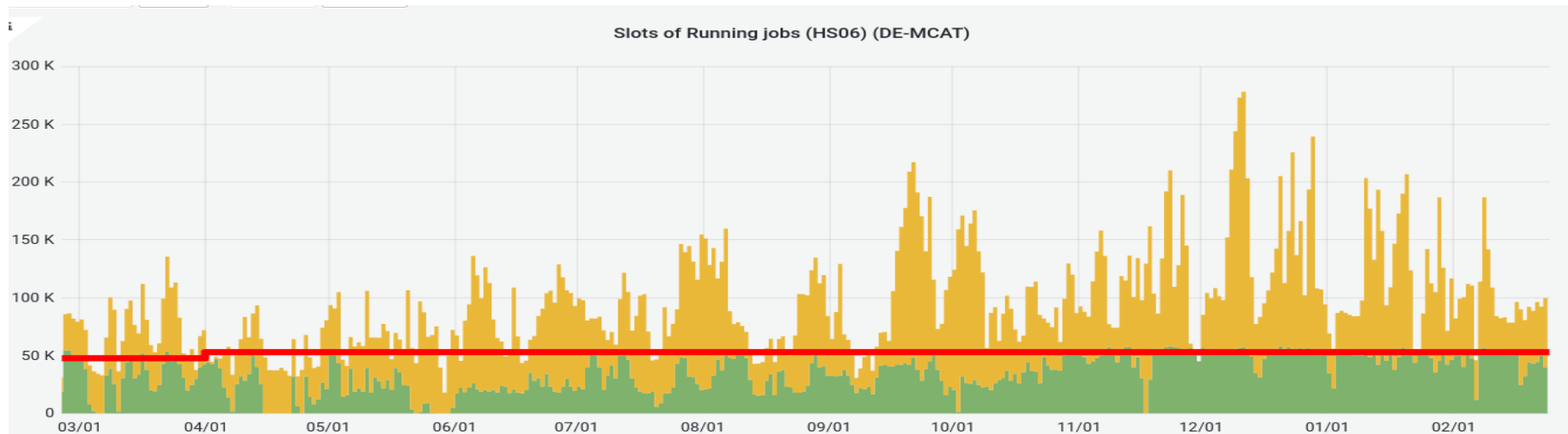# LRZ-LMU report – A&C research compound meeting – Feb 2023

- Pledges & Usage

- Person-power

- Procurement plans

- Power costs

- Additional activities

LMU-Team:
O. Biebel
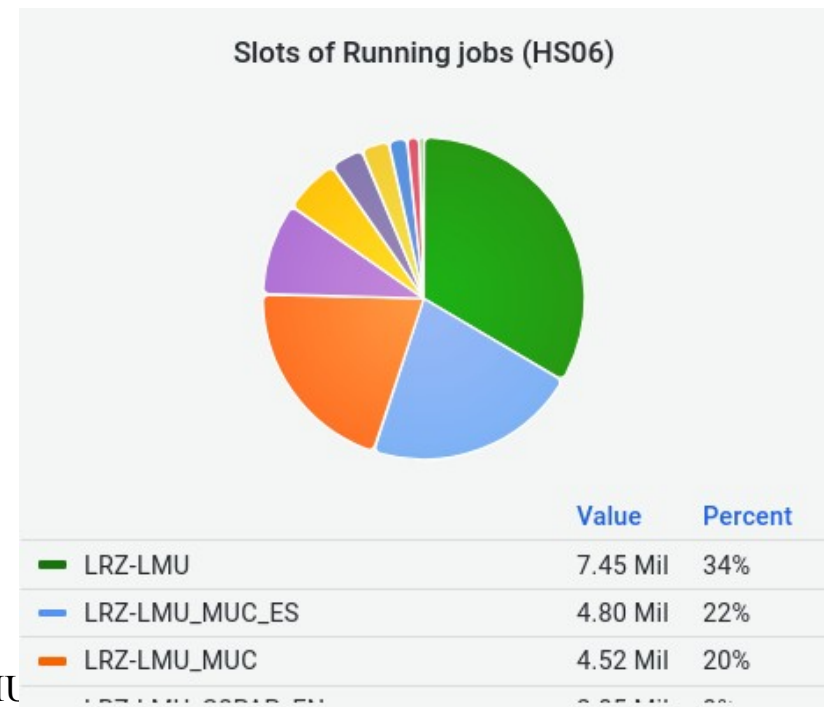G. Duckeck
A. Lory
C. Mitterer
R. Walker

LRZ-LMU: pledges & usage

Slots of Running jobs (HS06) (DE-MCAT)

LRZ-LMU

MPPMU

- Federation w/ partner site MPCDF/MPP
  - Std ATLAS-DE T2 2023 pledges:
    29 kHS06 CPU, 2800 TB Disk
- Substantial addtl opportunistic CPU resources:
  - T2 (40%), SuperMuc (42%), C2PAP (12%), LRZ-cloud (3%), …
  - Last year CPU: ~2.2 x pledge

Slots of Running jobs (HS06)

	Value	Percent
■ LRZ-LMU	7.45 Mil	34%
■ LRZ-LMU_MUC_ES	4.80 Mil	22%
■ LRZ-LMU_MUC	4.52 Mil	20%

LRZ-LMU: person-power

- G. D. (coordination, procurement, ...) – LMU position

- C. Mitterer (dCache & T2 services) – LMU position

- R. Walker (T2 CE, opportunistic resources, ATLAS DPA, ADC technical coordinator) – BMBF core computing

- A. Lory (HammerCloud, HC coordinator since fall 22) – BMBF DE computing support (full position since 03/2022)

  - HammerCloud – coordination, operational support, auto-exclusion check & optimization

- LRZ personnel: sys-admin, hardware install, networking, …
    – LRZ positions

LRZ-LMU: hardware status

- CPU:
  Purchase usually via LRZ Rahmenvertrag for current HPC architecture

  - 44 Lenovo nodes, Xeon E5-2697 from 2015-2017

    - SuperMuc/CoolMuc-2 architecture, ~25 kHS06

  - 18 Megware nodes, Xeon 6230, 2020

    - CoolMuc-3 architecture, ~18 kHS06

- Disk:
  Usually self-organized purchase, standard tender procedure

  - 18 HP servers a 10x8TB HDD from 2017

    - ~1400 TB

  - 19 HP servers a 12x16 TB HDD from 2021

    - ~3600 TB

LRZ-LMU: procurement plans

- No procurement so far in current BMBF-FP

- 2023: CPU :

  - Replace Lenovo systems (6-8 y old) + increase: ~40 kHS06

- 2024 Disk :

  - replace old HP + increase: ~3000 TB

LRZ-LMU: power costs

- Power contracts handled by LRZ
  - Long-term contract – only modest increase 2022 → 2023 (<10%)
    - Though cost 2024+ completely unclear
  - Cost covered by LMU administration (so far)
- Side-note:
  - From 2016→ 2022 power consumption **halved** & resources **doubled**
- Active project by Rod Walker to reduce CPU clock rate in periods of power shortage/high-cost/high-CO_2 (→ presentation WLCG 2022)
  - Implemented on CPU cluster and functionality demonstrated
    - Rough estimate: for 10% CPU loss one could save up to 25% power-cost
      - If there would be a dynamic power tariff – so far only dry-run

LRZ-LMU: add-ons

- Substantial use of opportunistic resources since many years

  - SuperMuc-NG: Rather special requirements → dedicated setup

    - Multi-node jobs, pre-empt, GlobusOnline for data IO, ATLAS Harvester, ...
    - Rather variable availability, >10 k cores sometimes

  - C2PAP (CPU cluster for ORIGINS exc-cluster)

    - Purely opportunistic usage, IO via T2 dCache, mix of regular and preempt

  - LRZ openstack cloud and K8s test cluster: ~100 cores

- Storage site for HEPHY-UIBK (Innsbruck)

  - OpenStack cluster ~1500 cores, IO via LRZ-LMU dCache

- XCache: several active servers

  - Integrated in ATLAS VP (virtual placement) for analysis: ~300 slots

    - Regular operation since ~2020

LRZ-LMU: add-ons - 2

- Fidium TA-3 – analysis technologies
  - Ongoing activity related to Iris-HEP Analysis Grand Challenge (D. Koch)
    - Perform standard analysis test-suite (Coffea/Dask) on different cluster environments in DE
    - Tests in progress on
      - Vispa/RWTH, Desy-NAF/Uni-HH,
      - LRZ-LMU: dCache, HDD XCache, SSD XCache, ...
- Considerations to setup OpenStack/K8s cluster
  - Substantial CPU procurement in 2023 → K8s cluster?
  - Similar plans & experience at MPCDF partner site
  - Strong interest & activity on K8s analysis cluster by new ATLAS group at TUM (L. Heinrich)
- Belle 2
  - LRZ-LMU dCache integrated in Belle 2 as resource for local group
    - Using phased-out storage servers