Status of Computing and Storage Activities at DESY

Annual Meeting of the BMBF-funded Research Compound 2023.Feb.27

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https://dcache.org   https://grid.desy.de   https://naf.desy.de

HELMHOLTZ RESEARCH FOR GRAND CHALLENGES

DESY.

DESY HEP Computing Activities

Activities Fields

- dCache Storage Development

- Storage and Compute

  - ATLAS (HH + ZN)
  - CMS (HH)
  - Belle II Raw-Data Centre (HH)
    - Community Tools
  - Icecube, CTA (ZN)
- National Analysis Facility

  - DE HEP User Compute Cluster

dCache Development

DESY one of the main contributors to dCache storage system

- in house developers at DESY

- dCache instances serving s wide range of use cases

  - 120PB instance with 20-40GB/s ingest (XFEL)

  - instance with 1.2e9 objects w. DB ~2.5TB (Photon)
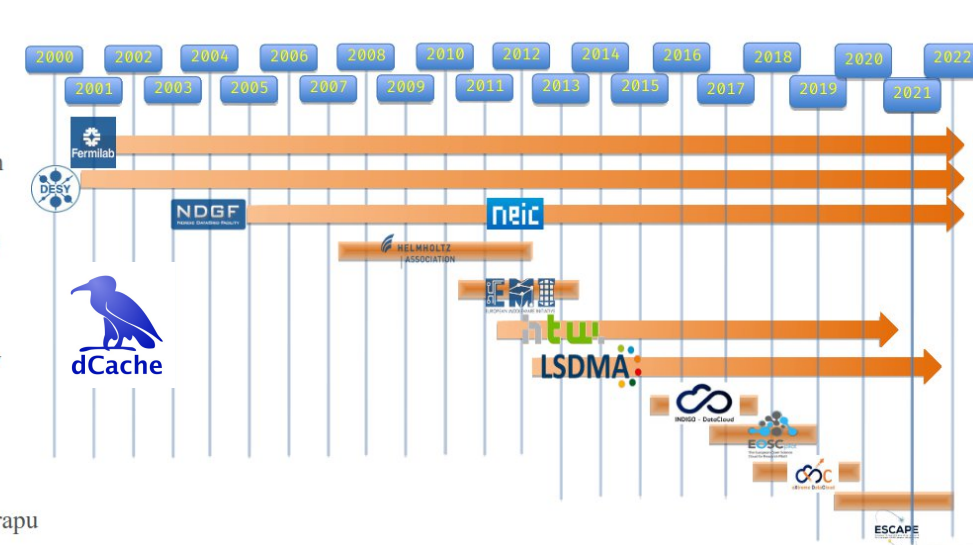
  - file lifetimes <1s (cloud)

Recent Developments

- CTA tape backend integration

- Tape Rest API

- flexible metadata/namespace views

- storage event integration for alarming & self-healing load optimization

- Quotas, Tokens,...

- **DESY**
  - Svenja Meyer
  - *Paul Millar**
  - Tigran Mkrtchyan
  - Lea Morschel
  - Marina Sahakyan

- **FermiLab**
  - Dmitry Litvintsev
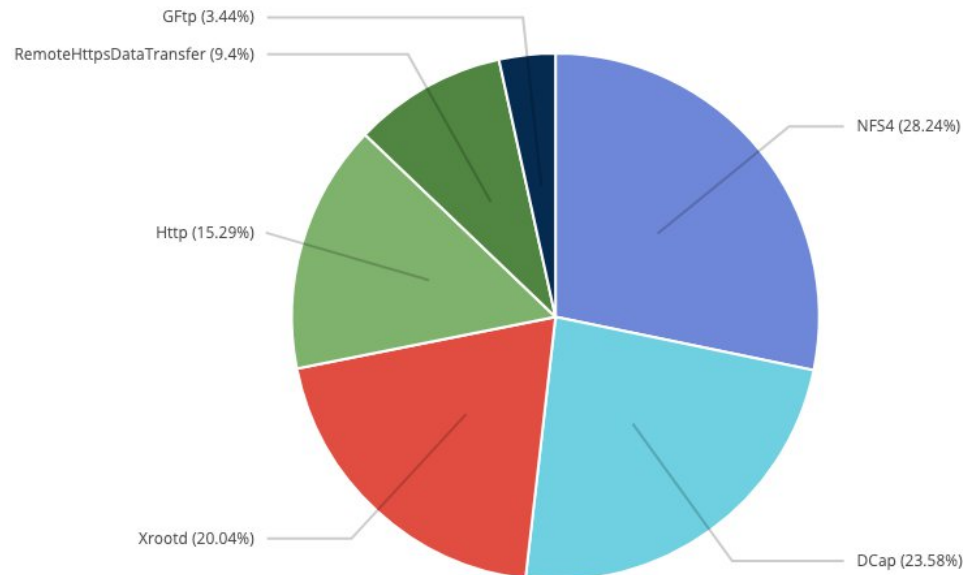 - Albert Rossi

- **NeIC**
  - Krishnaveni Chitrapu

RSVP
dCache Workshop
May.31-June.1

Storage Operations

DOT Team HH (C. Voss), Team ZN (A. Haupt)

- about 29 PB HEP+Astro raw storage under management in HH+ZN

- dCache storage deployments at v8.2

- instance monitoring based on storage events

- unique challenges with Grid production and NAF user activities in parallel

VO	Raw Size
ATLAS DATADISK HH	2.6 PB
ATLAS SCRATCHDISK HH	0.2 PB
ATLAS LOCALGROUPDISK HH	3.4 PB
ATLAS DATADISK ZN	2.75 PB
ATLAS SCRATCHDISK ZN	0.05 PB
ATLAS LCOALGROUPDISK ZN	0.5 PB
Belle II prod+cal HH	2 PB
Belle local HH	0.4 PB
CMS Unmerged HH	0.2 PB
CMS Store HH	6.1 PB
CMS User HH	5.6 PB
ICECUBE ZN	2 PB
CTA ZN	2.2 PB
ILC HH	0.57 PB

GFtp (3.44%)
RemoteHttpsDataTransfer (9.4%)
Http (15.29%)
Xrootd (20.04%)
DCap (23.58%)
NFS4 (28.24%)

Storage Operations

NAF Tape Support for User Data

Tape Support for ATLAS+CMS in Deployment at HH

- (unique) user data had been single copies only

  - risk for data losses w/o Grid replicas

- tape support for ATLAS & CMS in preparation

- close collaboration with dCache developers (CTA)

Grid Computing and Middleware @ ZN

Grid Production HTC Cluster

Grid HTC Cluster serving ATLAS, CTA, ICECUBE

- ~90 kHS06 on 5000 cores

- ~54 kHS06 on 2800 cores since energy-saving switch-offs January 2023

- ICECUBE GPU cluster with ~120 GPU cards

Grid Computing and Middleware @ HH

Grid Production HTC Cluster

- various CVMFS stratum-0 repositories

- investigating IAM deployment for token workflows

- Grid HTC Cluster with ~338 kHS06 on ~22k HT cores

HS06/Watt performance between worker generations

Sustainability Studies

- overfulfilling pledges by ~75% w. oow workers

  - HS06/Watt factor ~4 between generations

  - PoC christmas load shedding of none-pledged HS06

  - investigated worker throttling

    - idle load power consumption prohibitive
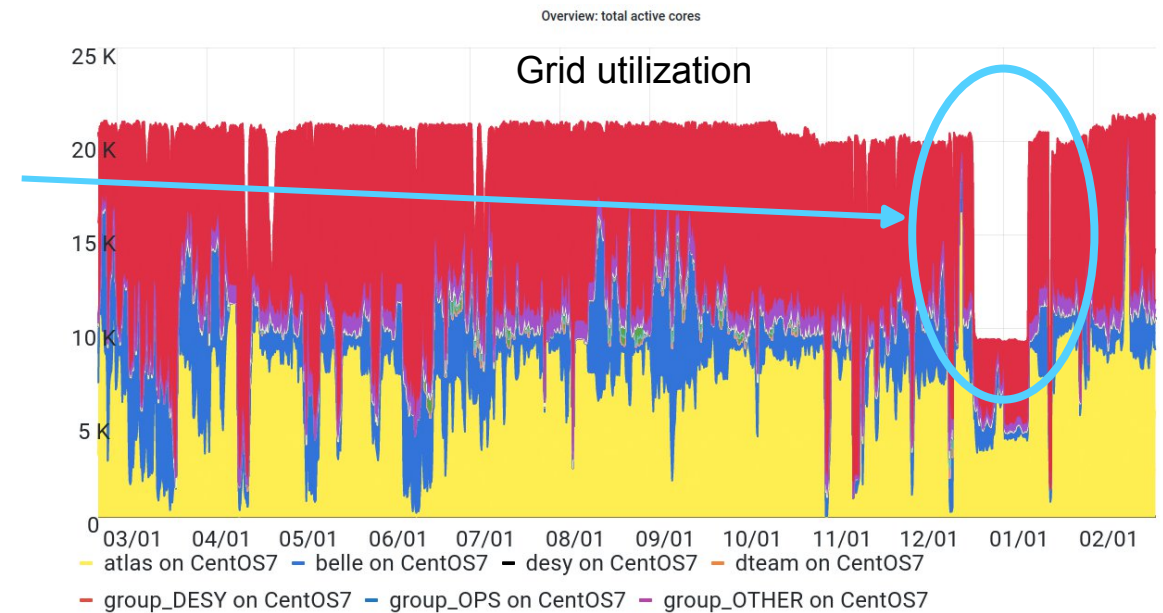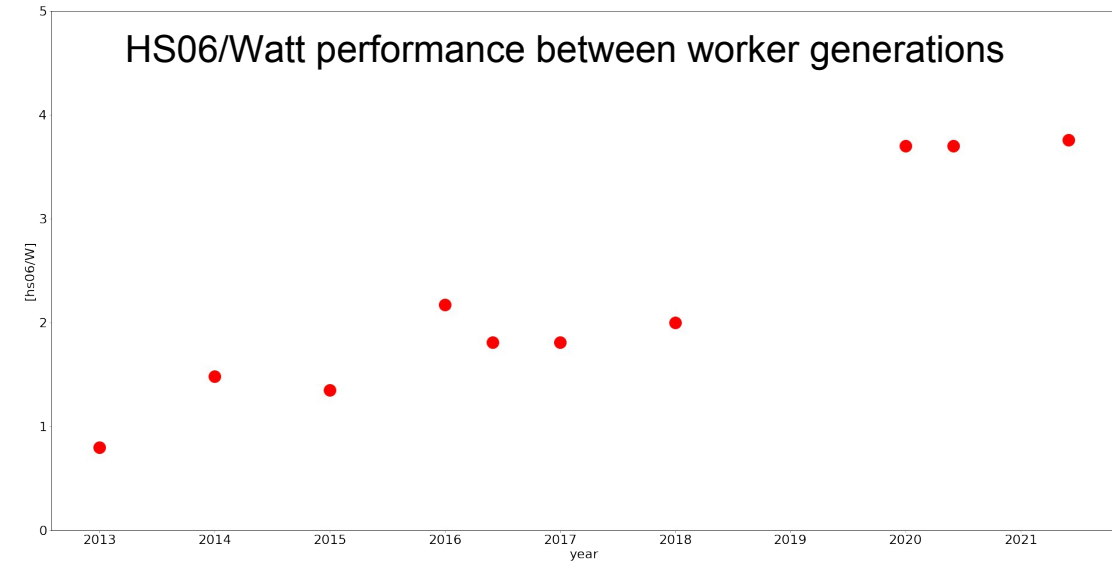
Grid utilization

National Analysis Facility

User Analysis HTC Cluster (C. Beyer)

- HTC cluster for DE HEP communities with ~290 kHS06

- shared scratch & grid storages available

- dynamic Jupyter notebooks

- low job turnaround latency – fast user response

  - utilization more dynamic than Grid HTC cluster

- worthwhile energy conservation target

  - power load correlated with user activity

  - dynamic cluster compactification and load shedding of unrequested cores/workers (C. Beyer)

  - impact on user job latency to be limited

NAF utilization

power saving projections
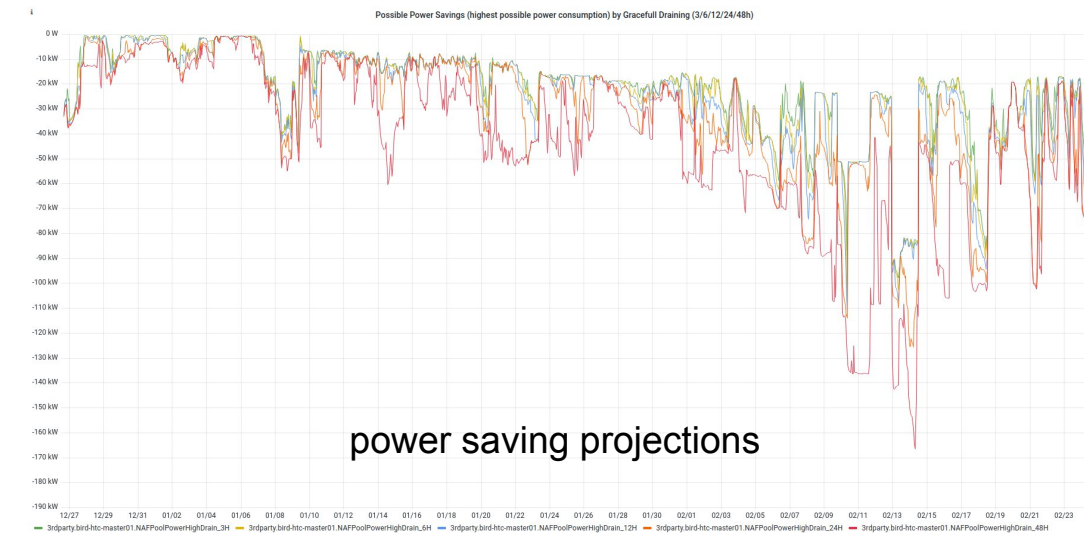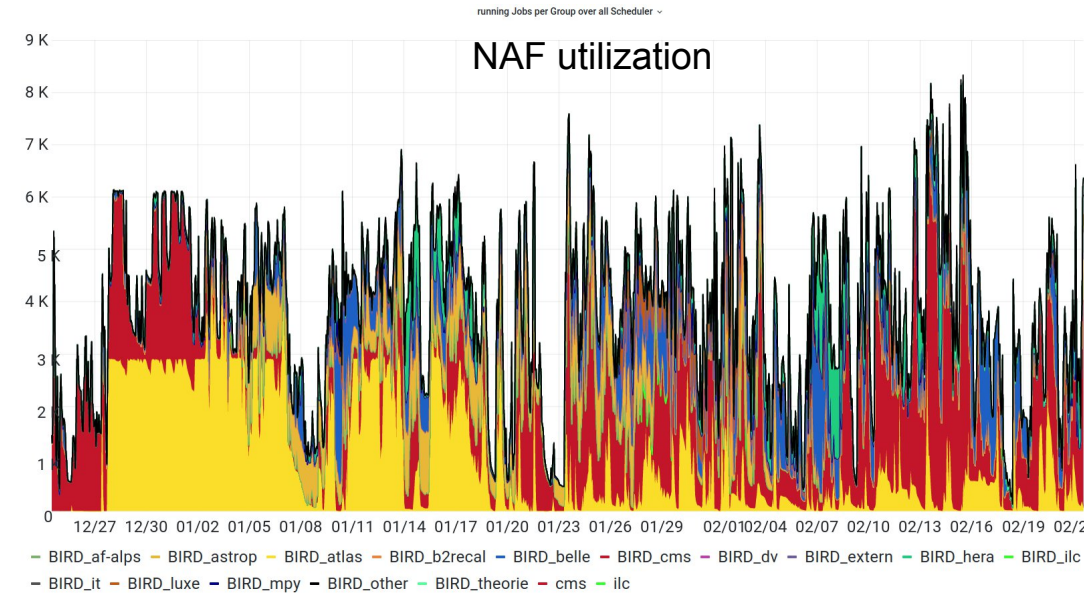
Summary

DESY HEP Computing Activities

- active contributor to dCache devlopment

- operational experiences for a wide range of storage use cases

Contact

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Elektronen-Synchrotron

www.desy.de