THE UNIVERSITY OF Münster DEPLOYS ZUTACORE'S WATERLESS, TWO-PHASE LIQUID COOLING

Organization: University of Münster

Industry: Higher Education

Challenge: Increasing computing power while managing heat, energy consumption, and limited floor space

Solution: ZutaCore HyperCool® Direct-to-Chip Liquid Cooling

Results: Improved processing capacity, reduced energy costs, and scalable, reliable cooling infrastructure

HyperCool® Delivered the Most Computing Power for the Money; Eliminated the Risk of Water Leakage and Reduced Energy Costs

Project Background: HPC Systems Lie at the Heart of CIT

With 43,000 students, the University of Münster is among Germany's largest universities. Its Center for Information Technology (CIT) is responsible for all IT infrastructure, communication, and media technology.

The University is located in the middle of North-Rhine-Westphalia in Germany and spans multiple buildings and physical locations. The University's HPC system has its own building with its own infrastructure for power and cooling. In recent expansions, CIT installed an ASUS HPC system, featuring:

- 44 dual-socket nodes: AMD EPYC 9654, 96-core processors, 768 GB RAM
- 4 dual-socket nodes: AMD EPYC 7773X, 64-core processors, 4 TB RAM

These powerful systems consume up to 400 watts per processor, pushing traditional cooling systems beyond their limits.

The Challenge: An Urgent Need For Liquid Cooling

Like many research institutions, the University faces increasing demands for computing power, creating challenges related to heat management, energy consumption, and space optimization. Traditional air-cooling systems are no longer sufficient to handle the heat generated by the latest high-power processors, leading CIT to explore advanced cooling technologies.

Why HyperCool?

The University evaluated several liquid cooling technologies, such as direct-to-chip and immersion. The ZutaCore® HyperCool® waterless direct-to-chip liquid cooling solution came out the clear winner for both performance and environmental benefits to the University.

The decision was driven by HyperCool's unique ability to:

- Eliminate water usage: The HyperCool system conserves up to 90% of water, aligning with sustainability goals while protecting equipment from leaks and corrosion.
- Maintain compatibility: Operating with minimal changes to existing infrastructure, HyperCool can scale up to 120kW per rack and cool up to 2,800 watts per processor, enabling a significant compute density increase.
- Reduce energy costs: Saving up to 82% in energy consumption compared to air-cooling systems, HyperCool also reduces power demand for fans and eliminates the need for chillers.
- Enhance reliability and reduce environmental impact: HyperCool fluid is 100% safe for IT equipment, has zero ozone depletion potential (ODP), and supports a low 1.04 PUE.
- Enable 100% heat re-use: The system's closed-loop design allows the heat to be reused within the data center or even adjacent buildings, optimizing energy efficiency and offering new avenues for sustainable energy management.

The HyperCool Solution: Installation & Implementation

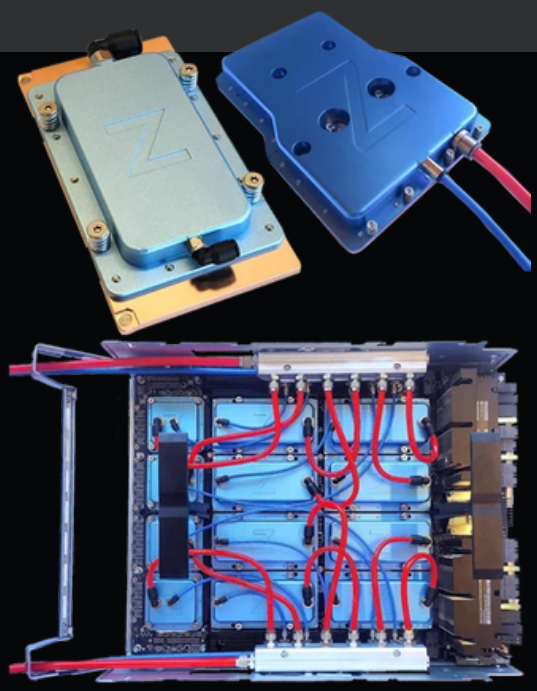
The HyperCool system's installation at the University's HPC server room was quick and straightforward. Components were shipped and assembled on-site. **"After the system was completely assembled, we ran a few tests and it was clear that the ZutaCore system fit all of our needs and provided the performance, energy savings and reliability that was so important to us."** said Jürgen Hölters, Deputy Head of CIT.

The system's energy efficiency impressed the CIT team, as it enabled lower fan speeds and reduced CPU temperatures, resulting in improved CPU efficiency. Additionally, the ZutaCore HyperCool allows the University to avoid approximately **50% of the space** typically required by air-cooling systems, thanks to its compact design and high heat-transfer efficiency.

"And after running the system for months with no problems, we are extremely confident in our selection of HyperCool." Jürgen added. **"This would have never been possible with air cooled systems, and the system is also much quieter due to the reduction in fan noise."**

Holger Angenent, Leader of CIT's e-Science Infrastructure Group, offered an explanation of how HyperCool technology offered the ideal solution to their challenges:

"By deploying ZutaCore's direct-to-chip liquid cooling technology, we were able to increase the density of servers in a rack, while also using less electrical power for fans. Also, in comparison to a water based solution, ZutaCore technology allowed us to achieve greater server density and reduce energy costs while operating at higher liquid temperatures compared to water-based systems."



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Results and Future Plans: Scalability in the Future

Since deploying HyperCool, the University has realized several key benefits:

- Increased Processing Power: By cooling CPUs more efficiently, the University could use fewer nodes for the same compute power, maximizing available rack space.
- Energy Savings: Slower fan speeds and lower CPU temperatures contributed to significant reductions in energy costs, with annual savings projected to exceed $1M based on estimates for a 2MW data center.
- Enhanced Quietness: The lower fan noise improved the server room's operational environment.

Looking ahead, the University plans to incorporate HyperCool in future expansions, with the potential to take advantage of heat reuse within the University's facilities — another advantage over other liquid cooling technologies. As Jürgen noted, **"The possibilities to redirect that heat can deliver a significant environmental impact not only to the University, but to the planet itself as we strive globally for net zero emissions."**

Looking Forward:
A New Standard in Liquid Cooling For AI + HPC

The University of Münster's adoption of ZutaCore's HyperCool solution exemplifies the transformative potential of advanced liquid cooling in higher education and research.

HyperCool has established a scalable, environmentally conscious foundation for future HPC needs. With reduced energy costs, enhanced computing power, 100% heat reuse, and zero emissions in the data center, HyperCool supports the University's goals of sustainable innovation and operational excellence.

Data centers worldwide continue to face escalating power demands from AI and HPC workloads. ZutaCore's HyperCool technology is setting a new benchmark for liquid cooling, paving the way for next-generation data centers that prioritize both efficiency and environmental responsibility. With HyperCool, institutions like the University of Münster are not only meeting current technological needs but also leading the charge in creating greener, more resilient data infrastructures for the future.

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