



Re-defining global computing at Rolls-Royce

By building a pilot grid-computing infrastructure to share data between geographically dispersed computers, aerospace giant Rolls-Royce is hoping to make massive IT and engineering efficiency gains.

Key benefits

- the opportunity to explore the efficiency advantages of an advanced, integrated grid-computing infrastructure within a global enterprise
- significant Rolls-Royce IT optimisation throughout the organisation
- developing new service offerings for exploitation by UK commercial and research organisations

After studying the relevant Technology Programme competition documents and eligibility criteria, Rolls-Royce were able to formulate a project consortium to satisfy their need for a shared grid-computing project. One of the immediate advantages of having such a grid would be the ability to review and analyse Rolls-Royce engine data instantly from all over the world – with obvious engineering and operational benefits.

Launched in January 2005 to run for three years, the BROADEN (Business Resource Optimisation for Aftermarket and Design on Engineering Networks) project has a total value of £3.49 million, half-funded through the Technology Programme. With a focus on three distinct development arenas – distributed diagnostics for engine health monitoring, high-performance

computing for design, and agent-based software development for business modelling – it promises to deliver a highly efficient means of sharing R&D resources between separate cost centres, and other widespread organisational benefits. Exploring the potential gains to be made by

integrating grid computing – a secure means of sharing information and applications between remote computers, databases and users that has significant flexibility and efficiency advantages over traditional methods – into an existing corporate environment is expected to deliver important benefits throughout the aerospace and other industries. Two of the commercial partners – EDS and Streamline Computing – are planning to introduce service offerings based on the lessons learned, while the universities and other commercial partners involved will be looking to exploit their key technologies more widely.

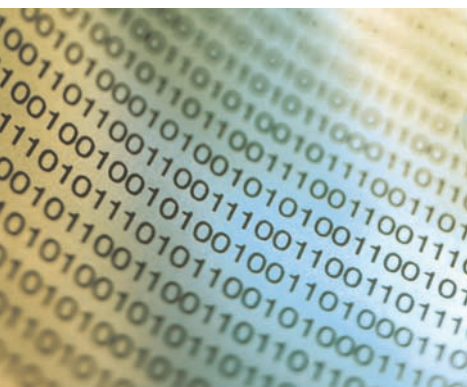
Rolls-Royce is the lead partner in the project, with Electronic Data Systems (EDS), Lost Wax Media Ltd, Streamline Computing, Oxford Biosignals Ltd, Cybula Ltd, and the universities of Leeds, Oxford, Sheffield and York.

For many years, the world's airlines have relied on Rolls-Royce engine monitoring systems as a fundamental element of their preventative maintenance programmes.

In the late 1990s, Quick Technology™ was developed. This is a highly advanced monitoring tool that detects subtle condition changes invisible to preceding technologies. Now, every time an engine flies equipped with the technology, a superabundance of data is generated.

The leap from kilobytes to gigabytes of data per flight presented Rolls-Royce with both a significant IT resource challenge and an important opportunity to increase the quality and quantity of engine condition information available to stakeholders across the world.

Addressing these issues was the purpose behind DAME (Distributed Aircraft Maintenance Environment), an Engineering and Physical Sciences Research Council e-Science pilot project



launched in 2002. This assessed the viability of creating a grid-computing solution – a way of networking geographically dispersed computers, databases and experts into a pool of constantly available managed services – that would enable the rapid and easy acquisition, analysis, cataloguing and searching of the data at airports throughout the world.

DAME ran until early 2005, operating outside Rolls-Royce on the so-called 'White Rose Grid', a metropolitan computing grid connecting the universities of Leeds, Sheffield and York. It successfully demonstrated some of the time and cost efficiency benefits available through the use of grid computing in an engineering environment. For example, following an experiment in which all relevant tools and data were integrated into one environment, the company's engineers estimated it could save up to 75% of the time taken to resolve typical root-cause analysis investigations.

Critically, Rolls-Royce decided to use the grid approach more widely across other business areas, and BROADEN was conceived.

Objectives

A key focus of the project was to deliver an implementation of DAME within Rolls-Royce – but this was not its only objective. A second was to enable optimised engine design by delivering the high-performance computing necessary for extremely complex scenario simulations. And third, it was to help drive logistics and supply chain software development by modelling on a large scale the very important and complex demands of Rolls-Royce's global aftermarket.

At an organisational level, it was also seen as an opportunity to integrate the grid-based approach with the cluster computing services model already in use within Rolls-Royce. This will enable web/grid services to co-exist with other middleware on the same infrastructure, allowing greater efficiency and flexibility throughout the business through to production level.

Solutions

By developing a pilot IT infrastructure capable of supporting grid computing, Rolls-Royce managers were confident that they could identify the issues involved in gaining the optimisation improvements they were seeking.

They pooled their requirements within a single bid document to apply successfully for a grant under the Inter-Enterprise Computing competition of the Technology Programme. This enabled the

BROADEN project to begin in January 2005. With the grid approach to enterprise computing widely seen as the future for global organisations, BROADEN is expected to drive valuable technology and process developments for Rolls-Royce, and UK industry as a whole.

Results

Ten months into the project, focus to date has been on defining all user requirements for the BROADEN grid, putting the necessary hardware in place and evaluating software options. The team is now poised to deploy the initial development environment and allow the experiments to begin in earnest.

According to Rolls-Royce Information Engineering Team Leader Graham Hesketh, "Effectively, we are now developing the recommendations and policies that will drive forward computing in Rolls-Royce globally. This is an important opportunity to prove and promote the benefits of grid computing within the business, so ensuring that we gain from the more effective, flexible and cost-efficient usage of expensive IT resources that it enables."

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Collaborative Research & Development

Collaborative Research & Development is one of two business support solutions within the Technology Programme, the other being Knowledge Transfer Networks (KTNs). Its primary objective is to enable the industry and research communities to work together in strategically important areas of science, engineering and technology in order to develop successful new products, processes and services. It also enables the latest thinking and understanding to flow between universities, other research centres and business.

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