

Cineca Supercomputers Rely on Vertiv in the COVID-19 Battle

A Vertiv case study



Background

[Cineca](#) is a not-for-profit Interuniversity Consortium comprising 69 Italian universities, 31 Italian Public Research Institutions and the Italian Ministry of Education, Universities and Research (Ministero dell'Istruzione dell'Università e della Ricerca, MIUR). Formed in 1969 as the Interuniversity Consortium of Northeastern Italy for Automatic Computing, today Cineca, which operates under the supervision of the MIUR, is the largest data centre in Italy and one of the most important worldwide. In fact, the supercomputer Marconi is one of the highest-ranked supercomputers in the Top500, which ranks the most powerful supercomputers in the world. Cineca also represents Italy as part of the PRACE (Partnership for Advanced Computing in Europe) project.

Cineca is becoming Italy's unique point of reference for technological innovation. With offices in Bologna, Milan and Rome, and more than 900 employees, Cineca serves the entire academic, educational and research network in Italy. In fact, Cineca has made a state-of-the-art computing centre available to the scientific community. It also supports the national and international sphere of research through supercomputing and its applications, creates management systems for university administration services and the MIUR, and engineers and develops information systems for public administrations, the healthcare industry and businesses.

To guarantee the consistent reliability, safety and flexibility of its critical infrastructure, Cineca is constantly updating and enhancing its technologies. Since the 1990s, it has been relying on solutions, services and capabilities from Vertiv to safeguard its data centres in terms of protecting the electricity supply, precision air conditioning and infrastructure monitoring.

CINECA

The results

- Low power consumption thanks to Vertiv™ Liebert® Trinergy™ Cube technology, with energy efficiency of up to 99% without compromising server power quality.
- High energy efficiency thanks to direct and indirect freecooling, as well as the use of technologically advanced components.
- Cooling capacity modulation according to heat load and excellent management of high heat loads in small spaces.
- Extremely low sound impact due to the exceptionally low noise level of the Vertiv units, which has allowed office areas to coexist in close proximity.
- Exceptionally high reliability of the systems, some of which have been operating 24 hours a day for over 15 years.

The context

The Cineca Consortium is involved in a number of research projects covering new and emerging technologies, such as AI, big data, machine and deep learning, digital twins and quantum computing. Supercomputers, such as the [Marconi-100](#), are increasingly being used to address some of the world's most challenging issues, including climate change and sustainable agriculture.

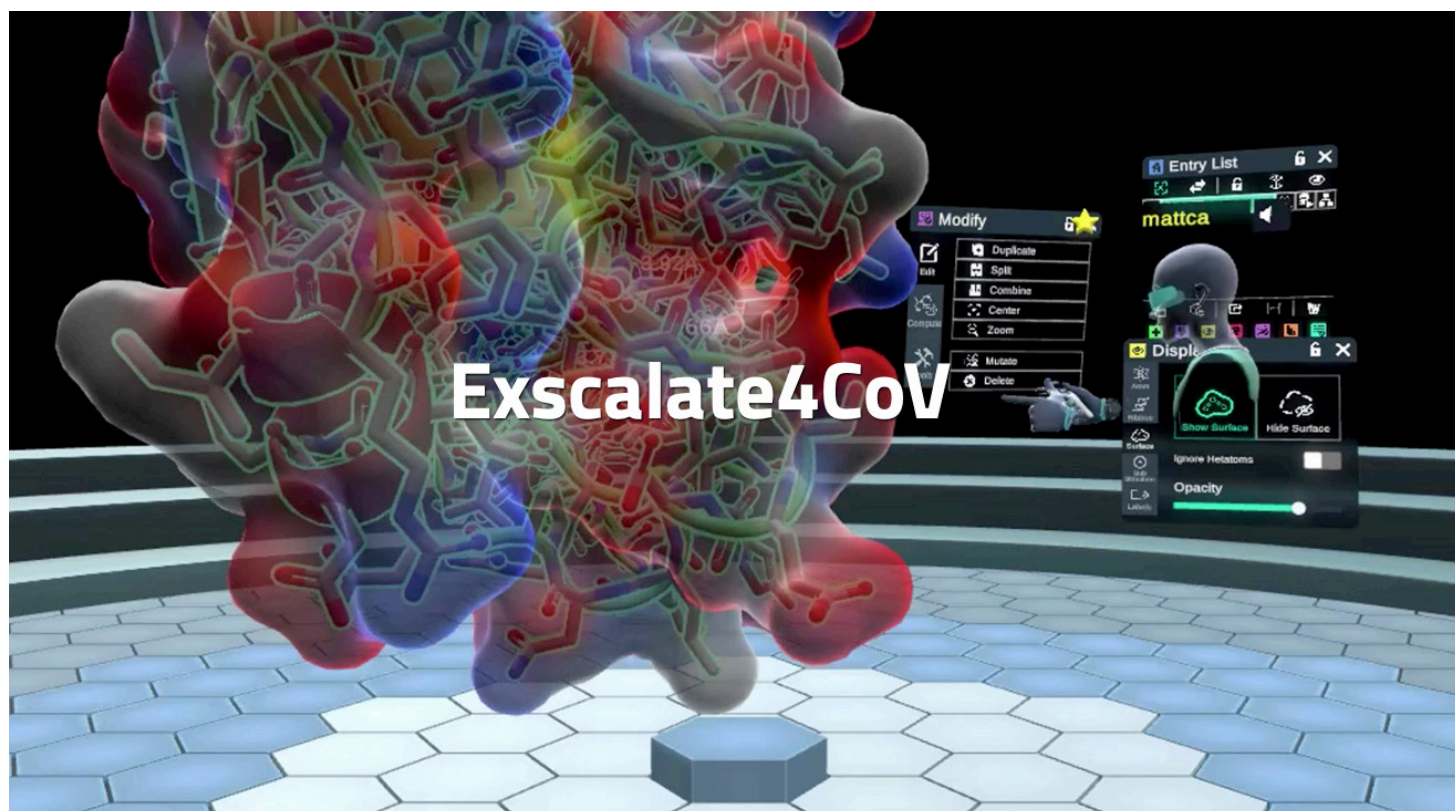
The challenge

Since the start of the pandemic, researchers at Cineca have been using supercomputers to fight COVID-19. In 2020, they began using the Marconi-100 to simulate the behaviour of proteins that allow the Coronavirus to replicate. Using this data, they perform virtual testing to find the drug molecules that are most effective at inhibiting the virus and work with pharmaceutical researchers to decrease the time required to develop therapeutic drugs. This is a huge computational project, as each protein requires at least one week of continuous simulation on 16 Marconi-100 nodes – a process that would take at least four months on a standard computer. Over the past year, Cineca's supercomputer has performed millions of operations per second in a non-stop effort to help scientists study the Coronavirus and fight the global pandemic.

Not surprisingly, the High Performance Computing (HPC) required for this project presents a unique challenge in terms of power and cooling. The Marconi-100 is a new accelerated cluster based on IBM Power9 architecture and NVIDIA Volta GPUs, providing approximately 32 P-Flops of computing capacity and paving the way for pre-exascale [supercomputers](#).

For these COVID-19 decoding calculations to continue without interruption, Cineca has relied on Vertiv, its critical IT infrastructure partner for over 30 years.

Throughout this decades-long collaboration, Cineca has chosen Vertiv multiple times to back its commitment to supporting scientific research. Cineca has been working with Dompè Farmaceutici for more than 15 years to use supercomputing to accelerate drug development, but Coronavirus has been the key target since the pandemic began. Cineca and Dompè collaborate with [Exscalate4CoV](#), a public-private consortium of 18 institutions from seven European countries focused exclusively on the treatment and cure of COVID-19. To capitalise on the expertise gained through Exscalate4CoV, the EU recently funded a new project called [LIGATE](#) that aims to create a leading drug discovery and design application solution using HPC systems down to the exascale level.



The solutions implemented

Vertiv™ power and cooling systems protecting the Marconi-100 and other supercomputers on the Cineca campus are among the most robust, sophisticated, and reliable IT infrastructure solutions in the world.

In order to maintain the precise environmental conditions required in Cineca's data centres, Vertiv™ Liebert® XD, [Vertiv™ Liebert® CRV](#) and [Vertiv™ Liebert® PDX](#) cooling units were installed. In particular, the Liebert PDX is an extremely energy efficient, reliable and flexible solution, equipped with power modulation using variable capacity compressors, latest generation EC fans, and a system control that optimises unit operation and performance, and thus makes the unit able to meet any installation need. In the case of Cineca, 6 Liebert PDX units were installed; 4 with economizers and 2 without.

In support of these Liebert PDX units, 3 [Vertiv™ Liebert® HPC](#) air-cooled chillers with an integrated freecooling system have also been implemented, allowing remarkably high energy savings in cold and temperate seasons as they exploit the low outside temperature and minimise the use of compressors.

As for the power supply, [Vertiv™ Liebert®Trinergy™ Cube](#) has been installed. This modular Uninterruptible Power Supply (UPS) controls and regulates the energy that powers the facilities and protects against surges, overvoltage, or unexpected interruptions that could compromise extremely important research. In fact, after carefully analysing the best UPS system for its supercomputing equipment, Cineca found that the Liebert Trinergy Cube was the only system capable of meeting all performance requirements, including reliability and remote monitoring services.

Finally, Vertiv provides Cineca with an additional layer of protection through the preventive monitoring and remote diagnostics of [Vertiv™ Life™ Services](#).

In fact, Vertiv Life Services constantly communicates critical system data to Vertiv engineers who monitor and analyse it in real-time to identify trends, predict behaviours and instantly respond (remotely) to any potential critical issues, or send an on-site technician if needed within just a few minutes.



“Vertiv Liebert Trinergy Cube delivers 99% throughput, enabling heat scalability up to 3.4 MW in a single unit and up to 27 MW in parallel. It also intelligently adjusts the power supplied to the charge based on the atmospheric conditions in the installation location. We are truly proud of this partnership - which we can consider historic - with Cineca and of the projects we have carried out over the years. We will continue to support them in the ongoing effort to improve the performance and energy efficiency of their technology environments.”

*Stefano Mozzato,
Country Manager for Vertiv in Italy*

“We chose Vertiv Life Services as we found it to be a cutting-edge service that showed a number of beneficial features compared to the competition. In addition, after the installation of the Vertiv Liebert Trinergy Cube, Vertiv Life Services proved to be an essential and valuable tool for constantly monitoring UPS to ensure maximum availability and efficiency.”

*Massimo Alessio Mauri,
General and Technical Services Area
Manager at Cineca*

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