



“The Fujitsu Liquid Immersion Cooling System is an efficient, cost-effective and green alternative to overheated server rooms. Without air conditioning, the server room is near silent which makes for a more pleasant work environment.”

Shashank Shekhar
Principal Research Scientist, SCFBio
Indian Institute of Technology Delhi

SCFBio has deployed a FUJITSU Liquid Immersion Cooling HPC Cluster, boosting performance fivefold and reducing energy consumption by 40 percent.

At a glance

Country: India
Industry: Education
Founded: IIT Delhi in 1961 and SCFBio in 2002
Website: www.iitd.ac.in
www.scfbio-iitd.res.in

Challenge

SCFBio's aging HPC cluster was prone to failure, slow and expensive to maintain. The center wanted to introduce a new HPC platform that would enhance performance, reduce costs and improve reliability.

Solution

The Center deployed an integrated Liquid Immersion Cooling HPC Cluster, consisting of 6 PRIMERGY CX400 multi-node chassis with 24 PRIMERGY CX2550 server nodes and a 50 TB Parallel File System.

Benefit

- Liquid immersion cooling removes the need for AC, reducing energy costs by 40 percent
- Performance is five times faster, speeding up project completion time
- The HPC solution takes up a third of the space, freeing up valuable real estate
- The absence of moving parts such as fans, improves reliability and makes the server room near silent

Customer

Established in 1961, the Indian Institute of Technology Delhi (IITD) is a public university which aims to contribute globally through excellence in scientific and technical education. The Supercomputing Facility for Bioinformatics & Computational Biology, (SCFBio) was created in July 2002 to establish a nodal facility for supercomputing; and to develop novel scientific methods for genome analysis, Ab initio protein structure prediction and active site directed drug design. The facility is working on all major aspects of Bioinformatics, including Genome Analysis, Protein Structure Prediction and Drug design.

Products and Services

- FUJITSU integrated Liquid Immersion Cooling (LIC) 50 TFlops HPC Cluster with a 50 TB Parallel File System, including 6 FUJITSU Server PRIMERGY CX400 multi-node chassis with 24 PRIMERGY CX2550 server nodes
- FUJITSU Server PRIMERGY RX2540
- FUJITSU Storage ETERNUS JX40
- Broadcom 48-port TOR Edge switch with redundant PSU
- Broadcom ICX 6430-48 switch

Upgrading HPC capability

In 2002, SCFBio became the first dedicated bioinformatics facility in the country, where it is developing its own set of tools and software to explore life sciences. However, this requires high-performing computing at the back-end as the demand for processor power increases daily.

"We didn't have sufficient compute power to reproduce the results achieved through experimental ways in a traditional 'wet lab' set-up. In order to validate the accuracy of the computational techniques, a lot of trade-offs need to be made," explains Shashank Shekhar, Principal Research Scientist, SCFBio. "The experimental techniques add a huge amount of time to the drug development cycle, so investing in a high-performance computing (HPC) platform seemed like a sensible decision."

The center bought its first HPC system in 2002 with 70 processors and 150 GFlops processing speed, later upgraded to a 75 node cluster in 2009, however neither had enough compute power to fully meet the required computational needs of the researchers associated with the center nor cater to the needs of the outside user community who were accessing the HPC facility remotely.

"Our first HPC had the equivalent power of a modern laptop and its replacement in 2009 was significantly bigger than the initial machine, but even that wasn't much faster. So when new funding was granted in 2017, we took the opportunity to take a fresh look at the market," adds Shekhar. "We wanted a solution that could not only deliver on speed and performance, but also reduce cooling and power requirements as well as minimize the physical footprint."

A revolutionary approach to cooling

IITD invited a number of leading vendors through an open bidding process to propose a solution- it was clear on its requirements as the software was mostly developed in-house.

"Essentially, much of the actual hardware is commoditized so there is not much to distinguish between competing vendors from a technical perspective - that's why support, industry experience and innovations such as liquid cooling are of primary importance," continues Shekhar. "Fujitsu demonstrated that it had the local presence along with a strong R&D and support team back in Japan to help build and support the HPC solution both locally as well as remotely."



Fujitsu designed and built the world's first integrated Liquid Immersion Cooling (LIC) 50 TFlops HPC Cluster with a 50 TB Parallel File System, including 6 PRIMERGY CX400 multi-node chassis along with 24 PRIMERGY CX2550 server nodes, 2 PRIMERGY RX2540 rack servers and an ETERNUS JX40 as a storage subsystem. By immersing the servers in a liquid that has high heat conducting properties and electrical insulating properties, the LIC system efficiently cools each server equally. In addition, because the heat generated by the server is not emitted into the server room, AC equipment is unnecessary and so less space is required.

"The Fujitsu LIC is an efficient, cost-effective and green alternative to overheated server rooms and, even if there is a power cut and there is a delay in restoring the back-up, the coolant will continue to protect the servers for up to 30 minutes," says Shekhar. "Without AC, the server room is near silent which makes for a more pleasant work environment and the cooling liquid will last for around 15 years."

Faster speeds, lower costs, improved reliability

SCFBio now enjoys a powerful compute platform with speeds around five times faster than its predecessor, enabling more students to complete projects much more quickly. This in turn helps the center attract new students and funding, keeping it at the forefront of Indian academia.

"People from all over India can have free access to our super-computing capability with 50 different institutions using it," comments Shekhar. "It is a real feather in the cap for the Department of Biotechnology, which is our primary funding agency and which granted the funding for the LIC solution and helped us to be a more attractive destination for academics and R&D in Bioinformatics and Computational Biology in the country."

The new Fujitsu LIC HPC solution also saves money and space - by removing the need for AC, the center is saving 40 percent on energy bills while reducing its carbon footprint considerably; at the same time, the physical footprint is almost one-third of what it was previously, freeing up precious real estate. Moreover, because there are no vibrational components, such as fans, there are fewer areas of failure so the system is more reliable.

"We are delighted with our Fujitsu HPC and, assuming it withstands the forthcoming summer heat, we will be looking at adding more nodes, which is simple thanks to the inbuilt scalability," concludes Shekhar. "We anticipate this platform going on for a long time due to its performance, reliability and cooling system. Fujitsu has proven itself as a leader in the field of HPC and we look forward to its next innovation."

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