VSB TECHNICAL UNIVERSITY OF OSTRAVA | IT4INNOVATIONS NATIONAL SUPERCOMPUTING CENTER

KAROLINA SUPERCOMPUTER

e-INFRA CZ

OUR SUPERCOMPUTERS SUPPORT EUROPEAN SCIENCE, INDUSTRY, AND SOCIETY

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), Data Analysis (HPDA), Quantum Computing (QC), and Artificial Intelligence (AI) and their application to other scientific fields, industry, and society. IT4Innovations operates the most powerful supercomputing systems in the Czech Republic, which are provided to Czech and foreign research teams from both academia and industry. Together with the CESNET and CERIT-SC institutions, IT4Innovations constitutes e-INFRA CZ, a strategic research infrastructure of the Czech Republic.

IT4Innovations currently operates three supercomputers — Barbora, NVIDIA DGX-2, a specialized system for AI calculations, and an EuroHPC petascale system called Karolina with a theoretical peak performance of about 15.7 PFlop/s.

The key research areas include big data processing and analysis, machine learning, development of parallel scalable algorithms and algorithms for quantum computers and simulators, solution of computationally demanding engineering problems, advanced visualization, virtual reality, modelling for nanotechnologies, and material design.

EuroHPC Joint Undertaking

EUROPEAN UNION
European Structural and Investment Funds
Operational Programme Research, Development and Education

MINISTRY OF EDUCATION, YOUTH AND SPORTS

Co-funded by the European Union

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- The petascale system Karolina, acquired as part of the EuroHPC Joint Undertaking, was installed in 2021.
- The Karolina supercomputer is designed to coherently respond to the needs of its user communities, addressing complex scientific and industrial challenges, including standard numerical simulations, demanding data analysis, and artificial intelligence applications.
- The Karolina supercomputer reaches a theoretical peak performance of 15.7 PFlop/s, which corresponds to 15.7 quadrillion floating-point operations per second.
- The Karolina supercomputer is the most powerful supercomputer in the Czech Republic.
- In the TOP500 list (June 2021), which evaluates supercomputers in terms of their performance, it ranked 69th worldwide, 19th in Europe. In the Green500 list of the most energy-efficient supercomputers, it even ranked 15th and in HPCG benchmark ranked 38th.

Technical specification

Put into operation	Summer 2021
Theoretical peak performance	15.7 PFlop/s
Operating system	CentOS 7
Compute nodes	831
Types of compute nodes	**756 CPU nodes** 2x AMD EPYC 7h12 · 64-core · 2.6 GHz · 256 GB RAM
	72 GPU nodes 2x AMD EPYC 7763 · 64-core · 2.45 GHz · 1 TB RAM · 8x NVIDIA A100 · 40 GB HBM2
	1 data analytics node 32x Intel Xeon-SC 8628 · 24-core · 2.9 GHz · 24 TB RAM
	2 visualisation nodes 2x AMD EPYC 7452 · 32-core · 2.35 GHz · 256 GB RAM · 1x NVIDIA RTX 6000 GPU
Accelerators in total	576x NVIDIA Tesla A100 · 2x NVIDIA RTX 6000
CPU cores in total	106,880
Storage	30 TB / home · 1,275 TB / scratch (NVMe, 730 GB/s sequential write performance, 1,198 GB/s sequential read performance)
Interconnection	Infiniband HDR 200 Gb/s

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