GridBriefings
Grid computing in five minutes

Transferring technology: Grids in Business

Grid technology allows users to harness the power of multiple computers, helping to provide enhanced processing power, access distributed resources and form stronger collaborations. Today, grid computing is used in many disciplines, from high energy physics to geosciences. However, grids have not yet been widely exploited outside academia. Spreading the technology and expertise created by the grid computing community to a wider audience could offer benefits for all. This article takes a look at some of the issues and challenges on the road to adoption of grid technologies.

Why should businesses use the grid?

Applying grids to the commercial world has the potential to offer many benefits. Businesses such as CGG Veritas working in the oil and gas industry, the drug discovery company, e-Therapeutics, and Imense image search, have all successfully used grids to improve their business.

• Grids enable companies to use their resources more efficiently. For companies that can't afford to purchase more computing power, grids offer a way to make better use of what is already available.

• Grid technology can allow organisations to carry out large scale processing that would otherwise be impractical, in much shorter times than they would realise without a grid.

• Grids give easy access to shared resources and data no matter what the user's location.

• Grids empower distributed communities. Virtual organisations give geographically dispersed groups the opportunity to share, discuss and form close-knit collaborations.

• Grids can help to improve the business performance of a company, through tangible benefits such as cutting costs, shortening processing times and increasing flexibility.

Putting words to pictures

Thanks to sites such as Flickr, the numbers of images on the web are on the rise. But searching for images is heavily reliant on prior labelling with keywords. UK-based company, Imense, hopes to solve this problem by automating content analysis.

istockphoto

Imense's application analyses images and is able to recognise their content and classify them without human intervention. However, to test their prototype software, the company needed to label millions of images, each taking 15 seconds to process. To help, Imense turned to the grid, processing 12.4 million images in a single month. The processing power was provided by GridPP, the UK grid for particle physicists.

"Having access to the grid was critical to launch imense.com. Analysing so many images would have been unfeasible for us as a small start-up, but the grid allowed us to test our software, impress our investors and secure funding for our company," says Imense CEO, David Sinclair.

Per Oster, EGI - *"If we want to build a sustainable large research infrastructure, along the European Grid Initiative (EGI) model, it is crucial that industry get involved in this infrastructure. Industry can benefit from the grid infrastructure as a provider, user or partner. The grid enables public and private companies to innovate and create additional revenues, which in turn benefits society."*

What are the hurdles?

Moving from a research to industrial environment is not easy and the commercialisation of grids is no exception. Grid technology is based on academic rather than commercial models, leading to a number of challenges.

• Grid services and applications are not always easy or intuitive to use, acting as a barrier for potential users.

• Grids are intrusive structures - complicated to set up and harmonise with systems and services that are already in place, such as security policies.

• Grids need to work in a commercial environment. For them to be successful in business, providers need to be able to log, account and bill for grid services.

• In Europe, the academic grid infrastructure Enabling Grids for E-sciencE (EGEE) can only be used for research as the network it is built on, GÉANT, cannot be used for commercial gain. Although EGEE offers 'proof of concept' - the opportunity to try out the grid on its infrastructure - there is no commercial version of EGEE available.

Nevertheless these challenges have been overcome in some sectors, and the grid community is working together to make the technology easier to implement and use.

Santi Ristol, BEinGRID - *"In today's changing economy, businesses require even more assurance that the solutions presented to them are valid, proven, and practical. Our many innovative end-users - around whom we have developed these solutions across sectors - reinforce that grid is business-ready, and set a model for related distributed computing uptake, as well."*

The cloud solution

While there are currently relatively few examples of grids in industry, cloud computing is becoming more widespread. A cloud is a collection of computers usually owned by a single party, connected so that users can lease access to a share of their computing power.

The grid was built on principles of sharing between academic communities but clouds are based on models that commerce understands – selling a service.

The RESERVOIR project is applying these lessons back to the grid, exploring how grid institutes could benefit from adopting a 'private cloud' model to provide resources. Private clouds allow organisations to easily manage their own computing resources in house. Using virtualisation technology to run multiple virtual computers on the same machine, they can alter the computing to suit the work at hand. This makes it easier to provide the necessary infrastructure for users, even if these needs change rapidly over time.

A virtual remedy: Collaboration made easier

"Advanced international scientific consortia need to set up ad-hoc collaborations," says Andrea De Luca, Clinician and Researcher at the Institute of Clinical Infectious Diseases, Catholic University of Rome, Italy. "For this reason, we used the concept of virtual organisations, introduced by international grid projects."

Credit : www.sxc.hu

Virtual organisations allow geographically diverse communities to access, store and manage resources spread across multiple locations. Together with a number of medical institutions, the company GridwiseTech has used this approach to help hospitals form better collaborations for carrying out medical research. Their AdHoc software made setting up and managing a virtual organisation simple and intuitive thanks to an easy-to-use interface. Although, initially developed for medical use, AdHoc can also be taken up by commercial organisations to manage access to resources across different locations, in a secure, effective and easy way.

Pawel Plaszczak, GridwiseTech - *"Grid architectures, as the backbone for cloud environments already have significant impact on business. In some niche sectors, like banking, oil & gas, or engineering, grids have been well established for a decade, and are a must-have to maintain competitiveness. What we see today is emergence of similar architectures in other sectors - such as media, gaming, telecommunication and the Internet industry. There, the marriage between grid with virtualisation resulted in the simple yet powerful concept of cloud computing."*

Grids for SMEs and the public sector

Grids do not have to be as large as the continent-wide infrastructures EGEE in Europe or EELA in Latin America. They can be adopted on a much smaller scale by one department or one office. In the business world there is large potential for grid use in small and medium enterprises (SMEs), as well as in bigger, more complex organisations. Organisations in both the public and private sector often have access to collections of computers which, with the help of grid technology, can let users access more power, share resources and manage large sets of data.

Owen Appleton, Emergence Tech - *"In the future, SMEs that can't afford to buy access to large scale facilities, could use grid technology to make better use of the resources they have or maybe even share resources with other SMEs that they have good relations with. There's also a lot of potential for the spread of the grid into the public sector beyond those areas where it began. I think hospitals, schools and university departments that aren't already gridded up might be very interesting as targets for grid tech transfer or grid exploitation."*

Experimenting for business

A number of organisations are working to put grid into business. BEinGRID is a project set up specifically to demonstrate the benefits of grid technology to industry. Funded by the EU, BEinGRID has used aspects of grid computing to run 25 Business Experiments in areas as diverse as the media and the environment. So far, eleven BEinGRID partners have taken the technology developed in the project forward to use in their work. Once BEinGRID ends in November 2009 it will continue through an online platform, IT-tude.com.

Rosa M. Badia, Barcelona Super-computing Centre - *"We used the framework of BEinGRID to help automate the creation of new products and processes in the chemistry industry. Using the joint solution that combines the grid programming models GRIDSs and GridWay, our users were able to design a new chemical process that is the best for the last 10 years of development, with revenue close to the physical maximum. Our solution is generic and non-invasive, and therefore can easily be adopted by other users."*

Nicolas Hubaux, Art & Build architectural practice - *"Thanks to the 'Virtual Reality for Architects' grid application, we now benefit from unused resources in a simple way. This implies reduced processing time. Saving time during the processing phase actually enable us to increase and concentrate more on the test phase, reducing post-production related issues. We raise the customer's satisfaction and avoid delays which is, at the end, really cost-effective."*

From academia to industry

Academia and business are very different environments, and a great deal of cultural translation is required between the two communities. Researchers working on applications that could offer commercial value often don't have the skills and know-how to take them to market, with the added perception that engaging in business activities is harmful for an academic career. In these cases, dedicated knowledge transfer networks embedded into academic institutions can prove invaluable.

As well as technology transfer, opportunities also exist to share the knowledge gained by grid computing. Often grid experts move into industry, applying their expertise and know-how to problems that exist outside the academic domain.
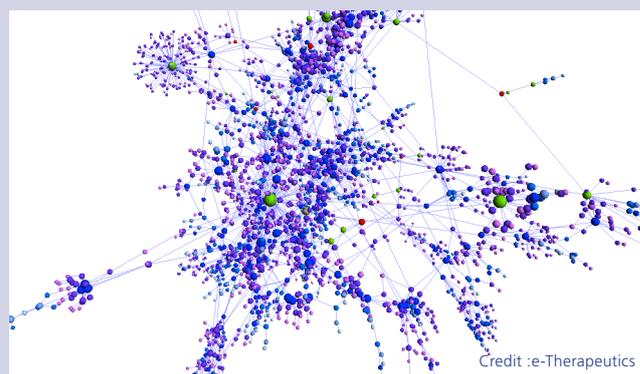
In the UK, Grid Computing Now! is a knowledge transfer network helping to enhance the ability of the UK to exploit grid and other scalable computing technologies, as well as providing a number of case studies like e-Therapeutics. Other technology transfer bodies such as that within the UK's Science and Technology Facilities Council (STFC) and The Israeli Association of Grid Technologies (IGT) also work to share knowledge and provide networking for those who want to develop grid technologies outside the research sector.

e-Therapeutics: Hunting for drugs

Drug discovery costs the pharmaceutical industry more than $80 billion worldwide. A complex task, it involves hunting for compounds that interact with specific proteins in the human body. By carrying out these initial stages on a computer, the company e-Therapeutics, is cutting both costs and time.

e-Therapeutics' initial work was carried out using computing power at Newcastle University in the UK. Today their internal grid of a couple of hundred processors helps them analyse a database of 15 million compounds and 2.6 million proteins. The company's portfolio includes an oral treatment for asthma, an antidepressant and a treatment for MRSA, several in the final stages of clinical testing.

"Using this kind of approach has led to more productivity with very little money," says Malcolm Young, e-Therapeutics CEO. "As a scalable process, the use of e-science oriented computing could completely change the economics of drug discovery."

Credit :e-Therapeutics

Ian Osborne, Grid Computing Now! - *"Grid and cloud computing open up business possibilities that simply aren't available on a standard in-house server set up. Knowledge Transfer Networks like Grid Computing Now! are vital in showing these companies what's possible, and also bringing like-minded organisations together. Anyone interested in what grid can do should have a look at the case studies on our site."*

Transferring knowledge, sharing technology

Commercial middleware has been developed specifically to help industry use grids: examples include GRIA and products produced by United Devices, Parabon and DataSynapse. GRIA has been used successfully in a number of BEinGRID supported projects such as the tourism-focused TravelCRM, which shares information between groups of travel agencies. This provides small agencies with customer data they would otherwise be unable to access. More comprehensive open source middleware such as KnowARC, from NorduGrid and EGEE's gLite can also be adopted, and adapted, by commercial organisations for use in internal grids, as long as licensing restrictions are adhered to.

In Europe, EGEE's Programme for Business is a three-stranded approach that shares the benefits of grid technology with industry. Companies can take gLite for use on their own resources and are able to run pre-competitive code on the EGEE infrastructure. Businesses can also engage in both technical and non-technical work of joint interest as a Business Associate.

A two-way street

As well as grids being beneficial for industry and enterprise, transferring the technology to the business world can help the technology itself. For grids to become sustainable outside academia, their take up by industry could be very helpful. In Europe, as the transition from EGEE to a sustainable infrastructure governed by the European Grid Initiative takes place, plans are being made to ensure this is kept in mind.

Sy Holsinger, Trust-IT Services - *"Sustainability of grid within academia and research institutes completes only half of the picture. Technology transfer and business involvement is essential as only when the commercial market is offering grid services, related technologies and application concepts will we ever reach true sustainability. Funding sustainability can only become a reality when governments begin to see an economic return on their investment into research and development."*

Searching for black gold

Oil and gas are big business. But finding new oilfields, monitoring resource recovery and practising sustainable development are complex tasks requiring worldwide collaboration and huge computing power. CGGVeritas has used the grid to aid with seismic data processing and reservoir simulations – essential tools in the search for oil and gas. By using EGEE's gLite middleware, they have developed an industrial application for the large number of SMEs which operate in this sector.

Image courtesy of CGGVeritas
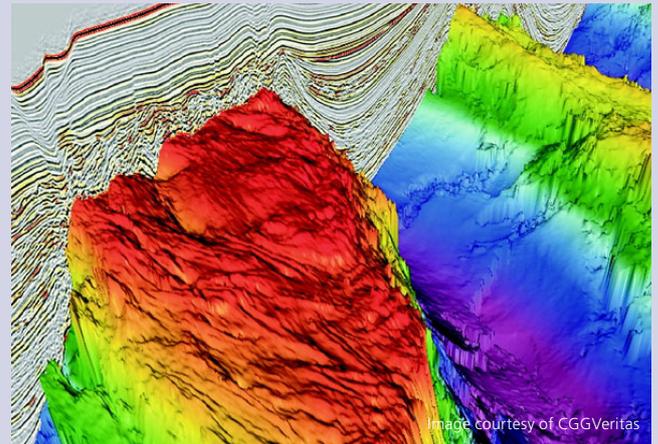
CGGVeritas' grid-enabled services help geoscientists to collaborate, provide easy access to computing resources and allow faster data processing. The company successfully developed both the software, Geocluster, and a sister application, Reservoir Simulation, to operate in a grid environment using an interface developed by NICE, a company specialising in grid and cloud solutions. Sold as a package or a service, the application gives clients increased flexibility, shortening time to market and speeding up the decision-making process. Additionally, pay-per-use means that businesses can manage their budgets more effectively.