Status of Integration of NHR at ATLAS

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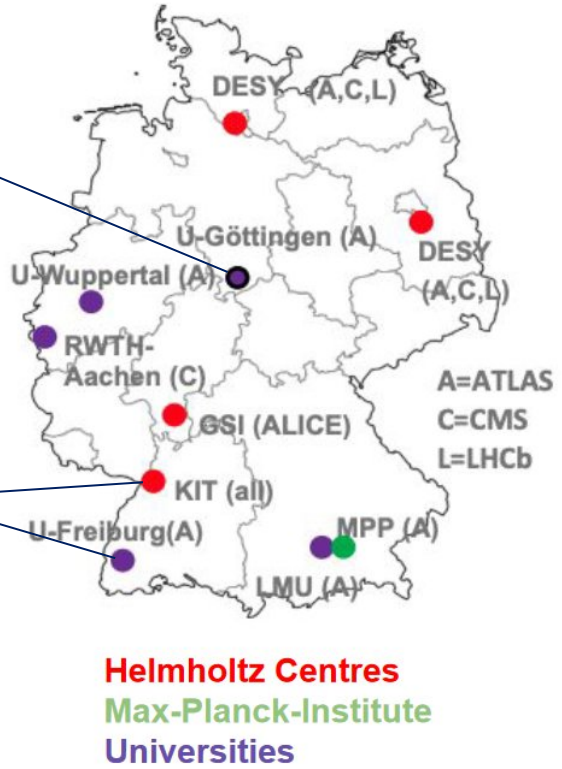
NHR sites for ATLAS data processing

NHR@Göttingen “Emmy”
taken care of by Göttingen group

NHR@KIT “HoreKa”
taken care of by Freiburg group



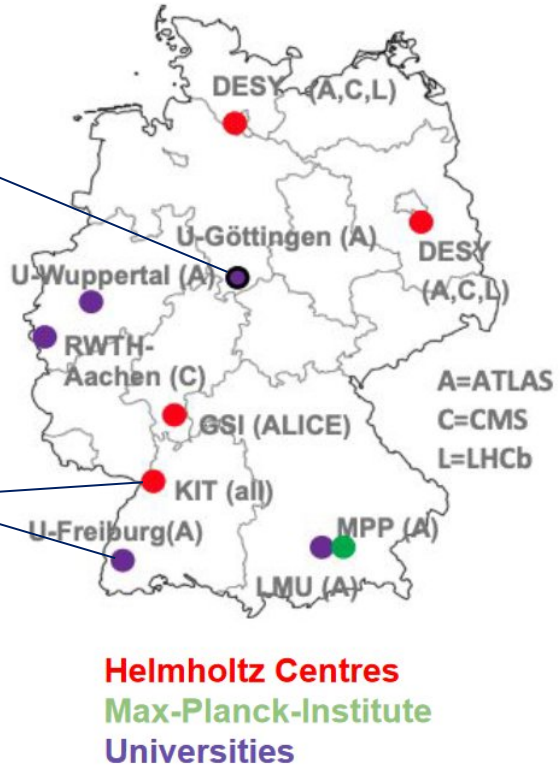
NHR sites for ATLAS data processing

NHR@Göttingen “Emmy”
taken care of by Göttingen group

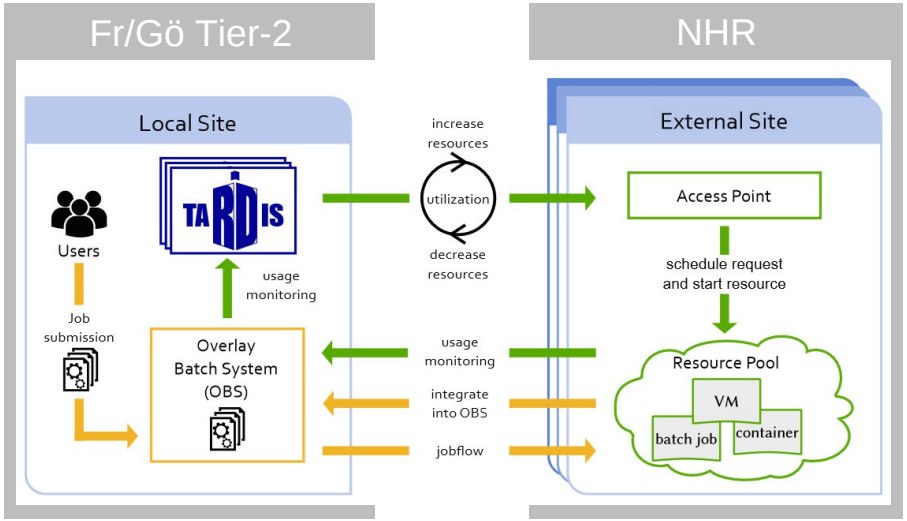
on-campus with GoeGrid Tier-2
➟ O(100Gbit/s) connection to GoeGrid mass storage

NHR@KIT “HoreKa”
taken care of by Freiburg group

on-campus with GridKa Tier-1
➟ O(100Gbit/s) connection to GridKa mass storage



General approach:
Virtual Worker Nodes (Drones)



Provides necessary freedom on HPC nodes for:

- Job slot design
- cvmfs
- network configuration

Details on setup at HoreKa/Freiburg

- ARC-CE and HTCondor of the Freiburg Tier-2 as OBS
- Cobald/Tardis used as resource manager
- Drone lifetime: 4h, to be extended to 4 days
- WNs equipped with local SSDs for scratch space
- Currently using Freiburg Tier-2 mass storage at ~40Gbit/s connection, planned to switch to GridKa mass storage
- No network modifications needed so far
- CVMFS provided in drones via cvmfs-exec
- Uses Freiburg Tier-2 squid proxy at the moment; to be changed to GridKa squid proxies

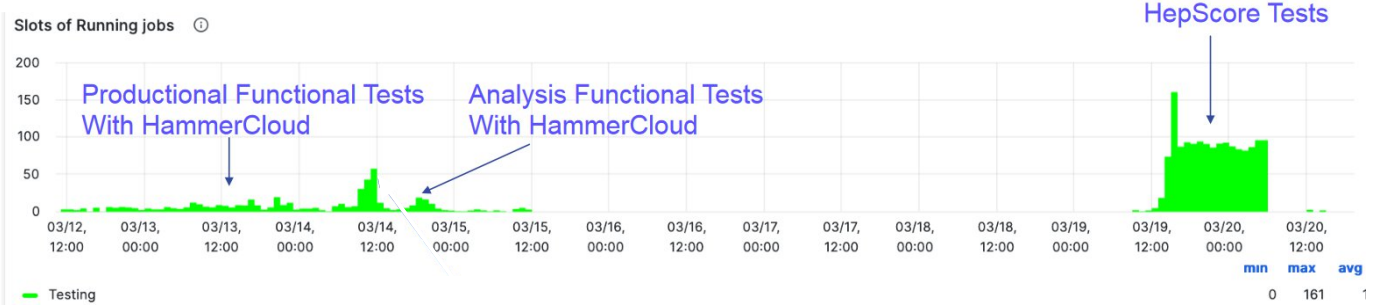
Details on setup at Emmy/Göttingen

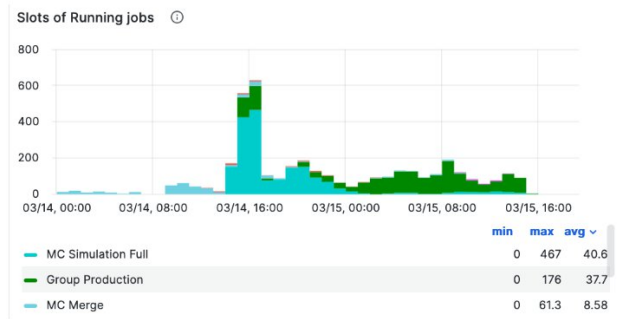
- ARC-CEs and HTCondor of GoeGrid as OBS (additional ARC-CEs were needed during large scale tests)
- Cobald/Tardis used as resource manager
- Drone lifetime: 1 week
- WNs used shared file systems for scratch space (HDD or SSD) in the past; more WNs are equipped with local SSDs now, which is used the moment and preferably in the future.
- Currently using GoeGrid Tier-2 mass storage at ~4x100Gbit/s connection
- Direct network connection behind GWDG firewall had to be established (exclusive access by our drones)
- CVMFS provided in drones via cvmfs-exec
- Uses GoeGrid Tier-2 frontier squid and Emmy http-proxy for default http-traffic

Tests at HoreKa/Freiburg

Tested since beginning of this month:

- HammerCloud tests
- Benchmark tests (22 HS23/core)
- First regular analysis and production jobs ran successfully





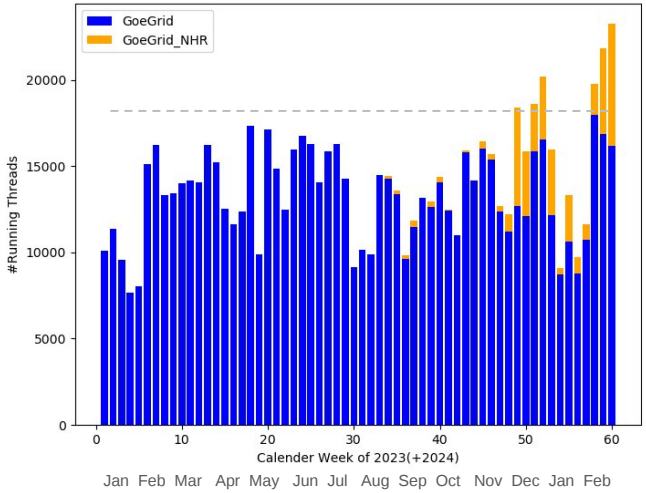
Regular ATLAS jobs run successful!

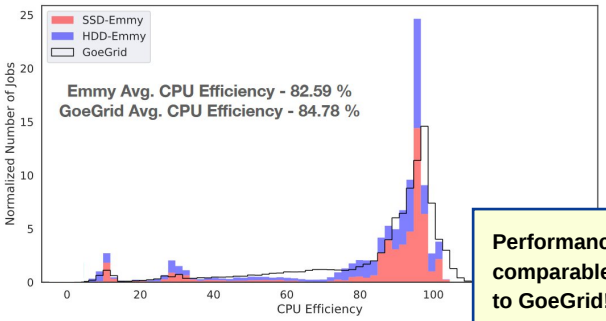
Perforance under larger load to be tested soon.

Tests at Emmy/Göttingen

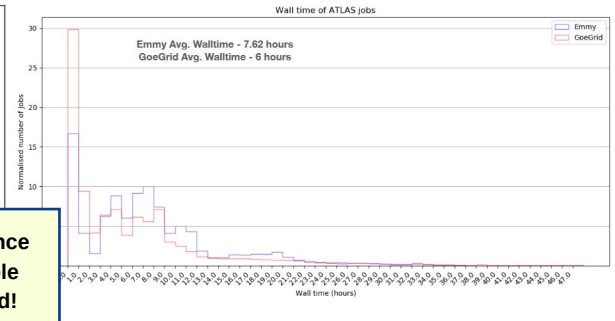
Tested since August:

- HammerCloud tests
- Benchmark tests (20 HS23/core)
- Regular analysis and production jobs incl. large scale tests reaching regular production conditions (up to 7000 virt. cores)
- Tests so far with manually launched drones; testing of Cobald/Tardis recently started
- 2 days of exclusive usage of Emmy did not revealt significantly different CPU effs.; however single incidents over past months where shared FS throttled by other users => use local SSDs if possible





Performance comparable to GoeGrid!



Regular ATLAS jobs run successful at scale of a Tier-2!
Going to test scaling up even further.

Status of NHR Project Applications

Pilot phase (Q2/24 - Q1/25) at 10% of 2024 German ATLAS Tier-2 pledges (2 x 2.7 Mio. coreh):

- Will be handed by Freiburg at HoreKa (rolling call)
- Handed in by Göttingen at Emmy

Applications for compute time in 2025 (pledged) to be prepared very soon.

(Need to hand in at Emmy by mid of April in order to know result by end of June (and before September))

Conclusion & Outlook

- Technical setups prepared and testing is ongoing (some minor changes still in the queue)
- Regular ATLAS jobs can be run at both sites HoreKa and Emmy
- Job load at Emmy successfully tested beyond pledges of an ATLAS Tier-2 site

- Long-term stability to be tested during upcoming pilot phase + further large scale tests
- Data streaming from/to GridKa / DESY to be tested and prepared for Emmy (bandwidth, caching...)

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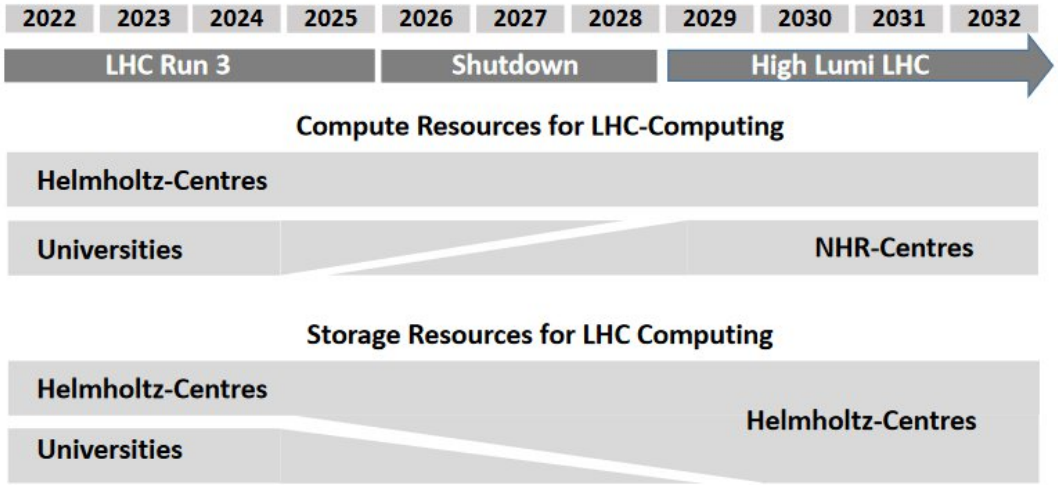
backup

Transformed Model for WLCG Resources in Germany



Moving Tier-2 resources from universities to NHR-Centers (for computation) and Helmholtz-Centers (for storage)

- Better cost and energy efficiency at fewer large sites
- Foster synergies with other science fields