

## Eurocontrol Goes for a Uniform Airspace



## CASE STUDY

### CHALLENGE

Eurocontrol needed to integrate the data from numerous aeronautical information systems into one European database to improve data flow.

### SOLUTION

Progress® SonicMQ® is the middleware layer that handles all the messaging in a project linking Eurocontrol's central database (EAD) to the databases of the member states and to any other organization that needs to access the data in the EAD.

### WHY PROGRESS® SOFTWARE

SonicMQ offers a perfect implementation of the JMS standard and has a proven track record in similar applications.

### BENEFIT

The entire message passing between the external clients and the central database is now handled seamlessly by SonicMQ, irrespective of the database type, formats, access protocols, rules, interfaces and regardless of the data volumes.

Eurocontrol has a vision: to create "One Sky for Europe," a uniform Air Traffic Management System (ATM) for 41 states in Europe, to ensure safe, secure and efficient use of European airspace by agreeing and enforcing common standards and procedures for ATM throughout Europe. And Progress SonicMQ plays a vital role in linking the diverse member state systems to Eurocontrol's central database.

Eurocontrol was created 40 years ago to manage the European sky as a single, seamless airspace in which traffic can cross national frontiers, supported by a synchronized, integrated system of air traffic management. By merging the information from the various national systems into a single database, Eurocontrol will be able to provide a single standardized set of data for each flight, from departure gate to destination gate.

### THE QUEST FOR CONSISTENCY

"Currently, every state creates, collects, produces and maintains its own set of data for a pilot to use during his flight", says Sylviane Wybo, European AIS Database Program Manager for Eurocontrol. "But in Europe, pilots do seldom just fly over one country, and so they need information coming from different states, preferably in a consistent manner. Many years ago, we realized that we had to find a way to integrate the data from all those aeronautical information systems into one European database, the EAD, in order to improve the data flow to all the parties involved."

That was easier said than done. Every member state uses its own type of database, different formats, access protocols, rules, interfaces, and so on. The purpose of the EAD project was precisely to standardize all that in order to provide consistent data, not just for the pilots but also for the airlines, for commercial companies that write manuals for example, or for any other interested party. Of course, at all times the states remain responsible for the data, but Eurocontrol had to find an efficient way to let them input that data into the central database.

That's when Eurocontrol came up with the idea of a programmatic interface. It now provides a library of functions to enable people to pass data by means of messages based on XML. To that end, Eurocontrol developed a complete protocol for requests and responses. It works like this: the user sends a message, which constitutes a request that is processed by the EAD and then a response is sent—either an error response or a successful response or data if data had been requested.



## ENTER SONICMQ

Eurocontrol decided to implement this interface in Java—the language most often used for this type of application—and with JMS (Java Messaging Service) as the basis for passing the message itself. The architecture they had in mind was such that, both on the client and on the server side, at the top level there is a bespoke application developed by the EAD system developers to provide access to the data. The middleware then takes care of the entire message passing.

In the initial phase, the architectural thinking and a lot of development work on the basic set of requirements was done by Eurocontrol’s own engineers, but then the weight of the project was gradually transferred to Frequentis, a system development company based in Vienna, Austria. First they built a prototype using open source software, and then together with Eurocontrol’s developers, they went looking for the application server and for the JMS product for the middleware. Eventually, Oracle was chosen for the application server and SonicMQ as the JMS middleware.

“In the final evaluation of the middleware four products remained,” explains Don Hughes, Eurocontrol’s Operational Data Analysis Team Leader. “Obviously price and licensing were taken into consideration as well, but one of the main reasons we went for SonicMQ was its reputation as a reliable product that had proven itself over and over again in many other types of applications, working particularly well with Oracle’s software. Another important issue here is whether a JMS product has a true implementation of the JMS standard, whether it respects all the APIs and we found that SonicMQ does, contrary to many other products.”

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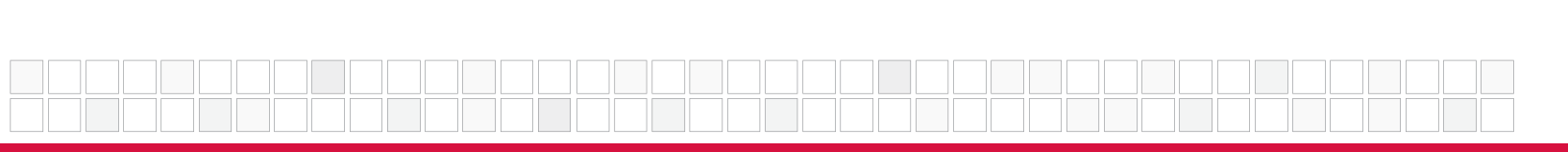
— Don Hughes  
Operational Data  
Analysis Team Leader

## PUSHING THE SYSTEM TO ITS LIMITS

The ESI is probably the most crucial part of the whole project as it represents the system-to-system interface between the EAD server and the external client systems. That is why, right from the start of the project in the late nineties, Eurocontrol decided to involve a number of states. Eleven of them served as pilot-clients in the development. They cooperated in the definition of the requirements, in the evaluation of the offers and in all the prototyping. In the final phase, the provisional acceptance, most of them connected to Eurocontrol’s central database, some using the proprietary ESI interface, others through a terminal interface.

Among those clients there were national administrations, the military and commercial companies. The biggest problem Eurocontrol faced was that the entire system could only be tested in real life situations, with real external clients. For Eurocontrol, though it ran thorough internal evaluations, the real acid test would be the full load that could only be completed with external clients connected to the system.

From the subsystem for notification messages, clients will be downloading messages continuously, something in the order of ten messages a day per state or hundreds with hundreds of clients. Everything goes through the ESI where SonicMQ has to be able to cope with the volume of transactions, and that is a crucial point because at the end of the day, there is no way Eurocontrol can anticipate what the volume of data and the system load will be.



Says Don Hughes: "In all honesty: we tend to push the boundaries of the technologies we are using, and consequently that causes some technical problems from time to time, but it was reassuring to find out that the reaction of the Sonic people was surprisingly good with a very responsive support team."

## **A NEVER ENDING STORY**

Both Hughes and Wybo admit that this is really a never ending project: new clients will be connecting all the time, new interfaces and new applications will be developed and additional information will be added to the database. As Eurocontrol is moving from a paper-based system to an electronic system, initially it will have to model its database to make it look as much as possible like the paper model everyone was used to. In the second stage, Eurocontrol will then have to see how it can optimize all this electronically and how it can distribute electronically what used to be on paper. "Obviously, twenty years down the road we don't know whether we will have twenty or a hundred clients, nor what the volumes of data will be," says Hughes. "But we have made sure that we developed a solid basis with a really firm set of requirements and with a middleware product that can scale to handle even the largest load, so we can have a good night's sleep!"

## **ABOUT PROGRESS SOFTWARE**

Progress Software Corporation (Nasdaq: PRGS) provides application infrastructure software for the development, deployment, integration and management of business applications. Our goal is to maximize the benefits of information technology while minimizing its complexity and total cost of ownership.

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