The JUPITER AI Factory (JAIF)

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jaif.ai

JÜLICH Forschungszentrum

RWTH AACHEN UNIVERSITY

Fraunhofer

hessian.AI

AI Factories

JUPITER AI FACTORY

EuroHPC Joint Undertaking

AI Factories

Bundesministerium für Forschung, Technologie und Raumfahrt

Ministerium für Kultur und Wissenschaft des Landes Nordrhein-Westfalen

HESSEN Hessisches Ministerium für Wissenschaft und Forschung, Kunst und Kultur

GCS Gauss Centre for Supercomputing

AI Factories provide large amounts of **computing power**, secure **data rooms**, and **AI development services**.
Also for *companies*!

The **JUPITER AI Factory (JAIF)** is currently the only one of the 19 AI Factories with an **exascale supercomputer** for AI training.

The **JUPITER AI Factory (JAIF)** is built around the JUPITER supercomputer.
And supported by "smaller" systems (JURECA-DC, JUWELS, 43, 42, ...).

JAIF provides **systematic/structural services** and **individual services** along the whole AI product cycle.

Jülich, 7th September 2025: JUPITER Inauguration

JUPITER
Exascale Supercomputing in Europe

> 1 ExaFLOP/s HPL-FP64 performance (< 20 MW)

- 24 000 NVIDIA GH200 superchips
- 2880 TB CPU memory (LPDDR5)
- 2304 TB GPU memory (HBM3)
- NVLink C2C (900 GB/s)
- NVIDIA Mellanox InfiniBand NDR/NDR200
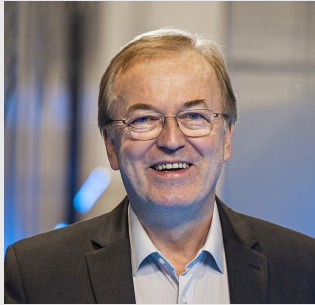- Dragonfly+ topology

> 1 EB total storage

- Hierarchical storage system: ExaFLASH < ExaSTORE/JUST6 < ExaTAPE/Archive
- ExaFLASH: 29 PB NVMe storage integrated into InfiniBand fabric
- ExaSTORE/JUST6: > 500 PB disk storage
- ExaTAPE/Archive: > 800 PB tape storage

Modular Data Center (MDC)

- 37.5 MW power capacity
- Containerized supercomputer
- Flexible and scalable concept
- Hot water cooling
- Utilization of waste heat
- High reliability
- Fast data connectivity

JAIF Excellence – Together for Europe!

JUPITER meets JARVIS
Completing AI Supercomputing

JUPITER - AI Training Supercomputer

NVIDIA GH200 [AI]

InfiniBand

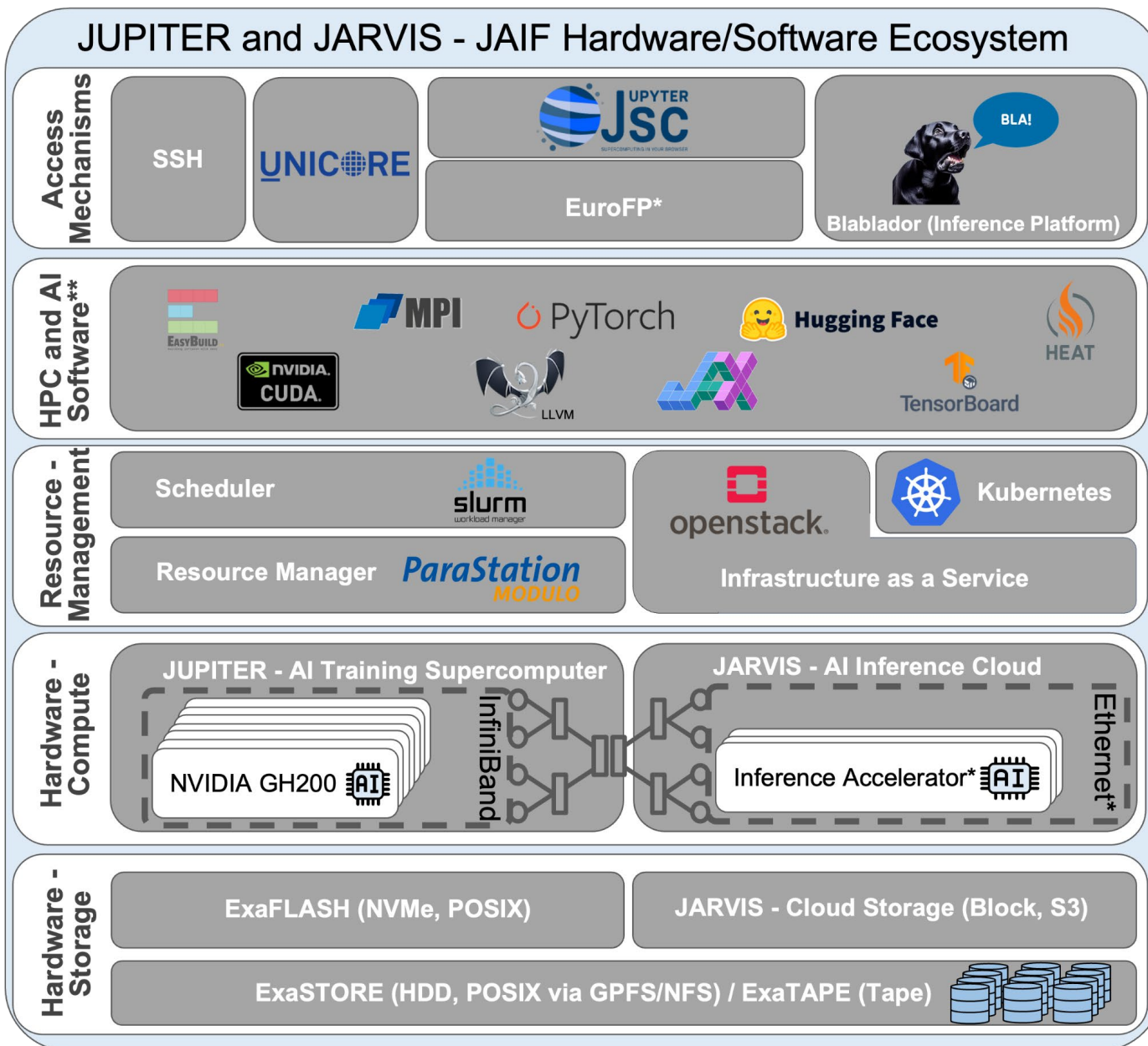**JARVIS - AI Inference Cloud**

Inference Accelerator* [AI]

Ethernet*
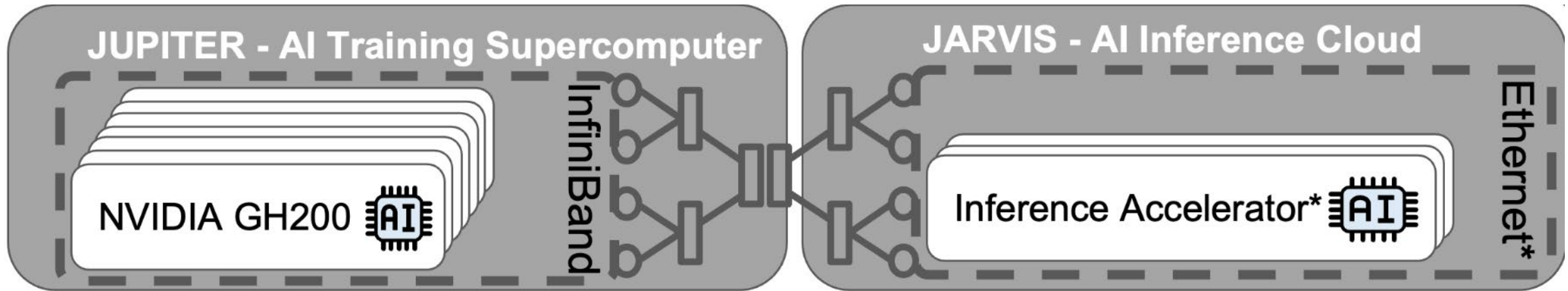
40 ExaFLOP/s FP8 AI performance
24 000 NVIDIA GH200 superchips

Scalability, Sovereignty
European (experimental) technology

JUPITER AI FACTORY

Software Stack

JUPITER and JARVIS - JAIF Hardware/Software Ecosystem

Access Mechanisms
- SSH
- UNICORE
- JUPYTER JSC (SUPERCOMPUTING IN YOUR BROWSER)
- EuroFP*
- Blablador (Inference Platform) — BLA!

HPC and AI Software**
- EasyBuild
- MPI
- PyTorch
- Hugging Face
- HEAT
- NVIDIA CUDA.
- LLVM
- JAX
- TensorBoard

Resource - Management
- Scheduler — slurm workload manager
- openstack
- Kubernetes
- Resource Manager — ParaStation MODULO
- Infrastructure as a Service

Hardware - Compute
- JUPITER - AI Training Supercomputer
  - NVIDIA GH200 [AI]
- InfiniBand
- JARVIS - AI Inference Cloud
  - Inference Accelerator* [AI]
- Ethernet*

Hardware - Storage
- ExaFLASH (NVMe, POSIX)
- JARVIS - Cloud Storage (Block, S3)
- ExaSTORE (HDD, POSIX via GPFS/NFS) / ExaTAPE (Tape)

*Depending on procurements and available functionality

**This is a subset of the available software

JAIF Domains – We Strengthen European Key Sectors and Transfer Competence to Start-ups, SMEs and Industry
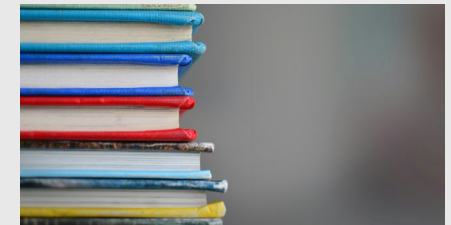
Healthcare

Energy

Climate Change and Environment

Education, Culture and Media

Public Sector

Finance and Insurance

Manufacturing

The JUPITER AI Factory (JAIF)

European Commission Executive Vice-President Henna Virkkunen during her visit to Jülich, 23rd April 2025.

"My congratulations to the Jülich Supercomputing Centre as it prepares to host an AI Factory, to be powered by Europe's first exascale supercomputer, one of the most powerful and energy efficient supercomputers in the world. This cutting-edge facility, to be inaugurated in just a few months, is more than just a milestone; together with other AI Factories it is the cornerstone of our AI continent strategy to foster German and European AI innovation and create a step-change in EU competitiveness. As I embark on my tour of Europe's emerging AI factories, starting right here in Jülich, I am inspired by its creativity and transformative potential. The future of Europe as AI Continent is being forged right here, right now."

(Henna Virkkunen)

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JUPITER AI FACTORY

JUPITER is the begin of the
Exascale era in Europe.

JAIF develops JUPITER into an
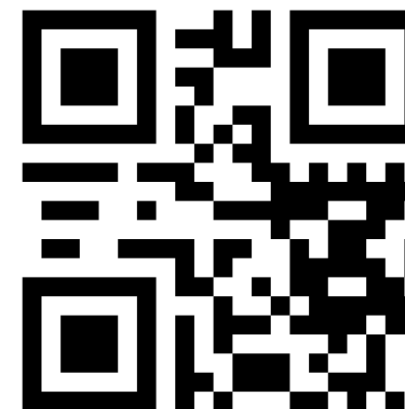**Advanced AI Platform**!

The combination of excellence in *HPC and AI expertise*, *Exascale computing*, and *services around AI* makes JAIF unique and the driver of the **European AI Continent**!

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