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Continuous Benchmarking

19/07/2022 | Nico Tippmann

Motivation

- Extending established process of Continuous Integration/Delivery by including non-functional properties like performance, efficiency and scalability

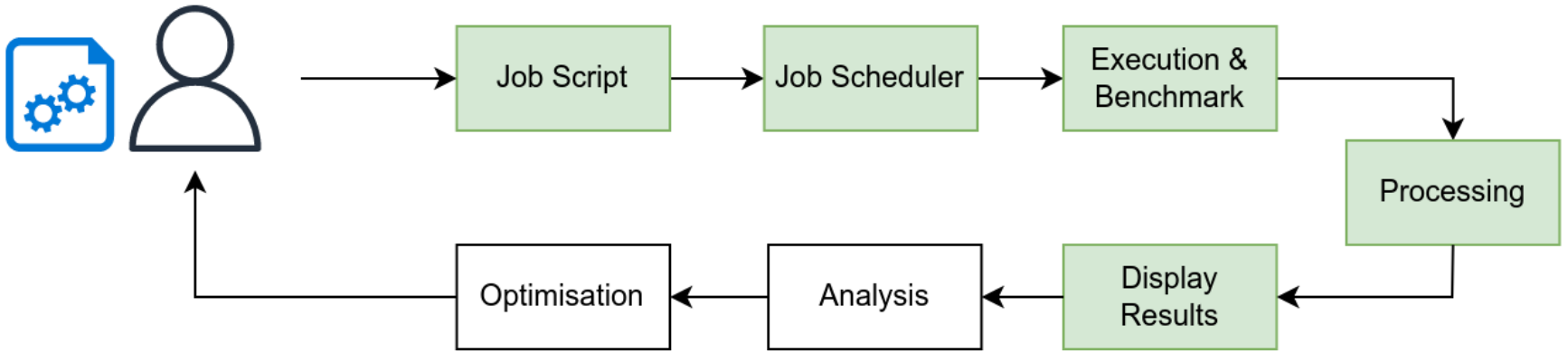
→ Concept and prototype developed during Master's Thesis @TUChemnitz (29.01.2021)

"Automation of Continuous Benchmarking for High-Performance Computing"

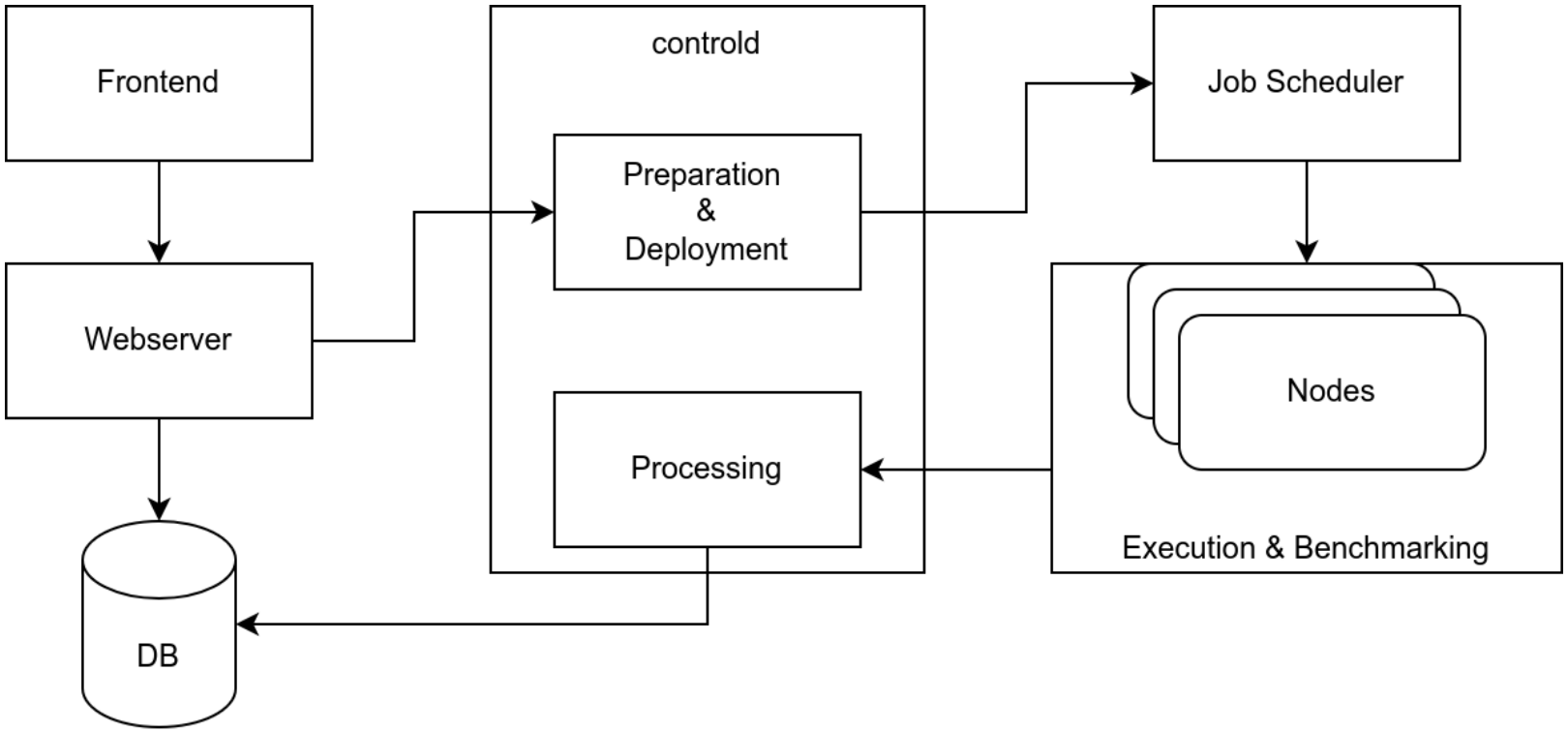
- High degree of automation to reduce time-consuming and error-prone benchmarking process
- Ability to automatically deploy, execute and benchmark any application directly on the cluster

→ Foundation for performance analysis and optimization

Automation


Job Script
Job Scheduler
Execution & Benchmark
Processing
Display Results
Analysis
Optimisation

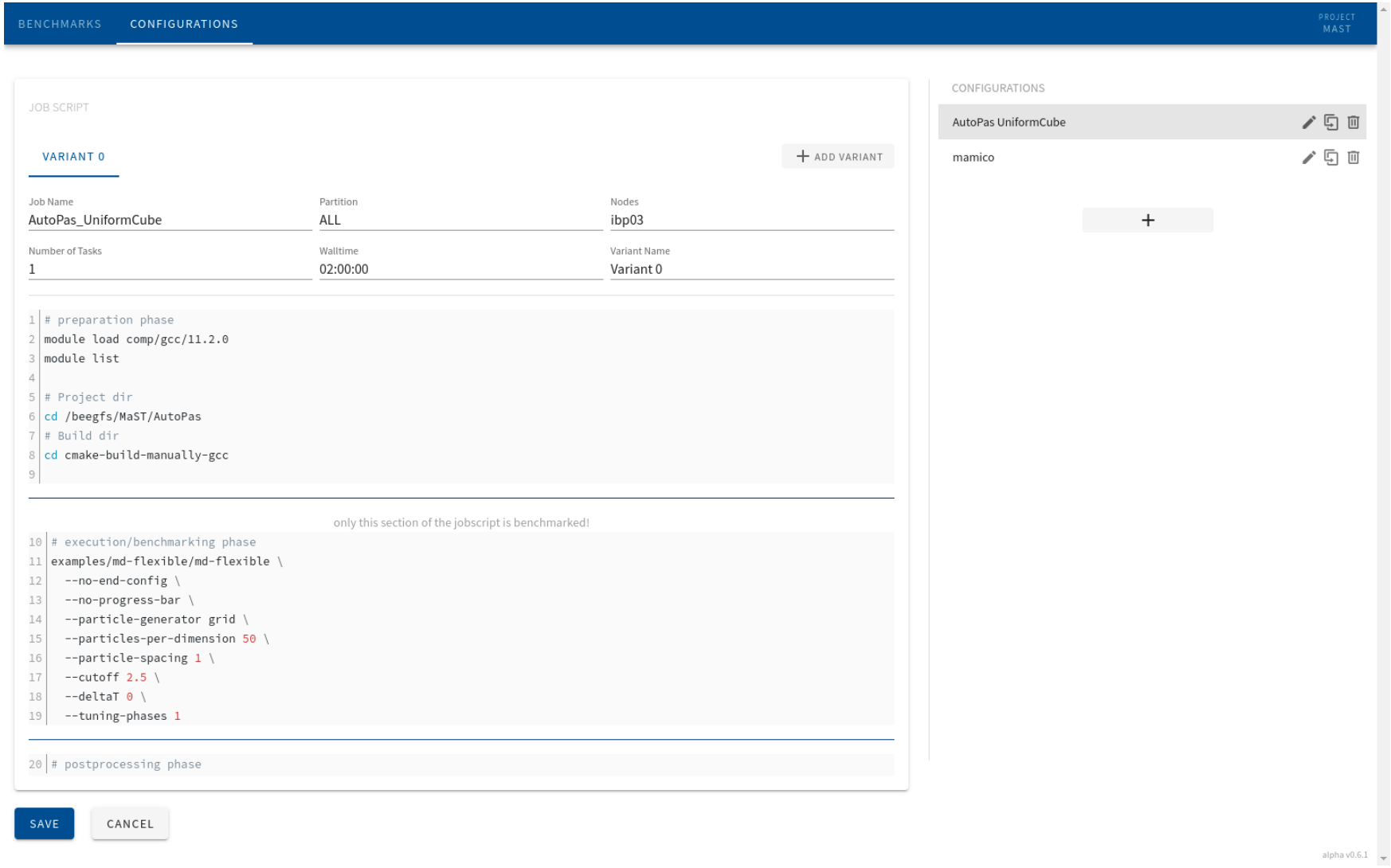
Architecture



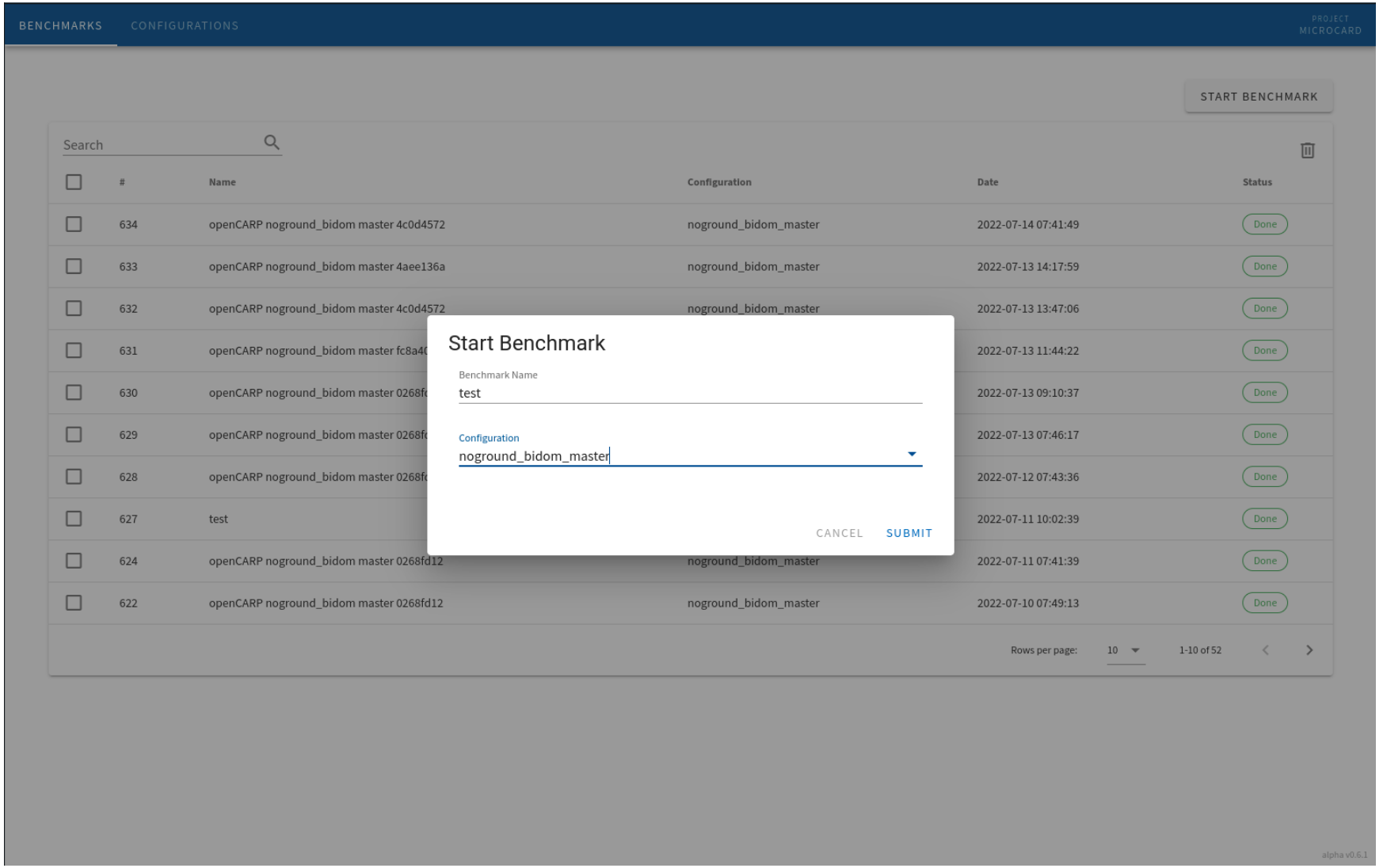
Current Status

- Target for beta-release end of Q3 2022
- Actively used in different two research projects
- Emphasis on CI extension, parameter studies and software regression testing
- Collection of ~130 different metrics
  - Usage of CPU, Memory, I/O and Network
  - GPU-Accelerators (currently only NVIDIA)
  - Hardware Performance Counters (via LIKWID) for low-level CPU/Memory-related metrics
  - Power Consumption
- Monitoring overhead < 1.5% with 5 second intervals

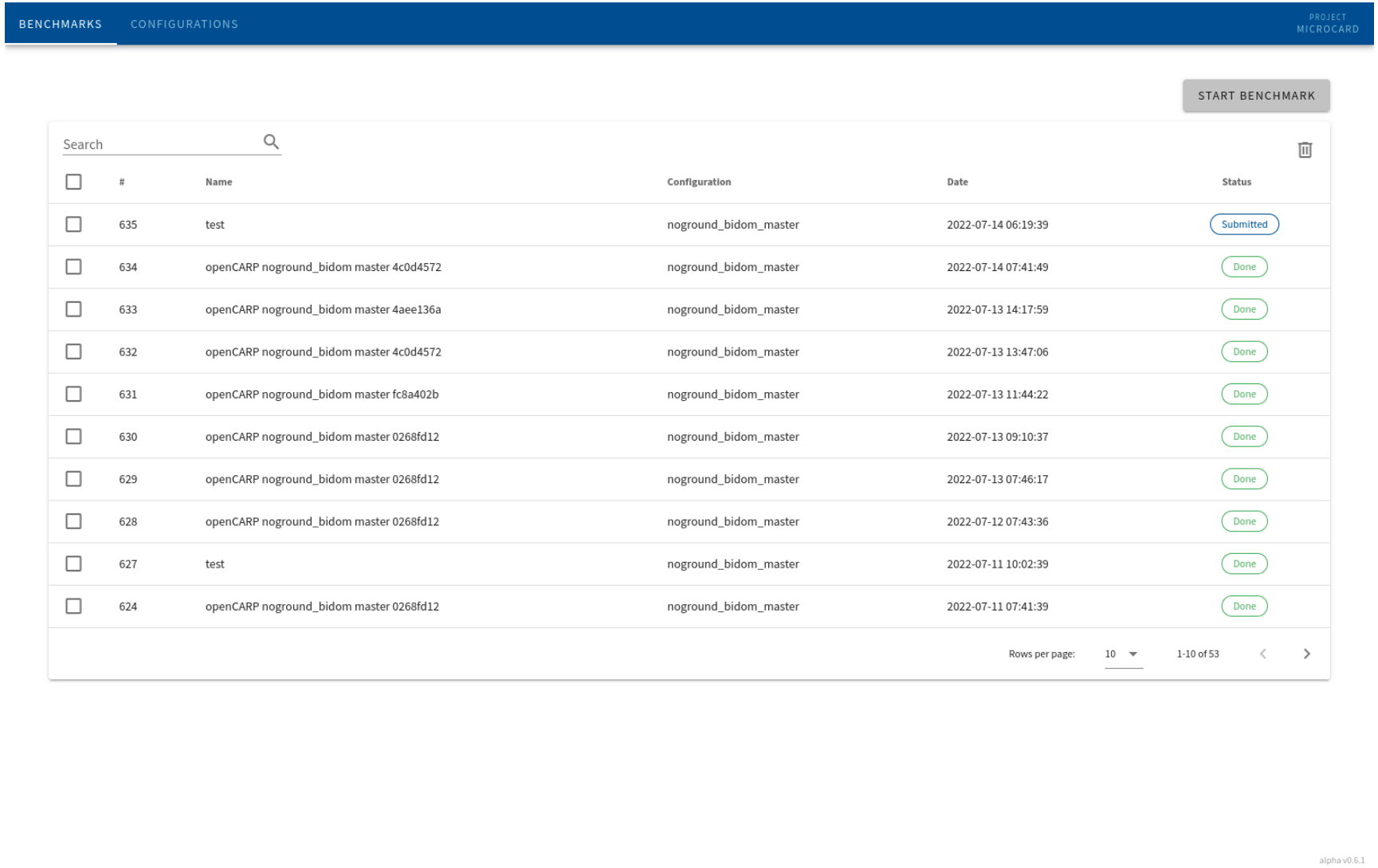
Web Interface – Configuration



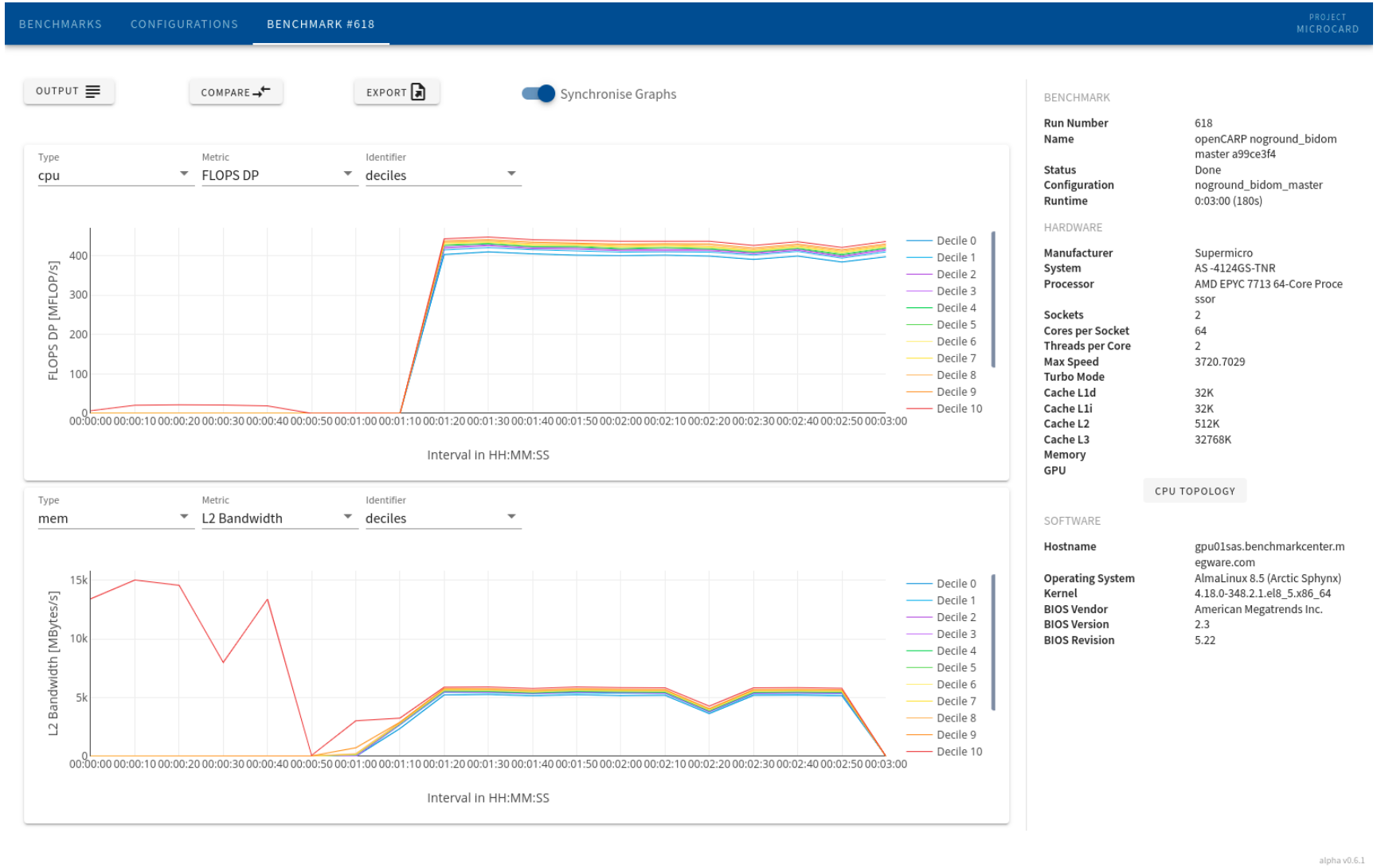
Web Interface – Starting a benchmark



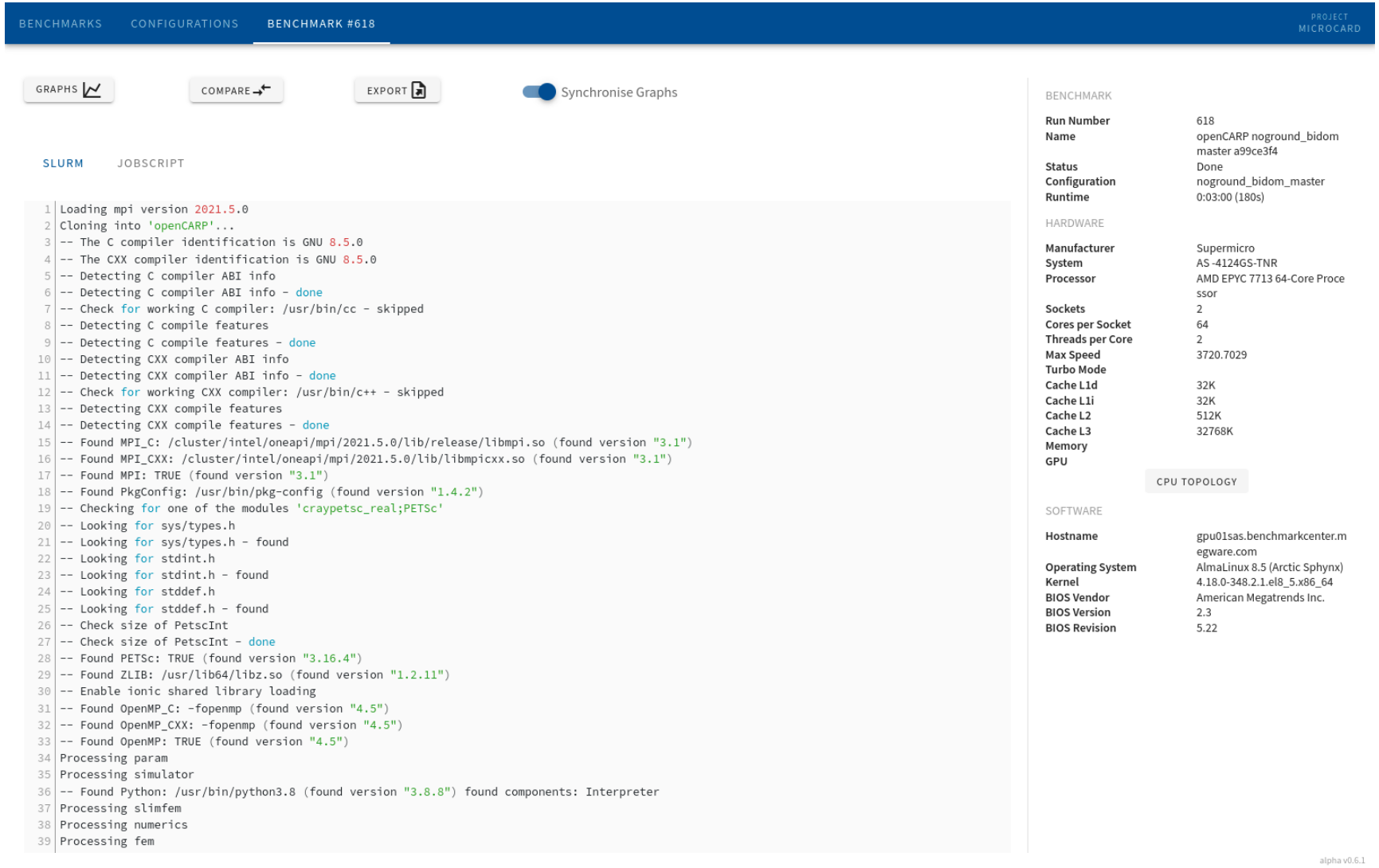
Web Interface – Benchmark Overview



Web Interface – Benchmark Results



Web Interface – Job Output



Future Work

- Extend monitoring (AMD GPUs, FPGAs, ARM, FileSystems)
- User Management
- Deployment at new HSU Cluster

Collaboration with Akash Mundra @TUM for his Master's Thesis

- Explore possible strategies to support users in the analysis of the data
  - Detection of bottlenecks
  - Relating performance metrics with hardware properties (micro-benchmarking)

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Thank you for your Attention!

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