Tomorrow's Affairs
Analysis of today
Assessment of tomorrow

By: Tomorrow's Affairs Staff

Europe's supercomputer, American heart – what the launch of JUPITER means

JUPITER, the first European exascale-class supercomputer (computers capable of performing more than 10^{18} (one quintillion) operations per second), was launched on 5 September in Jülich, Germany.

The ceremony was chaired by German Chancellor Friedrich Merz and attended by leading European scientists and industry partners.

JUPITER immediately became the fastest computer in Europe and the fourth-fastest in the world. It will be used for climate predictions, brain research, the development of new drugs, and simulations in the energy sector.

Behind the technical pomp, there is significant political meaning. Europe now belongs to a club in which there were previously only two powers - the USA and China.

But JUPITER is not entirely "European". Its power comes from American chips, in particular the GH200 Grace Hopper superchips from Nvidia. European companies, ParTec and Eviden, played a key role in system integration and design, but without American silicon, the project would not be possible.

What exactly is JUPITER?

The computer is located at the Forschungszentrum Jülich as part of the European initiative EuroHPC (European High Performance Computing Joint Undertaking - joint European programme for supercomputing).

The system has a modular structure (it consists of parts that can be exchanged or upgraded). The first module, known as the booster, consists of tens of thousands of Nvidia GH200 chips connected via a super-fast InfiniBand network, a special network technology that links computer nodes together.

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Each "node" has several processors (CPU - Central Processing Unit, for general tasks, and graphics processors, GPU - graphics units optimised for mass calculations). In JUPITER, the GPU and CPU are closely linked via NVLink (an interface for ultra-fast data exchange within a node), allowing immense amounts of data to be processed without downtime.

Another crucial component is liquid cooling. Instead of traditional fans, pipes with cooling liquid are routed through the modules, which drastically reduces energy consumption. Thanks to this, JUPITER also took first place on the Green500 list (a ranking of the most efficient supercomputers in terms of energy and consumption).

Why is this important?

The European Commission has labelled this project "a historic milestone" because the exascale supercomputer is not only a scientific tool but also a strategic infrastructure.

This means that it is not seen as a utility machine for scientists but as a pillar of digital sovereignty, on a level with energy networks or transportation systems.

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JUPITER will enable European researchers to work in an area where they have previously relied on American or Chinese systems. This means faster climate modelling (important for predicting floods, droughts, and fires), simulations of new materials, faster testing of molecules for drugs, and the development of safer reactors or turbines.

But this is also a paradox. Europe now has an exascale computer but no exascale chip technology of its own. If export policy changes or there is a crisis in relations with the USA, the question arises as to how independent Europe would then really be.

The broader political picture

At the inauguration, German Chancellor Merz emphasised that JUPITER "reduces the technological gap with America and China". However, in reality, Europe has not caught up with the USA and China; instead, it has moved up into their league with their technology.

Politically, JUPITER is a bridge rather than a trophy: it provides Europe time to develop its own processors and software standards.

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It is particularly important that JUPITER is designed as an open platform. The modular architecture means that later upgrades can also rely on European chips as the industry develops them.

This is key: if JUPITER is only used as a "box" for American hardware, it remains a symbol of dependency; if it becomes the basis of the European technological infrastructure (own software, tools, research), it can be the starting point for true technological independence.

Energy and industrial dimension

Supercomputers are not only fast but also power-hungry. Exascale systems can consume megawatts of electricity.

JUPITER has shown that it is possible to harmonise performance and efficiency. Its direct liquid cooling and power design have made it the most efficient supercomputer in the world.

Bitkom warns that JUPITER must be available not only to large institutes but also to smaller research teams and startups

It is more than a technical achievement – it is a political argument that such projects can be sustainable without ruining the environment.

For the industry, the issue of access is just as important. The European association Bitkom (the largest German trade association for IT and telecommunications with more than 2,000 members - from startups and small IT companies to medium-sized enterprises and global corporations such as SAP, Google, Microsoft, T-Systems and IBM) warns that JUPITER must be available not only to large institutes but also to smaller research teams and startups.

What comes next?

JUPITER is now entering the phase in which it will be awarded to researchers and industrial projects. The first areas have already been identified: climate simulations, biotechnology, neuroscience and energy research.

However, the value of JUPITER will depend on who uses it and how. If Europe enables a wider range of users to develop software, tools and applications, JUPITER can become the core of a new European digital ecosystem.

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If it remains within the circle of large institutes, it runs the risk of being nothing more than a symbolic "prestige machine".

With the launch of JUPITER, Europe has moved up into the exascale league. This is a success, but not yet the end of the road.

The crucial questions are only just beginning: will this supercomputer become the engine of European technological development or just proof that the continent can buy the best American chips?