

## Supercomputer for cutting-edge AI research in Hesse

**The new AI supercomputer of the Hessian Center for Artificial Intelligence (hessian.AI) is named *fortytwo*. This was announced today by hessian.AI, a center funded by three Hessian ministries with the goal of promoting excellent cutting-edge research in the AI field and making it more widespread. This includes central investments in AI compute infrastructures as well as services for users based on them.**

*fortytwo* was designed and installed by Hewlett Packard Enterprise (HPE) based on the Apollo 6500 system. The AI supercomputer is specifically designed to answer research questions and their applications in the context of the third wave of AI. The new computing cluster is specifically designed for machine learning and training large AI models. The 14.5 million project was significantly enabled by three Hessian ministries (the Hessian Ministry of Science and the Arts, the Hessian Ministry of Digital Strategy and Development, the Hessian Ministry of Economics, Energy, Transport and Housing) and the German Federal Ministry of Science, Research and Education (BMBF) through the AI Service Centers funding line.

In *fortytwo*'s engine room, a total of 632 NVIDIA A100 Tensor Core GPUs, each with 80GB of memory, as well as four IPU units from Graphcore are performing their duties. These are distributed across 80 compute nodes, which are interconnected via an NVIDIA Quantum Infiniband high-performance network. To provide the system with data quickly, 1.2 petabytes of central flash storage (IBM Spectrum Scale) is available over the same high-performance network. The system's measured peak performance is around 8 PFlops. This places the system among the top 100 supercomputers in the world.

In much the same way that the number 42 serves as the answer to "the ultimate question of life, the universe, and everything" in Douglas Adam's classic "The Hitchhiker's Guide to the Galaxy," the new supercomputer *fortytwo* will help researchers and users at the AI Center find new insights and answers to complex questions in the fields of artificial intelligence and machine learning.

*fortytwo* is hosted by the Green IT Cube on the GSI/FAIR campus in the north of Darmstadt. This is one of the most powerful scientific computing centers in the world. At the same time, it sets standards when it comes to saving energy: Thanks to its special design and efficient cooling system, it is particularly energy- and cost-efficient: the energy required for cooling amounts to less than seven percent of the electrical power used for computing. The TU Darmstadt and the GSI Helmholtz Center for Heavy Ion Research have maintained a successful cooperation in the field of joint use of infrastructures for research for many years.

“The decoding of the human mind is comparable to the exploration of the Big Bang and the human genome. AI systems such as ChatGPT could make this dream a reality, as they are based on extensive text training and can handle multiple tasks. hessian.AI, as the nucleus of an AI ecosystem, promotes such breakthrough opportunities in science, business and society. The AI supercomputer *fortytwo* is the cornerstone of powerful AI applications, providing computing power to enterprises and research institutions. Together, thanks to *fortytwo*, we can shape a European 'Artificial Reason' that reflects the European values of freedom and democracy. Thanks to all stakeholders for the trust. *fortytwo* could be the cornerstone for a groundbreaking 'CERN for AI' initiative.”

*Kristian Kersting, Co-Director hessian.AI*

“*Fortytwo* is a building block of the strong hessian.AI ecosystem. With *fortytwo*, we establish a unique infrastructure for scientists and users alike. This creates excellent conditions for transferring the excellent AI research at TU Darmstadt and all universities involved in hessian.AI into practical applications. With the help of robust, secure and efficient AI systems, we can develop solutions for global challenges and major issues for the future – in exchange with our partners in business and society. I am pleased that we can continue to realize this goal in hessian.AI thanks to the great support of the Hessian State Government and the Federal Government.”

*Tanja Brühl, President of TU Darmstadt*

“The new wave of AI has the potential to enable breakthroughs in research areas such as climate prediction, disease diagnosis, and drug development. This requires exceptional supercomputing power to effectively train large AI models that lead to faster insights and solve problems. We look forward to advancing this mission for hessian.AI with *fortytwo*, which consists of HPE supercomputers and the HPE Machine Learning Development Environment. The solution simplifies and accelerates the development and deployment of AI environments that enable developers and data scientists to train models and collaborate on AI projects.”

*Evan Sparks, Chief Product Officer, Artificial Intelligence, Hewlett Packard Enterprise*

#### Press Contact

Elena Stahl

hessian.AI – The Hessian Center for Artificial Intelligence

✉ [elena.stahl@hessian.ai](mailto:elena.stahl@hessian.ai)

☎ +49 6151 16 – 28555

“The NVIDIA Accelerated Computing Platform is at the heart of the new *fortytwo* supercomputer. The compute nodes, which are particularly tightly connected via NVIDIA NVLink and InfiniBand, enable the highly scaled and high-performance computation of the most demanding neural networks such as Large Language Models (LLM). This allows even the largest models with several hundred billion parameters to be efficiently distributed across the AI cluster, which can thus make an important contribution to Europe's AI sovereignty. We are excited about the positive impulse on AI research and will closely support hessian.AI through the upcoming collaboration.”

*Carlo Ruiz, Head of EMEA AI Data Center Solutions, NVIDIA*

### **hessian.AI – The Hessian Center for Artificial Intelligence**

The Hessian Center for Artificial Intelligence (hessian.AI) pursues the goal of conducting excellent basic research with concrete practical relevance and also to promote transfer to industry and society. The center, which is funded by three Hessian ministries and in which 13 Hessian universities participate, bundles the expertise of 22 AI scientists and expands it through 22 new professorships. In the coming years, the center will invest around 40M€ in AI compute infrastructures as well as services for users based on these infrastructures.

[www.hessian.ai/infrastructure](http://www.hessian.ai/infrastructure)

#### **Press Contact**

Elena Stahl

hessian.AI – The Hessian Center for Artificial Intelligence

✉ [elena.stahl@hessian.ai](mailto:elena.stahl@hessian.ai)

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