

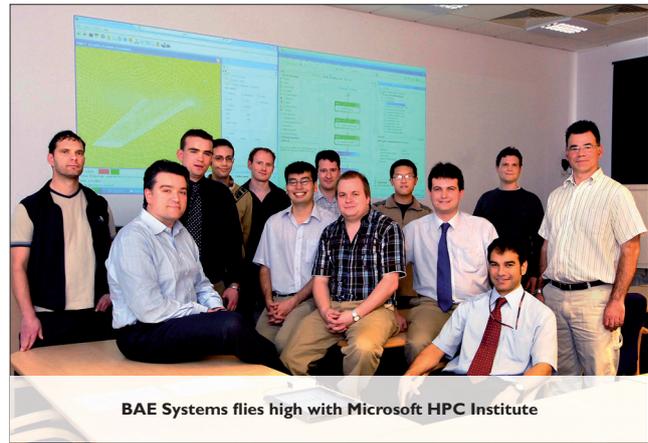
# Proof-of-Concept Engineering Workflow Demonstrator

When Microsoft needed a proof-of-concept implementation of bespoke engineering workflow software for their customer, BAE Systems, it called on the software engineering skills and experience of the Microsoft Institute for High Performance Computing.

BAE Systems was looking into converting their in-house SOLAR software suite to run on the MS Compute Cluster Server product with 64-bit MPI support in conjunction with an extended Windows Workflow environment for use by their engineers.

## Application

The SOLAR software suite is one of BAE's engineering packages designed for the modelling and simulation of fluid flow behaviour around full-size aeroplane designs. The suite consists of a range of modules (Mercury, Pluto, Jupiter, Io, Venus, ...) which are responsible for the geometry design, the meshing, the analysis, extraction of fluid flow profiles, and the post-processing and visualisation stages. These activities together form the engineering workflow.



BAE Systems flies high with Microsoft HPC Institute

## Implementation

Application engineers, software architects, software engineers and end-users arrived for a three week long implementation session at Southampton. At the end of this, a demonstrator was born which showed a fully integrated engineering workflow environment for the BAE SOLAR application executing on a Windows Workflow engine layer which submitted high-performance fluid flow job activities through an open-standard web-service to run on the MS compute cluster server.

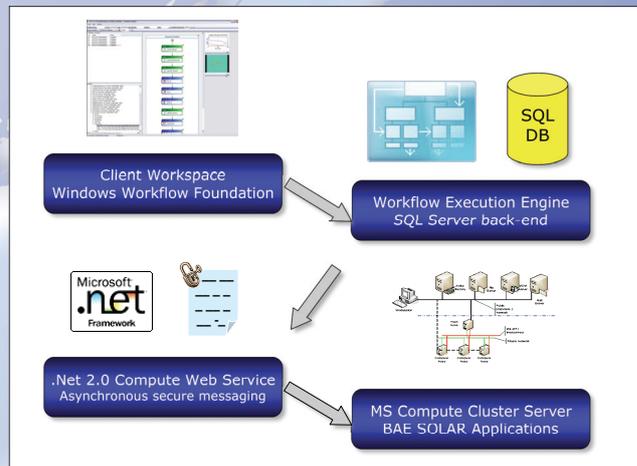
Workflow activities and processes were programmed so that they could be easily

On the final day, a successful demonstration by one of BAE's end-users proved that such a system can be developed within a short, intensive period with a team working closely together and its potential use in a large commercial engineering environment like BAE.

## Technologies

We made use of the following technologies within the demonstrator:

- Windows Workflow Foundation as part of the WinFX package which is part of next-generation Vista technology.
- Net 2.0 for Web Service implementation and asynchronous secure messaging for job notifications.
- SQL Server 2005 for storing workflows, execution states and rollback information.
- Visual Studio 2005 and Visual Source Safe for authoring and versioning workflow activities and end-to-end workflows.
- Windows Compute Cluster Server 2003 for high performance (high capability) computing.



The running of such large-scale simulations poses a challenge to compute resources in terms of size and performance and BAE decided to invest in a proof-of-concept demonstrator that could show the potential of the latest Microsoft technology in their engineering environment.

created and configured through code snippets in C#. Features of the demonstrator included an SQL Server-backed workflow archive, persistency control and roll-back capabilities as well as an open-standard secure Web service for access to the compute cluster.