

UNIVERSITY AIMS HIGH

Dell HPC delivers record-breaking research results while saving approximately £100,000 a year on electricity usage



Credit: Nik Szymanek and Ian King

High-performance computing (HPC) is crucial to university research activity. In addition to offering high-speed computing services to researchers, universities are now asking their IT teams to provide sustainable HPC solutions that pay for themselves by cutting the cost of energy consumption.

SOLUTIONS:

- GREEN IT
- HPC



University of
Leicester

CUSTOMER PROFILE

COMPANY: University of Leicester

INDUSTRY: Education

COUNTRY: United Kingdom

FOUNDED: 1957

EMPLOYEES: 3,500

WEBSITE: www.le.ac.uk

CHALLENGE

In line with its green agenda, the University of Leicester wanted to replace its existing high-performance computing (HPC) systems with an energy-efficient solution.

SOLUTION

After working with Dell to deploy a HPC cluster based on Dell™ PowerEdge™ servers featuring Quad-Core AMD Opteron™ Processors, the university won funding from the Revolving Green Fund.

BENEFITS

Get IT Faster

- Simplified installation ensures research is not interrupted

Run IT Better

- HPC solution helps astrophysicists discover planets at twice the rate of its direct international competitors
- Performance is increased by between 10 and 30 per cent

Grow IT Smarter

- Green HPC reduces power consumption by 120 kilowatts a year
- System pays for itself within nine months
- Scalable system lays foundation for future expansion
- Energy costs cut by up to £100,000 a year



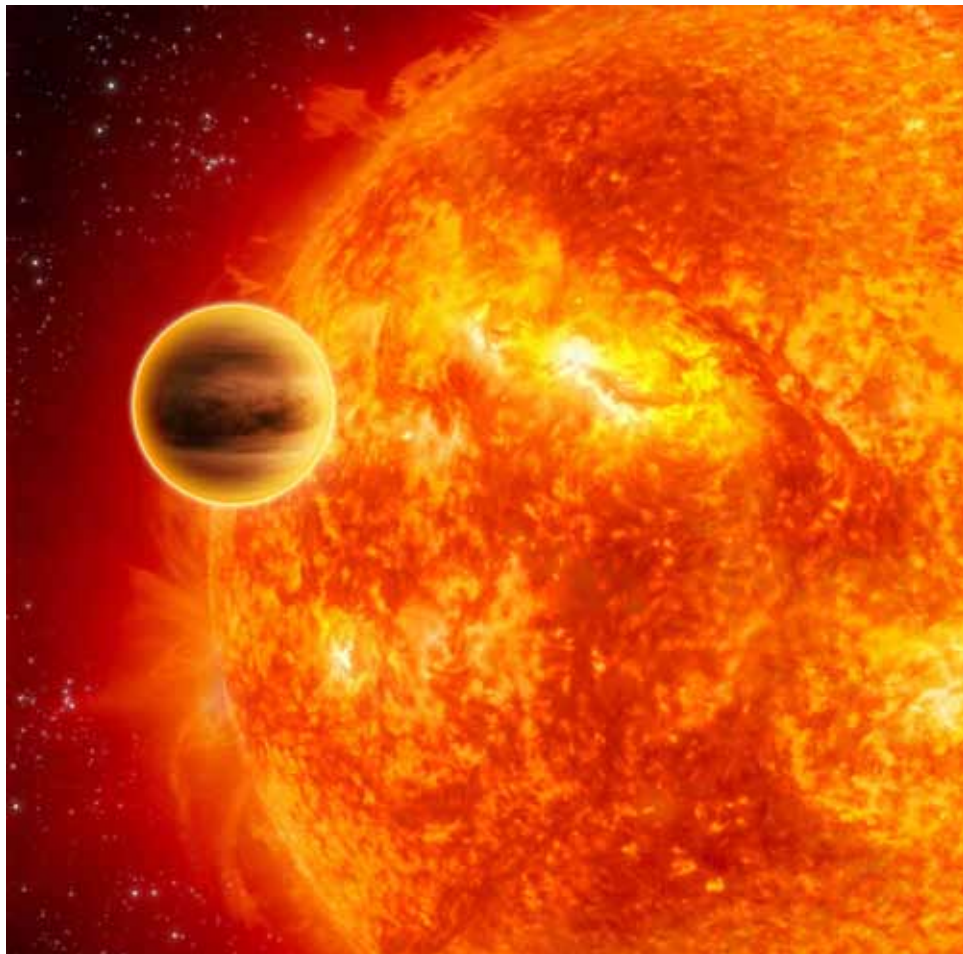
The University of Leicester has used HPC for the past 10 years. During this time, it has earned a reputation for high-profile HPC-led research, such as simulations of matter forming into black holes, stars forming and stars colliding. In fact, the astrophysics department has discovered more planets than any other research institution in the world.

HPC facilities on campus consisted of two Linux clusters spread across 12 computer racks in two rooms. As HPC became more widespread across disciplines – especially in areas that haven't traditionally used computing in research – administrators needed to increase services to serve more researchers within the university. However, space and funds were limited. It was clear that a solution would need to be compact and cost effective enough to allow for future growth. Chris Rudge, research computing services manager at the University of Leicester, says: "To get funding for a new system, we needed to prove that we could create a sustainable model, guaranteeing long-term research support. This included reducing the university's carbon footprint."

UNIVERSITY WINS GRANT BY PROPOSING GREEN SOLUTION

Rudge researched solutions providers and discovered that Dell™ PowerEdge™ SC1435 servers featured energy-efficient 45nm Quad-Core AMD Opteron™ 2300 Series Processors. He calculated that AMD Opteron 2300 Series Processors would reduce energy use by 120 kilowatts, or more than 500 tonnes of carbon

dioxide emissions a year. "The reduction in carbon dioxide emissions provided by AMD Processors is double the amount created by university staff per year, travelling both in the UK and abroad," says Rudge.



Credit: ESA C Carreau

“DELL NOT ONLY PROVIDED THE MOST ENERGY-EFFICIENT SOLUTION, BUT ITS HPC TEAM ALSO TESTED MY CALCULATIONS AGAINST RESULTS THEIR CLIENTS HAD ALREADY SEEN.”

Chris Rudge, research computing services manager, the University of Leicester

He applied for a grant and received funding from the Revolving Green Fund, a scheme launched by the Higher Education Building Council for England. "Dell not only provided the most energy-efficient solution, but its HPC team also tested my calculations against results their clients had already seen," says Rudge.

HPC SYSTEM PAYS FOR ITSELF WITHIN NINE MONTHS

The Revolving Green Fund stipulates that projects must pay for themselves within five years. Organisations that achieve this goal can keep the funds to re-invest into other green projects.

The Dell HPC solution is so efficient that 12 racks of equipment were replaced by three racks, with an increase in performance of between 10 and 30 per cent. Rudge says: "We've reduced our servers by 75 per cent. And, as a result, we've reduced the university's electricity bill by around £100,000 a year." The solution paid for itself in nine months, through energy savings alone. "The Dell solution not only offers long-term energy savings, but has also exceeded the criteria set by the Revolving Green Fund by more than four years," says Rudge. "Decreasing the physical footprint of the server eliminates the need to build more computer rooms, further increasing our savings."

HOW IT WORKS

HARDWARE

- Dell™ PowerEdge™ SC1435 servers with 45nm Quad-Core AMD Opteron™ 2300 Series Processors

SOFTWARE

- Baseboard Management Controller

“THE REDUCTION IN CARBON DIOXIDE EMISSIONS PROVIDED BY AMD PROCESSORS IS DOUBLE THE AMOUNT CREATED BY UNIVERSITY STAFF PER YEAR, TRAVELLING BOTH IN THE UK AND ABROAD.”

Chris Rudge,
research computing services manager,
the University of Leicester



SIMPLIFIED INSTALLATION AND MANAGEMENT

Rudge and his team of four IT administrators have an in-depth knowledge of HPC systems so they didn't need any training or support while installing the system. "Installation was such a straightforward process, so there was no need for technical support. Despite us having a number of different products, all of the Dell hardware management tools looked very much the same. If you can manage one piece of Dell technology, you can easily manage another," says Rudge.

The IT team runs the system on-site with Baseboard Management Controller (BMC). If needed at a later date, Rudge and his team can install Dell OpenManage™ Systems Management software to enhance the remote configuration and monitoring capabilities.

COLLABORATION BETWEEN UNIVERSITY ADMINISTRATORS AND DELL HPC SPECIALISTS ENSURES SUCCESS

Because the university was an early adopter of the Quad-Core AMD Opteron 2300 Series Processor, collaboration between Dell HPC experts and university HPC administrators was key to the success of the project. "From installation through to use, I had a lot of discussions with the Dell team," says Rudge.

Rudge has also been sharing his experience of the implementation with Dell. "We've been feeding back quite a lot of information about the Revolving Green Fund so that Dell can share this information with other universities. Several other institutions have contacted us to discover more about our Dell HPC," he says. This communication with other universities increases the University of Leicester's reputation of excellence in HPC-enabled research.

NO DISRUPTION TO RESEARCH

Because many researchers depend on HPC, it was important that the impact to users was minimised during the upgrade. "Our researchers often collaborate with researchers at other universities and external organisations. Dell helped us avoid extended periods of downtime that could interfere with those collaborations," says Rudge.

The installation was conducted in tiers over three weeks with only two days' downtime. "If we had more space to work in the computer room we would have had no downtime at all. A smaller physical footprint ensures that future upgrades will not disrupt the service at all," says Rudge.

“CUTTING ENERGY CONSUMPTION WHILE ACHIEVING BETTER PERFORMANCE WITH A COST-EFFECTIVE SOLUTION FROM DELL HAS FREED UP FUNDS TO INVEST IN FUTURE PROJECTS.”

Chris Rudge, research computing services manager, the University of Leicester

ASTROPHYSICS DISCOVERIES BEAT ALL OTHER RESEARCH INSTITUTIONS

Researchers in the astrophysics department use the Dell HPC solution to collaborate on a project called SuperWASP, the Wide Angle search for planets. This project has identified 25 new planets around other stars, one third of all the extra-solar planets discovered. With the computing ability provided by the university's HPC system, the team is discovering planets at twice the rate of its direct international competitors.

SCALABLE SYSTEM LAYS FOUNDATION FOR FUTURE EXPANSION

The initial goal of the HPC project was to reduce the physical footprint of the original HPC server. The footprint of the system

is 75 per cent smaller than the previous system, giving the university more space to expand to meet future needs. “Cutting energy consumption while achieving better performance with a cost-effective solution from Dell has freed up funds to invest in future projects,” says Rudge.

For more information on this case study or to read additional case studies, go to www.dell.com/casestudies and www.dell.co.uk

This case study is for informational purposes only. DELL MAKES NO WARRANTIES, EXPRESS OR IMPLIED, IN THIS CASE STUDY.



SIMPLIFY YOUR TOTAL SOLUTION AT DELL.COM/Simplify



Availability and terms of Dell Services vary by region. For more information, visit www.dell.com/servicedescriptions
© August 2009, Dell Inc.

AMD, the AMD Arrow logo, AMD Opteron, and combinations thereof are trademarks of Advanced Micro Devices, Inc. Other names are for informational purposes only and may be trademarks of their respective owners.