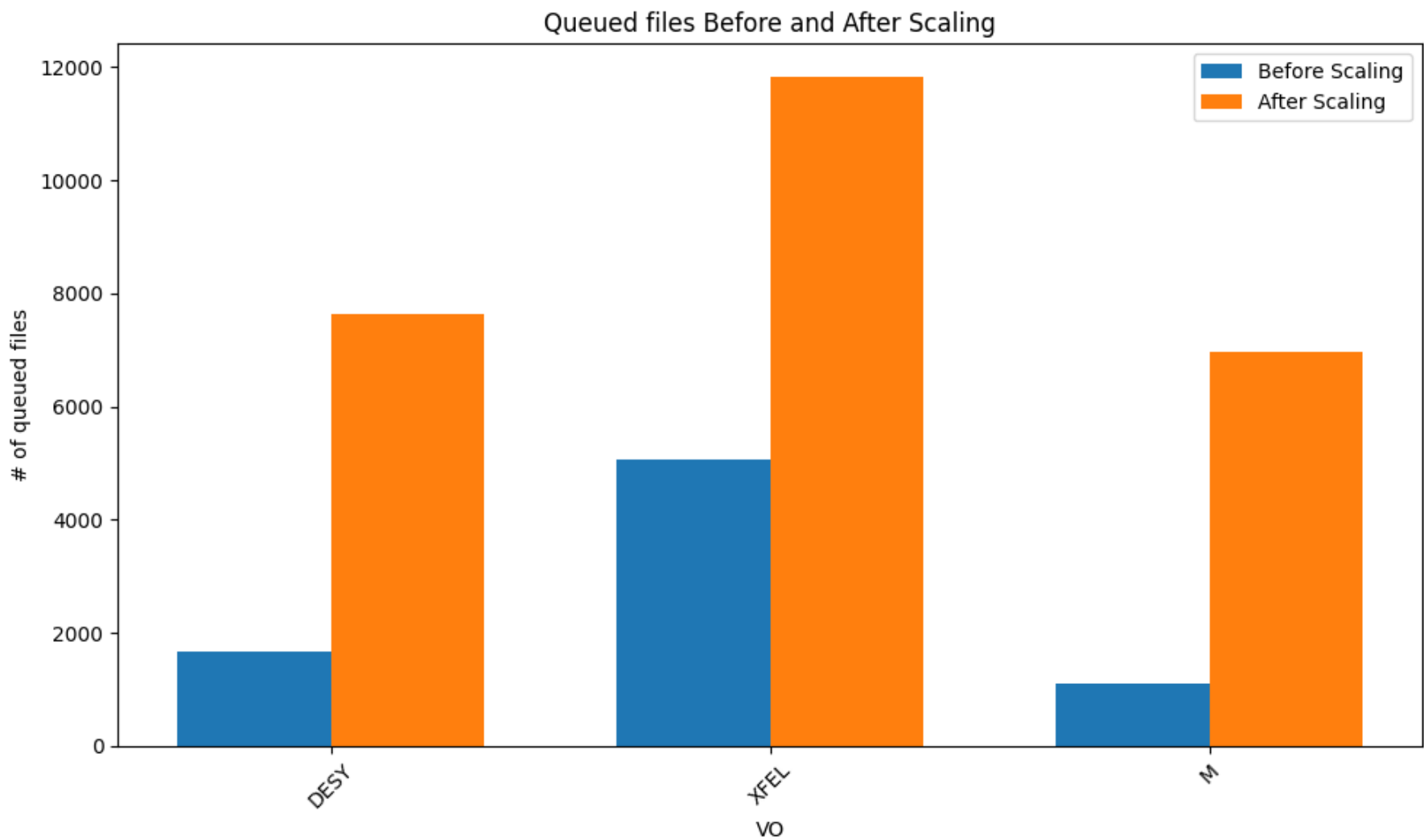 - Fault tolerance

Deployment

- Single point of failure
- Limited capacity
- Inability to handle traffic spikes

Deployment

- Better resource utilisation
- Improved system efficiency
- Reduced mounting delays

Deployment

Queued files Before and After Scaling

Workload spread across enabling more requests to be handled in parallel.

Operations

Ops-tools - Cta-Verify-File Wrapper

• Schedules verify jobs

• Extends the CTA-Catalogue

   • *tape_file_read_{counters, counters_last_run, counters_last_queue}*

Drive/Vol Allocation & Job Management

• Drive eligibility: online and free / or drives with ongoing retrieves

• Thresholds: *MaxRetrievesJobsForVol*, *useMaxDrivesInLogLib, MaxRetreievesBytesforVol*

• Validation jobs added if *MaxRetrievesBytesforVol* not exceeded - Just enough to keep the drive busy

• New volumes added if validation jobs < no. of eligible drives

Operations - Improvements

Faster Ingest & Retrieval times

- Frontend-grpc scaling

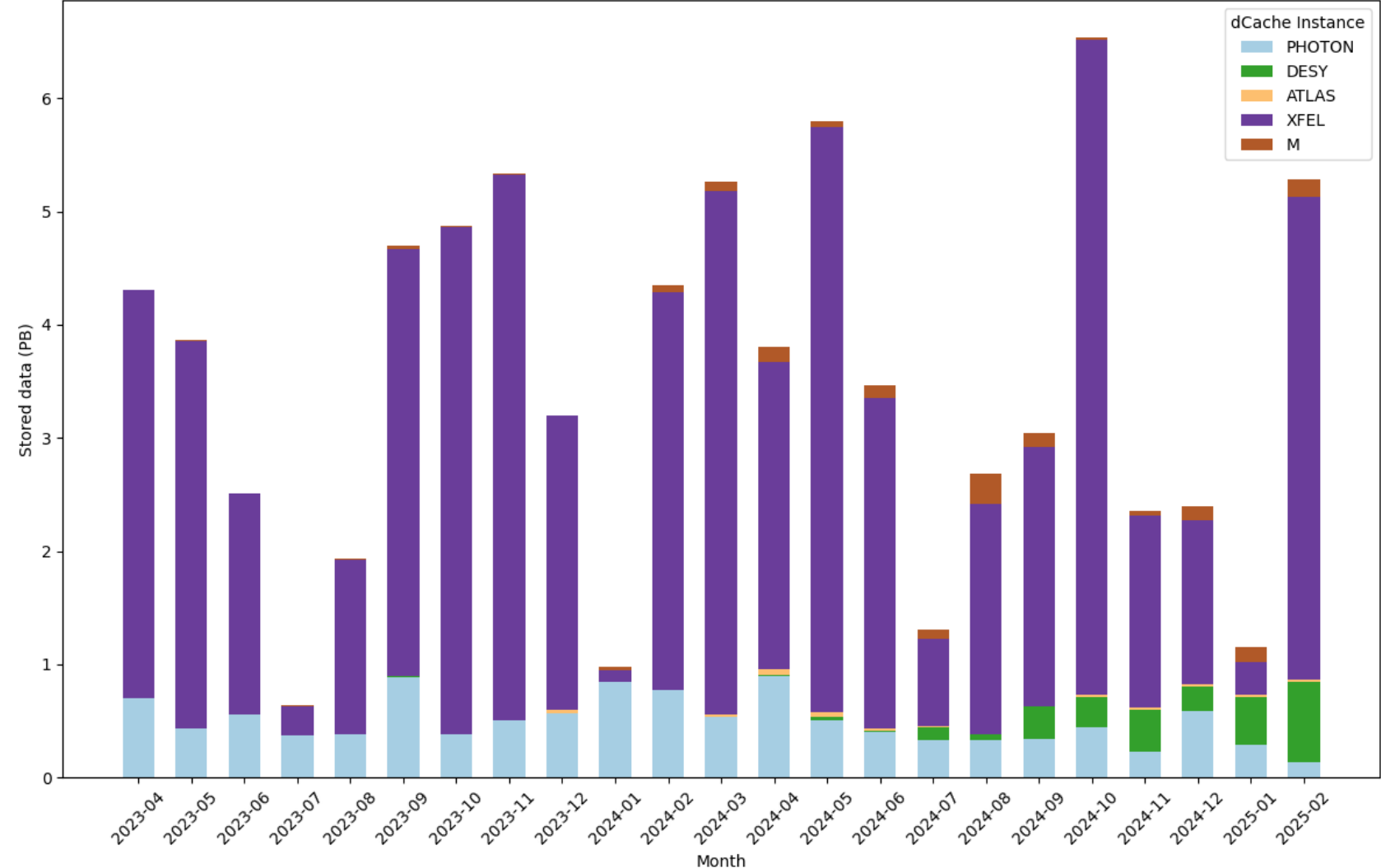- Using available config options - mount policies, archive/retrieve age

Stability & Monitoring Enhancements

- Improved alerting for tape/drive failures and other anomalies

  - Tapes being **DISABLED**

- Integrated missing components into our alarming system

  - *cta-frontend-grpc, cta-rmcd*

Operations

CTA Flushed Data by dCache Instance

- Total Archived data - 85PB

Operational Challenges

- Handling increasing recall requests

```
[dcache-core-photon04] (local) karimimw > \sn cacheinfoof 000016072D4DF89B4985A00B719754E5438D
 dcache-photon44-10    <=== File is already on disk
```

```
    "copynb": 1,
    "maxtotalretries": 6,
    "maxretrieswithinmount": 3,
    "retrieswithinmount": 2,
    "totalretries": 6,
    "status": "RJS_ToReportToUserForFailure",
    "lastmountwithfailure": "454",
    "failurelogs": [
      "Mar 20 08:36:36.976085 tpm302 In XrootWriteFile::XrootWriteFile failed XrdCl::File::Open() on root://dcache-photon44.desy.de:45003/000016072D4DF89B4985A00B719754E5438D?oss.a
size=30010351256 [ERROR] Server responded with an error: [3011] Request not found: 000016072D4DF89B4985A00B719754E5438D code:400 errNo:3011 status:1",
      "Mar 20 08:43:23.133453 tpm304 In XrootWriteFile::XrootWriteFile failed XrdCl::File::Open() on root://dcache-photon44.desy.de:45003/000016072D4DF89B4985A00B719754E5438D?oss.a
size=30010351256 [ERROR] Server responded with an error: [3011] Request not found: 000016072D4DF89B4985A00B719754E5438D code:400 errNo:3011 status:1",
      "Mar 20 08:54:32.193652 tpm304 In XrootWriteFile::XrootWriteFile failed XrdCl::File::Open() on root://dcache-photon44.desy.de:45003/000016072D4DF89B4985A00B719754E5438D?oss.a
size=30010351256 [ERROR] Server responded with an error: [3011] Request not found: 000016072D4DF89B4985A00B719754E5438D code:400 errNo:3011 status:1",
```

SOLUTION => Delete the retrieve shards & dereference the queue

Operational Challenges

- File locks lead to deadlocks

- dCache pool restarts need further optimisations

Expectations / Nice To Have

- LTS CTA versions

    - Prioritise stability, reliability and long term maintenance over new features

- Differentiate Retrieve Requests (*forUser/forRepack/forVerify*)

- Drive tagging

- dCache CI

Summary

- CTA stable at DESY

- Significant performance and reliability improvements achieved

- Challenges remain but proactive solutions in place

- More community collaboration for continuous improvement

Thank you