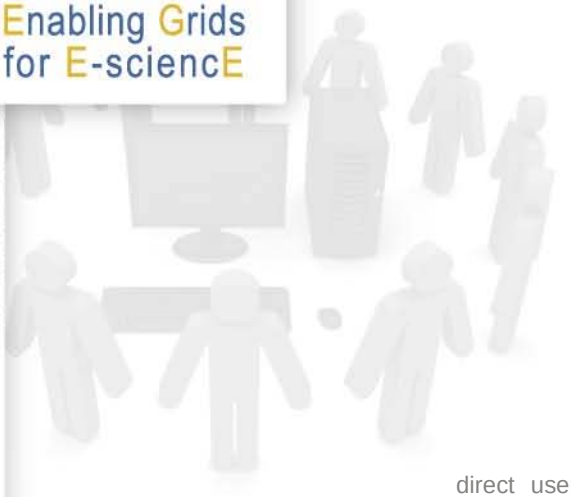
ACTIVITIES



NA4

The Enabling Grids for E-sciencE (EGEE) project began by working with two scientific groups, high energy physics and life sciences, and has since grown to support many more domains including astrophysics and astro-particle physics, computational chemistry, earth sciences, fusion and computer science. The user community runs applications from research domains as diverse as multimedia, finance, archaeology and civil protection. Researchers in these areas collaborate through Virtual Organisations that allow them to share computing resources, common datasets and expertise via the EGEE grid infrastructure.

To help the user community take advantage of the benefits of grid computing, EGEE provides a range of support services to its users: direct user support, Virtual Organisation support and application porting support. Through other activities, the project also provides beginner and expert training on various topics.

Getting involved

Details of how to join EGEE can be found on the EGEE website at **http://technical.eu-egee.org/index.php?id=392.**

Members of business and industry are also encouraged to join the project. For more details see the "EGEE and industry" section on **http://www.eu-egee.org/.**

High energy physics

The high energy physics community is one of the pilot application domains in EGEE, and is the largest user of its grid infrastructure. At present the major users are four experiments (ALICE, ATLAS, CMS and LHCb) from the Large Hadron Collider, set to begin proton-proton collisions in autumn 2009.

These four experiments are using grid resources for large-scale production work involving more than 330,000 jobs per day on the EGEE infrastructure and sister projects, such as OSG in the USA and NDGF in the Nordic countries. Other major experiments, such as BaBar, CDF, DØ, H1 and ZEUS have also adopted grid technologies, and use the EGEE infrastructure for routine physics data processing.

Fusion

Commercial exploitation of fusion energy still needs to solve several outstanding problems some of which require a strong computing capacity. In particular, the exploitation in of the future International Thermonuclear Experimental Reactor (ITER) requires a modelling capability that is at the limit of what is possible with more traditional IT resources. This joint international research and development project aims to demonstrate the scientific and technical feasibility of fusion power, and could potentially produce 500 MW of power by 2016.

Presently several applications are already running on the EGEE grid, namely Massive Ray Tracing, Global Kinetic Transport and Stellarator optimisation, which have helped to open new research lines. A number of new applications devoted to ITER simulation are being ported to the grid, in close collaboration with EUFORIA project.

Astrophysics and astro-particle physics

The community currently includes 17 Institutes, all contributing with applications ported to EGEE. Among them, the most relevant are Planck, MAGIC, SWIFT/MERCURY and LOFAR. All of them share problems of computation involving large-scale data acquisition, simulation, data storage and data retrieval that the Grid helps to answer. Planck and MAGIC have been working with EGEE since 2004. The ESA Planck satellite, launched in 2009, is mapping the sky using microwaves, with an unprecedented combination of sky and frequency coverage, accuracy, stability and sensitivity. The MAGIC telescope, on the island of La Palma in the Canary Islands, is an imaging atmospheric Cherenkov telescope that has been in operation since late 2004.

Life sciences

Life science is a major application area for the EGEE project and has been used to guide the implementation of the infrastructure from the start. With more than 30 applications deployed and being ported, the domain had more than 200,000 jobs executed per month in 2007.

- The medical imaging domain works on a number of related systems, many of them in the compute-intensive area of image co-registration. This enables techniques such as 'virtual biopsies' for cancer diagnosis that avoid invasive surgical procedures.
- The bioinformatics domain studies gene, protein and all components of living organisms. There is key work on portals and web services that enable grid access for users in areas such as protein sequence or genome level analysis.
- The drug discovery domain uses the EGEE grid infrastructure to accelerate the search for candidate drug molecules against neglected diseases. The WISDOM initiative has been successfully deployed against diseases such as malaria and avian flu.

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Earth sciences
Applications of the earth science research domain cover many disciplines. The most numerous applications are in seismology, including applications that characterize earthquakes within a few hours of the occurrence. Several applications are based on atmospheric modelling, like the long-range air pollution transport over Europe, the regional el Niño climate and the ozone in polar regions. In hydrology, several applications run concerning the flood forecasting and the intrusion of seawater into coastal aquifers.

Geoscluster, an industrial seismic processing solution, is the first industrial application successfully running on the EGEE grid production infrastructure. Operated by the French company CGGVeritas, through the EGEODE virtual organisation, it enables researchers to process seismic data and to explore the composition of the Earth's layers.

Computational chemistry
The computational chemistry and Gaussian virtual organizations were established to allow access to chemical software packages on the EGEE infrastructure. At present both freely available (GAMESS, COLUMBUS, DL_POLY, RWAVEP or ABCtraj) and commercial software packages, including Gaussian, Turbomole and Wien2K, are used by chemists to better understand molecular properties, model chemical reactions or design new materials. The availability of chemical software is also beneficial for other communities as a source of molecular data parameters for their simulations.

Grid Observatory
The Grid Observatory is a new scientific activity within EGEE. It integrates the collection of data on the behaviour of the EGEE grid and EGEE users with the development of models and of an ontology for the domain knowledge. The availability of such data, grid models and analyses based on the models, can assist end-users, middleware development and system administration. This new work involves computer science research and development in both the grid and the machine learning areas, with specific work within the emerging field of autonomic computing. Initial traces of grid activity are available from the Grid Observatory Portal (**www.grid-observatory.org**). Those interested in analysing these data can register through the portal.

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