

As President Bush ends his state visit to Britain another historic link between the US and the UK is established (see below)

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EPSRC achieves a world first in high performance computing

For the first time supercomputers in the UK and the US have been linked to carry out an interactive scientific experiment. It involves three of the most powerful computing resources in the world working in parallel with each other.

This is the first demonstration of the use of the “Grid” to simultaneously link the high performance computers with remote visualisation centres in the UK and the US. This allowed scientists to interact with the computer models as they evolved in real time.

The “TeraGyroid” experiment was jointly funded by the UK’s Engineering and Physical Sciences Research Council (EPSRC) and the National Science Foundation, USA (NSF). TeraGyroid is based on the e-Science pilot project RealityGrid.

The UK part of “TeraGyroid” involved the CSAR and HPCx high performance computer facilities, both administered by EPSRC, on behalf of Research Councils UK. In the US the resources on NSF’s Extensible Terascale Facility (ETF) were used.

The link between these computing facilities was provided by the UK’s e-Science Grid (administered by EPSRC on behalf of Research Councils UK) and the USA’s TeraGrid.

The e-Science “Grid” is intended as the natural successor to the Web – moving beyond the provision of seamless access to information to providing seamless integration of computer, data and other remote sources.

The experiment was coordinated from the Supercomputing 2003 conference in Phoenix, Arizona, USA from 00:00 Tuesday 18th November to 24:00 Thursday 20th November (GMT).

The experiment involved all of the high performance computing resources carrying out lattice Boltzmann calculations. This has never been done before on this scale and in such a limited space of time (72 hours). Lattice Boltzmann methods are complex theoretical calculations to model complex self-assembly and fluid flow.

The success of this experiment demonstrates that this linking of multiple high performance computers can allow scientists to expand their knowledge of small systems containing a few molecules to larger, macroscopic, real-world situations containing hundreds of thousands of billions of molecules.

EPSRC's Director of Research and Innovation, Randal Richards, said: "This illustrates the increasing role that supercomputing power is taking in science, engineering and technology research. It also demonstrates, in line with a recent statement from Research Councils UK, that investment in such high end computing is strategic to the science and engineering base of the UK."

Notes for Editors:

The TeraGyroid experiment has access to a substantial fraction of the world's largest supercomputing resources, including the whole of the UK's supercomputing facilities and the USA's supercomputers based in Illinois, Pittsburgh and San Diego. Trans-Atlantic optical bandwidth is supported by British Telecommunications. The largest simulations are in excess of one billion lattice sites. These larger simulations can only be accommodated on the HPCx, NCSA (National Center for Supercomputing Applications, Illinois) and PSC (Pittsburgh Supercomputing Center) platforms.

The TeraGyroid project couples cutting-edge grid technologies, high performance computing, visualisation and computational steering capabilities to produce a major leap forward in soft condensed matter simulation.

The lattice Boltzmann method is resource intensive. In general, running simulations on large systems (greater than 100x100x100 grid points) is not practical on small computers (PCS) due to the lack of memory resources and long processing times. Because of these extreme demands on memory and computation the algorithm is an ideal candidate for parallel computing.

CSAR (Computer Services for Academic Research) and HPCx are the UK's national supercomputing services for the academic community, provided on behalf of the Research Councils. EPSRC is the managing agent for the services:

- CSAR is provided by a consortium "Computation for Science" led by Computer Services Corporation, partnered by SGI (Silicon Graphics, Inc.) and the University of Manchester.
- HPCx is provided by a consortium led by the University of Edinburgh, partnered by CCLRC (Council for the Central Laboratory of the Research Councils) and IBM.

The lattice-Boltzmann work is performed by the "RealityGrid" project which is part of the UK's e-Science initiative. RealityGrid provided the visualisation link between the UK high performance computers. A central objective of RealityGrid is to extend the concept of a Virtual Reality Centre across the Grid, linking it to massive computational resources at high performance computer centres as well as to experimental facilities. For more information on RealityGrid visit: www.realitygrid.org/

The UK's e-Science Core Programme is managed by the Engineering and Physical Sciences Research Council (EPSRC). It is part of a £230M Government investment in e-Science, which involves seven UK Research Councils and the DTI. The UK programme has also engaged industrial investment of £30M.

The Engineering and Physical Sciences Research Council (EPSRC) is the UK's main agency for funding research in engineering and the physical sciences. The EPSRC invests more than £500 million a year in research and postgraduate training, to help the nation handle the next generation of technological change. The areas covered range from information technology to structural engineering, and mathematics to materials science. This research forms the basis for future economic development in the UK and improvements for everyone's health, lifestyle and culture. EPSRC also actively promotes public awareness of science and engineering. EPSRC works alongside other Research Councils with responsibility for other areas of research. The Research Councils work collectively on issues of common concern via Research Councils UK. Website address for more information on EPSRC: www.epsrc.ac.uk/

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