

IT4INNOVATIONS

EMPOWERING INNOVATIONS WITH AI,
THE KAROLINA AND BARBORA SUPERCOMPUTERS
AND THE VLQ QUANTUM COMPUTER



IT4Innovations National Supercomputing Center at VSB – Technical University of Ostrava is a leading research, development and innovation centre active in the fields of High-Performance Computing (HPC), High-Performance Data Analysis (HPDA), Quantum Computing (QC), and Artificial Intelligence (AI), and their applications across scientific fields, industry and society.

Together with CESNET and CERIT-SC, IT4Innovations constitutes e-INFRA CZ, a strategic research infrastructure of the Czech Republic.

IT4Innovations currently operates three supercomputers – Karolina, Barbora and Barbora NG, as well as smaller complementary systems. Czech research communities also have access to the LUMI supercomputer, one of Europe's most powerful supercomputers.

In 2025, IT4Innovations installed the Czech Republic's first quantum computer, VLQ, acquired by the LUMI-Q consortium.

IT4Innovations is actively involved in the European network of AI Factories – it is a member of the LUMI AI Factory and coordinates the Czech AI Factory.

SUPERCOMPUTERS

	KAROLINA	LUMI	Barbora NG
Put into operation	summer 2021	winter 2023	summer 2026
Theoretical peak performance	15.7 PFlop/s	531.5 PFlop/s	1,858 TFlop/s
Compute nodes	831	5,042	144
Accelerators in total	576x NVIDIA Tesla A100	11,912x AMD Instinct MI250x	-
	2x NVIDIA RTX 6000	8x NVIDIA A40	-
CPU cores in total	106,880	454,784	27,648

HISTORY

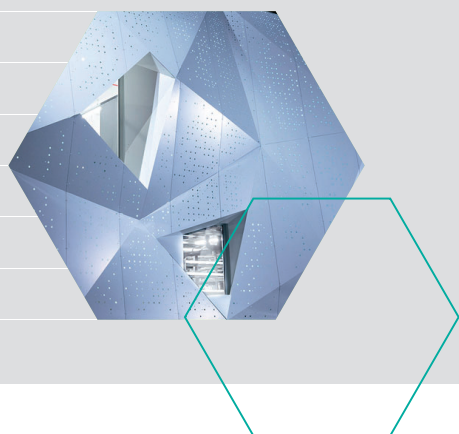
- 2011** - The foundation of IT4Innovations
- 2013** - Launching of the Anselm supercomputer
- 2014** - Opening of the IT4Innovations building
- 2015** - Launching of the Salomon supercomputer
- 2019** - Launching of the NVIDIA DGX-2 system and the Barbora supercomputer
- 2020** - IT4Innovations becomes the National Competence Centre in HPC
- 2021** - Launching of the Karolina supercomputer
- 2022** - Inauguration of the LUMI supercomputer in Kajaani, Finland, whose computing resources are also used by the Czech scientific community.
- 2023** - The establishment of the European Digital Innovation Hub Ostrava
- Launching of complementary systems
- 2024** - IT4Innovations part of the CLARA Centre of Excellence
- 2025** - Launch of the VLQ quantum computer of the LUMI-Q consortium
- IT4Innovations part of the LUMI AI Factory
- IT4Innovations participates in the delivery of the EuroHPC Federation Platform
- 2026** - Launch of the Barbora NG supercomputer
- IT4Innovations coordinates the Czech AI Factory



The key research areas of IT4Innovations include big data processing and analysis, machine learning, the development of parallel scalable algorithms, algorithms for quantum computers and simulators, solving computationally demanding engineering problems, advanced visualisation and virtual reality, modelling for nanotechnology, and the development of new materials.



RESEARCH LABS



Advanced Data Analysis and Simulations Lab

Infrastructure Research Lab

Parallel Algorithms Research Lab

Modelling for Nanotechnologies Lab

Quantum Computing Lab

AI Factories

The main aim of the AI Factories is to support the development of AI startups and the deployment of artificial intelligence in industry, public administration, and society at large.

www.czai.ai

www.lumi-ai-factory.eu

The National Competence Center in HPC

The reference and the single point of contact and coordination in Czechia for High-performance computing (HPC) and data analysis (HPDA).

www.eurocc-czechia.cz/en

European Digital Innovation Hub Ostrava

Supports the deployment and use of digital technologies primarily in small and medium-sized companies.

www.edihostrava.cz/en

Research projects

- Horizon 2020, Horizon Europe and the Digital Europe Programme projects
- EuroHPC JU projects
- National projects

Education and training Activities

- 40 courses, workshops and conferences per year
- Operation of an HPC oriented doctoral study programme Informatics and Computational Science
- Involved in the EUMaster4HPC project

Employees

The number of employees of IT4Innovations by divisions in full time equivalent (FTE) is appr. 179 FTE in total,

- 25% are Management and Administration
- 63% are Research and Development
- 12% are Supercomputing Services

Certification

- ISO 9001 Quality Management System
- ISO 27001 Information Security Management System

Computational Resources Allocation:

- Open access
- Access for Thematic HPC Resource Utilisation
- EuroHPC JU Grant Competitions



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IT4Innovations is a proud member of



EuroHPC
Joint Undertaking



iRODS

LUMI



VI-HPS

WHPC