

JUPITER – Europe’s First Exascale Supercomputer

JUPITER, the first European exascale supercomputer, is set to be launched at Forschungszentrum Jülich. “Joint Undertaking Pioneer for Innovative and Transformative Exascale Research”, or JUPITER for short, is the first system in Europe with a computing power of more than one ExaFLOP/s. This corresponds to one quintillion floating-point operations per second or the computing power of roughly one million modern smartphones. As one of the world’s most powerful AI supercomputers, JUPITER will enable a whole new level of breakthroughs in the use of artificial intelligence and scientific simulations – serving as a major driver of progress for Germany and Europe and ensuring technological and digital sovereignty.



Simulations and AI

JUPITER is designed for simulations and AI applications in science and industry that require a maximum level of computing power, such as training large neural networks. Climate and weather simulations can be enhanced and will significantly improve predictions of local extreme weather events, such as heavy rain and severe thunderstorms. JUPITER will also drive the development and optimization of a sustainable energy system.

Up to 80 ExaFLOP/s for AI

JUPITER is set to be the first European supercomputer to achieve the performance of more than one quintillion floating point operations per second – or **1 ExaFLOP/s** – **with double the precision (64 bits)** typically required for scientific simulations. The

computer performance is equivalent to that of around one million modern smartphones. There are currently only three other computers of this performance class, all of them are located in the US. For the training of AI models, JUPITER will be able to provide an AI computing power of about **40 ExaFLOP/s at 8 bit AI precision** or even **80 ExaFLOP/s in 8 bit sparsity mode**. This would make JUPITER one of the fastest computers for AI in the world.

High energy efficiency

JUPITER is equipped with particularly energy-efficient processors and will be powered by green electricity. It is the most energy-efficient system among the top five in the TOP500 list of the world's fastest supercomputers, which was presented in June 2025 at the International Supercomputing Conference (ISC) in Hamburg.

Its estimated energy requirements will average around 11 megawatts, which is roughly equivalent to the requirements of several thousand typical households. JUPITER will be operated with a highly efficient warm-water cooling system. The heat that is generated will be used to heat buildings, which will cover a substantial proportion of the heating requirements on the Jülich campus in the medium term.



Modular data centre

JUPITER is housed in a high-performance **modular data center (MDC)** consisting of around **50 container modules**. The MDC covers more than 2,300 square meters — roughly the equivalent of half a football field. This concept has numerous benefits,

including the fact that planning and assembly times are significantly shorter, and construction and operating costs are lower. It can also be flexibly adapted for new generations of computers and new power supply and cooling infrastructure, as well as offering improved opportunities for recycling.

Costs

The costs for JUPITER and its operation over an estimated period of six years amount to **€ 500 million**, half of which is being provided by the European supercomputing initiative EuroHPC JU. The other half is being provided in equal parts by the German Federal Ministry of Research, Technology and Space (BMFTR) and the Ministry of Culture and Science of the State of North Rhine-Westphalia (MKW NRW).

Partners

JUPITER is owned by the European supercomputing initiative EuroHPC JU.



The supplier is the German– French consortium ParTec- Eviden, which is led by Eviden. Both parties signed a contract for the construction of the exascale supercomputer in October 2023. Europe's first exascale supercomputer will be located at Forschungszentrum Jülich in North Rhine- Westphalia.

Timeline

JUPITER Booster and its storage systems have been fully installed. Scientific users will get access in the coming weeks. Over 100 national and international applications have been selected via the JUPITER Research and Early Access Program (JUREAP), the GCS Exascale Pioneer Call, and the Gauss AI Compute Competition for AI projects.

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