VSB TECHNICAL UNIVERSITY OF OSTRAVA | IT4INNOVATIONS NATIONAL SUPERCOMPUTING CENTER

News from IT4Innovations and the Czech National Competence Center

HPCSE 2026

Vít Vondrák

INTRODUCING IT4INNOVATIONS

VSB TECHNICAL UNIVERSITY OF OSTRAVA | IT4INNOVATIONS NATIONAL SUPERCOMPUTING CENTER

Established in 2011

15 YEARS IT4INNOVATIONS

5 partners Ostrava

to build na

Unit of the VSB – Technical University of Ostrava

More than 200 employees

- Supercomputing services (12%)
- 5 research laboratories (64% in ADAS, INFRA, PAR, NANO, QC)
- Management and administration (24%)

Member of e-INFRA CZ

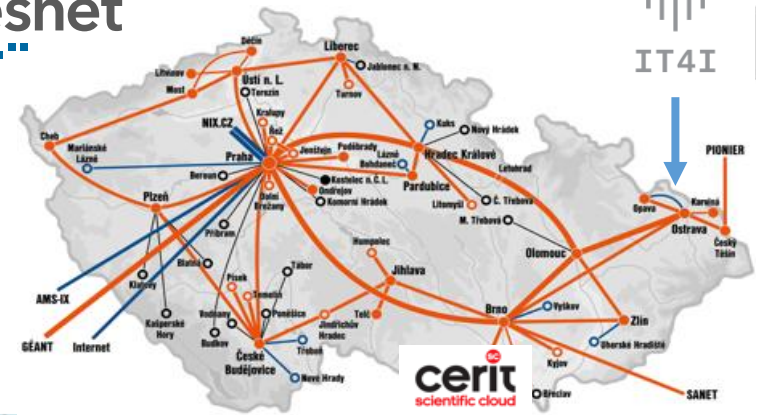
- a strategic large research infrastructure of Czechia
- Networking / Computing/ Data technologies and services
- HPC / HPDA / AI / QC at IT4I

Member of many international infrastructures, associations, and initiatives

e-INFRA CZ

cesnet

IT4I



cerit scientific cloud

ETP 4 HPC

UIC

BDV BIG DATA VALUE ASSOCIATION

EUDAT

iRODS

eosc

VI-HPS

PRACE

WHPC WOMEN IN HIGH PERFORMANCE COMPUTING

IT4INNOVATIONS HPC AND QC SYSTEMS

VSB TECHNICAL UNIVERSITY OF OSTRAVA | IT4INNOVATIONS NATIONAL SUPERCOMPUTING CENTER

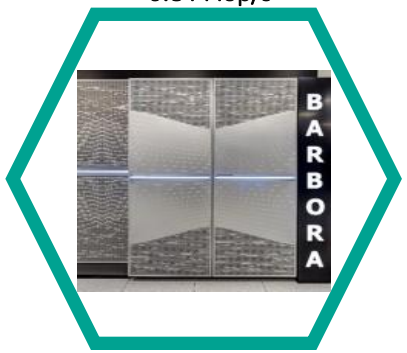
2011
* IT4I

July 2013
Anselm
0.1 PFlop/s

July 2015
Salomon
2 PFlop/s, #40

March 2019
DGX-2
2 PFlop/s AI

October 2019
Barbora
0.8 PFlop/s

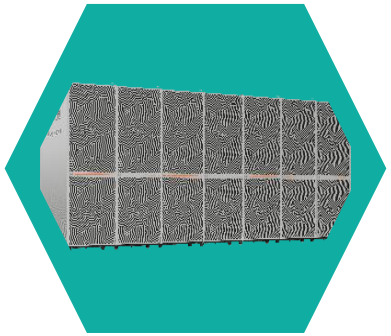


August 2021
Karolina
15.7 PFlop/s, #69

Autumn 2021
LUMI
550+ PFlop/s , #3

September 2025
VLQ
Quantum Computer

Q2 2026
Barbora NG



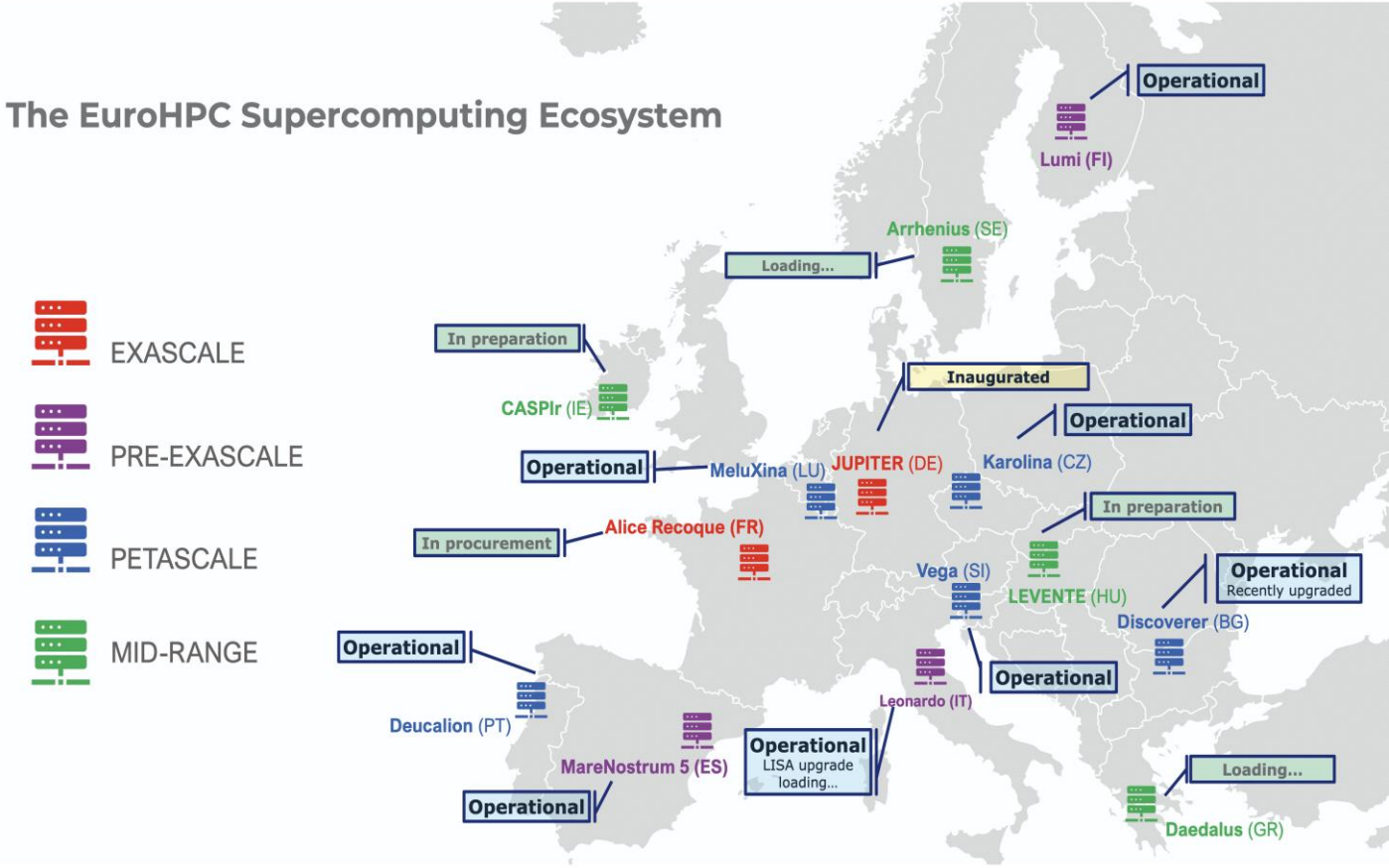
EUROHPC JOINT UNDERTAKING

EuroHPC Joint Undertaking

- Established in 2018
- Czechia member since January 2018
- Composed of 38 countries, 3 private member (ETP4HPC, BDVA, QuIC) and EU

EuroHPC goals

- A federated HPC/QC/AI infrastructure
- European Technologies & Applications for the HPC ecosystem
- Leadership in HPC use and skills
- NEW: AI Factories



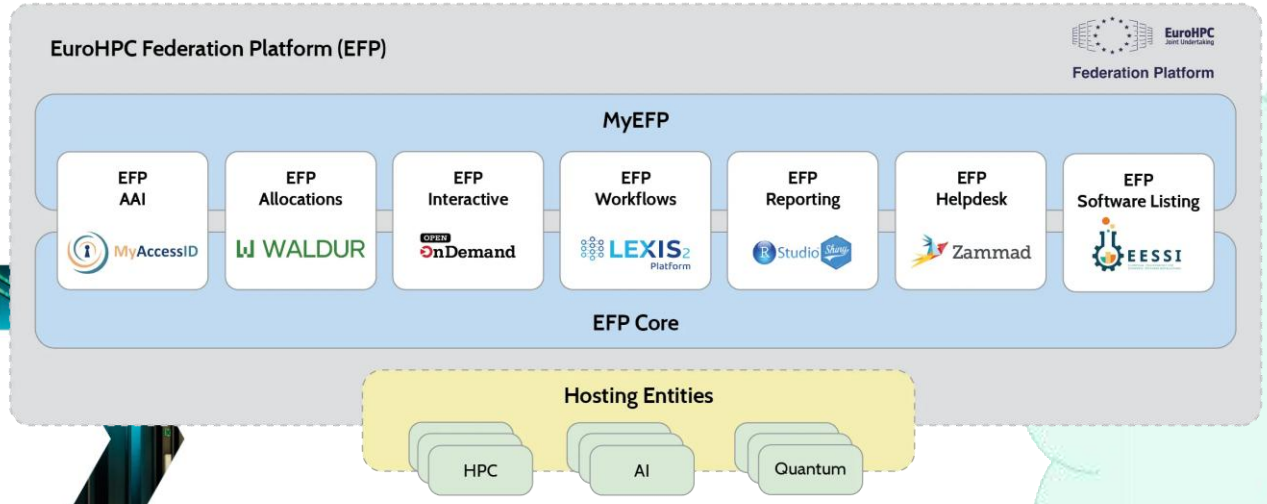
EUROHPC FEDERATION PLATFORM

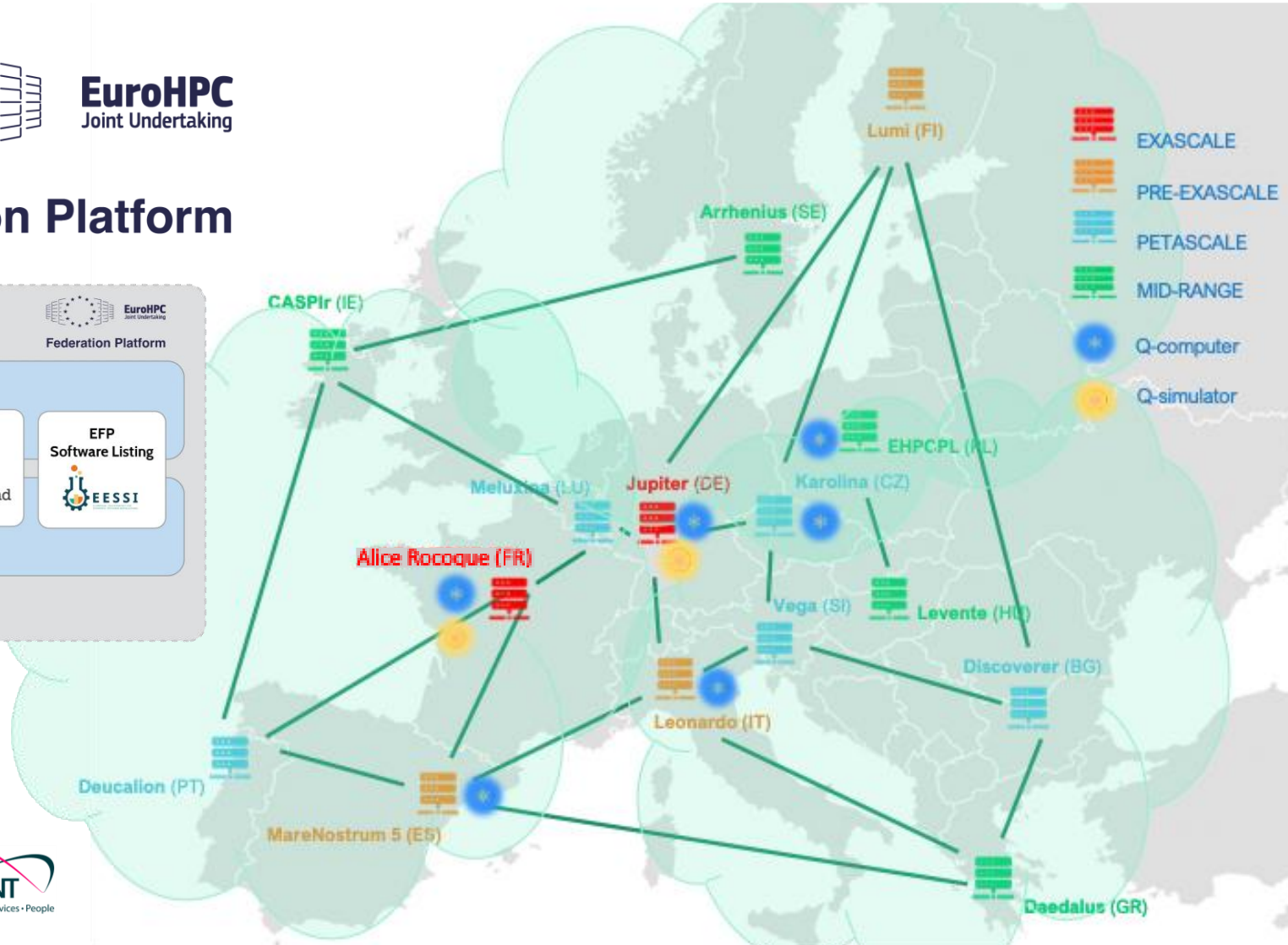
"A one-stop-shop for accessing and utilizing EuroHPC systems and services"

- Direct access
- Interactive interfaces
- Programmatic APIs
- Unified software stack

EuroHPC Joint Undertaking

Federation Platform





VSB TECHNICAL UNIVERSITY OF OSTRAVA | IT4INNOVATIONS NATIONAL SUPERCOMPUTING CENTER

NORDUnet Nordic Gateway for Research & Education

CSC

TARTU ÜLIKOOL 1632 UNIVERSITAS TARTUENSIS

GHENT UNIVERSITY

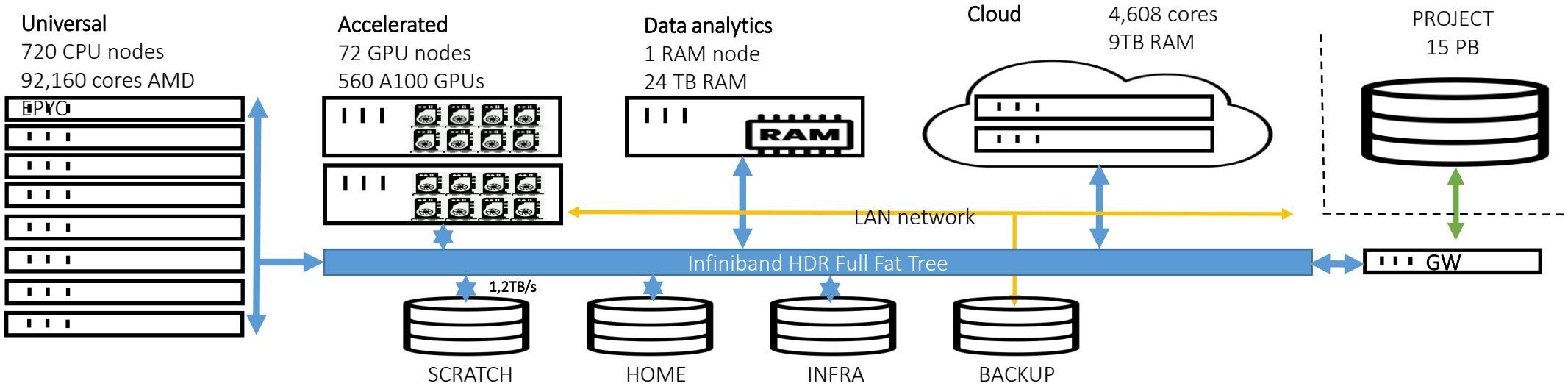
GÉANT Networks · Services · People

KAROLINA SUPERCOMPUTER

VSB TECHNICAL UNIVERSITY OF OSTRAVA | IT4INNOVATIONS NATIONAL SUPERCOMPUTING CENTER

- In operation from 2021, #69 in TOP500, #8 in GREEN500
- EuroHPC supercomputer by HPE
  - 65% Czech funding
  - 35% EU funding (for EuroHPC users)
- Total investment approx. EUR 15 million
- Total theoretical performance 15.7 PFlop/s
- Used by more than 2,000 users to solve more than 700 projects
- Expected end of operation for EuroHPC users 2026

EuroHPC Joint Undertaking

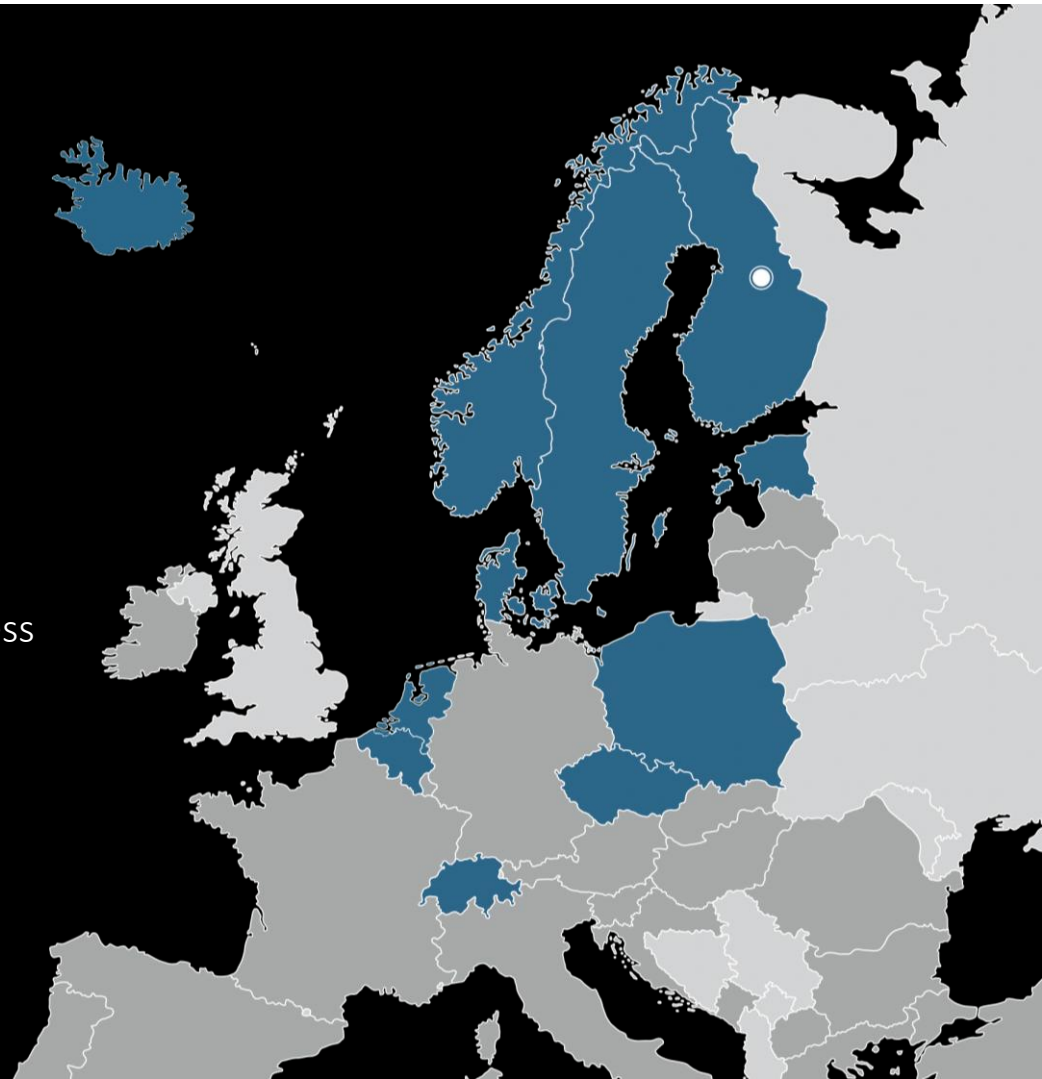


LUMI

www.lumi-supercomputer.eu

EuroHPC Joint Undertaking

- Manufactured by **Hewlett Packard Enterprise**
- Total budget: 207.1M€ **(50 % EuroHPC JU)**
- **11912x GPU AMD Instinct MI250X, 128GB HBM2e**
- **LINPACK Performance: 379,7 Pflop/s**
- #3 in TOP500, #3 in GREEN500, and **#1 in EU (May 2022)**
- Period of operation: 2021–2027
- Consortium: **FI (CSC in Kajani)**, BE, CH, **CZ,** DK, EE, IS, NL, NO, PL, SE
- Ca **2,5% of the resources available to the Czech users** through IT4I Open Access calls



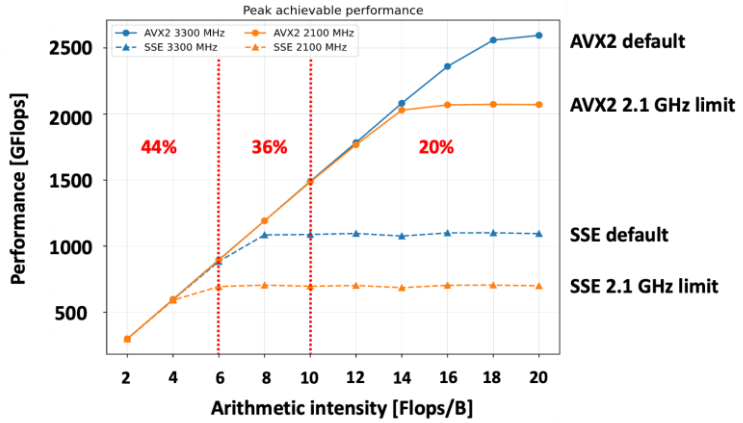
BARBORA NG

Investment

- CZK 91 million (funded through the OP JAC)
- operational in Q 2026

CPU only cluster

- based on Eviden BullSequana XH3000
- 144 nodes with Intel Granite Rapids 2.1 GHz (Intel Xeon 6952P)
- 2 processors per node and 96 cores per processor = 27648 cores
- DDR5 RAM with MCR ECC 8800MT/s
- RAM capacity 768GiB per node
- Fat Tree Infiniband NDR (400 Gb/s)



Enhanced ultra-energy-efficient Direct Liquid Cooled solution

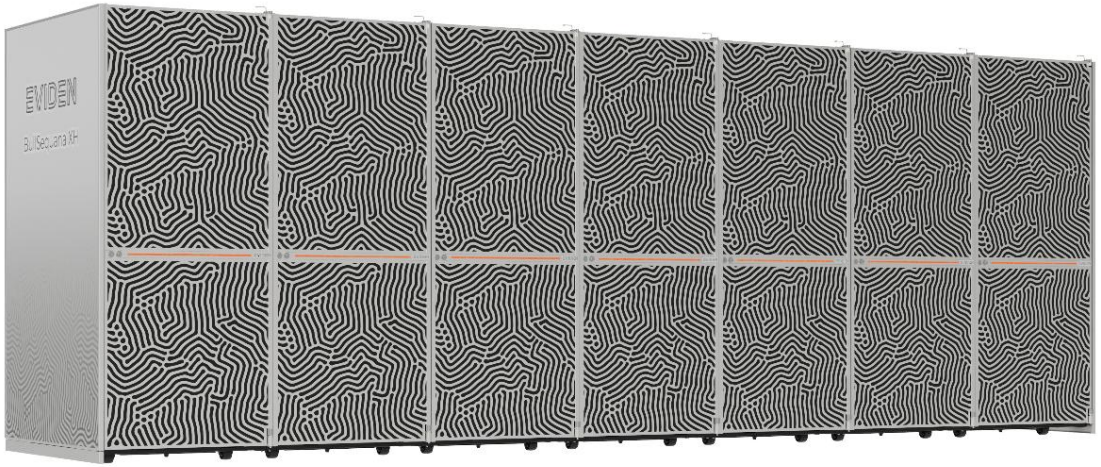
- with warm water input of **up to 40°C and over 97%** heat dissipation into water from compute nodes

KAROLINA NG

VSB TECHNICAL UNIVERSITY OF OSTRAVA | IT4INNOVATIONS NATIONAL SUPERCOMPUTING CENTER

Investment

- CZK 240 million (funded through the OP JAC)
- operational in Q4 2026



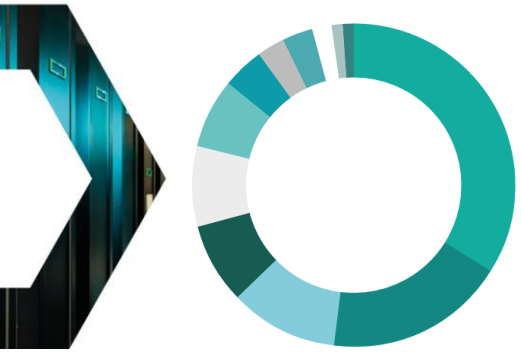
GPU accelarated cluster

- based on Eviden BullSequana XH3500
- 20 nodes with 8x Mi355X-288GB-HBM3e
- 2x CPU AMD Turin 9555 per node i.e. 128 cores per node
- DDR5 RAM capacity 1,520 GiB per node
- Fat Tree Infiniband NDR (200 Gb/s per GPU)
- Total LINPACK performance 8 Pflops
- 2PB scratch storage (550GB/s read, 350GB/s write)

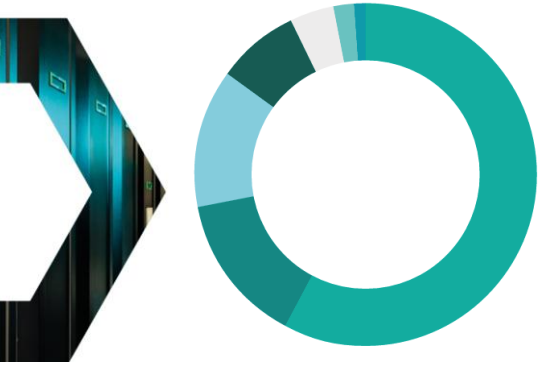
Enhanced ultra-energy-efficient Direct Liquid Cooled solution

- with warm water input of **up to 38°C and over 95%** heat dissipation into water from compute nodes

USERS FROM ACADEMIA



- 34% Czech Academy of Sciences (50 projects)
- 18% VSB – Technical University of Ostrava (30 projects)
- 11% Brno University of Technology (24 projects)
- 8% Masaryk University (11 projects)
- 8% Czech Technical University in Prague (38 projects)
- 7% Charles University (25 projects)
- 4% Palacký University in Olomouc (13 projects)
- 3% University of Chemistry and Technology in Prague (8 projects)
- 3% CESNET (1 project)
- 2% University of Ostrava (4 projects)
- 1% CEITEC (7 projects)
- 1% Others (ELI Beamlines, University of South Bohem



- 58% Material sciences (91 projects)
- 14% Physics and astronomy (24 projects)
- 13% Computer science (32 projects)
- 8% Biosciences (35 projects)
- 4% Earth sciences (13 projects)
- 2% Applied mathematics (14 projects)
- 1% Engineering (12 projects)

ACCESS to supercomputers (Karolina, Barbora, LUMI)

- Open access (Regular - every 4 months, Fast Track - continuous)

  Allocation of the computational resources to the research community in Czechia based on scientific excellence, computational competence and readiness, and anticipated benefits to society and the economy.

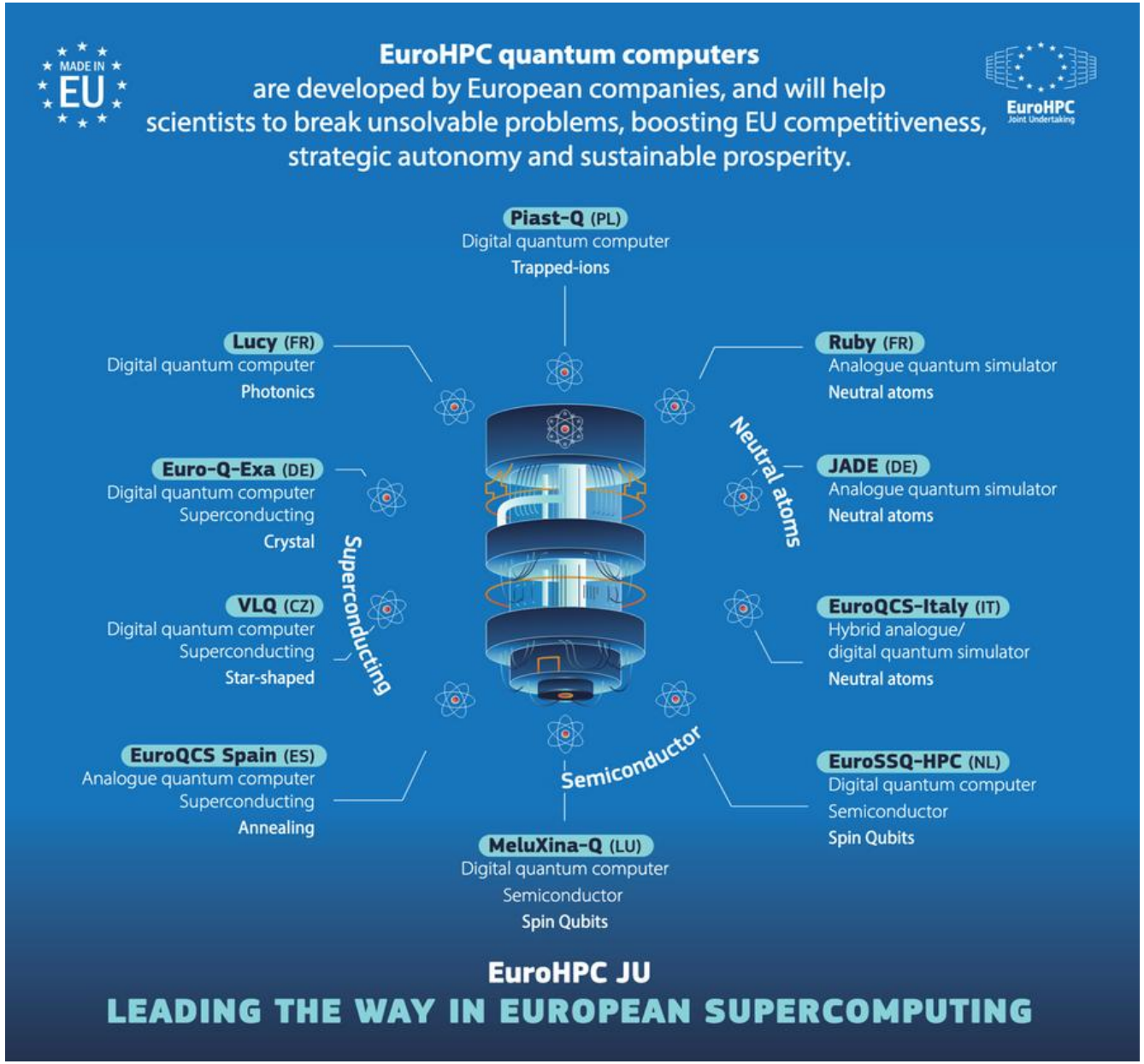
- Thematic access (continuous)

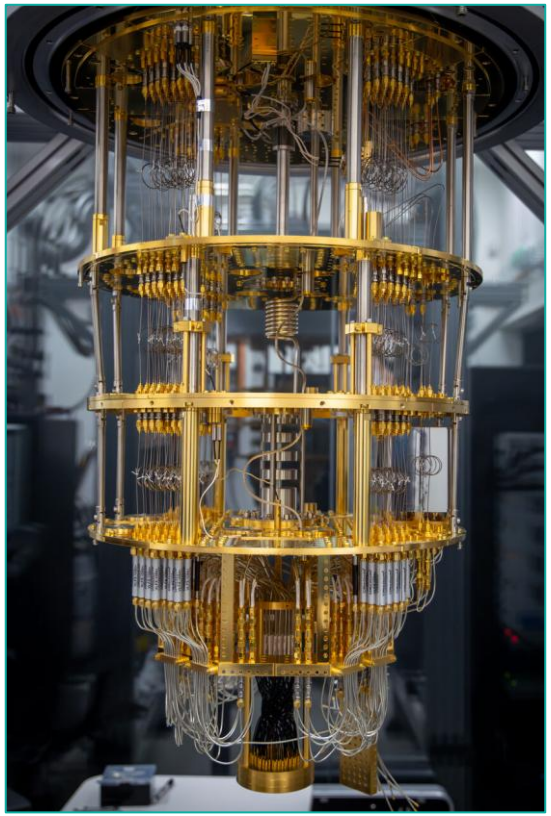
  Societal end economic needs incl. cooperation with industry, education, …

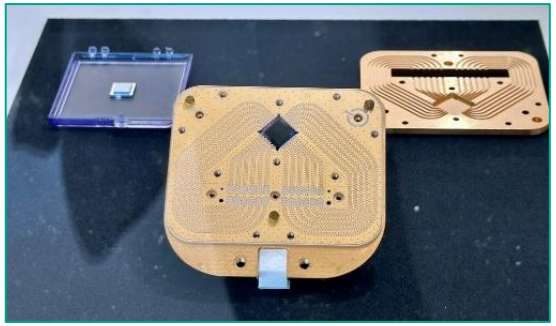
- EuroHPC JU access

  Regular, Extreme Scale, Benchmark, and Development Access

EUROHPC QUANTUM COMPUTERS







VLQ QUANTUM COMPUTER

EuroHPC Joint Undertaking

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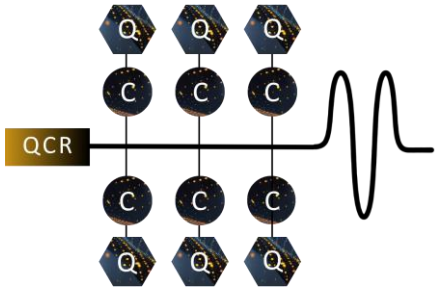
LUMI-Q

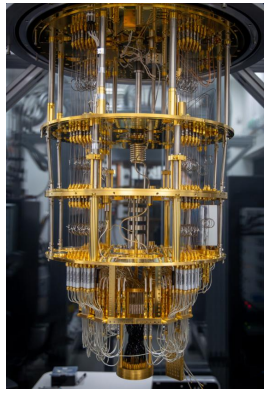
1st quantum computer in Czechia

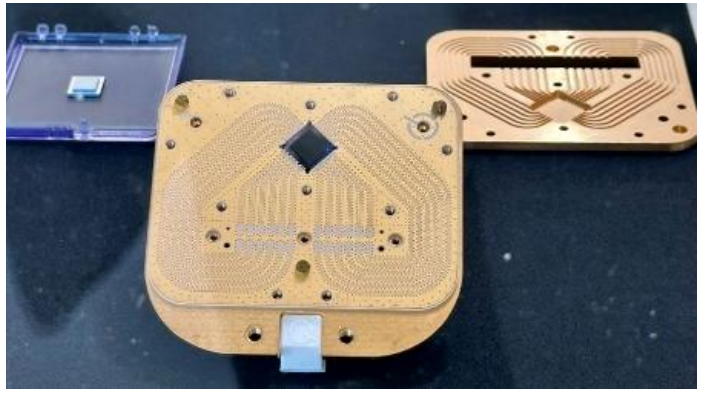
Superconducting qubits

Star-shaped topology

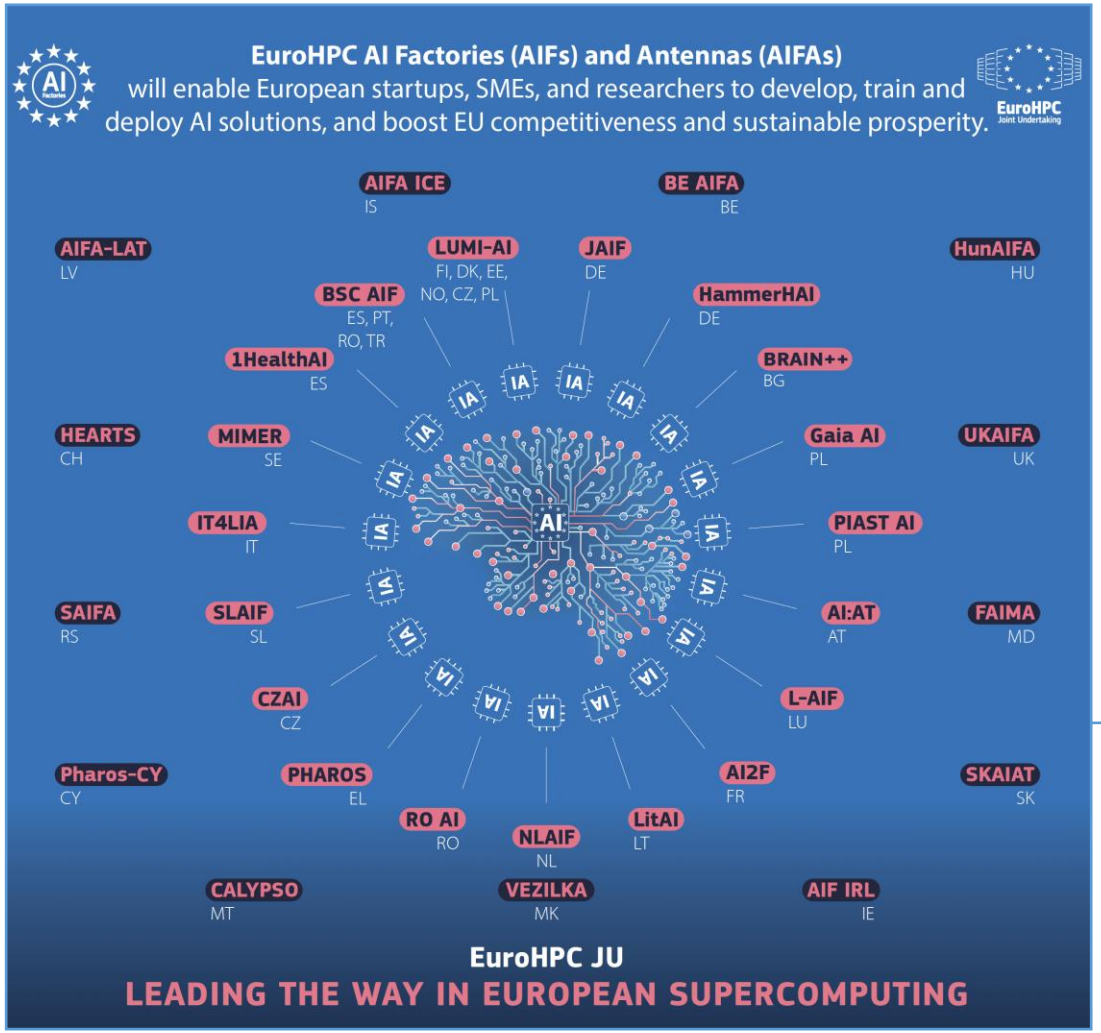
24 physical qubits

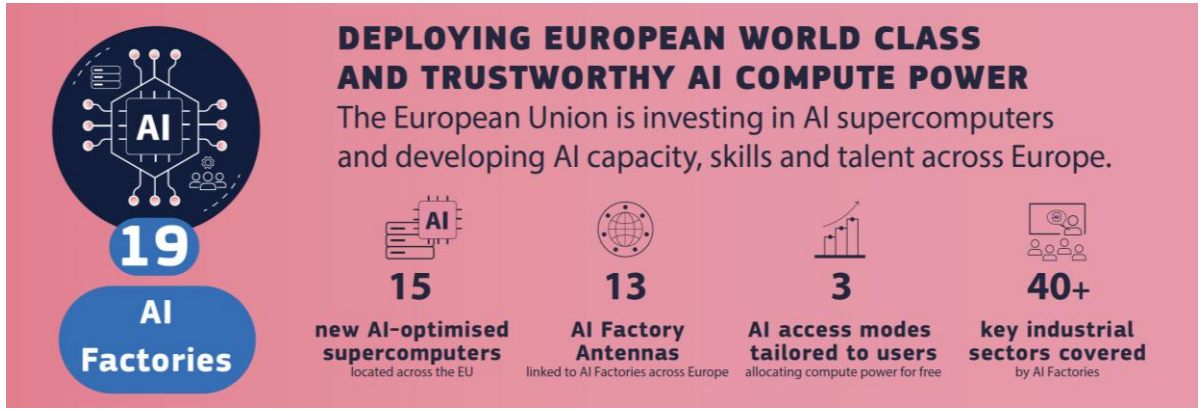


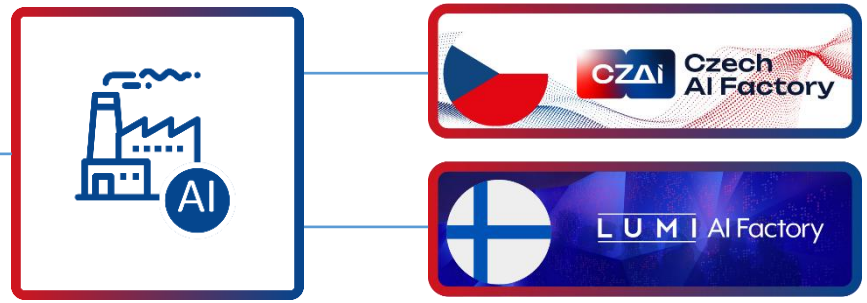




EUROHPC AI FACTORIES







EuroHPC Joint Undertaking

Co-funded by the European Union

Ministry of Education, Youth and Sports of the Czech Republic

EuroHPC Joint Undertaking
Co-funded by the European Union
Ministry of Education, Youth and Sports of the Czech Republic
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LUMI AI Factory

LUMI AI Factory (2025–2028)

- The international consortium consists of six countries: Finland (coordinator CSC), the Czech Republic (IT4Innovations), Denmark, Estonia, Norway, and Poland.
- Its main pillars include the AI-optimised supercomputer LUMI-AI, the AI Factory Service Centre, and the experimental quantum computing platform LUMI-IQ.
- Services include access to massive computing power, data services, expert support, and tailored professional training.
- For startups, small and medium-sized enterprises, industry, and public and research organisations.
- The total budget is set at €612 million, 50% of which comes from the EuroHPC JU.

EUROHPC AI FACTORIES

EuroHPC Joint Undertaking | Co-funded by the European Union | Ministry of Education, Youth and Sports of the Czech Republic | VSB TECHNICAL UNIVERSITY OF OSTRAVA | IT4INNOVATIONS NATIONAL SUPERCOMPUTING CENTER

Czech AI Factory

VSB TECHNICAL UNIVERSITY OF OSTRAVA · CTU CZECH TECHNICAL UNIVERSITY IN PRAGUE · INDRC · ÚOCHB AV ČR IOCB PRAGUE · Charles University · BRNO UNIVERSITY OF TECHNOLOGY

- Smart manufacturing
- Health & Life Sciences
- Sustainable Energy
- Public Administration
- Cybersecurity
- Future Mobility

Startups and SMEs · R&D · Public administration · Industry

Czech AI Factory (2026-2031)

- The consortium is led by VSB-TUO (IT4Innovations) in collaboration with partners Czech Technical University in Prague, Charles University, Brno University of Technology, INDRC, and IOCHB.
- KarolAIna – an AI-optimized supercomputer with a total performance of approximately 850 PFlop/s in standard AI operations.
- Services include access to computing power, data and case analysis, design, training, and tuning of AI models, data collection, inference services, AI task execution, technical support, an AI assistant, specialized training, and legal consulting.
- For startups, small and medium-sized enterprises, academic teams, and public administration.
- The total budget is approximately 40 million EUR, funded 50/50 by the EuroHPC Joint Undertaking and the Czech Republic.

CZAI STRUCTURE

EuroHPC Joint Undertaking
Co-funded by the European Union
Ministry of Education, Youth and Sports of the Czech Republic
VSB TECHNICAL UNIVERSITY OF OSTRAVA | IT4INNOVATIONS NATIONAL SUPERCOMPUTING CENTER

CZAI Czech AI Factory

- Industrial Applications
- Health & Life Sciences
- Sustainable Energy
- Public Admin. & Cybersecurity
- Future Mobility

CZAI Hub Services

- AI Tools & Models
- Workflows & Data Mgmt
- Training & Skills
- AI to Market

AI Campuses

Networking & Ecosystem

Communication, Dissemination, Outreach

CZAI Infrastructure (KarolAIna Supercomputer)

IT4INNOVATIONS RESEARCH FLAGSHIPS

VSB TECHNICAL UNIVERSITY OF OSTRAVA | IT4INNOVATIONS NATIONAL SUPERCOMPUTING CENTER

AURORA

Artificial Intelligence for Unified Representation, Observation, Rendering and Advanced Simulation

Principal Investigator: Dr Tomas Brzobohaty
Co-investigator: Dr Petr Strakos

CADENCE

Computationally Accelerated Discovery of Advanced Materials and Biomolecular Systems

Principal Investigator: Prof. Michal Otyepka
Co-investigator: Dr Jan Martinovic

HPQC4F

High Performance and Quantum Computing for Future

Principal Investigator: Prof. Marek Lampart
Co-investigator: Dr Dominik Legut

LEXIS PLATFORM

Flagship advances Europe's leadership in data-driven research

Principal Investigator: Dr Jan Martinovic

MERIC

Energy efficiency software suite for data centres

Principal Investigator: Dr Ondrej Vysocky
Co-investigator: Doc. Lubomir Riha

INDUSTRY COLLABORATION

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EURO CZECHIA

EDIH OSTRAVA

LUMI AI Factory

CZAI Czech AI Factory

BORCAD CZ s.r.o.

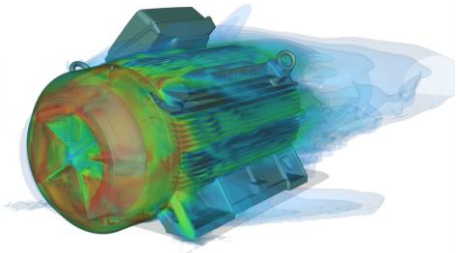
Design of passenger train seats

Ullmanna s.r.o.

Weed detection – weeding machine

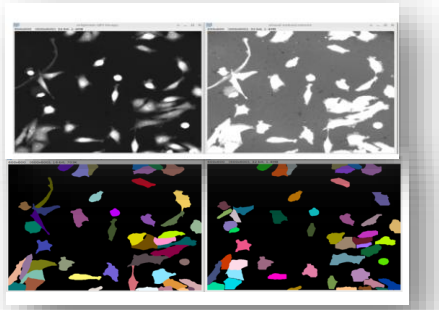
SIEMENS

Fan section optimization in asynchronous electric motors



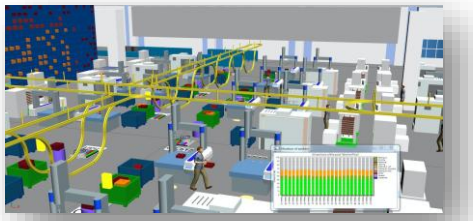
Telight s.r.o.

AI and a supercomputer have enabled to enhance the accuracy of cell analysis



NC Line a.s.

Production planning for better profitability and competitiveness



MoraviaLab s.r.o.

Smart technology helps grow microgreens

OTHER PARTNERS

NC LINE

IMPAERIA GLOBAL

esa

T-Mobile

POLICIE ČESKÉ REPUBLIKY

Lenzing Innovative by nature

invelt group

Fraunhofer

inwiro testing & engineering

Continental

Janssen Pharmaceutical Companies of Johnson & Johnson

GS GLASS SERVICE

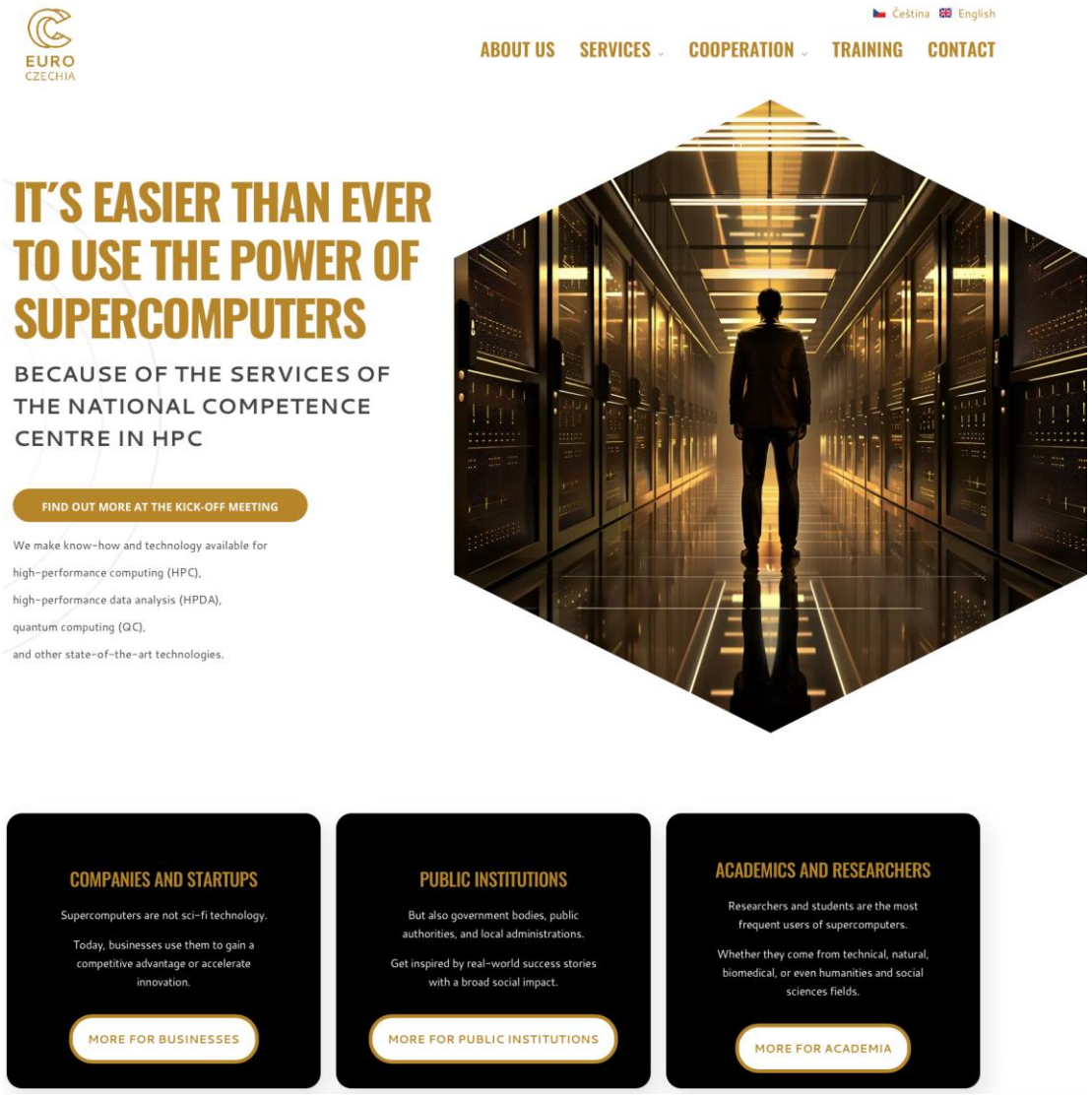
telight

DEVINN

FNO FAKULTNÍ NEMOCNICE OSTRAVA

REMANTE

NATIONAL COMPETENCE CENTRE IN HPC



Since 2020, the NCK has served as the contact and coordination point for HPC, data analysis, QC, and other advanced technologies in Czechia.

It is one of **36 national NCKs** at the pan-European level.

Following two successful phases, the third phase—EuroCC 3—began on **April 1, 2026**.

The NCK provides services in the following areas:

- Expert technological consulting
- Connecting with experts in the field of HPC
- Providing training services

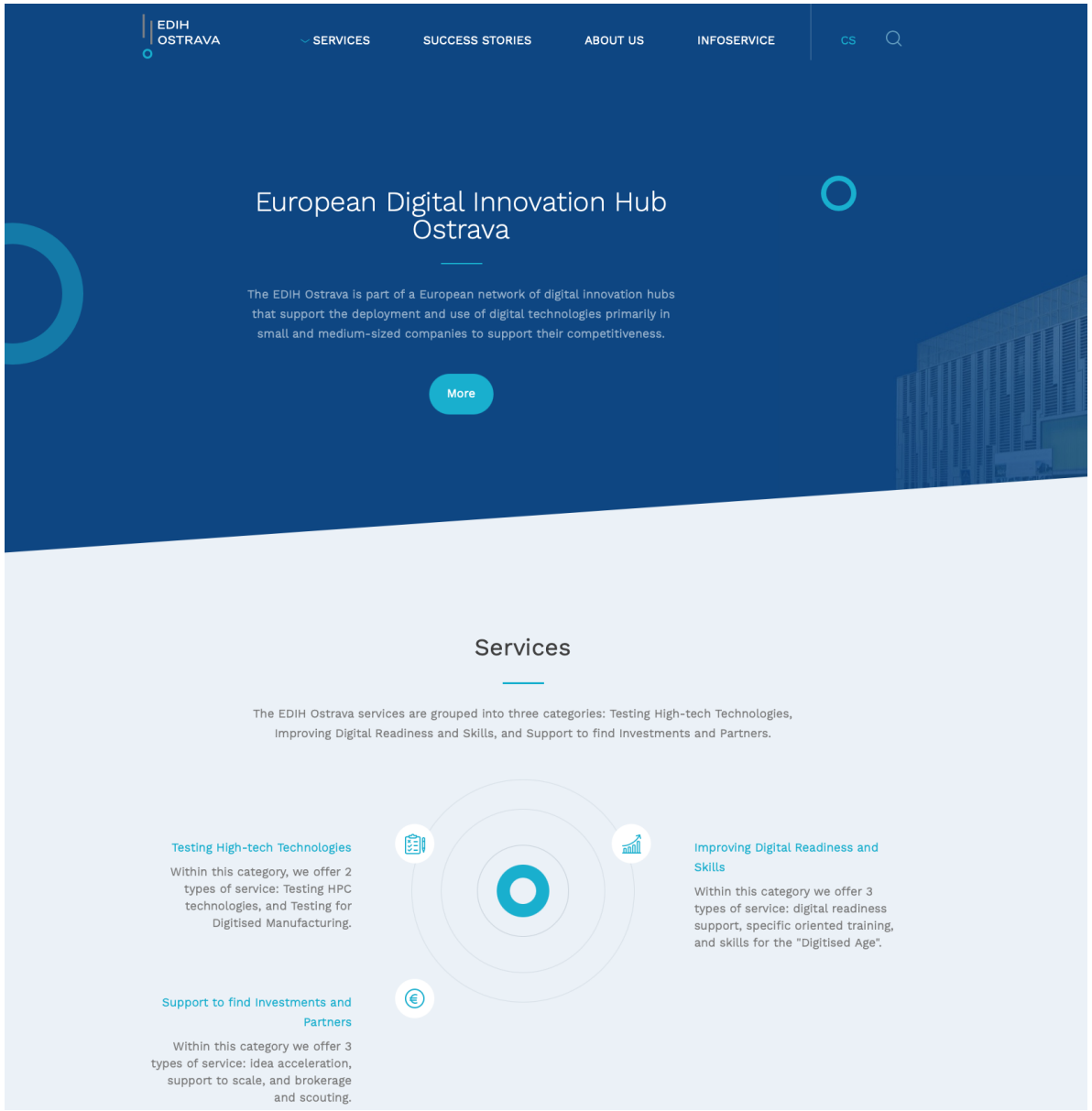
End users include:

- Industry
- Small and medium-sized enterprises
- Startups
- Public institutions
- The academic sector

More at www.eurocc-czechia.cz

EURO CZECHIA

EDIH OSTRAVA



- EDIH Ostrava 2.0 is dedicated to accelerating the digital transformation and strengthening the competitiveness of SMEs in the Czech Republic.
- Offers a comprehensive portfolio of services, including support for the development of advanced technologies through "Test before Invest," support for digital readiness, skills development, consulting focused on improving access to financing, and networking and ecosystem development.
- Compared to the first phase, EDIH Ostrava 2.0 significantly expands its consulting services and strengthens direct links to leading European infrastructures in AI and HPC.
- Project duration: 2026–2029.
- More at www.edihostrava.cz

EDIH OSTRAVA

TRAINING ACTIVITIES

https://events.it4i.cz

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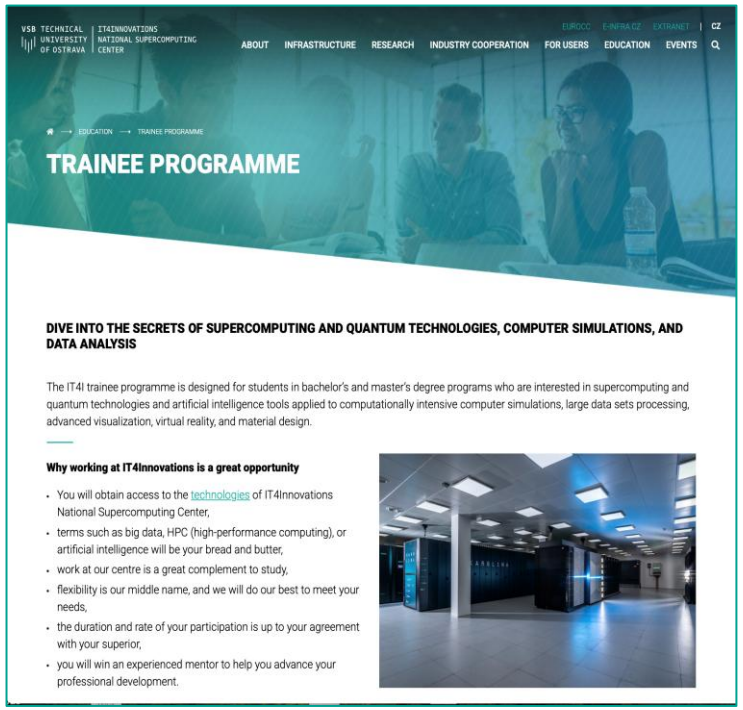
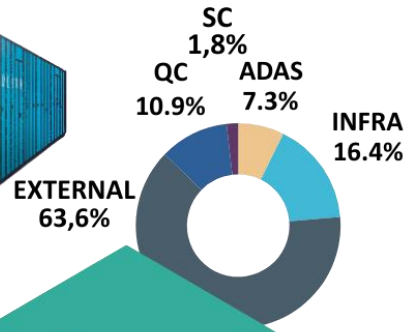


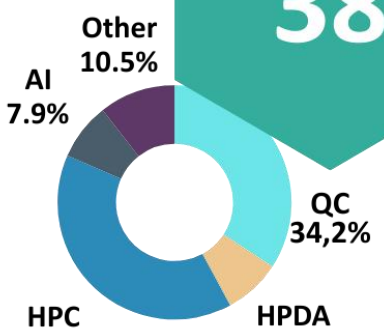


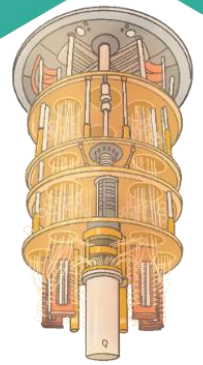
23
participants/event

Events
38

Participants
886

Tutors
55





9%
from IT4I

23%
from industry

47%
foreign affiliation

EOSC-CZ
16 training events
1 conference

HPC·TRAIN

EUMaster4HPC

SUPERHEROES 4SCIENCE

EVITA
EuroHPC Virtual Training Academy

VSB TECHNICAL UNIVERSITY OF OSTRAVA | IT4INNOVATIONS NATIONAL SUPERCOMPUTING CENTER

Vít Vondrák

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