AMAX submer

Solution Brief

Pushing Operational Limits and Efficiencies with **Liquid Immersion Cooling**

Density-optimised *GPU-accelerated servers from AMAX and immersion cooling racks from Submer offers first-rate performance in computing power and overall energy efficiency*

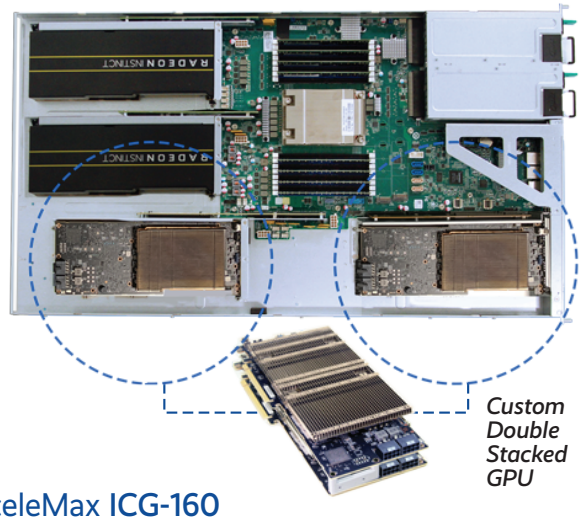
As hardware density and costs continue to rise, liquid cooling is transforming the data centre industry, pushing the operational limits of both CPU- and GPU-based servers while roughly halving the construction costs of traditional data centres. Already used for geoscience and other high-demand applications, experts agree that immersion is the future of cooling technology,[1] and will scale to support the data centre technologies of tomorrow.

According to Uptime Institute, the average cost of building a data centre is currently $11.50 per Watt of critical (IT) load plus $300 per square foot for site preparation. That means a 100% increase in power consumption would mean an additional $11.5 million per Megawatt and three times the space requirement to manage density for air cooling at $300 per square foot.[2] Rack-based immersion cooling solutions support breakthrough growth and cost-saving potential, delivering across-the-board improvements in rack density, cooling capacity, data centre layout, and location options.

Meanwhile, conventional cooling is incapable of handling high-density computing required for emerging applications. Data centre sites already require significant CAPEX to have electric utilities deliver additional power as they scale, relocate, or push to the cloud as well; conventional cooling cannot deliver the energy efficiency required to contain these costs. In time, enterprises may find conventional cooling is unable to provide the reliability and uptime required to meet the business needs of the future. Immersion cooling is a system of cooling CPUs and GPUs where the coolant is in direct contact with the processing units itself. Most of the contributors to internal thermal resistance are eliminated. Direct liquid immersion cooling offers a high heat transfer coefficient that reduces the temperature rise of the processors surface above the liquid coolant temperature.

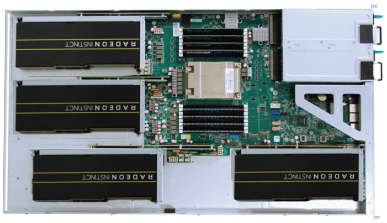
Immersion is the Future of Liquid Cooling

Among the four primary liquid cooling technologies available —single phase, two phase, core plate, and rear-door heat exchange—single-phase immersion cooling delivers the most optimised performance per-watt-per dollar, with outstanding density, superior bandwidth, lower data centre TCO, optimised compute, memory, and significant reduction in cooling data centre energy consumption.



AceleMax ICG-160

1U 6x GPU Density Optimised Server for Immersion Cooling



AceleMax ICG-160

- Supports up to 6x single-wide or 4x double-wide GPU cards in a 1U immersion cooling chassis
- Supports one AMD EPYC™ 7002 series processor family

Features

- Onboard dual-port 10GBase-T networking
- Heatsink optimisation
- Fanless
- Adapted power supply
- Optimised design for thermal efficiency
- Air-to-immersion subsystems compatibility

Specifications

Processor	• Single AMD EPYC™ 7002 series processor, 7nm, Socket SP3, up to 64 cores, 128 threads
Memory	• 16x DDR4 DIMM slots • Up to 2,048GB RDIMM/ 1,024GB LRDIMM/ 2,048GB LRDIMM 3DS • Memory speed up to 3200 MHz
Graphics Processing Unit (GPU):	• Up to 6x single-wide or 4x double-wide GPU cards in a 1U immersion cooling chassis
Expansion Slots	• 6x PCIe Gen 3 x16 slots for GPUs • 1x FH/HL PCIe Gen 3 x16
Network Controller	• 2x 10GBASE-T ports • 1x 10/100/1000 management LAN
Storage	• 2x hot-swap 2.5" SATA Drive Bays • 2x SATA 6G SATADOM ports • 2x NVME/SATA M.2
Chassis	• 1U rack-optimised chassis • Modified power supply: 1600 watt redundant, 80 PLUS Platinum
Supported Immersion Cooling Rack: GRC Chassis	• Power dissipation per rack: 25kW - 100kW • Number of U per rack: 42U – 52U *Immersion Cooling Rack includes:* • Rack(s) filled with liquid immersion coolant • Coolant distribution unit (CDU) • Monitoring and alerts application • Mirrored System, with 2N redundant pumps • Integrated cable management • Rack-mounted service rails for easy server maintenance and hot swaps
Immersion Cooling Solution Value Proposition:	• Cut cooling energy by up to 95% • Attain an mPUE <1.05 • Lower upfront costs 50% • Reduce server power draw 10-20% • Cool up to 200 kW in a single rack • Enables high-density data center layouts • CPU/GPU-agnostic • Fast deployment: 8-12 weeks • Enables Scaling in 1 to 4 rack increments

[1] *Marc Bhuyan, Google Machine Learning Infrastructure Project Manager. BisNow Conference, December 2018. Published: https://www.bisnow.com/silicon-valley/news/data-center/new-cooling-computer-technologies-could-mean-savings-for-data-centers-96080*
[2] *Pitt Turner IV, P.E. with Kenneth G. Brill. Cost Model: Dollars per kW plus Dollars per Square Foot of Computer Floor. Uptime Institute, 2015.*

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