Building a Service-Oriented Architecture around the Mainframe

The ISO experience with WebSphere Application Server for z/OS

An Arcati User Study

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Service Oriented Architectures (SOAs) are gaining momentum, but nowhere more so than in the highly competitive financial services sector. This is where SOAs can really make an impact on the bottom line, not just through cost savings but also by giving banks, insurance companies and their business partners far greater flexibly in the way that they can exchange data and services dynamically via industry-standard interfaces.

The nature of business in the financial services sector has changed dramatically in recent years. With the development of web-based products and services, companies in the insurance and banking industries are now called upon to make split-second decisions on premium levels, loan eligibility and exposure to fraud, and to assess numerous types of risk. Across the underwriting and lending worlds, product competitiveness relies on companies maintaining the highest levels of service and customer responsiveness, and this means that the information on which they base their decisions needs to be of the highest quality, delivered at the right time and in the right way.

Service-oriented architectures provide a key solution to this problem. By creating standard services that integrate the insurance companies and their IT applications on the one hand and the providers of decision-support information on the other, it becomes much easier to increase the accuracy and timeliness of the information passing between business partners and between service providers and their customers.

ISO weighs up the risks

One company that has made some significant steps in building an SOA environment around its existing IT infrastructure is the Insurance Services Office, Inc (ISO) of Jersey City, NJ in the USA. For more than 30 years ISO has been a

leading provider of data, analytics and decision-support information to the insurance industry, and the data that it collects is used to calculate premiums, assess risk levels and support underwriting decisions across the country. It also provides data to mortgage, healthcare and real estate companies that need to manage risk and protect themselves against fraud.

ISO gathers 1.9 billion records per annum, and at any one time has some 11 billion records on file which provide essential input to its calculations. Throughout the company's life, it has managed this mountain of data within an IBM mainframe environment, and it continues to be an enthusiastic user of z/OS-based applications.

Historically, the information that ISO provides to its customers has been disseminated off-line. As IT Infrastructure VP Steve White explains, "We had huge printers, and they would run all night and produce output, and we would take that output and stick it in envelopes and send it off to the insurers."

Six years ago, though, things began to change. With the growth of Web-based information resources, the company started to respond to the need for real-time data and began to offer its customers screen-based data via distributed systems.

Early Internet solutions

In the early days of Internet delivery, the company's existing mainframe environment did not offer an effective means to get the right data to the right people, so ISO turned to a distributed solution. However, this had a number of technical limitations which White and his team were keen to overcome. In particular, distributed servers were far more difficult to manage than a centralized system, and coordinating the application, database, and network components on different boxes required far more manpower and expertise, which were not in plentiful supply.

Scalability was another key issue for ISO: Web-based traffic is notoriously unpredictable, and coping with the peaks and troughs of user demand proved to be far more difficult in the distributed world than on the mainframe. The company wanted an architecture that would it allow it to manage workload variations and scalability in the same way that it had always done for its centralized applications. The ideal solution would be to integrate the two environments as closely as possible, in order to be able to share data and resources and to use the same tooling across the new Web-facing systems and core transactional applications alike.

A further consideration for ISO was the high level of support required for its distributed development environment. “Every four or five years we had to change our development platform,” explains Steve White, “and there was no easy way to do the upgrade from one version of the software to the next.” By contrast, ISO’s COBOL-based applications had been maintained and enhanced since the 1960s with relatively little effort. COBOL itself did not provide the answer as skills were getting harder to find and COBOL was too mainframe-focused to offer a long-term strategy; nevertheless it was essential to find a development solution that would be at least as robust and easy to support as COBOL had been hitherto.

The next step – WebSphere Application Server for z/OS

As ISO considered its IT options for the future, its business was also going through considerable change. In the late 1990s, the company had put technologies in place that allowed customers to obtain data analysis and decision-support information in real-time, accessing the data via web browsers rather than printed reports. This was a big step in itself, but it was not enough to keep ISO at the leading edge in a highly dynamic business sector. To stay ahead of the competition, ISO needed to embrace SOA principles, to open up its existing systems via standard interfaces, offering services that its customers could build into their own applications running on a variety of different platforms.

To move towards an SOA environment, ISO concluded that the best strategy was to conduct future development in Java, which offered a maturing industry-standard development environment and was well supported across the board. Taking into account its experience to date and its future requirements, the company decided to opt for a more centralized approach in its provision of real-time data to customers, based on WebSphere Application Server (WAS) for z/OS from IBM.

WAS provides a full-function Java development and run-time environment that spans mainframe, mid-range, Unix, and PC servers. The product enjoys a number of significant advantages in the highly competitive app server market, including (at version 6) full compliance with J2EE 1.4. The z/OS version is also tightly integrated with mainframe sub-systems such as CICS, on which ISO relies heavily, and offers the scalability and manageability benefits that only the mainframe can provide.

ISO started with WAS for z/OS version 5.1 and is currently in the process of moving to version 6. At the version 6 level, the z/OS implementation of WebSphere

AS shares a common code base with the distributed version – from now on the two versions will be locked together, with service updates provided in step and with identical content (except, of course, in areas where the mainframe offers unique functionality, such as support for Sysplex).

The combination of J2EE 1.4 support and a common code base across the whole IBM server range is unique within the IT industry and has proved to be *extremely* valuable to ISO as it moves towards SOA. WAS for z/OS allows ISO to centralize its own Java-based applications on the mainframe, knowing that its code will be entirely compatible with that of business partners, vendors and customers who run their applications on other platforms. As Steve White points out, even though his own company wishes to run its Java code on the zSeries, this might not be the case with the customers and business partners with whom ISO needs to interoperate. “There may be a customer who wants to run a copy of our application locally in their shop and they are running on an iSeries machine. That Java application will report to the iSeries machine in its normal form without having to be rewritten.”

As an industry-strength J2EE environment, WAS for z/OS also supports a huge range of Java-based application packages across the whole spectrum of ERP, CRM, e-commerce, business intelligence, financial and transaction management. This gives ISO an excellent opportunity to increase the diversity of its application portfolio on the mainframe in the future. It also allows for consolidation of distributed Java applications in due course, which can lead to substantial benefits in terms of cost-effectiveness and manageability.

zAAP reinforces mainframe TCO advantage

One of the drawbacks of moving to Java development is that it is a very inefficient compiled language, certainly when compared with ISO’s mature COBOL applications. Despite the enormous capacity of the mainframe, White and his team were aware that there could be a significant overhead associated with Java. However, at the time that ISO was considering a move to WAS for z/OS, IBM was introducing the zAAP (Application Assist Processor), a co-processor which allows customers to offload Java processing without paying software costs for the additional capacity. ISO installed a zAAP as soon as it was available, moving over all its Java code to the co-processor (which initially ran at 40% utilization). The zAAP has since grown to 100%, and ISO is looking to install a second one.

zAAP has made a fundamental difference to the way that ISO views the cost of

running WebSphere on the mainframe. The cost case is particularly compelling because there are none of the additional software costs that traditionally accrue (often for no good reason) when users add MIPS capacity to their mainframe systems. “With the zAAP implementation,” says White, “there are absolutely no costs or checks that need to be written to third-party vendors.”

What is more, by offloading its Java workload to zAAP, ISO has been able to free up sufficient capacity to delay its next zSeries processor upgrade. Between the lower cost of the current zAAP workload, the predicted savings on the forthcoming zAAP implementation, and the financial effect of delaying a major CP upgrade, ISO estimates that it will have saved approximately $3,000,000 in software costs over two years.

OMEGAMON and system availability

One of the additional benefits of using WebSphere Application Server for z/OS was that it allowed ISO to expand its use OMEGAMON, the system management toolset recently acquired by IBM from Candle and integrated into the Tivoli product range. ISO had been an OMEGAMON user for many years, and had built up considerable skills in using the software to monitor and fine-tune the performance of its z/OS and CICS systems.

More recently, OMEGAMON has been extended to monitor the internals of WebSphere. The mainframe architecture is already very well equipped to manage allocation of resources to WebSphere tasks and services, with the help of Workload Manager, but the OMEGAMON tools allow operators to make sure that memory is being used efficiently and that services are not becoming overloaded.

According to Steve White, the ability to use mature tools like OMEGAMON is essential to making sure that outages are prevented and that the mainframe actually delivers the ultra-high availability levels for which it is prized. This really matters in the competitive atmosphere of the insurance industry: customers are simply no longer happy to accept outages and will turn to alternative information providers if the service declines.

With OMEGAMON, ISO retains complete control over the WebSphere service delivered by its centralized computing environment, something that is simply unattainable with distributed servers. The toolset has allowed ISO to build an end-to-end systems management environment that allows the company to manage

performance, resource utilization, and ultimately customer service consistently across both its back-end legacy mainframe systems and its new web-oriented applications that are built around WebSphere.

Scalability and security

The other key advantages of a z/OS-based WebSphere environment are the scalability (with near linear performance benefits) and the inherent security of the mainframe platform. With Internet applications, argues Steve White, “You don’t know whether you are going to have two people coming in today or 200,000 people … With the mainframe, the system itself is able to dynamically expand to make sure that we are delivering the response time that the customer is used to, whether it’s two people or 2000.”

In addition to the system’s native scalability, ISO is planning to take advantage of IBM’s Capacity on Demand and Capacity Backup services, turning on resources as required to ensure that it not only provides consistently high service levels but also keeps its system costs in line with day-to-day usage patterns. In conjunction with tools like the Intelligent Resource Director, IBM’s on-demand capacity for the zSeries offers an unparalleled degree of flexibility in allocating resources on the fly, so that service levels can be met and maintained without the increase of costs that would otherwise be unavoidable in accommodating usage peaks.

Ultimately, the success of an SOA environment within the financial services sector depends as much on customer confidence in data integrity and security as it does on service reliability. With the mainframe, ISO already had a totally secure transactional data management environment in place, and it seemed very logical to extend this level of security to the new-generation Java applications that will drive the business forward. In the Internet world, supporting the ubiquitous Secure Socket Layer (SSL) standard can be extremely resource-heavy, but ISO found that offloading SSL onto a Cryptographic Processor within a zSeries complex allowed it to use SSL across the board with negligible performance impact on mainstream application work.

With the work that has taken place recently on managing public key encryption from the mainframe, ISO has also been able to build customer confidence in the security of their data end-to-end across the Internet and between participating business partners.

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WebSphere and the mainframe: bottom-line benefits

For a company like ISO with a long-standing investment in high-performance MVS applications, the benefits of a secure centralized solution for managing its nascent SOA environment are very clear. The main questions to consider are whether WebSphere Application Server for z/OS offers superior scalability, functionality and cost-effectiveness to competitive J2EE server offerings, and whether the mainframe offers the best long-term platform for ISO's SOA strategy.

With WebSphere's common cross-platform codebase, its large application portfolio, the substantial performance benefits than have been achieved with version 6, and the whole range of manageability, security and performance benefits that the zSeries brings to the table, the company has been left in no doubt that WAS for z/OS is the best way forward.

Moreover, the support is in place. Right from the time that ISO implemented version 5.1 of WAS for z/OS, it has been able to call on expertise straight from the Poughkeepsie labs via IBM's National Support Team. The company needed to migrate its applications to the Application Server as rapidly as possible to avoid business delays, and IBM was able to offer support for both developers and systems programmers throughout the migration process.

This close support has continued as ISO moves on to version 6. What makes it even more valuable is that IBM clearly appreciates ISO's specific business requirements. "IBM has a good understanding of the insurance industry and of ISO as a corporation," says Steve White. "We have a client rep who really draws together all the resources within IBM when we need them."

And that, in today's highly competitive financial services sector, is even more valuable than the technology itself.

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