

HEP/HPC Strategy Meeting

All Regions

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Welcome and Goals of the meeting

- **Welcome to this HEP/HPC Strategy meeting**
 - This initiative has as primary goal to bring together HEP and HPC sites experts to discuss technical challenges on HPC integration and related initiatives
 - We aim at writing a white-paper
- **It started with small group of people (HPC experts from HEP and resource providers) starting a dialogue on HPC integration**
 - USA-region, January 2024, New York
 - EU-region, September 2024, Ljubljana
- **The interest and engagement has grown (80 registrants)**



Motivations

- **High-Performance Computing (HPC) presents a transformative opportunity for HEP**
 - Modern HPC systems, with exascale capabilities and advanced hardware like GPUs and AI accelerators, offer computational power that could help supporting future HEP activities besides WLCG
 - **To make use of this opportunity we must Strengthen HPC Partnerships and enhance collaboration::** Deepen collaboration with EuroHPC-JU, national HPC providers (EU, US, Asia), and align with evolving AI-focused and exascale plans. Secure long-term resource allocations and harmonize strategic priorities.
- **Fully harnessing this power requires significant adjustments to current computing workflows**
 - **Applications & Software:** Redesign HEP software for accelerated architectures (e.g., GPUs) and develop compatibility libraries, unified programming models, and access to heterogeneous processors.
 - **Software Distribution:** Maintain effective distribution of HEP software (via CVMFS) with sufficient connectivity at HPC nodes or edge services.
 - **Data Management & Access:** Ensure robust data and metadata handling (Rucio/Dirac/FTS) for large-scale processing and AI workloads, identity federation and trust
 - **Security & Federated Infrastructure:** Develop interoperable, federated solutions to connect HPC resources with major HTC/Cloud/Storage environments, supported by standardized AAI (e.g., eduGAIN).
- **Industry's focus on AI algorithms and lower-precision calculations poses challenges for HEP's classic high-precision calculations**
 - strategic collaboration between HEP, industry and HPC communities is needed to ensure HEP needs are met

Objectives

Strengthen HPC Partnerships

- Deepen collaboration with **EuroHPC-JU** and **National HPC resource providers** (from EU to USA and Asia)
 - EuroHPC is focussing on AI Factories besides two Exascale systems
 - EU post-exascale plan being revisited to to the AI-factories re-prioritization ?
- Align strategic priorities with HPC and AI facilities providers
- Secure long-term resource allocations

Enhance Collaboration

- Foster communication among WLCG, CERN experiments, groups, and initiatives
- Ensure effective utilization of HPC resources through shared goals and alignment

Actively participate in HPC user groups, coordination boards, and steering committees, to influence decisions and stay informed about the latest advancements and opportunities

Respond to (Euro)HPC and national HPC access opportunities—while building internal expertise to position HEP as a key candidate for "strategic access."

Support CERN experiments, groups and departments by deploying testbed resources, both on-premises, hosted at HPC centers, cloud-based, enabling the development and testing of accelerated architectures

Initiatives

- **EuroHPC JU** - EuroHPC JU is a joint initiative between the EU, European countries and private partners to develop a World Class Supercomputing Ecosystem in Europe.
 - Explore similar initiatives in USA and Asia
- **EuroHPC Federation Platform** - Led by CSC to develop the Federation Platform to provide users with a single access point to current EuroHPC supercomputing resources and in the future EuroHPC AI Factories and quantum computers.
- **EC-funded project SPECTRUM** - SPECTRUM unites leading European science organisations in HEP and Radio Astronomy together with e-Infrastructure providers to formulate a Strategy for a European Compute and Data Continuum.
- **US initiatives on HPC**, including IRI- DOE's Integrated Research Infrastructure from ASCR, NSF initiatives
- **Joint ECFA-NuPECC-APPEC (JENA) WG1** on HPC/HTC - addresses the need for discussions on the strategy and implementation of European federated computing at future large-scale research facilities.
- **Computing WG** for the European Strategy for Particle Physics Update (**ESPP**)

More forward-looking activities:

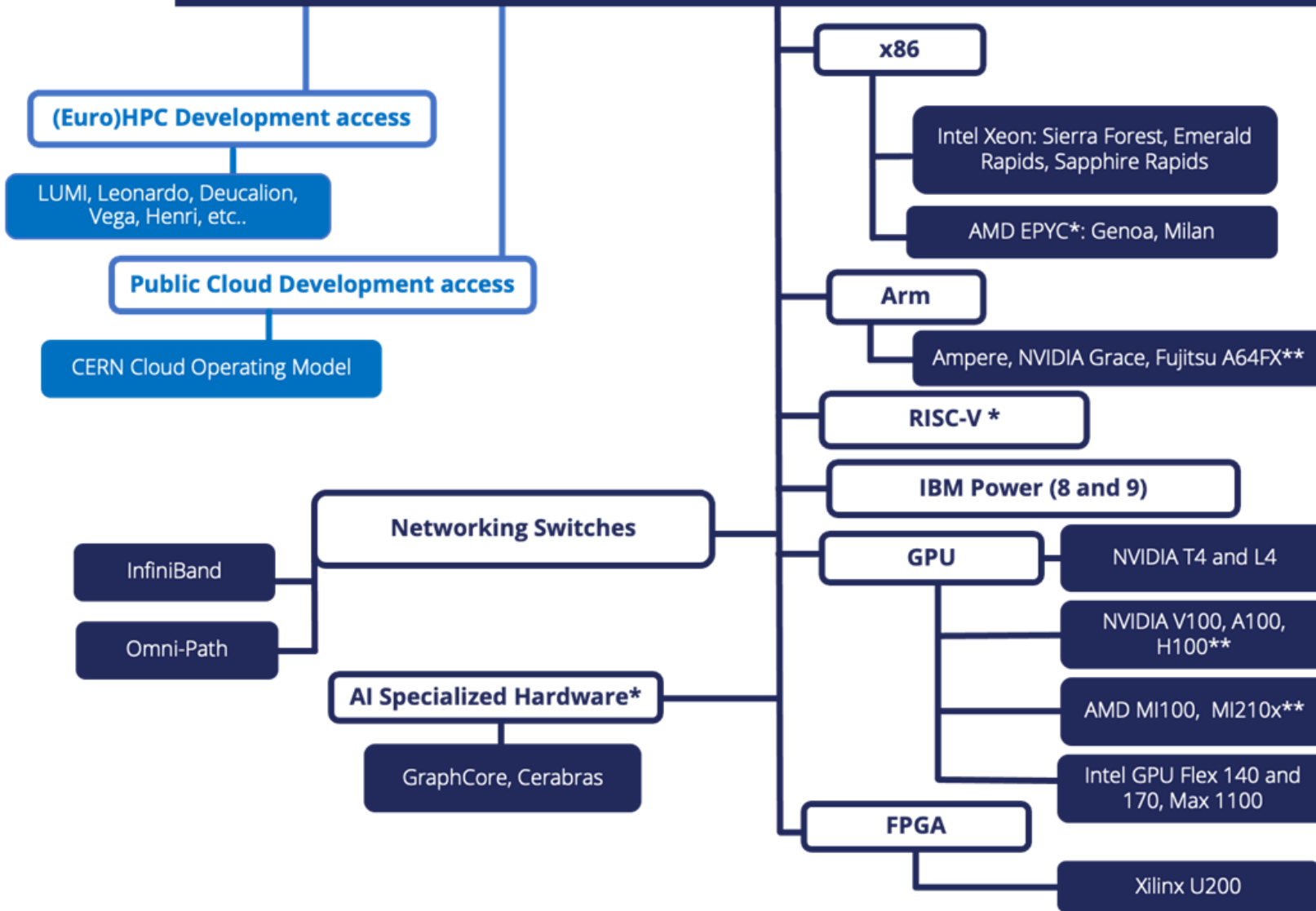
- **InPEX (The International Post-EXascale project)**

What we need to cover in two short days

- **WLCG and experiment perspectives**
- **Conclusions and analysis of the first meetings**
- **Update on HPC common initiatives**
 - EuroHPC JU (including Platform Federation and ARC), IRI, SPECTRUM, JENA WP1
- **The HPC landscape in Europe, USA and Asia**
- **Report from HPC integration efforts**
- **Path Forward**
 - including ESPP

AND WE NEED TO LEAVE TIME FOR TOMORROW'S DISCUSSIONS!

Heterogeneous Architecture Testbed: Hardware



100+ users & 290+ accounts

~95 systems, mostly bare-metal

Used by ATLAS, CMS, LHCb, QTI, openlab, CERN EP, IT, ATS

~200 tickets handled p/a

*Remote access via E4 

**Remote access via Simons Foundation 

Housekeeping

Talks are short, discussions are needed, and there is allocated time tomorrow
respect time (it includes a few questions)

Coffee breaks, this evening social drink and tomorrow's lunch will be located
outside the cafeteria (go down the stairs near the auditorium)

We have a limited number of seats for a visit to the CMS experiment on Fri, leaving
CERN ~ 4 pm and getting back 6:30 pm or so.

If you are interested, please fill the form at <https://forms.gle/6ucDjFTntXBu2euF7> **by today.**