CERN Tape Archive (CTA) : Deployment and Migration from CASTOR

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EOS+CTA Overview

- CTA is the tape back-end to EOS
- EOS+CTA offers the "Best of Both Worlds"
  - User interface and file access from EOS
  - Tape system management from CASTOR
  - New scalable, robust queuing system to link the two
- CTA design principles
  - Simplicity
  - Scalabilty
  - Performance

EOS+CTA Performance Enhancements

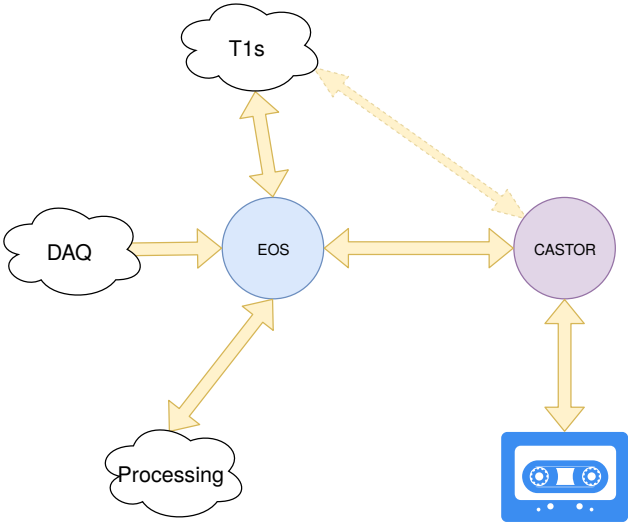
Reduced latency compared to CASTOR

- Just-in-time scheduling
- Preemptive scheduling

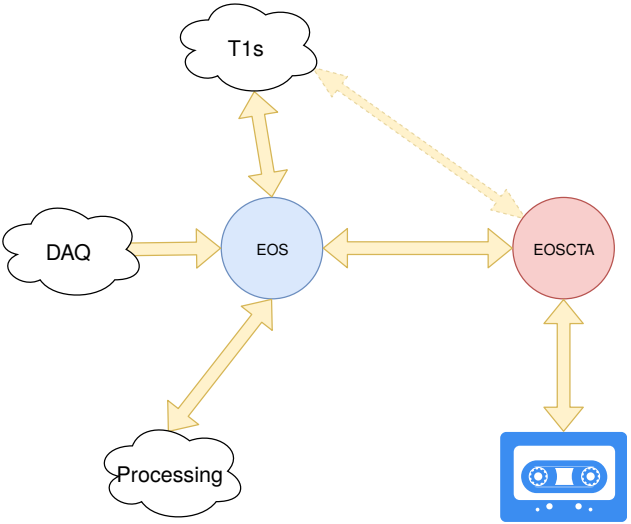
New features for Run–3

- Recommended Access Order (RAO) for LTO media
- Colocation hints

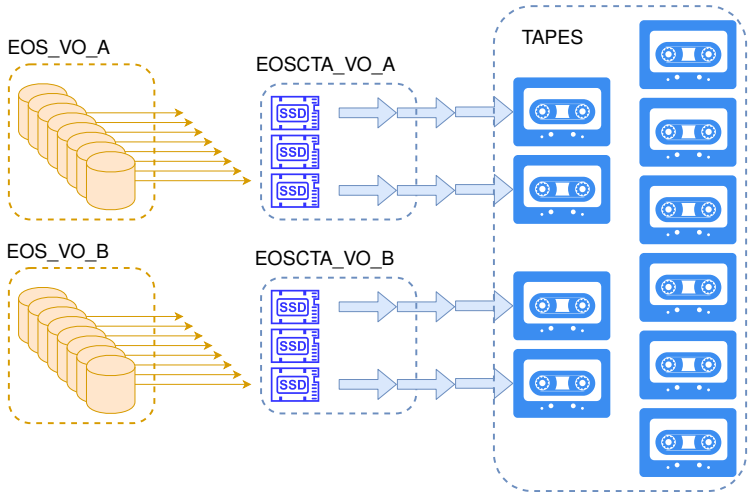
EOS+CTA Architecture



EOS+CTA Architecture



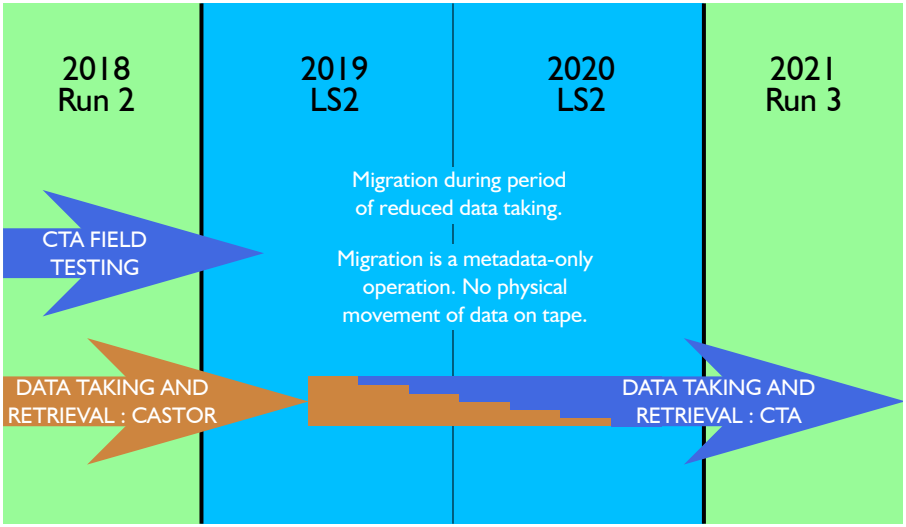
EOS+CTA Architecture



EOS+CTA Deployment

- 4 instances for the LHC experiments
- 1 instance for PUBLIC
  - Active non-LHC experiments: *AMS*, *Compass*, *Dune*, *NA61*, *NA62*, *nTOF*, …
  - Inactive legacy experiments: *LEP*, …
  - CASTOR backup
  - User files
- Tier-1s: *RAL*

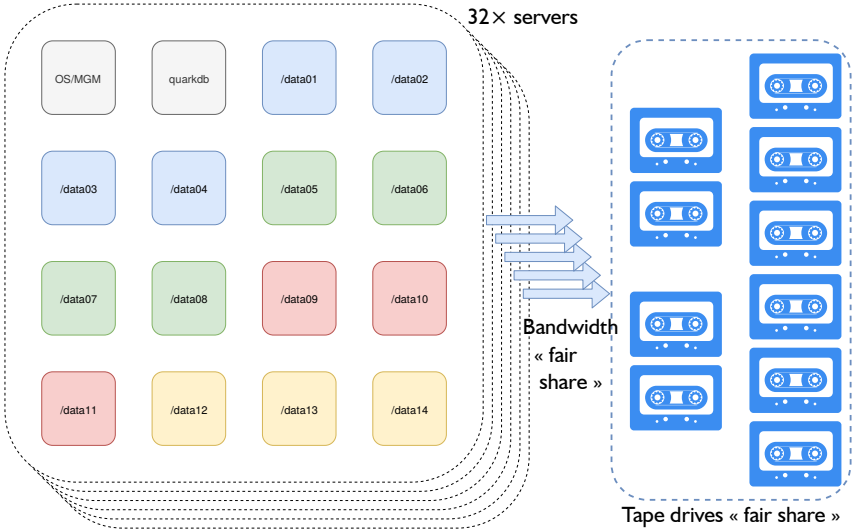
EOS+CTA Timeline



EOS+CTA Status: Hardware

- Racks are cabled
- Network switches are allocated (6× 100 Gb/s links)
- 32× hyper-converged servers have been delivered to CERN. Operating tape drive at full-speed, full-time requires SSD-based buffer.
  - 16× 1.92 TB SSD
  - 25 Gb/s Ethernet

Max. throughput, minimum contention



EOS+CTA Status: Software

- CTA v1.0 release 11 December
- Workflows have been integrated with FTS and Rucio (via XRootD)
- Deployment onto production instances as soon as hardware is ready

Commissioning (January 2020)

- Migrate CASTOR ATLAS to CTA ATLAS (≈90 million files, read-only copy)
- 4–5 servers dedicated to ATLAS to offer 10 GB/s
- ATLAS Run–2 reprocessing campaign
  - Targetting 3–4 PB from CTA (out of 18 PB total)
- ATLAS data taking stress test

ATLAS Migration (1Q 2020)

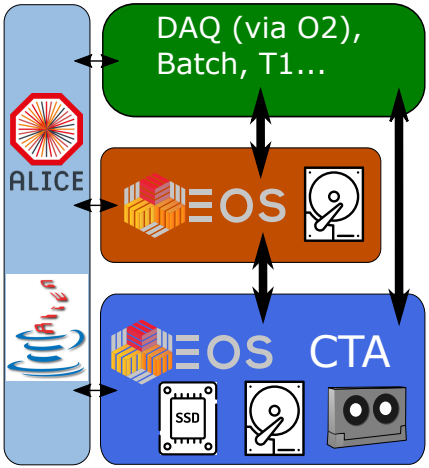
Schedule to be agreed with ATLAS, contingent on successful reprocessing campaign

- Disable the tapes in CASTOR
- Extract metadata
  - CASTOR Catalogue → CTA Catalogue
  - CASTOR Namespace → EOS Namespace (≈ 6 million files per hour)
- Enable tapes in CTA
- Rucio: update all CASTOR endpoints to CTA

Risk Mitigation

- CTA is prohibited from writing to tapes imported from CASTOR
- To return a tape to CASTOR, disable the tape in the CTA catalogue and re-enable the tape in CASTOR

ALICE Migration (2Q 2020)



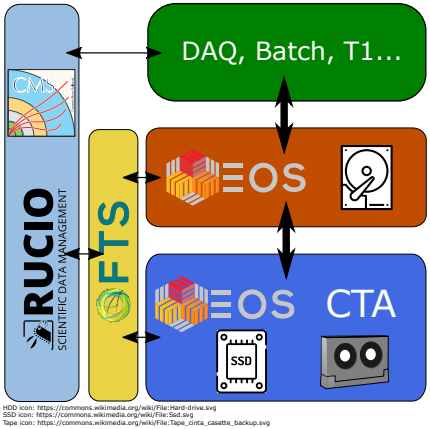
HDD icon: https://commons.wikimedia.org/wiki/File:Hard-drive.svg
SSD icon: https://commons.wikimedia.org/wiki/File:Ssd.svg
Tape icon: https://commons.wikimedia.org/wiki/File:Tape_cinta_casette_backup.svg

Schedule to be agreed with ALICE

Integration with JAlien:

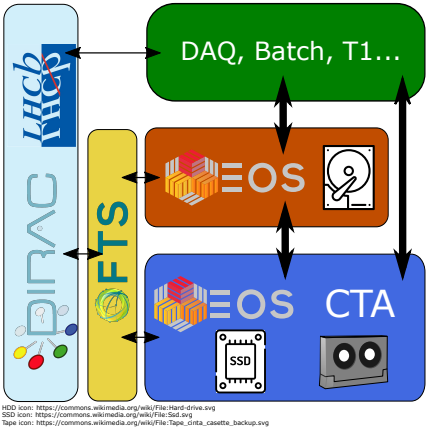
- Dual Space buffer
  - SSD buffer for data taking
  - ≈5 PB HDD cache for retrieves, with garbage collection
- Requirement for occasional T1 access to EOSCTA

CMS Migration (2H 2020)



- Similar setup to ATLAS : Rucio + FTS + EOSCTA
- Schedule driven by CMS adoption of Rucio

LHCb Migration (2H 2020)



- Similar setup to ATLAS and CMS : Dirac + FTS + EOSCTA
- Requirement for occasional export from EOSCTA to T1
- Schedule driven by T1s supporting XRootD 3rd Party Copy with delegation

EOS+CTA Status: Summary

- Hardware to be installed by end of year
- Software to be deployed by end of year
- January 2020: Stress testing and commissioning (ATLAS)
- 1Q 2020: ATLAS migration CASTOR $\rightarrow$ EOS+CTA
- 2Q 2020: ALICE testing and migration CASTOR $\rightarrow$ EOS+CTA
- Other LHC experiments to be migrated before YE 2020

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