



Bundesministerium
für Bildung
und Forschung

Welcome and Update on the German HPC/AI Strategy

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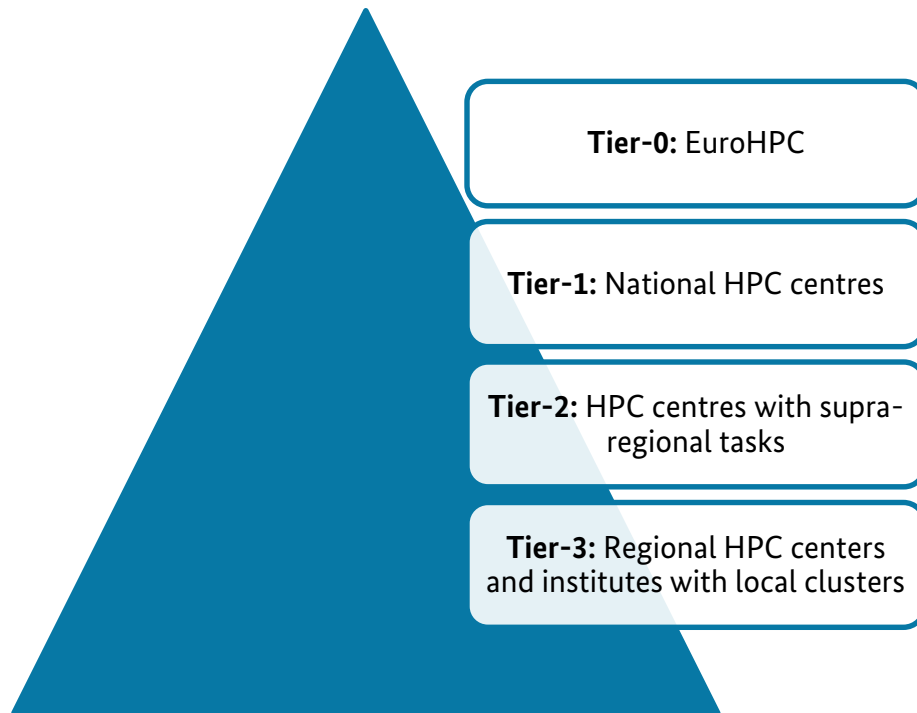
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Electronics and autonomous driving; Supercomputing

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Powerful HPC Structures in Germany



Europe-wide computing time allocation via individual supercomputers with a computing power of up to 1 ExaFLOPS

Three computing systems with a current total performance of approx. 130 PetaFLOPS

12 HPC systems, including 9 National High Performance Computing (NHR) centers in the future with current individual performance of up to 25 PetaFLOPS

Systems with a computing power of usually less than 1 PetaFLOPS



HPC for the Digital Age

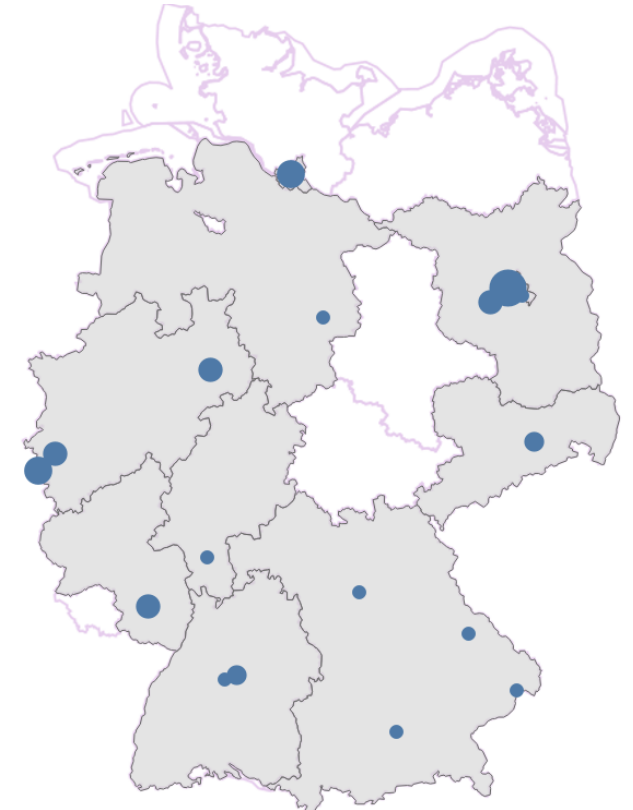
- Enabling excellent and innovative research: physics, energy research, climate research, artificial intelligence, etc.
- Industry transfer and support for the economy
- Securing global competitiveness and technological sovereignty
- HPC funding on National and European level - including GreenHPC, SCALEXA, EuroHPC JU (e.g. DEEP/EuroCC projects)
- [bmbf.de/bmbf/de/forschung/digitale-wirtschaft-und-gesellschaft/supercomputing/hoch-und-hoechstleistungsrechnen.html](https://www.bmbf.de/bmbf/de/forschung/digitale-wirtschaft-und-gesellschaft/supercomputing/hoch-und-hoechstleistungsrechnen.html)





National Funding Programme GreenHPC

- Initial situation: Data centers in Germany consume around 3 % of electricity and have CO₂ emissions of around 8 million tons/a
- Rising trend - computing and storage power will continue to increase
- Improvement in the energy efficiency of HPC systems required
- Objective: Improving the energy efficiency of scientific and commercial data centers
- Comprehensive approach: optimization of hardware and software (or co-design)
- Around 14 million € funding
- Selection of 9 consortia with 38 partners; start of projects in Q3 and Q4 2022





GreenHPC: Focus on Content

- Objective: Improving the energy efficiency of hardware and software (reducing the CO₂ footprint by lowering energy requirements)
- Fields of application:
 - Energy-efficient HPC systems:
 - New energy-saving components
 - Optimization of topologies (computer/power networks)
 - Development of control systems for the infrastructure
- Fields of application:
- Energy-efficient software technologies:
 - New and generic concepts for better load balancing
 - Improving the scalability of user codes, methods of approximate computing
 - Significantly reducing resource consumption by means of simulation (e.g. using a digital twin)



Key Technology AI

- “ChatGPT moment”: The potential of large AI models for the economy and society has become a matter of general awareness.
- Mastering large AI models is an important future field; international competition is fierce.
- Training large and powerful AI models requires high computing power and specific computing infrastructure, accessibility of the systems and their effective use.
- <https://www.bmbf.de/bmbf/de/forschung/digitale-wirtschaft-und-gesellschaft/kuenstliche-intelligenz/ki-aktionsplan.html>





The BMBF's AI Action Plan

- Goal: More AI “Made in Germany” or “Made in Europe”:
 - Accelerate the transfer of AI into the economy
 - Tapping into the social and scientific benefits of AI
- Central condition for achieving the goals of the AI action plan:
 - Targeted expansion of the AI computing infrastructure





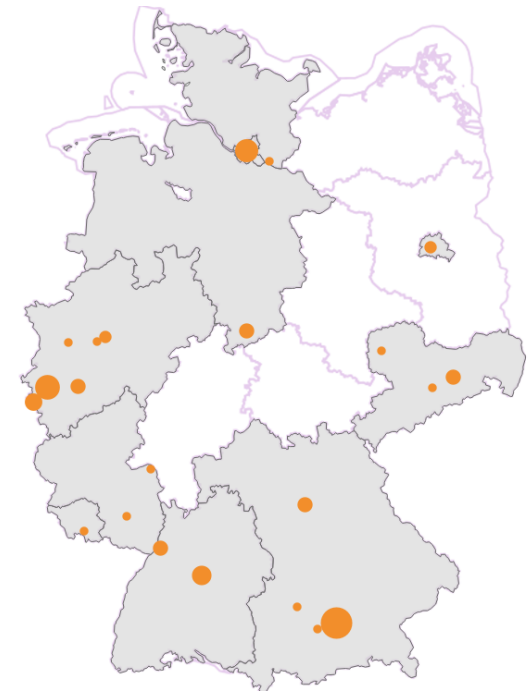
Selected AI Actions in the Overview

- Expansion of the AI computing infrastructure: JUPITER, AI service centers, further expansion of GCS and NHR
- Improvement of access conditions: “[EuroHPC Special Access](#)”, further opening of industry access at GCS
- Expansion of service offerings: AI service centers, GCS user support
- Further development of the software stack: EuroHPC project to develop methods, programme environments and a software stack
- BMBF Action for AI Infrastructure: elektronikforschung.de/dateien/bericht-ki-rechnerinfrastruktur-2024-05-web.pdf



National Funding Programme SCALEXA

- Initial situation: Germany is about to enter the exascale age with the EuroHPC/GCS system JUPITER
- Exascale speed offers great opportunities to solve complex problems faster and more efficiently
- Optimal use of the new possibilities requires effective use of exascale computers
- Objective: Effective use of applications and simulations on exascale systems
- Approach: improving the scalability of user software and further development of technologies
- Around 22 million € funding - Selection of 15 consortia with 66 partners; start of projects in Q3 and Q4 2022





SCALEXA Content Focus

Fields of application:

1. Basics for the exascale capability of applications
(**software side**):

- Parallelization of user software
- Improving the scalability of user software
- System-independent programming on heterogeneous hardware

2. Development of new exascale technologies (**system side**):

- Development of new methods for load management
- New methods and optimization of memory and storage system accesses
- Further development of the file and batch system



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Project Fact Sheets on EuroHPC, GreenHPC and SCALEXA

Please visit:

gauss-allianz.de/de/project/all#projekte





Future HPC and AI Activities

- Possibilities of adapting HPC activities to new architectures and more powerful systems
- Expansion of the computing infrastructure with AI systems
- Activities for AI implementation: AI competition
- AI Factories of the EuroHPC JU
- New challenges for sustainable data centers

Feel free to contact us:

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Thank you for your attention

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