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**LIQID**

# University of Groningen improved its data centre infrastructure to better support its scientists and accelerate breakthrough innovations

Customer profile

university of groningen
center for information technology

Education and research | The Netherlands

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working with companies
like Dell Technologies,
because they don't
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**Henk-Jan Zilverberg**
HPC consultant,
University of Groningen

## Business needs

• Remain innovative

• A scalable, flexible and state-of-the-art infrastructure

## Business results

• Accelerate scientific research and innovations

• Accommodate a wide variety of workloads simultaneously

• No need for costly overprovisioning

• Add disaggregated hardware as required

• Reduce the physical data centre footprint and emissions

## Innovations at a glance

• Dell EMC PowerEdge servers R650 and R7515

• Liqid's Composable disaggregated infrastructure, 4x LQD400x08P GPU PCIe Expansion, with 27 GPU's installed

Founded in 1614, the University of Groningen is one of the oldest universities in the Netherlands. It ranks amongst the top 100 universities in the world and besides offering various programmes for students, it's also a research intensive institution that aims to drive innovation. For example, the Innovation Lab for Science and Education (ILSE) is an initiative founded by the Centre for Information Technology (CIT) at the University of Groningen and Dell Technologies. ILSE is intended for academic, government,

and non-government entities and aims to develop breakthrough innovations (e.g. applications and algorithms) for the long-term benefit of research, education and society in the fields of artificial intelligence, data science, HPC and HPDA technology.

The ILSE has to effectively support existing research activities, facilitate collaborative research, and be change-ready to grow the number of participating organisations and respond to developments in the world as they happen. To carry out their activities, support scientists and to continue to innovate, the University of Groningen needs a scalable, flexible and state-of-the-art infrastructure data centre system that can accommodate a wide variety of data-intensive AI, HPC and scientific research applications.

## Improving the data centre environment on-demand

The University of Groningen and Dell Technologies have had a partnership for more than ten years, which is why the university thinks of Dell as a partner, not so much as a supplier. The team at Dell Technologies is continuously exploring new technologies, developing innovations and looking at ways to remain innovative. This resulted in their proposal to innovate in the ILSE lab. Dell introduced the University of Groningen to the composable disaggregated infrastructure from Liqid to make life easier for scientists and help accelerate breakthrough innovations. The University of Groningen, Dell Technologies and Liqid have continuously worked together to ensure the platform became operational. Henk-Jan Zilverberg, HPC consultant, University of Groningen, said the data centre architects were "instantly enthusiastic" about the potential for a software-defined adaptive architecture. Thus, Dell Technologies and Liqid built a composable disaggregated infrastructure system (Liqid Matrix), designed for disaggregated, change-ready growth. It unlocks cloud-like data centre speed, flexibility and more efficiency. Liqid Matrix is configured with Dell EMC PowerEdge servers and allows IT users to configure, deploy and scale bare-metal servers in seconds. Then, they can reallocate valuable accelerator and storage resources (disaggregated pools of GPU, CPU, FPGA, NVMe storage, storage-class memory, and other PCIe-accelerators) via software in real-time, on-demand, and as needs evolve.

"We needed an environment that allowed us to prioritise innovation, which means the infrastructure needs to be flexible," said Zilverberg. "In a traditional data centre, workloads run for days and cannot be interrupted to experiment. With ILSE, we are developing an architecture in which our scientists can do things that are normally not possible in other environments. We prioritise failure as a way to learn what works and to determine the next steps. Many of the experiments are likely to fail. That's incredibly valuable, because failure is a confirmation that you need to do something different. Thanks to the composable disaggregated infrastructure (CDI) solution, we enable our scientists to adapt the infrastructure in seconds and find out what works best. We appreciate working with companies like Dell Technologies, because they don't just sell you equipment, they collaborate with you to develop meaningful, effective solutions and innovations. Dell brought up Liqid's CDI software and fabrics and we didn't take much convincing. The ability to compose for GPU and other accelerators without having to add additional equipment that we don't need at the moment is less capital and operationally intensive in the long run and much more dynamic, which is important given what we are trying to accomplish."

Considering the data centre environment that ILSE wanted to introduce, it was only natural to collaborate with Dell Technologies and Liqid because they are able to pool GPU via software. Jaco van Dijk, Advisory Systems Engineer, Dell Technologies: "We have a very strong partnership with the University of Groningen. We worked with data centre architects at ILSE to build a system that can be utilised by scientists throughout the Netherlands to build a platform for collaborative use of applications in artificial intelligence, machine learning, and HPC that rely heavily on GPU and other powerful workload accelerators. With composable disaggregated infrastructure (CDI), we can integrate hardware changes into software, enabling scientists to compose hardware resource configurations via Liqid Matrix software."

## Accelerate time to research, more efficiency and more sustainable

"By choosing a composable, disaggregated system from Dell Technologies and Liqid, we significantly speed up time to research, which is the time between the deployment of a research application and the results of that research. Scientists are now able to tailor systems that meet the needs of their workloads in seconds," says Zilverberg.
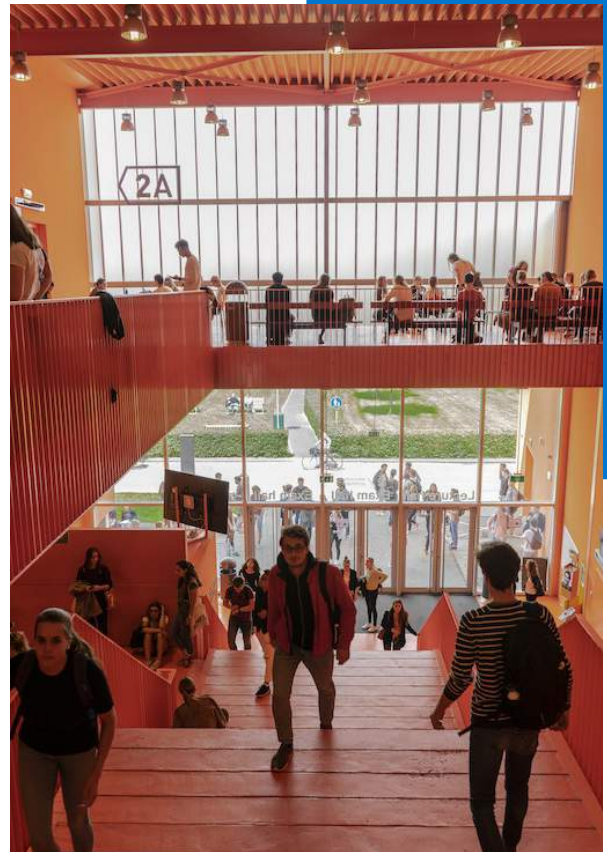


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In addition to increasing the amount of research that can be done, the flexible nature of the architecture also increases the diversity of that research. Because Liqid Matrix allows for configurations to be changed in seconds and for resources to be added as required, large HPC or AI applications can be examined simultaneously as quickly as smaller data sets.

The CDI system breaks through the limitations of traditional, static architectures by managing diverse, disaggregated hardware with Liqid Matrix software. Before, scientists had to physically reconfigure servers and accelerators for each new workload, which is time and cost prohibitive – and virtually impossible with a traditional, static data centre architecture. This slowed down innovation. The current system can accommodate and run a wide variety of workloads simultaneously, effectively and efficiently scale without sprawl, and change to meet the demands of the scientists. The system's efficiency also means that the university is positioned to meet global standards for emissions reductions by taking advantage of the inherent efficiencies the composable, disaggregated infrastructures offer. Furthermore, Liqid Matrix eliminates the physical limitations associated with traditional GPU-centric deployments, which had a maximum of eight per server. Users can now bundle and deploy GPUs through Liqid software in quantities that far exceed the previous amounts. For example, systems can be configured with twenty or more GPUs which can be used for blockchain workloads.

## Sustainable data centre growth

Because composable systems significantly improve utilisation and flexibility, the need to heavily and costly overprovision data centre environments is largely eliminated. IT users to add disaggregated hardware as required without deploying equipment that is unnecessary for the job at hand, meaning that power and cooling are not spent on equipment that is sitting idle. Furthermore, older equipment can be repurposed rather than being thrown out. The ability to pool resources like GPU and storage also decreases the need to deploy additional resources to support a larger number of devices that cannot be easily shared, further reducing the physical data centre footprint and emissions.

"Reducing emissions is a global concern with nations aligning their efforts to combat climate change," said Van Dijk. "The state-of-the-art, change-ready system that aligns with the European Commission's requirements to reduce emissions and physical footprint, makes sustainability one more compelling reason to consider deploying adaptive, composable architecture for initiatives such as the one deployed at the University of Groningen."

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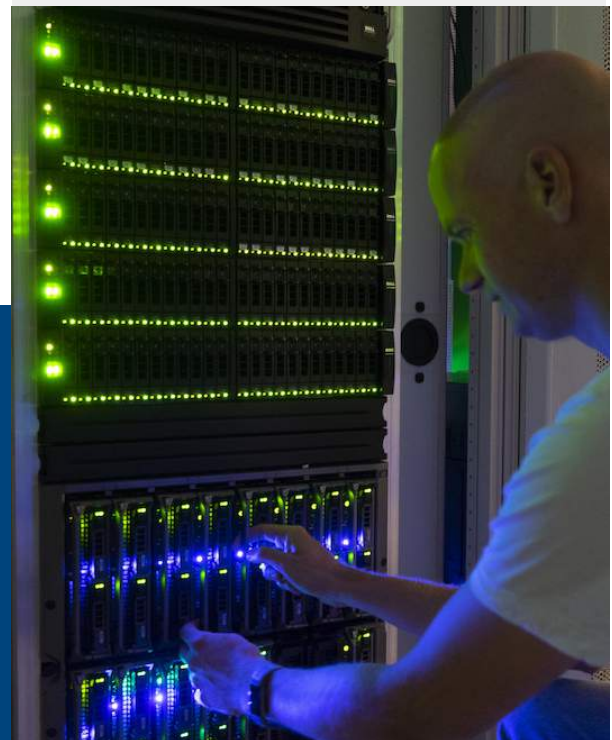
## Continuous innovation

"Innovating is an ongoing process and therefore our common vision for the lab is to create new solutions and innovations for the future," said Van Dijk. "The University of Groningen was one of the first universities with this platform in the Netherlands. Now, other universities have also started to look at this environment and have followed suit and we expect even more to follow. We don't know what the future holds, but composability enables the kind of change-ready system that can quickly adapt with the ever changing world."



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