Karlsruhe Institute of Technology

GridKa LK-II Highlights

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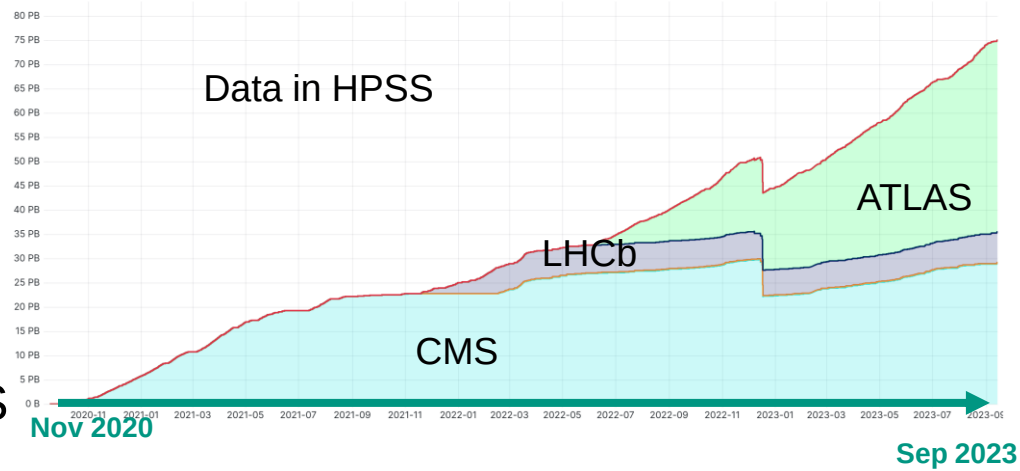
GridKa – Resources

- Compute
  - 217 active nodes – reduced to **110% plege** to safe power
  - 42500 active cores – **>97% efficiency**
  - Purchase **ARM nodes** for testing at scale
- Online Storage
  - **99 PB usable** storage
  - dCache + xrootd on IBM Storage Scale
- Offline Storage
  - **86 PB used**, 134PB pledged
  - **Flash** based disk buffers
  - Ongoing migration to **HPSS**
  - Development for **recall optimization**
- WAN
  - **200 Gb/s to CERN**/LHCOPN
  - **200 Gb/s to DFN**/LHCONE
- Detailed energy monitoring for all components

Smooth operations for Run 3 data taking

Tape Migration to HPSS

- Migration of 60+PB of data
  - From TSM to HPSS
  - From Oracle technology to IBM
  - From KIT CN to CS
  - Introduction of aggregation
  - VO metadata passing to tape system
- Parallel operation of TSM & HPSS



Nov 2020

Sep 2023

- Ongoing in-house software development for recall optimization
- Many lessons learned & successful operation

➔ looking forward to Data Challenges 2024

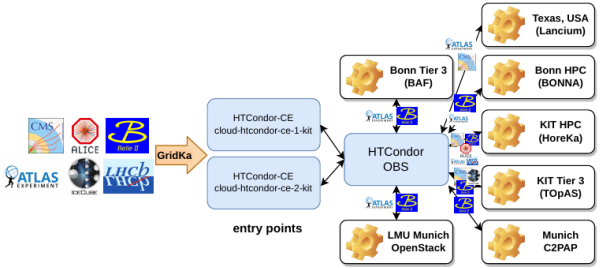
- Migration of 12PB ALICE data about to start

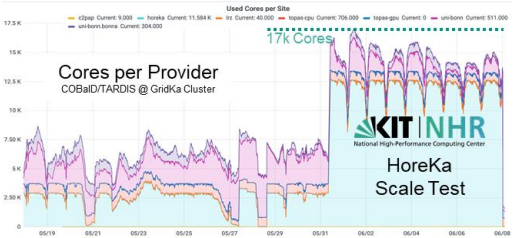
Changing WLCG Landscape in Germany

- University Tier-2 centers will phase out resources starting in 2025
- KIT/GridKa Participation in BMBF-proposal
  “Federated Computing for the ATLAS and CMS Experiments”
  - Funding period 2024 – 2025
  - **Storage pledges** @Uni T2s will be taken over by **DESY+KIT**
    - 2025 2PB (funded by BMBF)
    - 2026 +2PB (own funds)
    - 2027 +3PB (funded from FIS roadmap proposal)
    - will be transparently integrated into GridKa
  - **Compute pledges** @Uni T2s to be taken over by **NHR HPC** centers
    - Likely CLAIX (Aachen), Emmy (Göttingen), HoreKa (KIT)

Opportunistic Compute @ GridKa through cooperation with Group Günter Quast (ETP)

- Long term very successful cooperation
  - Development of the open-source software COBalD/TARDIS for **dynamic, transparent and on-demand integration of remote computing resources** (HPCs, clouds, …)
- COBalD/TARDIS
  - Demonstrated **production scale operation** during scale test together with HoreKa (HPC cluster at KIT)
  - **Central building block** of the Compute infrastructure in PUNCH4NFDI (DFG) and FIDIUM (BMBF)





Proof-of-Concept Integration of Lancium Compute

- US company balancing the power grid by operating **compute facilities** close to **renewables** (wind & solar)
- Dynamic, transparent and on-demand integration via COBalD/TARDIS
- Used for ATLAS/CMS MC generation (~700.000 CoreHours during PoC)
- Very smooth PoC, experiments did not even noticed that the jobs ran in the US
- Unfortunately, Lancium decided to get out of the PaaS business in April 2023