Heterogeneous Architectures Testbed

March 5th, 2025
openlab Technical Workshop

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Motivation

openlab initiative for novel architectures evaluation

- Rapid diversifying hardware landscape
- Comprehensive mandate: resources management + support
- Cross-architecture performance benchmarking
- Access to diverse, cutting-edge computing systems
- Serving a broad research community at CERN

Keep the "*you make it – we break it*" spirit of the early openlab days…
…but well integrating production-like quality and capabilities.

Portfolio: On Premises HW

With in-kind donations from:

intel. E4 COMPUTER ENGINEERING SIMONS FOUNDATION

CPU Systems

x86

intel XEON

6th Gen AP / SP

PowerPC

IBM

Power 8/9

x86

intel XEON

1st - 5th Gen

RISC-V

SOPHON

SG2042

Accelerators

NVIDIA T4, L4

NVIDIA A100

Intel Omni-Path

Fabric

NVIDIA Infiniband

Fabric

NVIDIA Bluefield

Intel Flex GPU

Intel Max GPU

Xilinx U200

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Portfolio: Remote HW

Access provided via:

SIMONS FOUNDATION

E4 COMPUTER ENGINEERING

CPU Systems

x86

AMD EPYC

Genoa, Milan

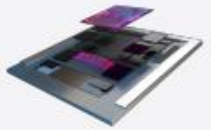
ARM

arm

Ampere, Fujitsu

Accelerators

NVIDIA H100



AMD MI210

cerebras

AI Acceleration

GRAPHCORE

AI Acceleration

- Also, opportunistic access to: NVIDIA Grace, Intel Gaudi, Altera FPGAs, and more.
- On-going work to have a CERN-like environment.
- Check also our HAT poster during the breaks!

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Portfolio: HPC Development Access

EuroHPC
Joint Undertaking

Access to remote facilities hosting, for example, AI-specialized hardware.

Through Euro HPC JU, access to a number of Supercomputer systems with development access such as

- LUMI
- Leonardo
- Deucalion
- Vega
- MareNostrum 5
- Discoverer
- Meluxina
- Karolina

More info: https://openlab-systems.web.cern.ch/hpc/ (requires CERN account).

What do we do?

- Reception, installation, configuration and benchmarking of new hardware
- Hardware and software maintenance
- Project and user support: access grant and system administration
- Support for tools on CVMFS
- Organisation and support for workshops, training courses

System Administration

- 100+ different users and 200+ accounts
- ~75 on-prem systems
  mostly bare-metal nodes + some VMs
- SNOW FE support (requests and incidents)
  - 100+ tickets handled every year

- **Puppet, Ansible**
- **Containerization**
- **Production-like (CERN IT) approach, e.g.:**
  - RHEL (Alma) based (…but there are exceptions)
  - Foreman
  - Gitlab
  - 10/25/40/100G network

Very small team, some tasks in best-effort capacity, but good feedback from users! ☺

Community

Supported Projects and Activities

openlab projects:

- **Intel**
- **E4/NVIDIA**
- **PureStorage**
  - See Luca's talk from yesterday
- **multi-science projects (e.g. BioDynamo, interTwin)**
  - See Stavros and Matteo's talks from today
- and any other project needing computing resources or assistance...

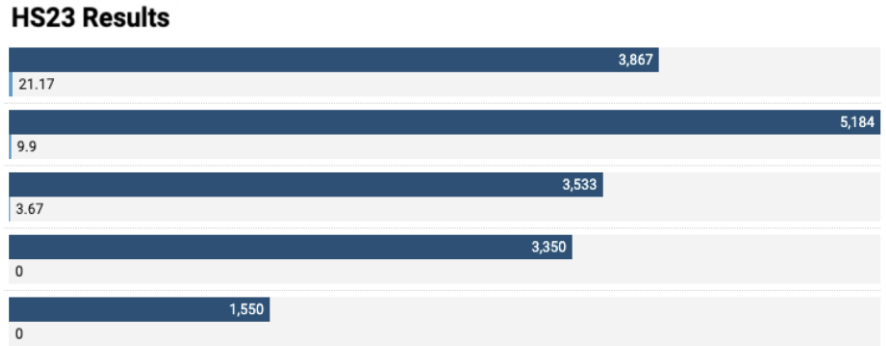
Supporting as well users from:

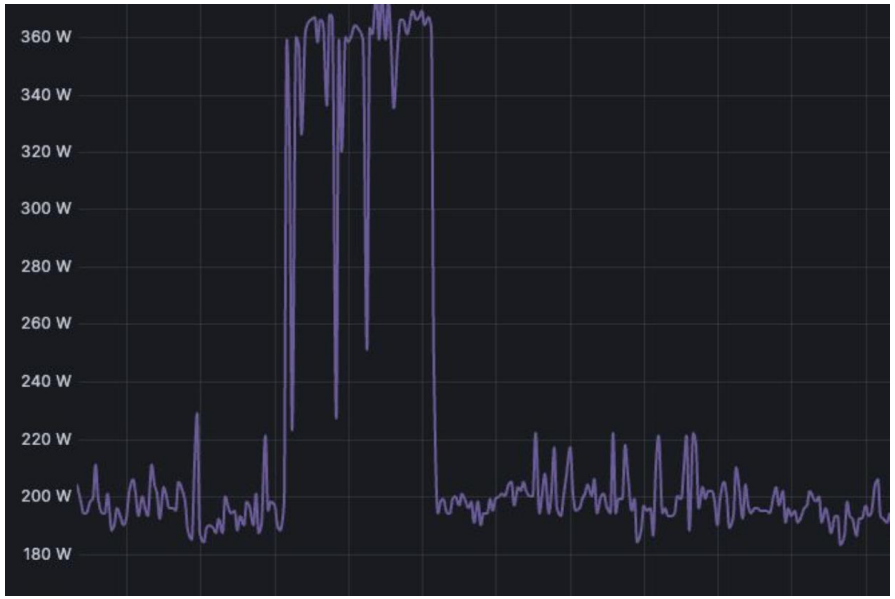
Much more than just user support

- Benchmarking
  - Strong collaboration with the HEPIX BMK WG
  - HS23 and other benchmark studies
    - See David's talk later
  - Energy and sustainability studies
  - Repercussions on CERN IT R&D and HW planning

- Co-development with industry
  - Intel AMX
  - LLM RAG tests
    - See Florian and Manuel's talk this afternoon

- Workshops, trainings, hands-on, hackathons
  - Accelerated Computing with Modern CUDA C++
  - oneAPI and code optimization
  - And many more...





Get in touch!

- **ServiceNow ticket**
  - **Preferential channel for access request or technical matters**

- **Check our website**
  https://openlab-systems.web.cern.ch

- **…or write directly to us!**
  openlab-systems@cern.ch

CERN openlab

Thank you!