

# The Greener Side of HPC at Poznan Supercomputing and Networking Center



Poznan Supercomputing and Networking Center (PSNC or PCSS) is a multifunctional hub for internet networking services, research and development, and supercomputing resources. The High Performance Computing (HPC) center within PSNC provides HPC resources for science, business, and public institutions and is recognized as a European leader in energy efficient supercomputing.

As a global leader in efficient data center management, PSNC had explored many energy saving technologies over the years to further reduce its carbon footprint. Using liquid as a cooling medium is a key efficiency strategy, and PSNC has strived to cool as much IT as possible using a warm water circuit of approximately 40°C.



## Direct Contact Liquid Cooling Prototype

In early 2015, CoolIT Systems and Huawei installed a 3 rack proof of concept (POC) system at PSNC that was cooled by Direct Contact Liquid Cooling (DCLC™). The system comprised of:

- **Huawei CH121 servers** that utilized Rack DCLC Passive Coldplate Loops to cool the dual CPUs and Memory DIMMs.
- **Stainless steel Rack Manifolds** to distribute coolant between the Passive Coldplate Loops and CDUs.
- **Rack DCLC CHx40 CDU:** a centralized pumping and liquid-to-liquid heat exchange module with external warm water supply

The 3 POC racks functioned smoothly throughout the hot 40°C plus summer of 2015 that temporarily disabled several CRACs at PSNC and forced the shutdown of all non-liquid cooled racks. The outstanding performance of the liquid cooled POC racks became the springboard for the investment in the larger system to come.



PSNC's first liquid cooling project utilized CoolIT Systems Rack DCLC CHx40 CDU's across 3 racks.

"We are pleased to have migrated from a liquid cooled pilot project with CoolIT Systems to a full-scale rollout. The pilot project proved to be very reliable, it met our efficiency goals, and provided a bonus performance boost with the processors very happy to be kept at a cool, consistent temperature as a result of liquid cooling's effectiveness."

Radoslaw Januszewski, IT Specialist,  
PSNC

## Customer Challenges

In 2015, PSNC released a public tender for a new 1.4 Peta-flop supercomputer to be named Eagle. The tender requirements for this new computer procurement were challenging in terms of specifications to lower the PUE while maximizing computing density. PSNC requested that over 85% of the total heat load generated by the IT equipment be managed directly with a warm water cooling system (defined as 40°C or higher), in order to recycle the waste server heat for secondary purposes and lower OPEX costs. They further required the system to utilize the existing onsite cooling infrastructure and datacenter space for the new Eagle supercomputer to reduce CAPEX for the new cluster. Ultimately, the target for Eagle was to create one of the most powerful yet energy efficient supercomputers in the European Union.

### Joint Solution to Meet the Challenge

With the challenge set by the RFP, CoolIT Systems and Huawei partnered once again to evolve the POC system jointly constructed in early 2015 into an enhanced proposal to meet the new PSNC requirements. The updated solution leverages the same Huawei CH121 server inside the Huawei E9000 chassis with a DCLC system provided by CoolIT Systems. An additional component was added to cool the voltage regulators to increase the total liquid heat capture from the server to over 85%.

The CoolIT Systems Rack DCLC system constructed for PSNC consists of three modules:

- **Passive Coldplate Loop:** A single liquid cooling loop manages heat loads from the processors, voltage regulators and memory components within each Huawei CH121 node. Each Passive Coldplate Loop terminates in a Stäubli dry-break quick disconnect.
- **Rack Manifold:** A pair of vertical stainless steel manifolds are installed at the back of each rack, allowing for hot-swapping of any server from the cabinet via Stäubli dry-break quick disconnects. The Rack Manifold is connected to the Coolant Distribution Unit via overhead or underfloor piping.
- **Coolant Distribution Unit (CDU):** The 20 racks are connected via a secondary network and managed by two CoolIT Systems Rack DCLC CHx650 centralized pumping CDUs in an N+1 redundant configuration.



The CoolIT Systems solution is simple to install, easy to service, and allows for increased density. As PSNC prides itself on being a leader in innovation, it is fitting that the warm-water generated from the servers is transferred to their external heating system. The PSNC campus heating system is able to reuse the waste server heat and save energy.

Eagle officially launched at the inauguration of the PSNC-Huawei Innovation Center on January 22, 2016. The cluster, ranking #80 on the Top500 Supercomputers Sites, is the second largest supercomputing installation in Poland.

### Customer Benefits

With a successfully installed CoolIT Systems Rack DCLC solution, PSNC is running a high-density supercomputer that is available for a wide array of research and development whilst also supporting innovative projects throughout Poland. The key benefits the liquid cooled system is providing to PSNC include:

- Lowered cooling costs than conventional A/C cooled systems
- Increased compute capacity without having to purchase additional CRAC systems or acquire more floor space
- Recycled processor heat is used to warm campus buildings
- Higher processing efficiency due to CPUs being kept at consistent temperature

For more information on how CoolIT Systems custom Rack DCLC™ solutions can enable higher rack densities, reduce energy costs and maximize compute performance, contact [sales@coolitsystems.com](mailto:sales@coolitsystems.com).