

European Grid Infrastructure: powering computing for European science

Steven Newhouse explains how the European computing grid is playing an essential role in advanced research

With dwindling oil and gas reserves and ever present concerns about the safety of nuclear power, the world needs an alternative, clean and sustainable source of energy for the future. One option that has been on the table for many years is fusion power – the process that fuels the Sun.

The theory is well-understood: the collision and fusion of two atoms of hydrogen into helium produces energy that can be harnessed by researchers. The journey from the blackboard to the light switch at home relies on a combination of advanced science and high-precision engineering, as well as many small and large-scale physical experiments and simulations.

This complex journey also requires another type of fuel: computing power. There is no single cost effective computer system in the world powerful enough to answer all the computing needs of data-intensive scientific challenges. Making fusion power available at the flick of a switch is just one example.

Solving scientific challenges today involves handling and analysing vast amounts of data within transnational collaborations between hundreds of scientists. e-infrastructures – geographically distributed computing and storage resources, linked by fast, high-performance networks – are critical in undertaking these challenges.

E-infrastructures such as the European Grid Infrastructure (EGI) allow scientists to share data securely, analyse it quickly and collaborate with



Photo: ©Pranod K Mahanand

Future green energy? Testing the use of fusion as an energy source requires state-of-the-art computing power supported by the European Grid Infrastructure.

colleagues worldwide. Today, e-infrastructures are an essential part of modern research, a driver for economic growth and innovation.

GRID COMPUTING IN EUROPE: EGI

EGI is a pan-European federation of computing resource providers set up to deliver sustainable, integrated and secure computing services to European researchers and their international partners. The original European computing grid was conceived in 1999 to analyse the Petabytes of experimental data produced by the Large Hadron Collider at CERN. Twelve years on, the European grid has diversified from its original focus on high energy physics and it now serves research in dozens of scientific fields, including life sciences, fusion and humanities.

The development of EGI has been funded by the European Union framework programmes FP6 and FP7 through several generations of initiatives and projects. To move away from this project-dependent business model, and to guarantee the sustainability of this now crucial service to science, the European grid community established EGI.eu, an organisation based in Amsterdam to coordinate the infrastructure on its behalf. EGI.eu's stakeholders are the National Grid Initiatives (NGIs), which run grid services in their individual countries, and European Intergovernmental Research Organisations (e.g. CERN). The participants contribute to the running costs of EGI.eu and to the services provided to coordinate activities across Europe.

POLAND'S ROLE IN EGI

In July 2011 Poland began its six-month presidency of the European Union Council, taking a crucial role in European policy. Poland is also one of the leading countries in the EGI federation and PL-Grid (officially the Polish Infrastructure for Supporting Computational Science in the European Research Space) was established in 2009 as one of the first European National Grid Initiatives.

PL-Grid is a nationwide computing infrastructure, built to support scientific studies based on advanced simulations and large-scale

computations. Nowadays, PL-Grid caters for 600 registered users working on cutting edge topics such as simulation of the effects of antibiotics, speech recognition, the origin and dynamics of small objects in the Solar System and of the magnetic characteristics of cobalt nanostructures.

By the end of 2011, the services provided by PL-Grid to the research community will be extended by about 215 TFlops of computing power and 2500 TBytes of storage capacity. In June 2011, PL-Grid saw three of its computers on the list of TOP 500, with the ACC Cyfronet AGH peaking at the 81st position.

"Today, e-infrastructures are an essential part of modern research, a driver for economic growth and innovation."

Fortunately for the thousands of European scientists and researchers that depend on grid computing, Poland is not alone in its commitment to providing the computing power needed to fuel modern science. The European Grid Infrastructure is a transnational endeavour that transcends international boundaries and a vital scientific asset for Europe – promoting innovation and the free movement of knowledge, now hailed as Europe's fifth freedom. ★

Steven Newhouse is the Director of EGI.eu.

