ALICE Computing:
Data Challenges and Analysis Facilities

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Plans for the nex Data Challenge (2027)

- ALICE will participate in the DC on the same level as DC24, unchanged rates and target tiers. T2s are not involved.

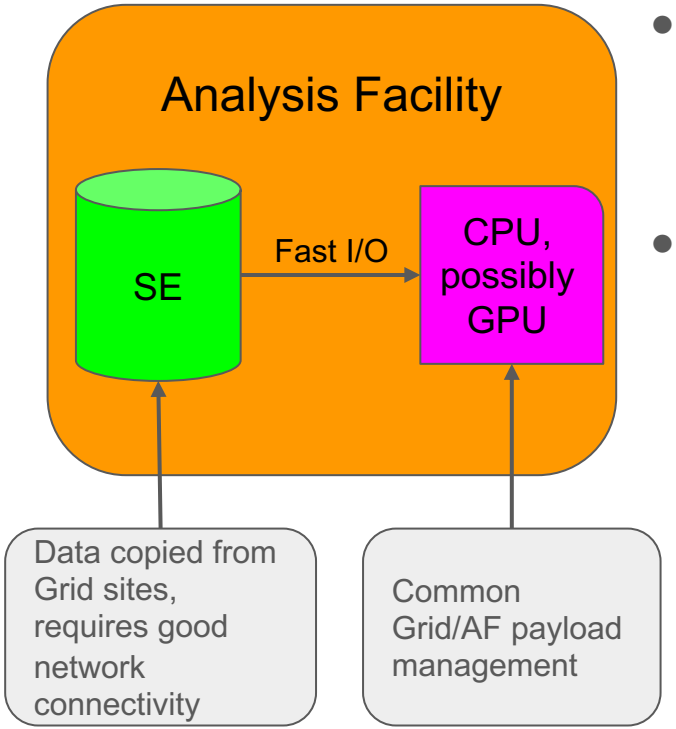
Centre	Target rate GB/s
CNAF	0.8
IN2P3	0.4
KISTI	0.2
GridKA	0.6
NDGF	0.3
NL-T1	0.1
RAL	0.1
CERN	*10*

- **ALICE target rates are defined for Run3/4 and remain unchanged:** 2.5GB/s (T1s) + 10GB/s (T0)
- All rates tested and achieved during data challenges and subsequently in 2022/2023 (real data transfers)
- Rates coordinated with T0/T1s custodial storage experts
- Data to be transferred during DC24 - 34PB from 2023 Pb-Pb run
- Other WAN load from normal activities (full T0/1/2-T0/1/2 mesh)

Feedback from Data Challenge 2024

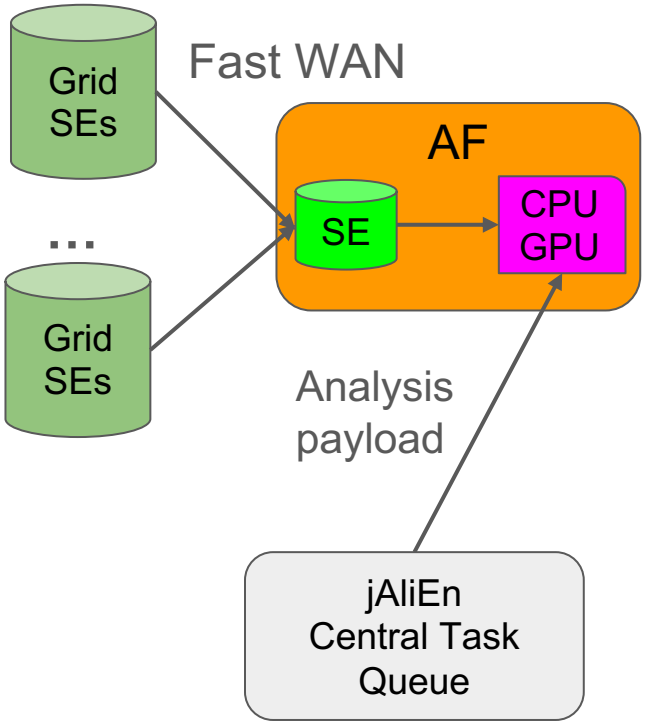
- Used real data transfer in the exercise, i.e. tested the entire custodial storage chain - source, network, target storage and transfer software
- Target rates surpassed by 40% at T0 and at T1s
- Steady transfers to all target storage elements, minimal intervention required in only two sites, zero network issues
- No interference observed from activities of other VOs, no effect on other activities within ALICE
- No errors during transfer
- **DC24 was successful for ALICE, many thanks to the sites and to the network!**

Quick recap of ALICE Analysis Facilities



- Integral part of the ALICE computing model for Run3+
  - Bulk of data analysis through organized analysis trains on Grid
  - Final steps (histograms) on physicist laptop/workstation
- Basic architectural considerations
  - Dedicated location with comprehensive data samples from asynchronous and MC data processing at **~10% statistics**
  - Fast I/O, ~15MB/s/core, total of ~10kcores, ~10PB of storage capacity
    - Emphasis on predictability of analysis turnover, especially in pre-conference times
  - Leverage existing Grid sites and middleware
  - Easy functional expansion for new elements, for example accelerators

AF implementation



- Identify AF suitable computing facilities
  - Enthusiastic local support - highly visible part of the analysis system, downtimes are undesirable
  - Adequate internal site structure - fast interconnect between SE and WNs
  - Good WAN connectivity for data transfers
  - Compatibility with Grid middleware - common workload and data management tools
- 3 T2s identified for full or partial conversion to AF
  - GSI Darmstadt (GreenCube), KFKI Budapest (Wigner Scientific Computing Lab), LBNL Berkeley (HPC systems)
- Choice of these T2s is not coincidental
  - Full compatibility with architectural requirements for storage, compute size and connectivity
  - Already existing centres with proven operational record
  - Added bonus - lower energy footprint@some of the AFs

A French Analysis Facility for ALICE?

- The ALICE collaboration would be happy to have a French Analysis Facility very welcome to have
- However, the requirements for ALICE AF are very specific (see previous slides): in particular, it would require a T2 backed up by a team with strong interest in running it. Limited (no) availability from the ALICE French groups
- T1 does not seem to be a good place for an AF, given the multi-VO orientation of such a facility (unless a larger AF for multiple VOs is something CCIN2P3 will be interested in, in which case ALICE would be willing to act as an advance testers and users)