

Academic Research | United Kingdom

Driving ever more ambitious research

Newcastle University

To support world-class multidisciplinary research, Newcastle University worked with OCF to deploy a powerful new high-performance computing (HPC) system based on Lenovo ThinkSystem technology.



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Customer background

Who is Newcastle University?

Newcastle University is a public research-intensive university in North East England. Founded in 1834, the university now operates in three locations—Newcastle, Singapore, and Malaysia—and is home to an international community of over 28,000 students from 130 countries. The university has built on its foundations in medicine and engineering, adding natural sciences, computing, mathematics, business, humanities, creative arts, and social sciences to its broad disciplinary base. Ranked in the global top 140 in the QS World University rankings 2026, Newcastle is a university of innovators.



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The challenge

As a member of the Russell Group, an association of 24 research-intensive institutions in the UK, Newcastle University is committed to delivering pioneering research that makes a positive impact in the world—from meeting the challenges of engineering, the environment, data science, and health to protecting cultural heritage. To this end, the university is investing millions of pounds in upgrading its HPC service.

Professor Ian Head, Academic Lead for the HPC project, begins “Almost every aspect of our world-leading research is reliant on powerful computational capacity. Our previous HPC system had served us well, but could no longer support state-of-the-art, computationally intensive research. To ensure that we remain at the forefront of advances in all areas of our research, we needed a major upgrade in our HPC resource.”

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The challenge

The University set three goals: increase CPU capacity to scale up traditional large parallel computing workloads; increase GPU capacity to support proliferating artificial intelligence (AI) and machine learning (ML) workloads; and provide access to a wider body of users through technology enablers (remote access, containerization and greater use of GUIs), and better user training and support.

“Naturally, we wanted to expand the size and performance of our HPC facility,” says Professor Ian Head. “But equally important was widening access and building a broader user community for HPC.”

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“The breadth of HPC users at Newcastle is so varied. We have experts running large-scale models with parallel processing across thousands of cores, and then there are researchers who are just taking their first steps with HPC, moving from their laptop or workstation. So, the system really needs to do a little bit of everything, and we need to support a user base with a very varied skillset.”

John Snowdon

Senior Research Infrastructure Engineer / HPC Technical Lead, Newcastle University IT Service



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“To help improve the quality and reach of research, we aimed to make our HPC service more powerful and more accessible, regardless of user discipline or skillset.”

Professor Jaume Bacardit and
Professor Nilan Chakraborty

Co-Directors of Advanced and High-
Performance Computing, Faculty of
Science, Agriculture and Engineering,
Newcastle University

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The
solution

Cutting-edge cluster

Following an open tender, Newcastle University engaged HPC experts OCF to design and deliver a next-generation system based on Lenovo ThinkSystem server and storage technology.

Named Comet, the new cluster consists of 56 [Lenovo ThinkSystem SR675 V3](#) and [SR665 V3](#) servers powered by AMD EPYC 9004 and 9005 Series CPUs, with five of the servers also equipped with NVIDIA L40S GPUs to support AI and ML workloads. [Lenovo ThinkSystem DE4000F](#) all-flash storage arrays underpin a Lustre parallel file system with 2.2 PB usable capacity.

Hardware

[Lenovo ThinkSystem SR675 V3 Server](#)
[Lenovo ThinkSystem SR665 V3 Server](#)
[Lenovo ThinkSystem D4390 Direct Attached Storage Enclosure](#)
[Lenovo ThinkSystem DE4000F All Flash Storage Array](#)

AMD EPYC 9004 Series CPUs
AMD EPYC 9005 Series CPUs
NVIDIA L40S GPUs

Software

Lustre
OCF Steel Stack
Red Hat Enterprise Linux

Services

[Lenovo Premier Support for Data Centers](#)

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The
solution

Hands-off management

Lenovo 360 Circle partner OCF installed the Lenovo ThinkSystem servers and storage systems in Newcastle University's data center, configuring and optimizing the Comet cluster for peak performance and stability.

OCF's Managed Services team provides ongoing management of the cluster. OCF's Steel Stack cluster orchestration and management suite offers all the tools and services needed to run HPC applications on Comet, together with the tools that help to manage, maintain, and monitor the HPC environment.

Newcastle University plans to regularly expand the Comet cluster in the coming years to ensure that it meets the evolving needs of the research community. In fact, the university is already considering a GPU expansion. "With more and more researchers looking to take advantage of AI in their work, there is huge appetite for GPU resources," confirms Professor Ian Head.

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The solution

Widening access to HPC

Alongside conducting fundamental acceptance testing and alpha testing with expert HPC users, Newcastle University has put together extensive training packages for researchers with less experience using HPC resources.

As part of the new user registration process, everyone will have to complete a test to ensure that they are competent to use the system before being granted access to Comet.

“It’s a sort of ‘driving license’ that proves they understand the basics of using a Linux HPC system,” explains John Snowdon, Senior Research Infrastructure Engineer / HPC Technical Lead at Newcastle University. “We hope that this will give researchers who are new to HPC the confidence to schedule and run jobs properly to get the most out of the system.”

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“One of our key goals was democratization of HPC. With the new training packages, we hope that non-traditional HPC users feel comfortable using the system to help advance their research.”

John Snowdon

Senior Research Infrastructure Engineer / HPC
Technical Lead, Newcastle University IT Service



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The results

Delivering significantly more compute power than its predecessor, the Comet cluster will enable researchers from across Newcastle University to run larger, more complex models and simulations, crunch more data, and get results faster.

“Researchers will be able to work at a more ambitious scale with the new Lenovo HPC system. Based on feedback from testing, workloads are running significantly faster,” says Professor Nilan Chakraborty, Co-Director of Advanced and High-Performance Computing, Faculty of Science, Agriculture and Engineering at Newcastle University.



Almost tripled CPU capacity: 14,080 CPU cores vs 5,400 CPU cores in predecessor



Increased GPU provision 9-fold: 36 GPU cards vs 4 GPU Cards in predecessor



Significant new functionality with built-in containerization utilities and interactive GUI for Matlab, R-Studio, and Jupyter Notebook

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The results

Professor Nilanjan Chakraborty confirms: “I use HPC to run direct numerical simulations of turbulent combustion, with the aim of better understanding what happens during combustion in automotive engines and gas turbines, for example, with the ultimate goal of making them more energy efficient and environmentally friendly. Our new HPC capabilities allow us to run far more intensive computational experiments by relaxing many of the constraints imposed by our previous system. This leap in performance will not only elevate the quality and impact of our research, but also empower our users to pursue even larger, more advanced studies on Tier-1 national facilities such as ARCHER2 and, ultimately, on Tier-0 exascale platforms.”

While the increased CPU capacity accelerates parallel processing for traditional HPC workloads, the Comet cluster’s GPU nodes will support new kinds of research. “We were recently approached by a member of the Fine Art faculty eager to run 3D visualization software to help with their rendering,” says John Snowdon. “Fine Art is not a discipline traditionally associated with HPC, but Comet opens up exciting new possibilities.”

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“Upgrading our HPC offering with Lenovo and OCF makes Newcastle University more attractive to the best researchers. The new Comet cluster will enable us to support more ambitious research projects that have a positive impact on the world.”

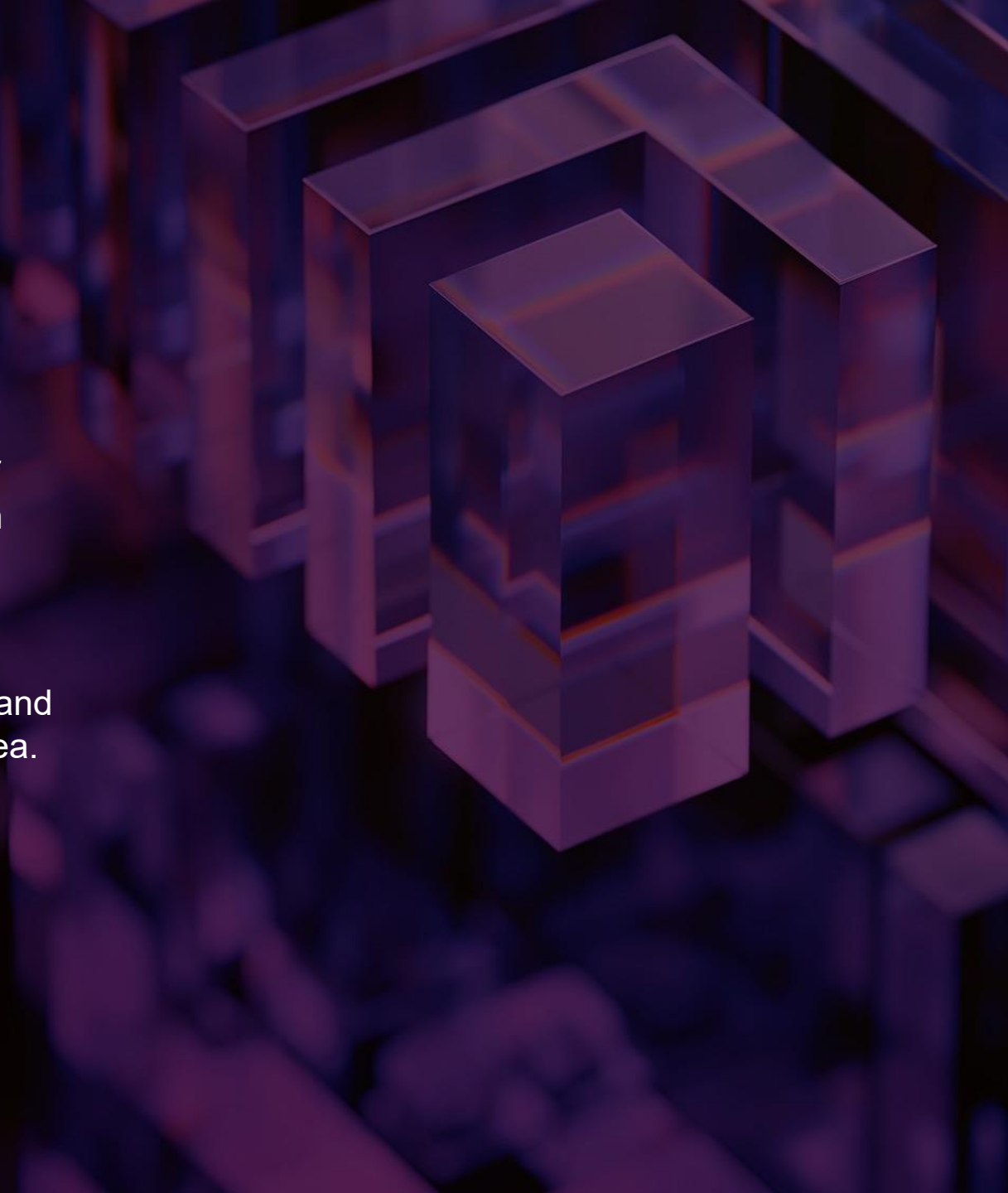
Professor Jaume Bacardit

Co-Director of Advanced and High-Performance Computing, Faculty of Science, Agriculture and Engineering,
Newcastle University

Why Lenovo and OCF?

OCF and Lenovo scored highest in the tender both in terms of hardware and services, and the two companies have a proven track record of delivering HPC clusters for UK universities.

Jason Bain, Chief Information Security Officer at Newcastle University, comments: “Cyber security was part of the tender, and OCF and Lenovo more than proved their credentials in this area. The Comet cluster is designed to meet the UK Government’s Cyber Essentials scheme.”



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“We’re proud to partner with Newcastle University and Lenovo to deliver a state-of-the-art research infrastructure. Our HPC experts will support the continued optimization and expansion of the Comet cluster to support ever more ambitious research.”

Andrew Dean

Sales Director, OCF Limited



How can universities support pioneering multidisciplinary research?

Newcastle University worked with OCF to deploy a Lenovo HPC cluster that will support cutting-edge research across the university.

[Explore Lenovo HPC Solutions](#)