

# ECO-FRIENDLY SUPER COMPUTING

Power efficient 'green' super computing solution puts British university at the forefront of research



As interest in environmentally friendly practices increases, organisations are looking at ways in which they can reduce their carbon footprint. Power consumption is often one of the first areas to come under scrutiny. By simplifying IT systems and ensuring they run efficiently from the outset, it is possible to become more eco-friendly whilst benefiting from reduced operational costs.

## SOLUTIONS

- HPC
- GREEN IT



**University of  
Sunderland**

## CUSTOMER PROFILE

**COMPANY:** University of Sunderland

**INDUSTRY:** Higher Education

**COUNTRY:** United Kingdom

**FOUNDED:** 1901

**EMPLOYEES:** 16100

**WEBSITE:** <http://welcome.sunderland.ac.uk>

## CHALLENGE

Having secured government funding for a new state-of-the-art super computing grid facility, the University of Sunderland wanted to adopt an environmentally-friendly solution. It needed to provide the scalability, power and reliability of high performance computing whilst delivering a 'green', energy efficient solution.

## SOLUTION

The University introduced a high performance computing cluster based on energy efficient Dell™ PowerEdge™ 2950 servers. A Dell PowerVault™ MD1000 external disk expansion enclosure was split into two to provide centralised storage for the dual boot cluster. Dell Precision™ 380 dual-screen workstations are connected to LCD panels to showcase the solution in the University's public atrium.

## BENEFITS

- Eco-friendly super computing solution drives power efficiencies by 50 per cent each year
- One of the first British universities to showcase eco-friendly HPC super computing solution without cooling
- Students achieve highest level of research results

DELL

When Sunderland University secured funding for a state-of-the-art grid computing facility for the next generation of higher education research and scientific purposes, ensuring the new operation was as energy-efficient

as possible was a priority. It wanted power consumption and cooling requirements to be considered without compromising on the creation of an advanced high performance computing (HPC) system.

Using the expertise of networking specialists and professors at the University as well as conducting extensive research with other universities, the technical team developed an in-depth knowledge of the structure required for the HPC solution. When the university went out to tender, Dell™ was the only IT solution provider that listened to their requirements and was able to deliver what they wanted. Dell worked together with the university to provide a range of Dell Infrastructure Consulting Services to refine the solution further, ensuring it was as energy efficient as possible to limit heat and noise levels. Dell's recommendations of the most appropriate servers and approach to grid set up - using a little extra space to reduce heat - played a key role here.

The grid computing solution consisted of HPC clusters based on 42 energy efficient Dell PowerEdge™ 2950 servers, set up as computer nodes with two acting as head nodes to



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Kevin Ginty, Technical Manager, centre Internet technologies, Sunderland University

provide increased performance for scientific computing purposes. The clusters are set up for a dual boot configuration of Microsoft® Windows™ Compute Cluster Server 2003 and Linux Dual Boot Open SuSE to allow for leading edge comparative testing between the HPC platforms. Centralised storage is provided by a Dell PowerVault™ MD1000 with 71/2 terabytes, split into two for each high performance computing platform. Dell provides onsite maintenance and hotline support for the project.

The solution is showcased in the University's central glass atrium. Ten Dell™ Precision™ 380 dual-screen workstations are connected to LCD panels to visualise the facility in a graphical format, making it the first public HPC showcase in a British university.

**‘GREEN’ SUPER COMPUTING  
REDUCES PLANNED POWER  
CONSUMPTION BY 50%**

The University of Sunderland has been able

to achieve its ‘green’ super computing facility as a result of energy-efficient servers from Dell and the eco-friendly design of the set up by Dell and the university team. As a result, its planned power consumption budget of up to £15,000 for running the new facility per year will be reduced by half. It is one of the first British universities to go down this eco-route for a super computing solution without cooling.

The Dell PowerEdge 2950 2U servers are specifically designed to increase performance while reducing heat and energy consumption. They have bigger fans to run more efficiently with more space to create less noise. This means there is no need for expensive air conditioning to reduce heat. The servers are set up in a roofless room in the University's glass atrium to allow heat to escape naturally. The system was also designed with the Dell PowerEdge 42U racks half filled to reduce power density and run the system more efficiently.

## HOW IT WORKS

### HARDWARE

- Dell™ PowerEdge™ 2950 servers
- Dell PowerVault™ MD1000 disk expansion enclosure
- Dell PowerEdge 42U racks
- Dell Precision™ 380 workstations

### SOFTWARE

- Microsoft® Windows™ Compute Cluster Server 2003
- Linux Dual Boot Open SuSE

### SERVICES

- Infrastructure Consulting Services
- Project Management
- Implementation
- Gold Enterprise Support



**“OUR DELL POWEREDGE HPC SOLUTION USES A LITTLE MORE SPACE THAN USUAL BUT IS DESIGNED SO WE HAVE NO NEED FOR AIR CONDITIONING TO COOL THE SYSTEM. THE HEAT AND NOISE LEVELS MEET HEALTH AND SAFETY REGULATIONS AND WE’RE SAVING 50 PER CENT ON POWER CONSUMPTION. THIS WILL BE A SIGNIFICANT COST SAVING FOR THE UNIVERSITY AND WE’RE DELIGHTED.”**

Kevin Ginty, technical manager, centre Internet technologies, Sunderland University

Kevin Ginty, technical manager, centre Internet technologies, Sunderland University, says: “Heat and power efficiencies were very important. Heat can be a big problem – it’s very difficult to remove. Our Dell™ PowerEdge HPC solution uses a little more space than usual but is uniquely designed so we have no need for air conditioning to cool the system. The heat and noise levels meet health and safety regulations and we’re saving 50 per cent on power consumption. This will be a significant operational cost saving for the university and we’re delighted.”

Innovative dual-boot system drives forward student research and testing facilities

Another innovative aspect of Sunderland University’s super computing facility is having HPC clusters set up for a dual boot configuration for Microsoft® Windows™ Compute Cluster Server 2003 and Linux Dual Boot Open SuSE. This allows the two HPC platforms to run concurrently on different parts of the system, which is helping the university lead the way in comparative research

between the two platforms.

Ginty says: “Using the dual-boot system, for the first time we can accurately compare cluster applications, many written in Java, running on both platforms. We believe that what we are doing is unique and will enable us to integrate new capabilities into our research. The Dell HPC dual-boot system is driving forward our research, keeping higher education at the forefront and helping students achieve the highest level of research results.”

#### **CENTRALISED STORAGE REDUCES COMPLEXITY AND INCREASES EFFICIENCY AND PRODUCTIVITY**

By developing a high performance centralised storage solution, the University is benefiting from fast access to information from either HPC platform. The Dell PowerVault™ MD1000 is split into two to provide centralised storage for the dual-boot cluster, therefore centrally managing data from both platforms. It has a data storage capacity of 7<sup>1/2</sup> terabytes for handling high processing HPC tasks such as graphics rendering, which is improving

productivity whilst offering scalability for future requirements.

Ginty says: “The simplicity of the Dell system is perfect. Using the Dell PowerVault connected to the PowerEdge servers, all the information is stored together, whatever platform we’re working on. We can get to this information faster and more easily than ever before. With graphics rendering, we can divide the screen into 40 bits for each computer node. Each node works in parallel, which is much more efficient. For example, for a recent ‘Starship Enterprise’ project, rendering the spaceship image went from taking 90 minutes with a normal computer to only 31 seconds with the HPC solution, greatly improving productivity.”

#### **SCALABLE HIGH PERFORMANCE COMPUTING LAYS FOUNDATIONS FOR FUTURE DEVELOPMENTS**

The high performing super computing solution running on Dell PowerEdge servers with extensive data storage provides the scalability, power and reliability required by the university. With a new system that is smart, flexible

and set up for future growth, the university is already planning new areas of expansion, looking to connect to students at home and expand into services for the local business community, enabling a flexible learning environment in the future. The Dell™ solution is effectively placing the university at the hub of the community.

John Tindle, professor at the University of Sunderland, says: "The facility has been great at developing student excitement and enthusiasm whilst achieving efficiencies. I see no major bottlenecks to progressing remote learning opportunities and commercial applications where in-depth data analysis needs to be carried out. The Dell HPC system is scalable enough to build virtual networks using VMware®, where students can build their own learning worlds. We are also looking forward to reaching out to the business community to use the grid commercially and so generate revenue for the university."

### **PARTNERSHIP APPROACH PROVES KEY TO THE SUCCESS OF INNOVATIVE HPC PROJECTS**

Fundamentally, the university puts the success of the super computing project down to the team effort between Dell and the university.

Having awarded the contract to Dell as the IT supplier who listened to its requirements and worked with them to refine the final solution, it has been the ongoing strategic partnership approach which has ensured a successful implementation.

Ginty says: "We have established a strong partnership with Dell, and we all put in a strong team effort to make this 'first of a kind' implementation a success. Everyone was willing to invest additional time and effort to make sure it worked. We were impressed with Dell's project management structure, where all logistics were reviewed in advance to ensure everything was in place. This type of professionalism and commitment is critical in an exercise of this size and level of complexity. We now have an innovative super computing solution from Dell which ticks all the right boxes and have the support in place to expand in the future."

**For more information on this case study  
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**University of  
Sunderland**



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