

Green Research at Sheffield University

Summary

The MESAS (Multiscale Engineering Simulations at Sheffield) group has reduced the environmental footprint, and costs, of its (environmentally beneficial) research through more energy efficient servers.

The Innovation

Through MESAS, Sheffield University's Engineering Materials Department has a core strength in multi-scale modelling of materials. Much of this work has an environmental focus, including geological disposal of high level nuclear waste; biomineralisation and biomimetic materials; magnetic modelling of read/write heads and media within hard drives to help improve efficiency; developing low power biological sensors for use in medical or scientific applications; and optimising magnetic components for next generation, high efficiency, Toyota cars. This environmental awareness led the research team to investigate ways to reduce the environmental impacts of their computational-intensive modelling, and other applications. The centre currently has two computer clusters: one of 72 processors (18 nodes, dual processor, dual core with 16 Gb memory each), and another of 40 processors (10 various different PC's running Linux). Both clusters are housed in a cooled room with 2 cluster racks of 20 nodes, and are heavily used 24/7. In addition the centre has 11 PCs for its staff and students.

The team discovered that an innovative company, VeryPC, which produces what it claims to be the 'greenest' PCs and servers on the market, using only half the power of a typical device. This is achieved through low energy components, high efficiency advanced cooling, high efficiency power supplies and use of smaller parts, which reduce resources and hence pollution over the life cycle of the devices. Four of their "Janus II" nodes were purchased, with specifications of dual processor quad core 2.5GHz; 8GB RAM; 2 x 160GB 7200RPM HDD, and average power use of 142W (at 100% utilisation, per node).

Benefits

Lower costs – The Department estimates that each of their VeryPC servers saves £600 a year in energy costs, plus a reduced cost for the capital purchase of supporting infrastructure, resulting in less than 2 years payback of the higher purchase costs.

Reduced space needs – due to the reduced cooling required for lower energy PCs.

Improved university reputation – by greening research operations and applications, the university improves its environmental profile which in turn can help attract more environmental researchers.

Job satisfaction – saving energy reduces the disconnect between research for environmental improvement, and high carbon means of achieving it, and so makes the research team feel better about their work.

Lessons

There is a big variation in the energy and environmental footprint of individual servers and PCs.

Determined researchers can reduce the environmental impacts of their computing. However, they are not helped by current financial systems. Typically, research groups do not pay for the electricity costs, and research grants only cover the purchase costs of equipment. This favours the purchase of the cheapest equipment, even if it is energy inefficient.

Further Information

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