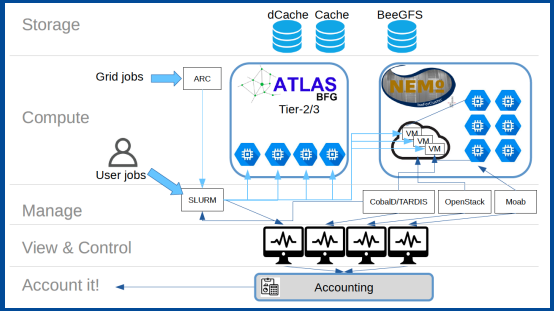
Plans and Status in Freiburg



Albert-Ludwigs-Universität Freiburg

UNI FREIBURG

Kick-Off-Meeting of Research Compound “Föderierte Digitale Infrastrukturen für die Erforschung von Universum und Materie (FIDIUM)“ - December 16th 2021

Michael Böhler

Physikalisches Institut
Albert-Ludwigs-
Universität Freiburg

Planned contributions

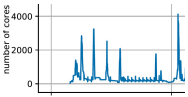
- TA-I: Development of tools for integration of heterogeneous resources
  - WP-1: Exploration and efficient integration of opportunistic resources
  - WP-2: Accounting and Controlling of heterogeneous resources
- TA-III: Adopting, testing and optimization of production and analysis environments
  - WP-1: Integration, tests, optimization and deployment of services
  - WP-3: Support

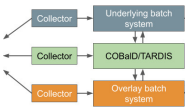
- 2 FTEs funded: filled with post-docs from HEP/Computing community

TA-I: Development of tools for integration of heterogeneous resources (1)

WP-1: Exploration and efficient integration of opportunistic resources

- Development of start-stop mechanism
  - large fluctuation of usage, might require possibility for full stop
    → save unneeded resources (e.g. start-stop mechanism in car)
- Development of plugins (interfaces) for the new accounting system
  - collectors will retrieve data from COBalD/TARDIS
    and provide data to accounting system
- Development and integration of a container solution
  - current ATLAS Freiburg setup is based on OpenStack virtual machines
    → evalute efficiency of containerization and adjust accordingly
- Update and maintenance of the developed adapters and plugins

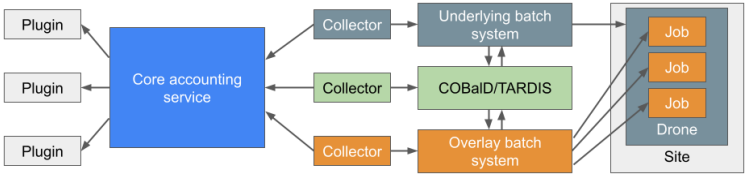




TA-I: Development of tools for integration of heterogeneous resources (2)

WP-2: Accounting and Controlling of heterogeneous resources

- Design, conception and technology selection
- Implementation of a accounting prototyp
- Further developments of the interfaces and quality assurance
- Consolidation and adjustments in production

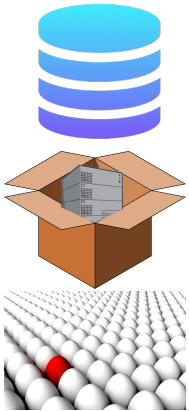


Accounting **D**ata handling **T**oolbox for **O**pportunistic **R**esources, the AUDITOR

TA-III: Adopting, testing and optimization of production and analysis environments (1)

WP-1: Integration, tests, optimization and deployment of services

- Improvement and optimization of the caching system (usecase ATLAS-BFG and NEMO(2))
  - transfer prototype into production
  - adjust for new parallel Storage - full flash (towards NEMO2)
- Setup and testing of „Compute Site in a Box“ for ATLAS-BFG and NEMO
- Provisioning of monitoring with **service checks**, **anomaly detection** and event handler



TA-III: Adopting, testing and optimization of production and analysis environments (2)

WP-1: Integration, tests, optimization and deployment of services

- Provisioning of a package with End-To-End-Tests for the operation of opportunistic resources
- Contribution to the development of an operating concept for a „ErUM Science Cloud“:

WP-3: Support

- Experience in operating an integrated resource with COBaID/TARDIS
- Experience in providing plugins and an adapter for COBaID/TARDIS
- Experience in setup of a caching solution

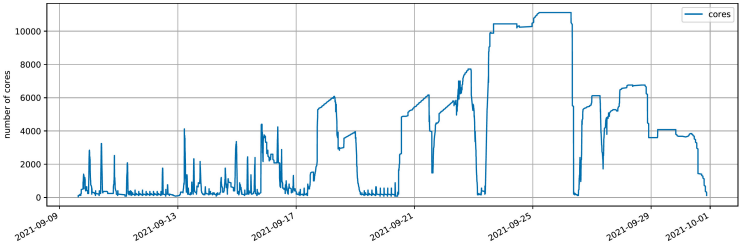
...

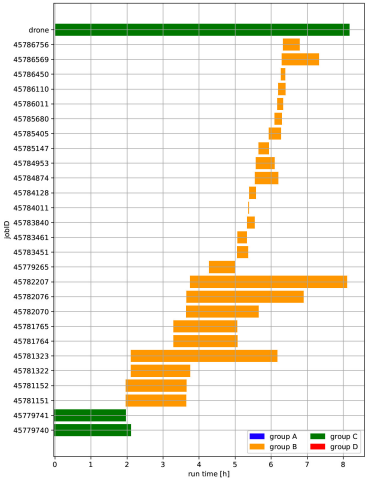
Previous works

- Successful integration of opportunistic compute resources with COBalD/TARDIS
- Development of a monitoring systems and integration in COBalD/TARDIS
- Pre-prototyp for an Accounting System (AUDITOR)
  - Fairshare Handler for the overlay batchsystem
- Installation and benchmarking of a caching solution
- Tests und benchmark measurements

Opportunistic Computing @ NEMO

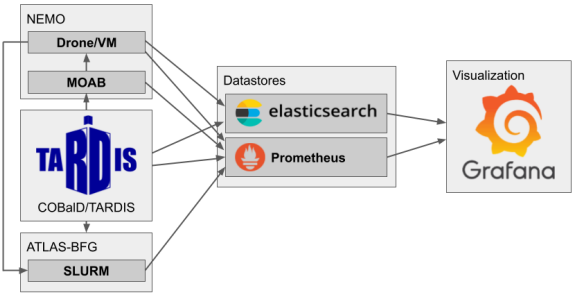
- Local ATLAS HEP Groups use Nemo as local batch system
- demand and usage varies heavily among groups
- NEMO policy one user gets entire node, opportunistic usage shares node among HEP users to increase efficiency
- Successully integrate $2 \cdot 10^6$ CPU h since beginning of 2020

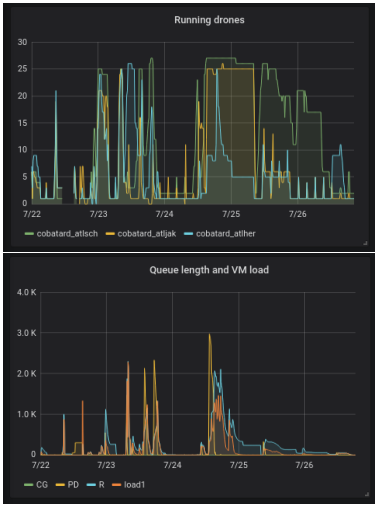




Monitoring

- Collecting data from various sources in multiple datastores

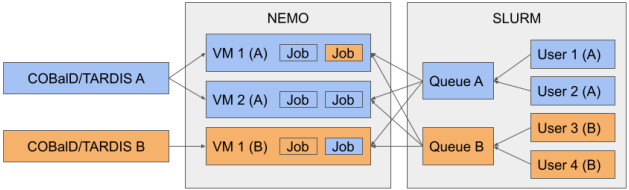




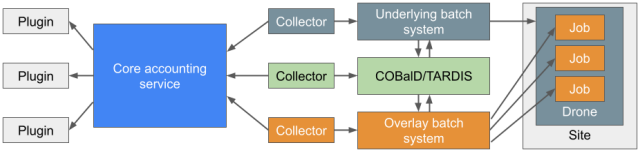
- Monitoring puppet module allows for the deployment of a monitoring setup for sites running COBalD/TARDIS

Fairshare Handler for the overlay batchsystem

- 4 local HEP groups with share in NEMO
  - individual queues on SLURM & COBalD/TARDIS instances
- Efficient use of resources → share VMs across HEP groups
- Provide faireshare on SLURM based on the provided resources on NEMO

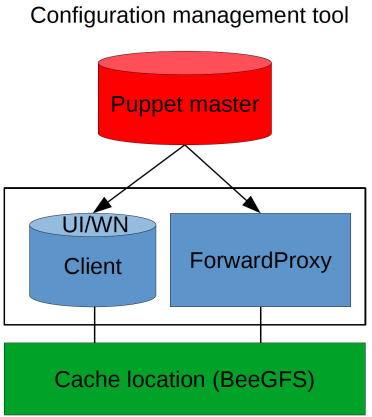


- Prototyp architecture of the fairshare/accounting framework



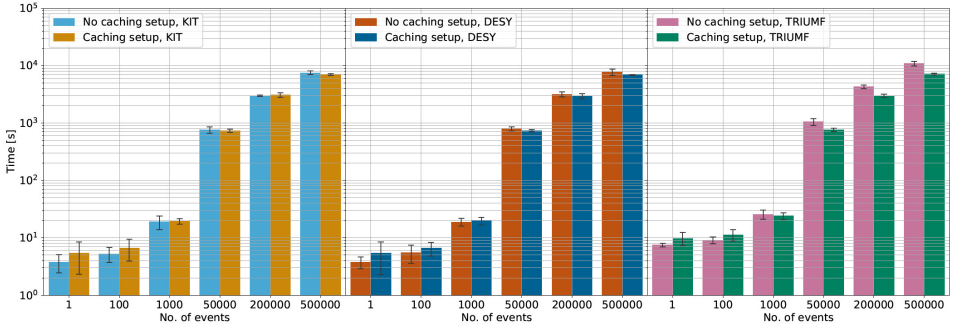
Data Caching (Prototype @ Freiburg)

- Deployment of **forward proxy** completely integrated in **puppet**
- **Non-privileged permissions** sufficient on storage system for cache space
- **Only environment variables** on the client host needed
  → no installation necessary



Data Caching Benchmarks

- mini HEP Analysis for benchmarking remote & cached file access
- network to sites close to Freiburg quite good, no caching required
- external data access from far distances: significantly slower than file access in cache
- **BUT** also first access (file note yet in data cache) benefits from caching
  - if the event loop is longer than the data transfer → further access switched to local file



Looking forward to stimulating and successful cooperation!