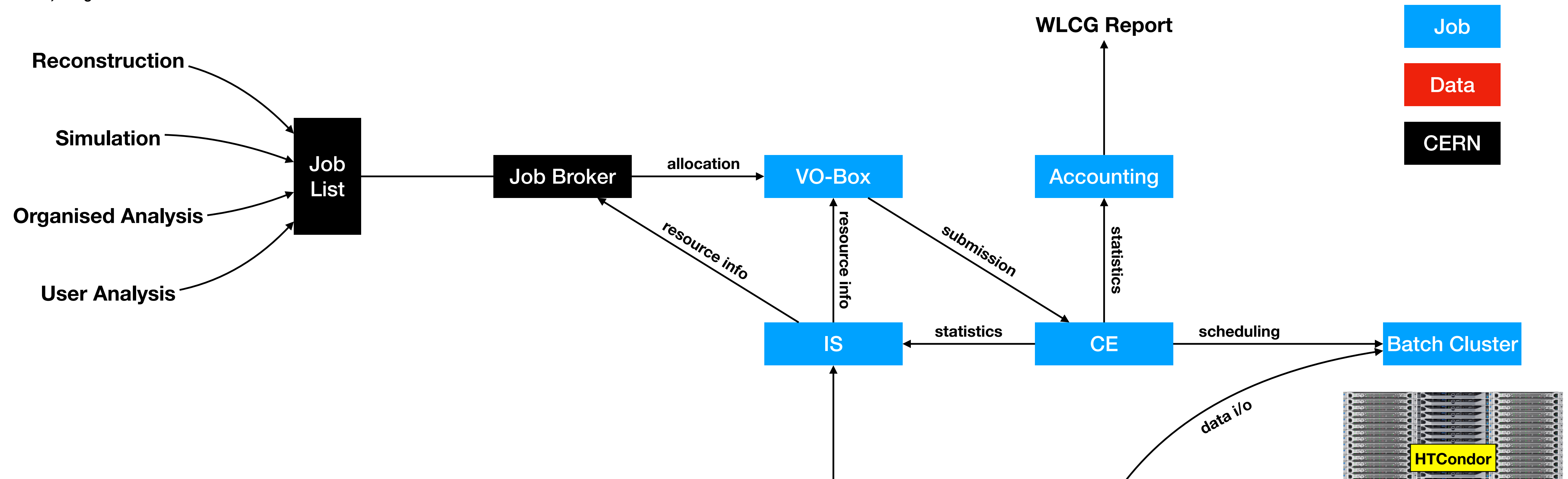


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# **ALICE Tier-1 Status**

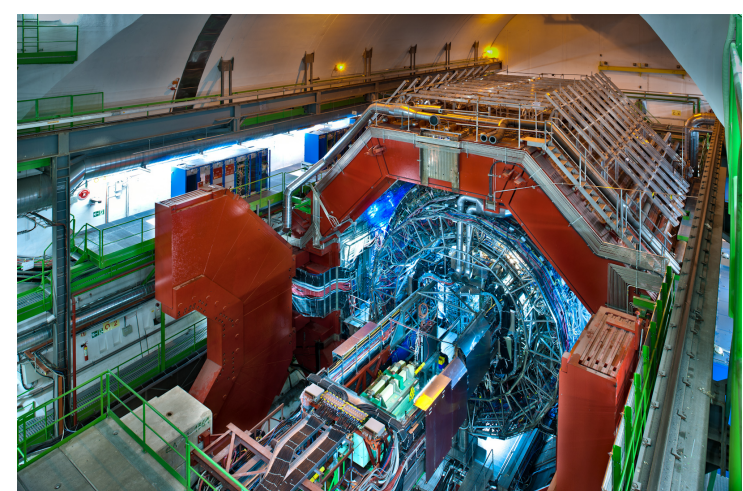
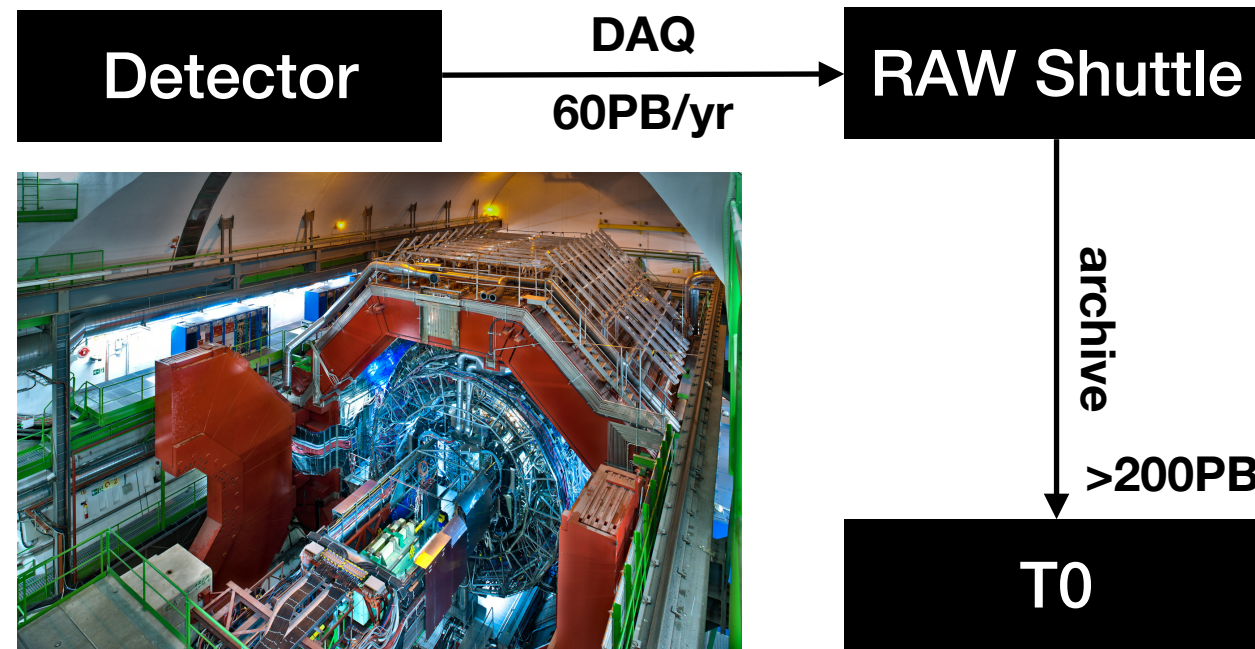
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**AHN SANG-UN @ KOALICE NATIONAL WORKSHOP 2021, 4 JANUARY 2022**

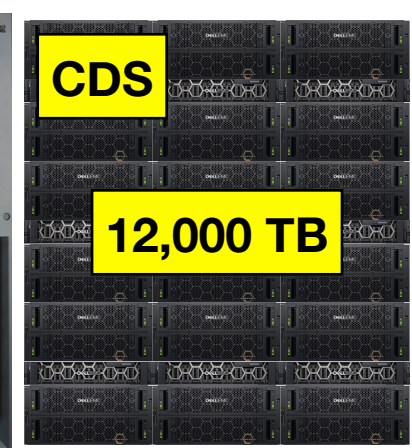
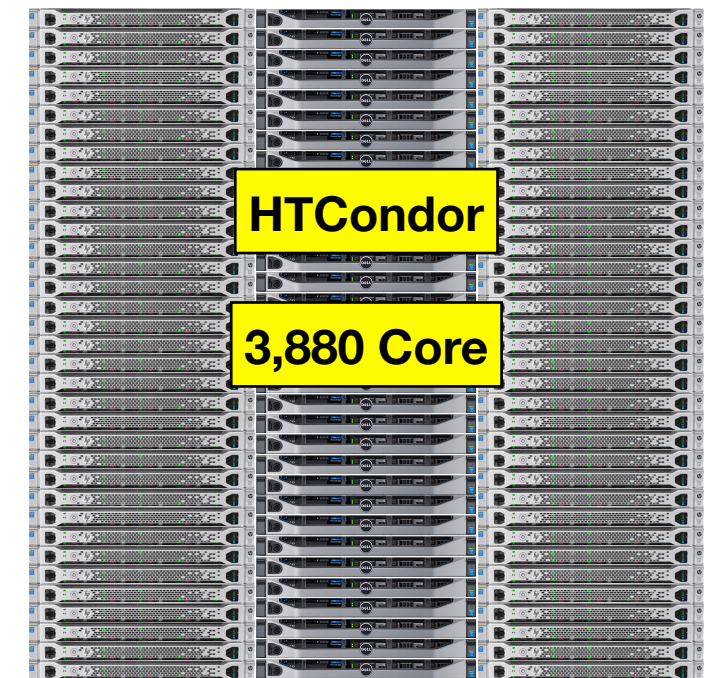
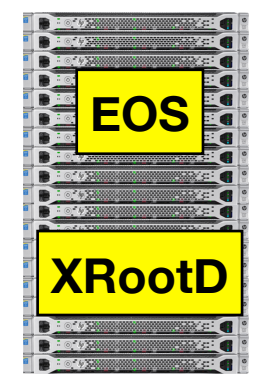
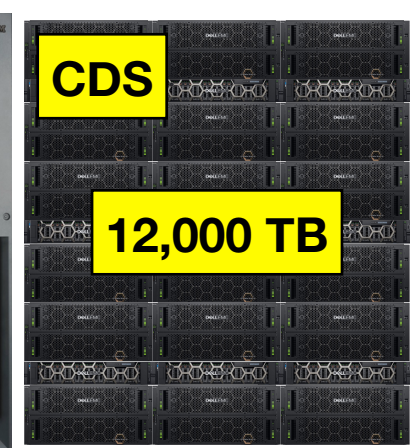
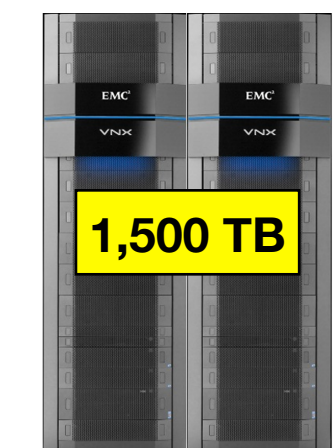
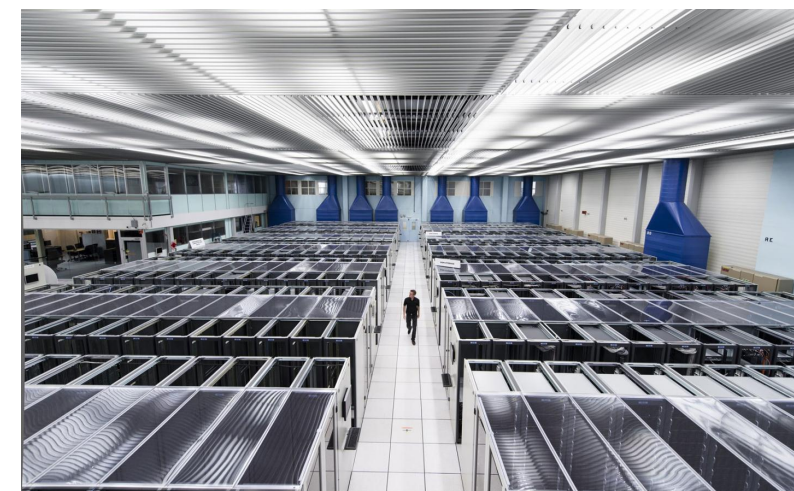
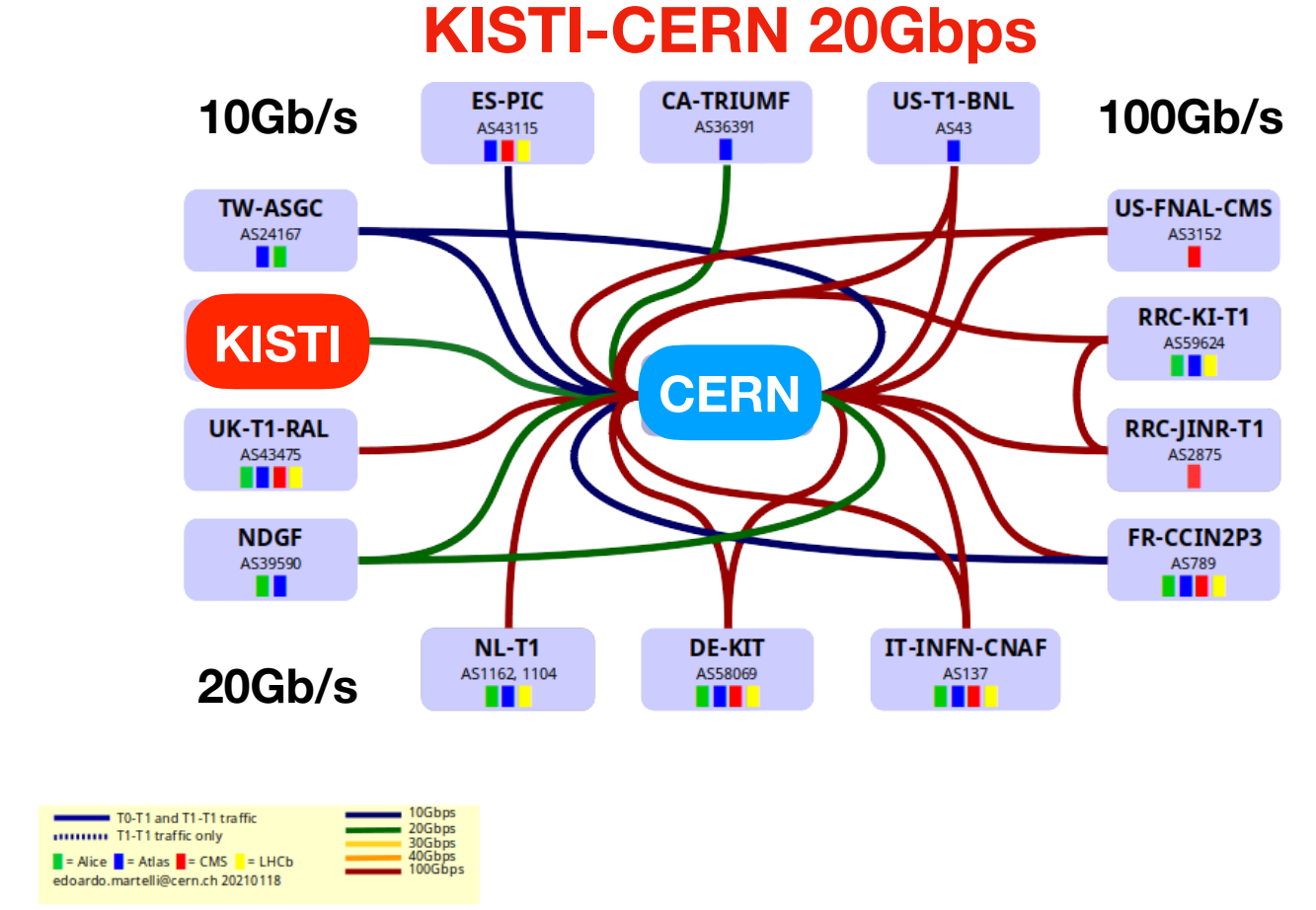


Legend for components:

- Job (Blue box)
- Data (Red box)
- CERN (Black box)



### LHCOPN



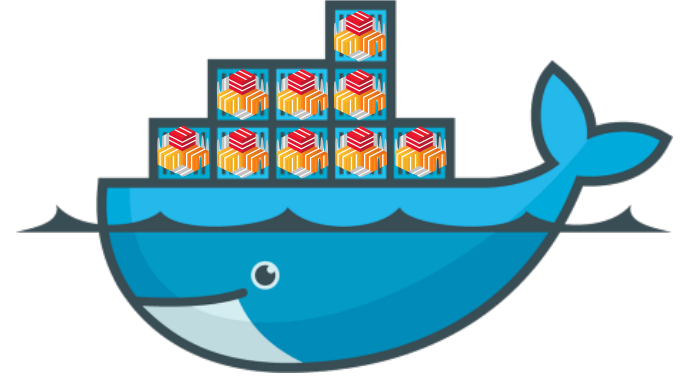
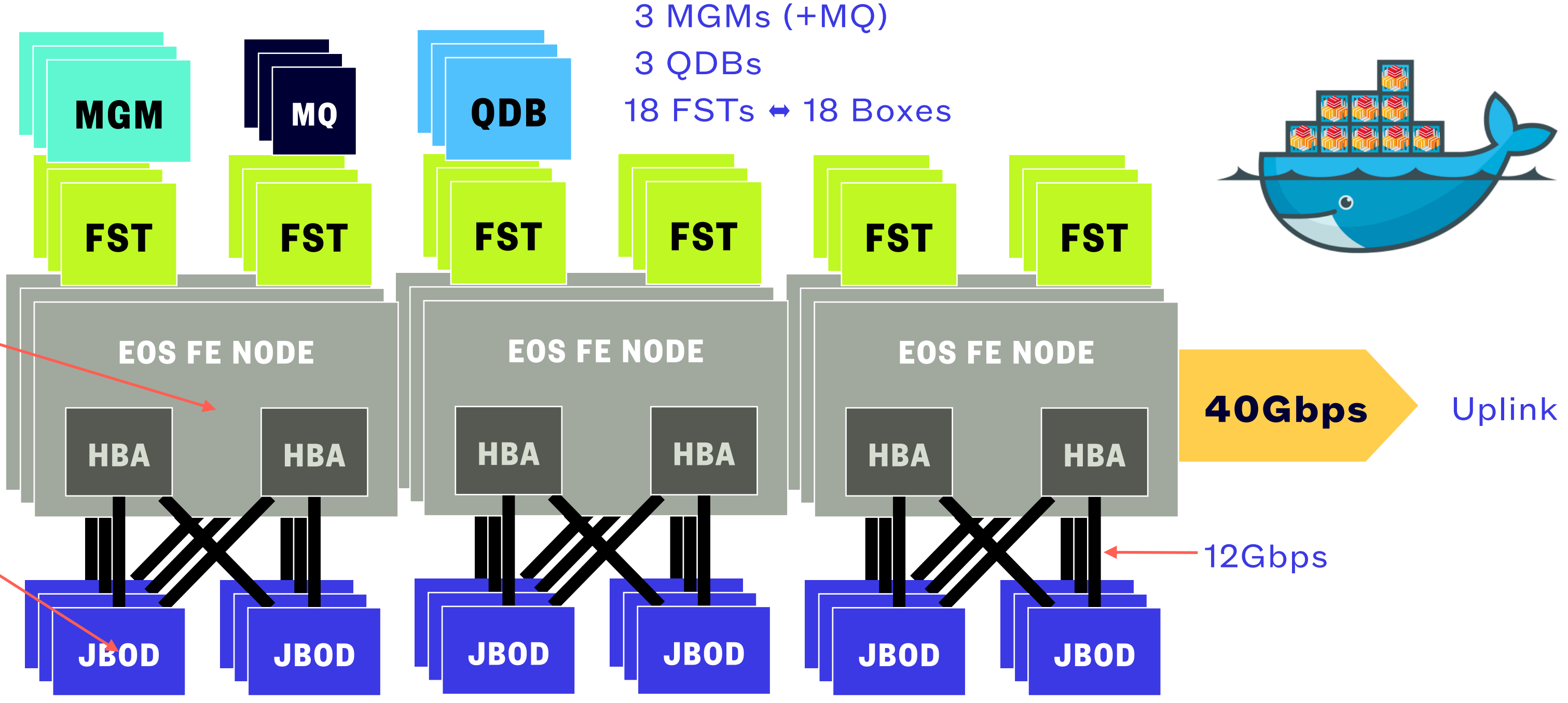
# CDS System Architecture



9 servers  
18 boxes



84 DISKS  
IN ONE BOX

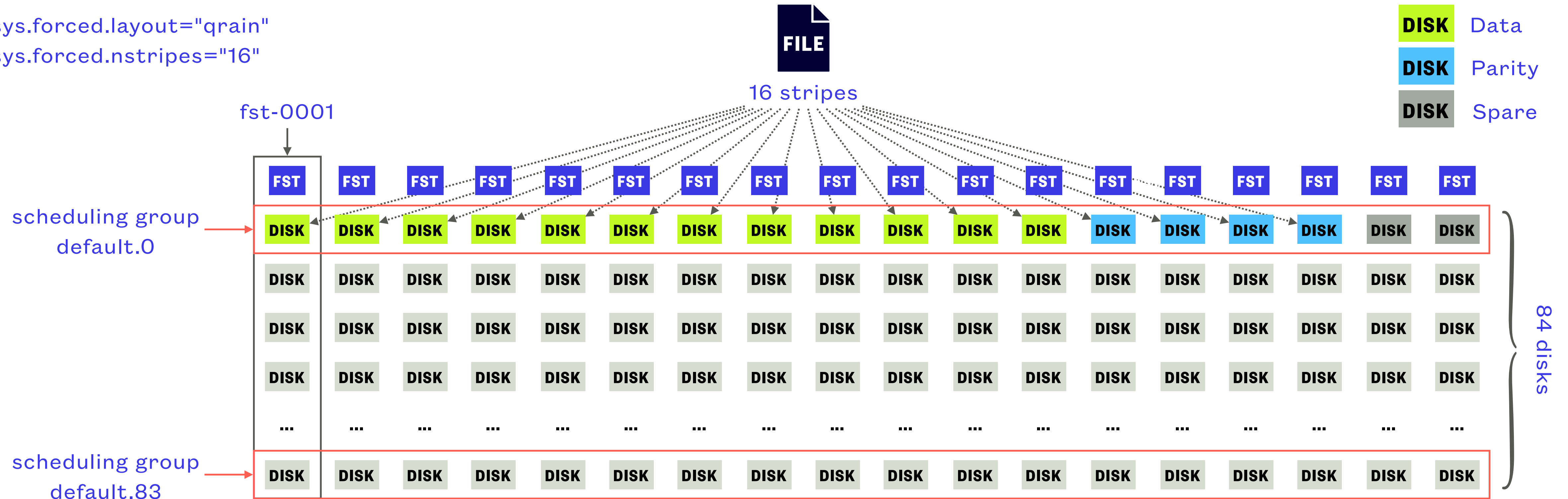


- Total raw capacity = 18 PB (= 12TB \* 84 disks \* 18 boxes)
- Total usable capacity = 12PB
- Current EOS version = 4.8.31

# QRAIN Layout



sys.forced.layout="grain"  
sys.forced.nstripes="16"

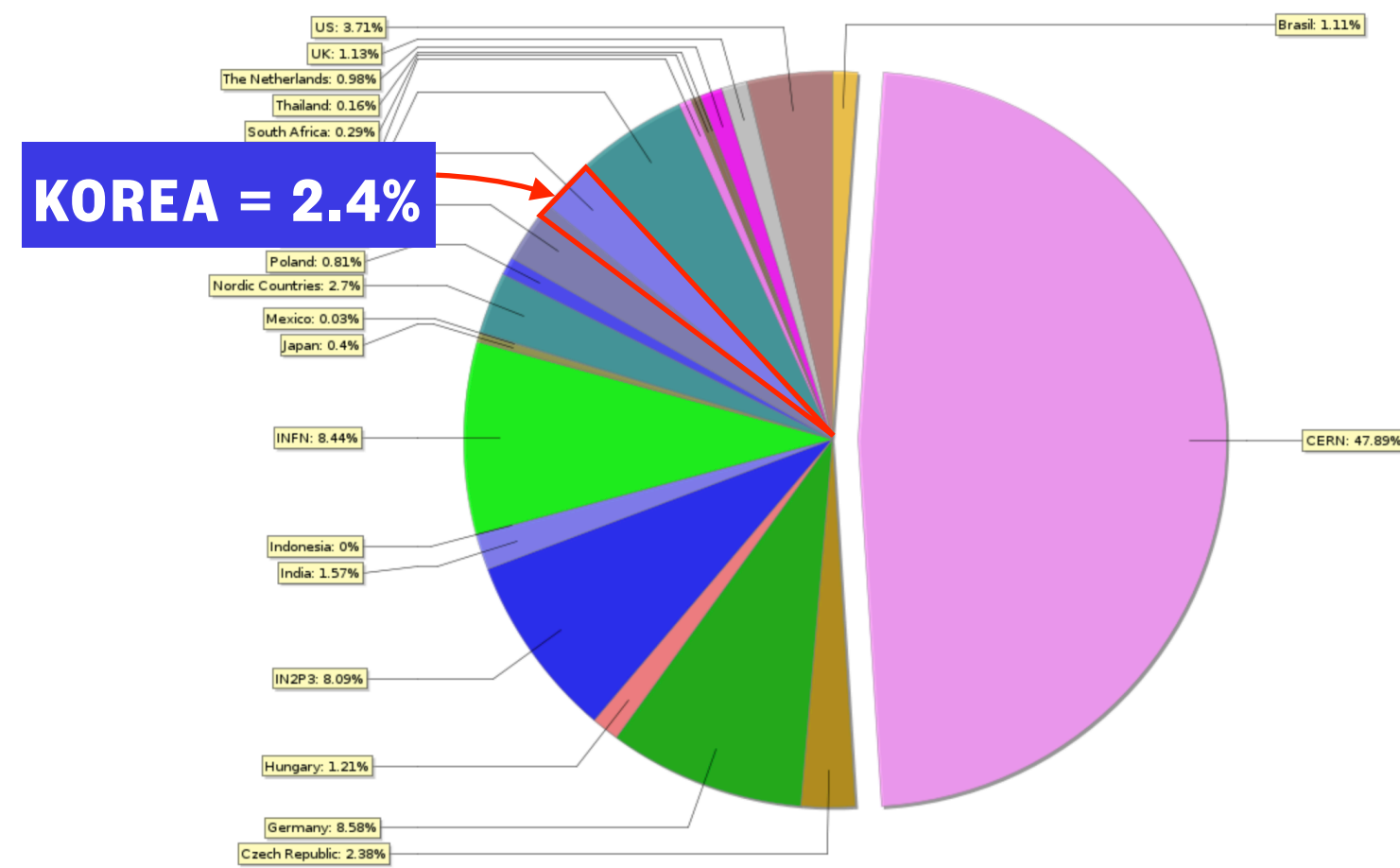


- Thanks to spare FSTs,
  - Data are still accessible if 6 FSTs are offline
  - Data can be written if 2 FSTs are offline
  - One node (= 2 FSTs) can be turned off for maintenance at any time
- Data loss rate in a year is  $\approx 8.6 \times 10^{-5}\%$ , where 5 disks are failed simultaneously, considering 1.17% of AFR in practice  
cf. vendor published AFR is 0.35% (AFR = Annualized Failure Rate)

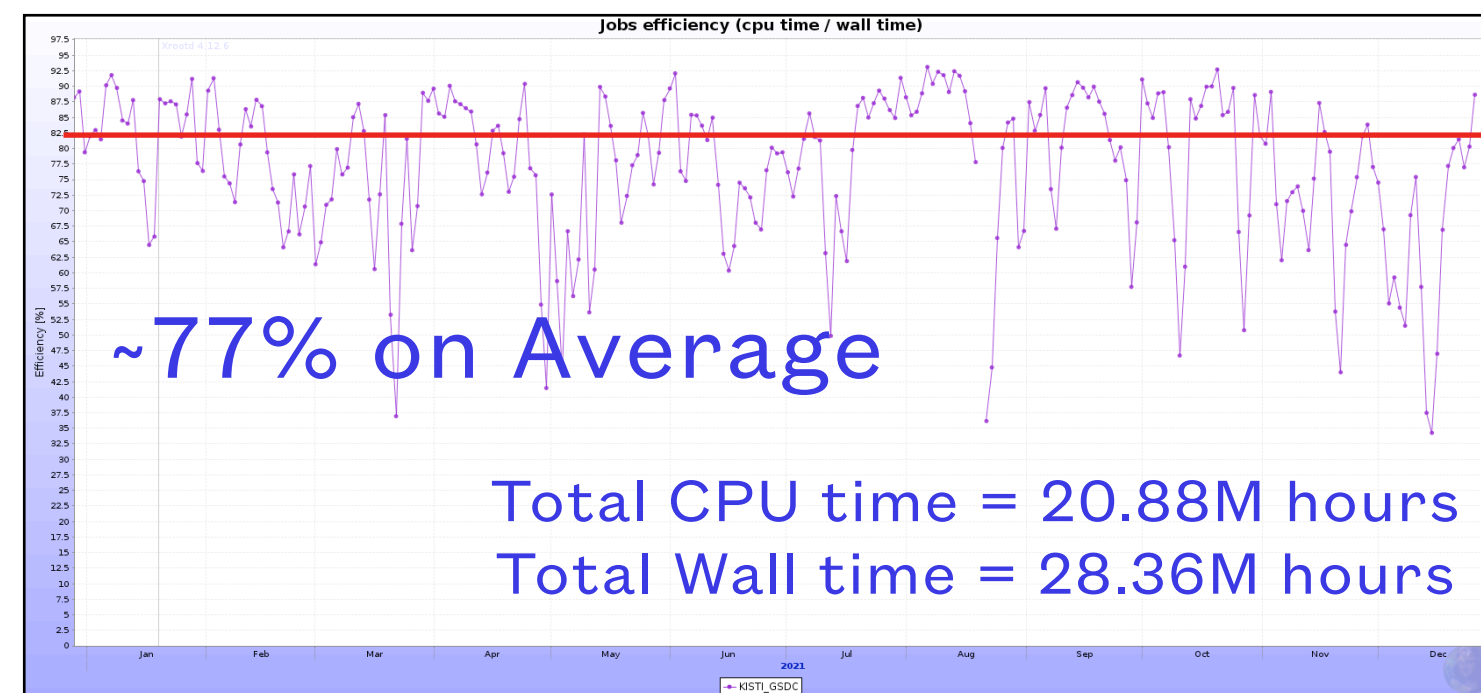
# Tier-1 Operations Summary 2021

## 2.4% Contribution to Total(T0+T1+T2+AF) ALICE Computing

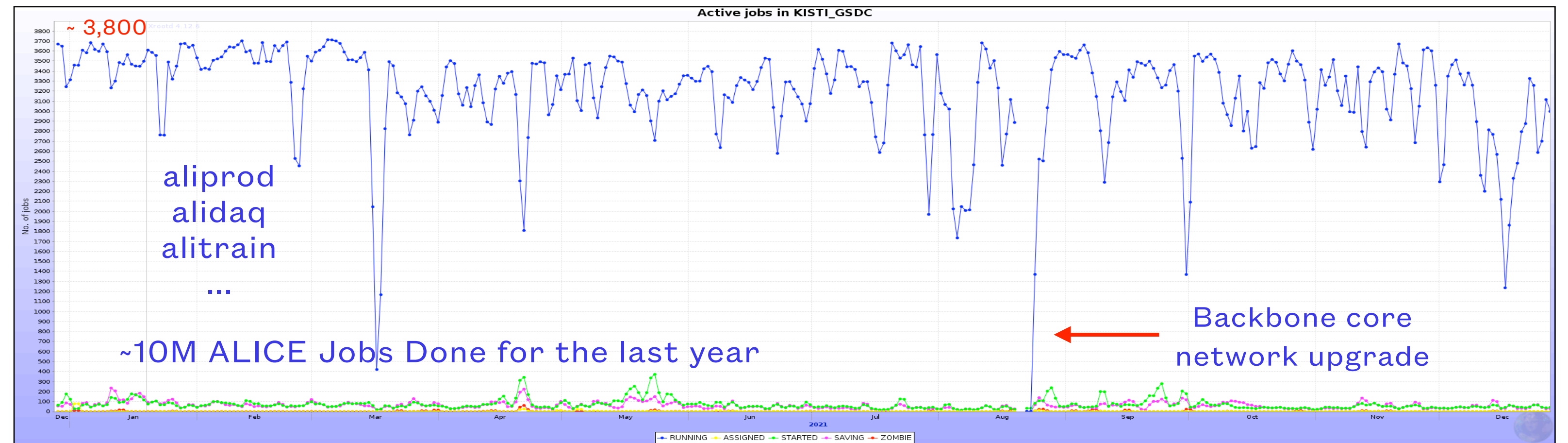
Total wall clock hours for ALICE jobs (1yr)



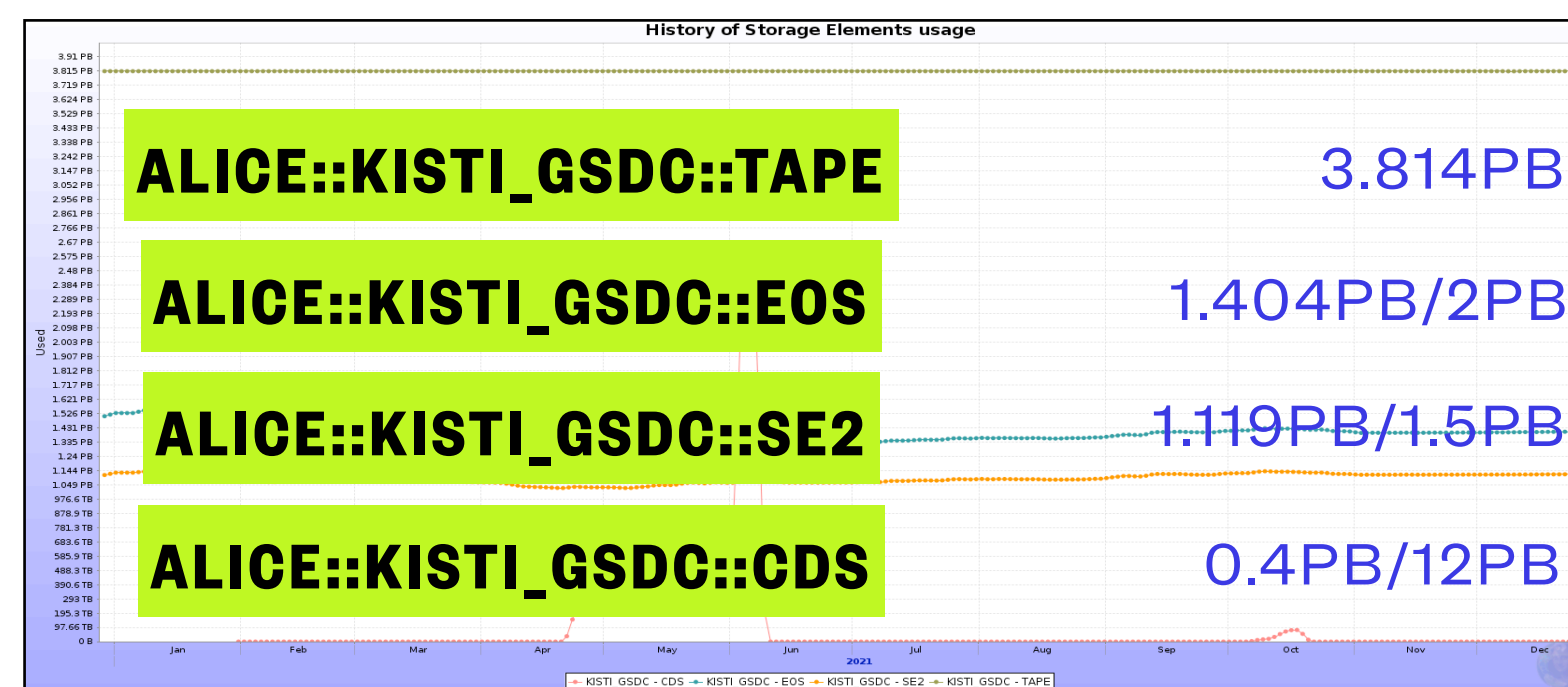
Job Efficiency



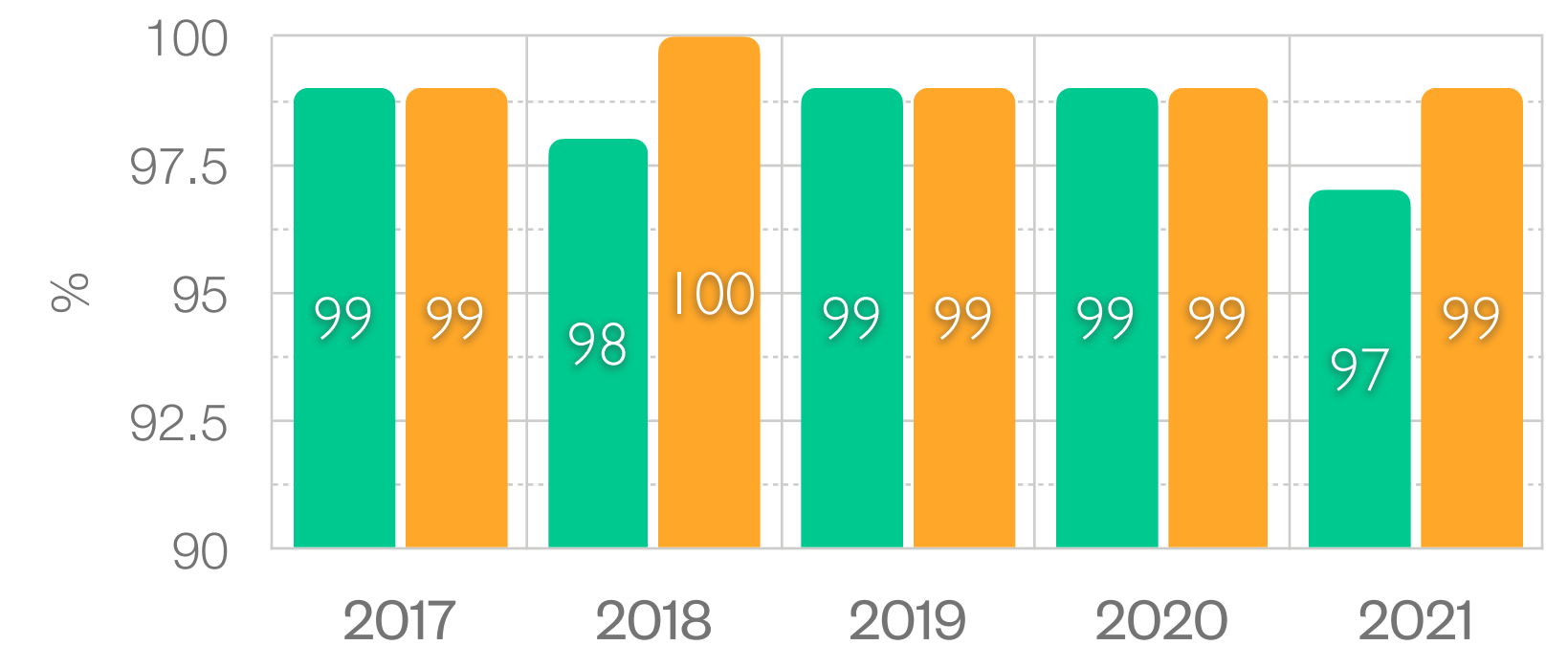
Running Jobs



SE Usage



Availability Reliability

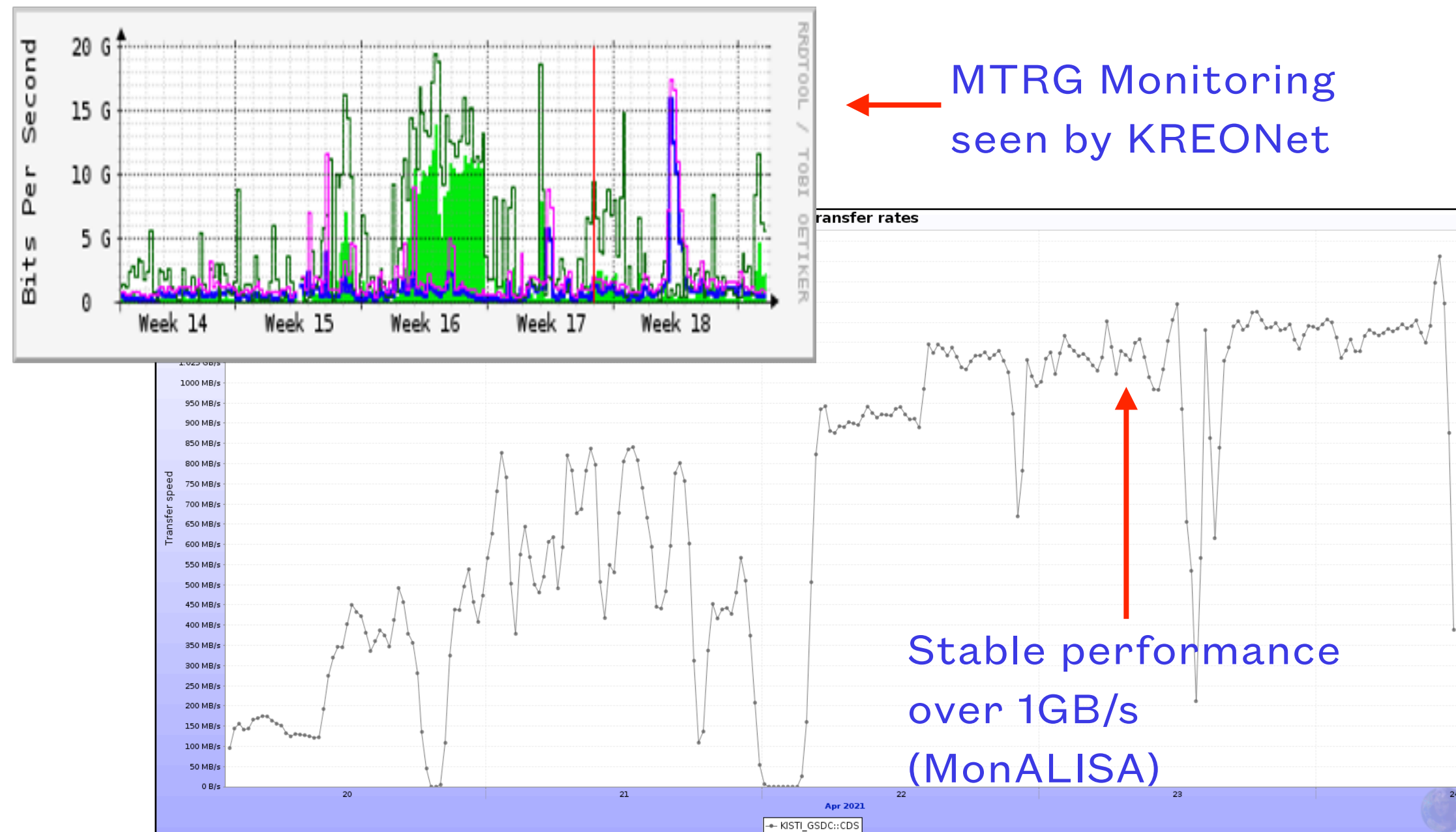


# LHCOPN 20G Upgrade

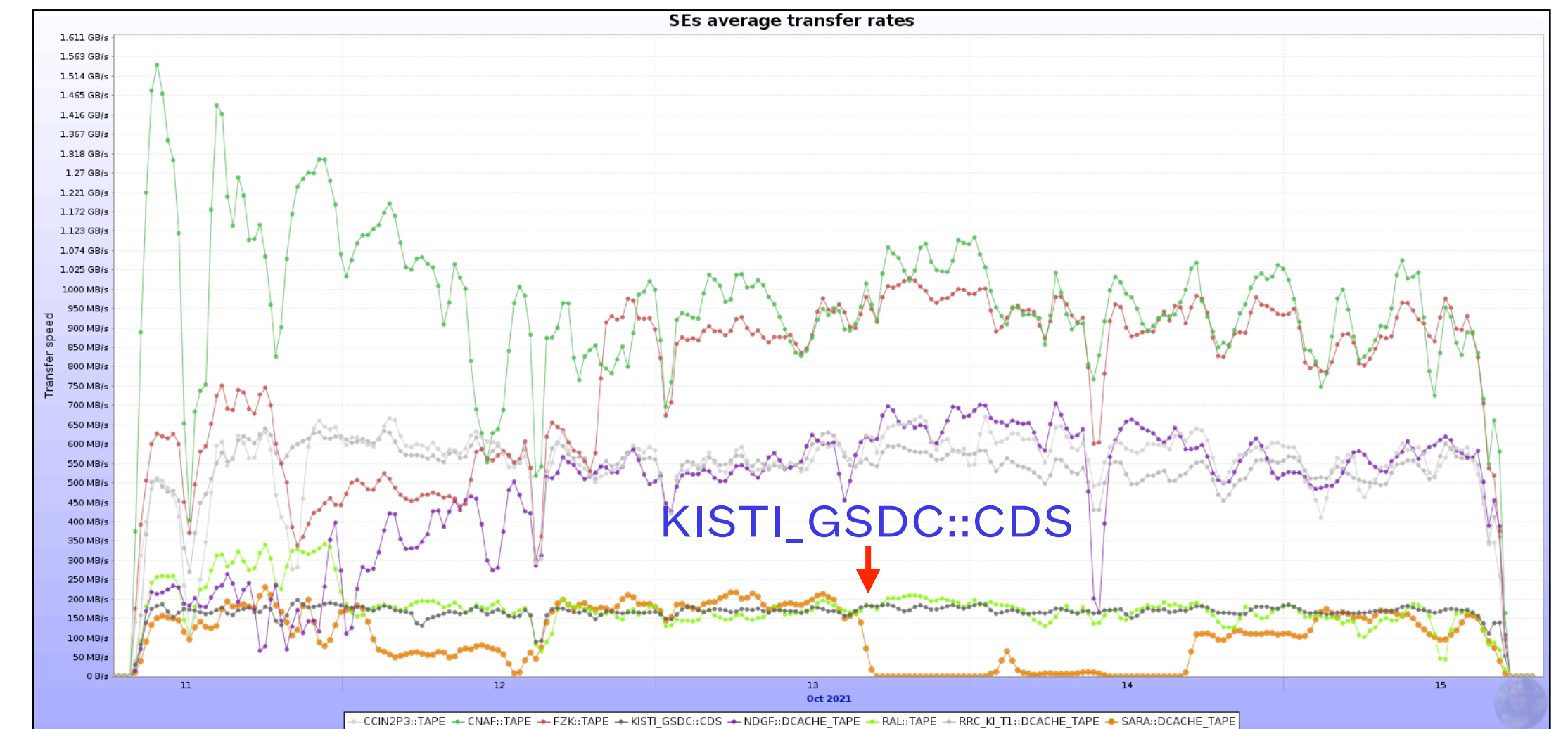
Average transfer speed

	Series	Avg
1.	SUM	3.714 GB/s
2.	CCIN2P3::TAPE	562.7 MB/s
3.	CNAF::TAPE	1001 MB/s
4.	FZK::TAPE	743.9 MB/s
5.	KISTI_GSDC::CDS	169.9 MB/s
6.	NDGF::DCACHE_TAPE	458.9 MB/s
7.	RAL::TAPE	193 MB/s
8.	RRC_KI_T1::DCACHE_TAPE	561.2 MB/s
9.	SARA::DCACHE_TAPE	112.6 MB/s

## Successful Transfer Tests Done!



WLCG Tape Tests Challenge - 11 ~ 15 October 2021



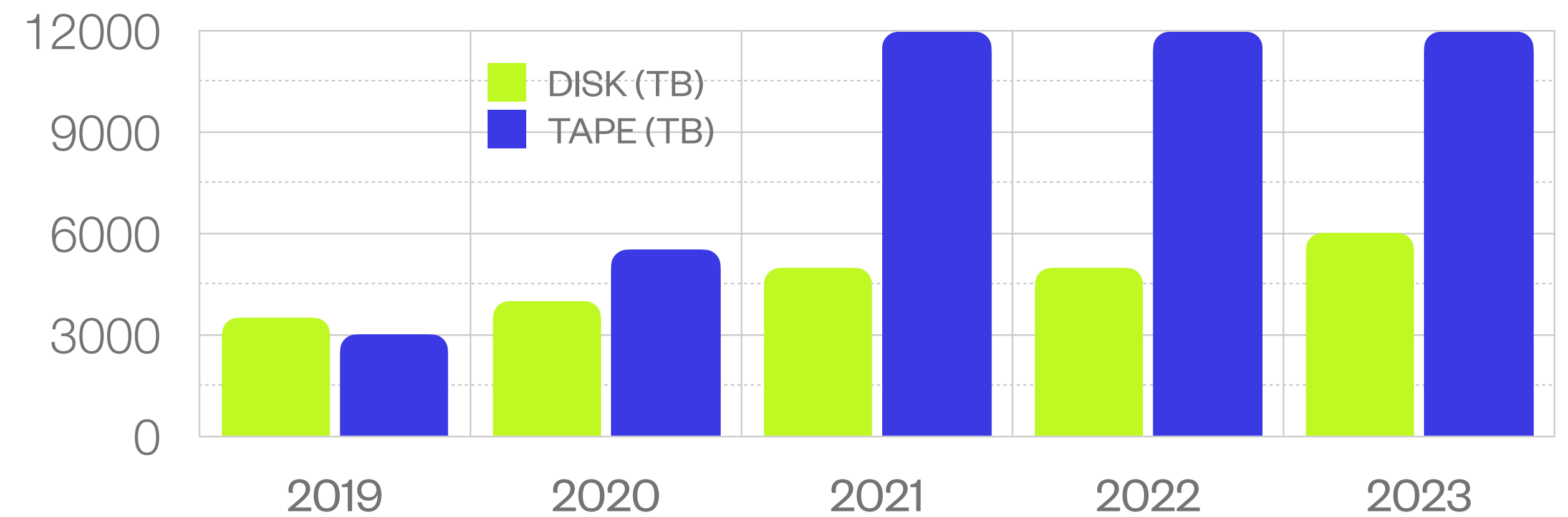
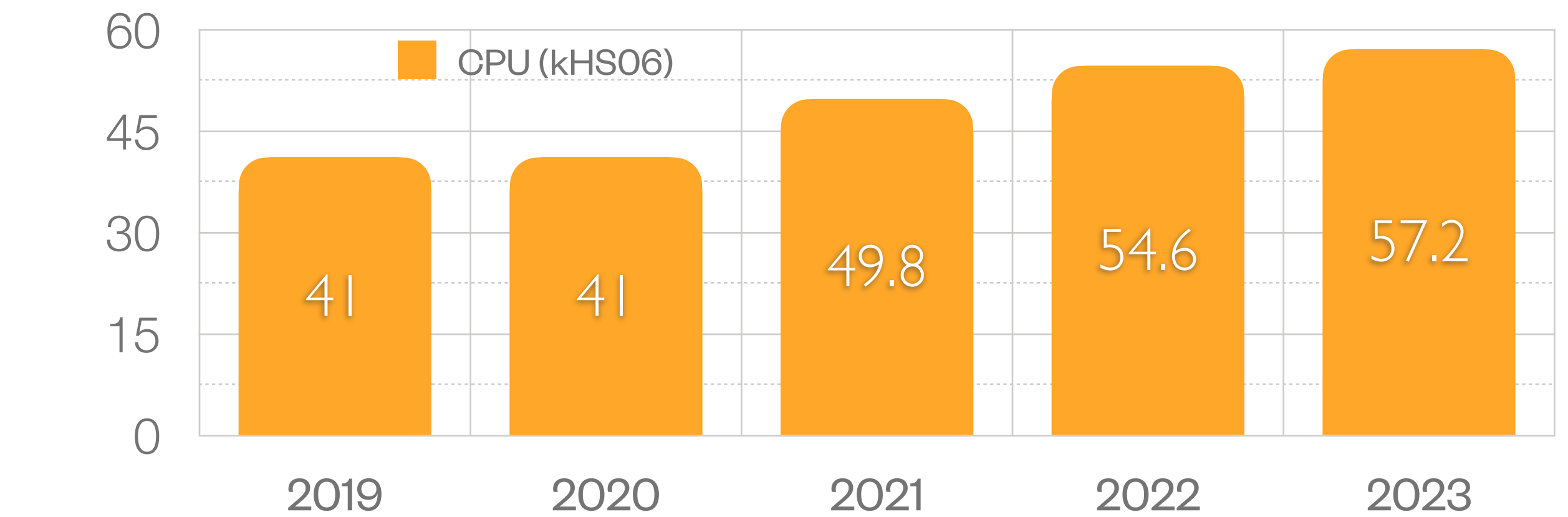
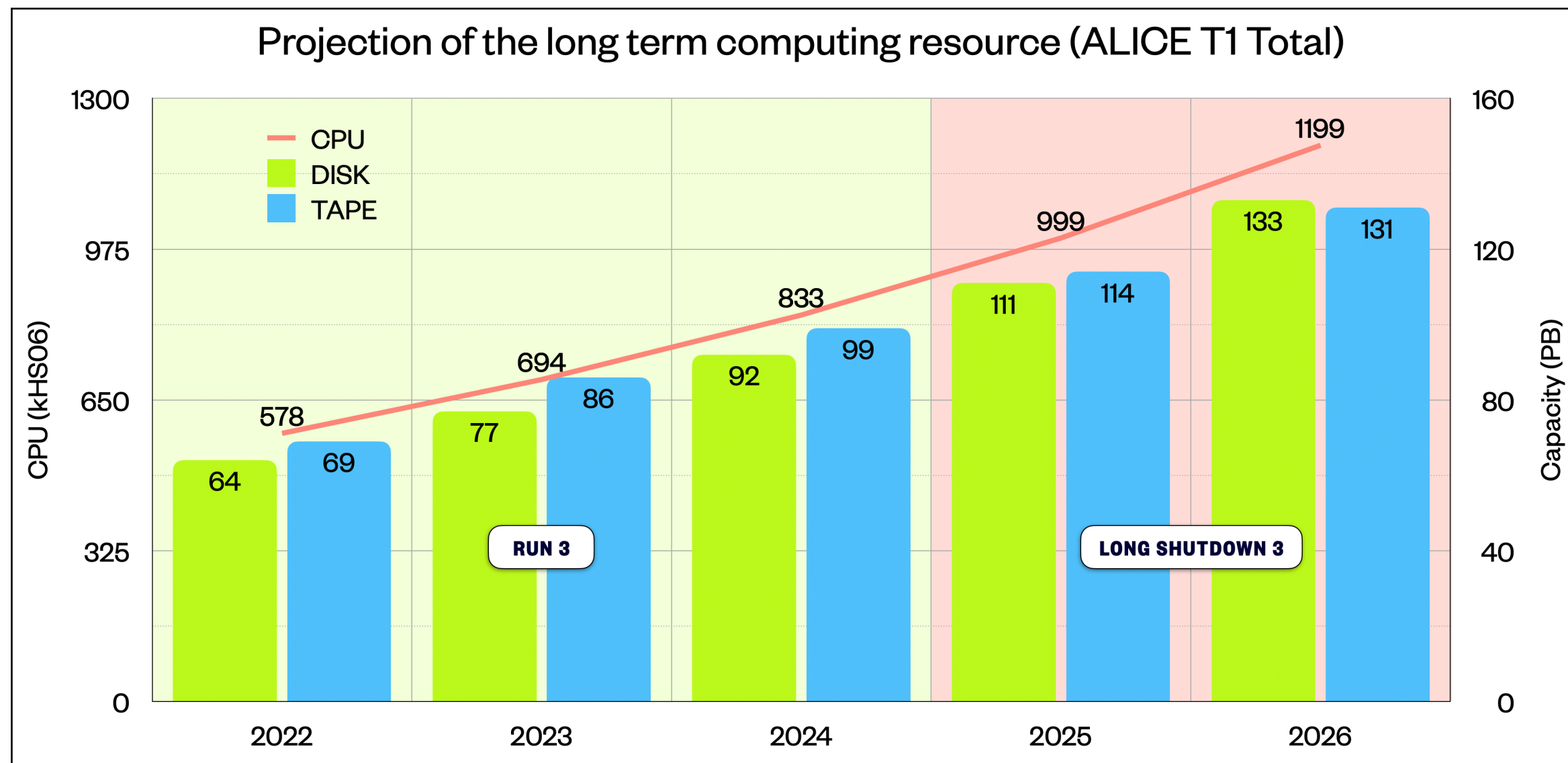
- Data transfer tests along with the OPN upgrade to 20Gbps in April
- Reached almost 20Gbps peak (> 1GB/s) during the tests

- Joined efforts of WLCG collaboration for LHC RUN3 data taking
- Successful results to meet the target transfer performance (150MB/s)
- Stable and smooth operations of CDS during the challenges

# Pledges



## 10% Contribution to ALICE Tier-1 Computing Requirements



	2019	2020	2021	2022	2023
CPU (cores)	3,800	3,800	4,500	5,000	5,500
DISK (TB)	3,500	4,000	4,500	5,000	6,000
TAPE (TB)	3,000	5,500	12,000	12,000	12,000

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# Summary

- Smooth operations of KISTI Tier-1 for ALICE experiment in 2021
- Successful OPN upgrade and data transfer tests done for LHC RUN3
- Continuous resource growth and dedicated effort to meet the ALICE computing requirement for LHC RUN3, RUN4 and beyond