London Stock Exchange Cuts Information Dissemination Time from 30 to 2 Milliseconds

"No other exchange is undertaking such an ambitious technology refresh programme based on next-generation Microsoft technology. We've always provided a first-class service, but now we can claim to be the fastest in the world as well."

Overview

Country or Region: United Kingdom
Industry: Finance

Customer Profile
The London Stock Exchange was established in 1801. With 440 employees, it is the world's premier international equity exchange and a leading provider of services that facilitate the trading of shares.

Business Situation
The London Stock Exchange needed a scalable, reliable, high-performance, and agile stock exchange ticker plant to replace an outmoded system. About 40 per cent of its revenue comes from selling real-time market data.

Solution
Working with Microsoft and Accenture, the London Stock Exchange replaced its London Market Information Link (LMIL®) system with Infolect®. It used the Microsoft® .NET Framework, the Microsoft Visual C#® .NET development tool, and the Microsoft SQL Server™ 2000 database.

Benefits
■ Substantially faster for trades

As part of its strategy to win more trading business and new customers, the London Stock Exchange needed a scalable, reliable, high-performance stock exchange ticker plant to replace its earlier system. Roughly 40 per cent of the Exchange's revenues are generated by the sale of real-time information about stock prices. Using the Microsoft® .NET Framework in Windows Server® 2003 and the Microsoft SQL Server™ 2000 database, the new Infolect® system has been built to achieve unprecedented levels of performance, availability, and business agility. Launched in September 2005, it is maintaining the London Stock Exchange's world-leading service reliability record while reducing latency by a factor of 15. Its successful implementation, with support from Microsoft and Accenture, shows the London Stock Exchange's leadership in developing next-generation trading systems.

accenture
High performance. Delivered.

Microsoft
Windows Server 2003

Situation

The London Stock Exchange, established in 1801, is the world's premier international cash equity exchange and a leading provider of services that facilitate the raising of capital and the trading of shares for companies across the globe. The London Stock Exchange is the most international equities exchange in the world, with Europe's largest pool of liquidity.

The Main Market has 1,615 companies listed, and there are 1,579 companies quoted on AIM, the London Stock Exchange's market designed for smaller, growing companies. By the end of 2005, the market capitalisation of United Kingdom (U.K.) and international companies listed on the London Stock Exchange's markets amounted to £4.1 trillion (U.S.$9 trillion), with £5.2 trillion (U.S.$9.8 trillion) of equity business transacted over the year.

The London Stock Exchange needed a scalable, reliable, high-performance, and agile market data dissemination system. The Infolect® project is part of the London Stock Exchange Technology Road Map (TRM), a four-year transition to next-generation trading technology, due for completion in mid 2007.

The London Stock Exchange previously disseminated data through the London Market Information Link (LMIL®)—based on an HP NonStop (Tandem) environment and written in COBOL language. HP acquired Tandem when it took over Compaq. Although the architecture is extremely reliable, new developments and capacity increases are complex, time consuming, and costly to implement. The London Stock Exchange needed more flexibility to facilitate new product and service development, reduce latency, and improve scalability.

David Lester, Chief Information Officer at the London Stock Exchange, says: "A new platform was required that would be more scalable, with better performance, and be cheaper to manage, with higher capacity and equal reliability levels. The existing environment had major constraints that meant significant expenditure would be needed to give the levels of service our customers require.

"As our customers continue to use the latest technology to upscale their trading strategies, we have a strong business requirement to give them access to real-time information faster than any other exchange in the world. Infolect is, therefore, a critical component of our TRM. Through its successful implementation, we were able to demonstrate the exchange's leadership in the development of next-generation trading systems."

Delivering a step change in scalability and flexibility was not the only reason the Exchange needed support for its TRM from Microsoft and Accenture. Infolect® is designed to handle more than 15 million real-time messages every business day and is 15 times

"We selected the Microsoft .NET Framework on the basis of several technical and commercial factors, including real-time performance, agility, integration, and developer productivity."

Robin Paine, Chief Technical Officer, London Stock Exchange

faster than the technology it has replaced.

Lester says: "The investment was justified on the basis of increased performance, which makes our markets more attractive to trade on for our customers. By using commodity server hardware and a Microsoft® .NET infrastructure, it will be quicker, cheaper, and more cost effective to increase Infolect's® capacity."

Solution

Before choosing Microsoft technology, the London Stock Exchange reviewed several potential architectures to meet the requirements of Infolect® and the TRM design objectives. The Microsoft .NET Framework—an integral component of the Windows Server® 2003 operating system—was selected for a number of reasons, including developer efficiency, performance, and scalability. The Infolect® application, which went into production in September 2005, was implemented on a total of 120 HP ProLiant servers across multiple data centres. This configuration allows Infolect to process an average of 15 million real-time messages a day distributed to more than 107,000 trading screens in more than 100 countries.

In the development, roll-out, and implementation processes, Microsoft worked closely with the London Stock Exchange to ensure not only that they understood their immediate requirements, but that the solution

fitted their long-term business plans as specified in the TRM project.

Robin Paine, Chief Technical Officer at the Exchange, says: "The London Stock Exchange was looking for a responsive partner to engage across all phases of the Technology Roadmap programme. The collaborative approach Microsoft offered made it an ideal choice.

The decision by the London Stock Exchange to implement Infolect on a Microsoft architecture was a high-visibility assurance to customers of the importance placed on reliability and support. The London Stock Exchange made a considered decision to invest in a solution provided by partners able to guarantee ongoing support and an in-depth understanding of its wider business requirements.

"To meet the objectives of our Technology Roadmap Programme, the London Stock Exchange needed a technology partner who understood both our business and technology objectives and who could be accountable to deliver mission-critical components of our architecture."

A prototype, which focused mainly on the architecture and the communications layer, was first developed with Microsoft and Accenture and guided the design and development of Infolect. Developers used many of the concepts and libraries and subsequently incorporated them into Infolect.

Microsoft®

Infolect is based on a Cisco network and a customised publish-and-subscribe communications layer, iBus, written using a Microsoft development tool. Paine says: "We selected the Microsoft .NET Framework on the basis of several technical and commercial factors, including real-time performance, agility, integration, and developer productivity. An additional factor was the ability of Microsoft to comprehend the London Stock Exchange's TRM vision and provide appropriate senior executive sponsorship and support."

The Infolect architecture, with the iBus messaging layer at its core, supports an "Active-Active" configuration, with all core components replicated across multiple data centres to achieve world-class levels of availability. Infolect is also designed to be both vertically and horizontally scalable through the use of a four-tier architecture implemented on commodity hardware.

Paine says: "Infolect is designed to receive real-time information feeds from multiple sources, including the London Stock Exchange trading system. These messages are translated into a common message format and then published to a transformation layer, which enriches the messages as necessary."

By using the .NET Framework in Windows Server 2003 and the Microsoft SQL Server™ 2000 database,

Infolect has been built to achieve "unprecedented levels of performance and business agility," Paine says. It has also maintained the London Stock Exchange's world-leading service reliability record, vital in maintaining its reputation for excellent and reliable service. Other Microsoft technologies deployed at the Exchange include the Microsoft Visual Studio® .NET 2003 development system, Microsoft Operations Manager, and Microsoft ASP.NET programming technology. Paine says: "Microsoft technology has proved highly reliable for the data centres. The London Stock Exchange is currently evaluating migration to Microsoft SQL Server 2005 and Microsoft Visual Studio 2005, but no decisions have been made as yet.

However, the London Stock Exchange has found the Microsoft server software, including Windows Server, to be 'very reliable,' which has been proven in more than four years in production. In addition to the Microsoft Visual C# .NET development tool, SQL Server forms a core part of the TRM architecture. Tight integration of the Microsoft development environment and database technologies provides increased developer productivity and thus increases application agility."

Infolect went live on September 19, 2005. Paine says: "There were several major challenges during the implementation phases, as would be expected for a project of this size. The biggest was to operate a stable and

Microsoft®

uninterrupted parallel run phase prior to Infolect cutover to ensure the system would be as reliable as its predecessor, which had a 100 per cent availability record."

Benefits

London Stock Exchange customers now gain access to real-time information faster than on any other exchange in the world. The successful implementation of Infolect, with support from Microsoft and Accenture, shows the London Stock Exchange's leadership in the development of next-generation trading systems for traders worldwide.

Fifteen Times Faster for Traders than Previous System
Infolect is performing better than the LMIL system in several key areas, which is helping to ensure London Stock Exchange customers can execute trades reliably and quickly—particularly when engaged in algorithmic trading.

Indeed, many market commentators consider that algorithmically generated trading operations now hold the key to the Exchange's commercial edge and future access. End-to-end latency, an inhibitor to those real-time, algorithmically generated trades, has been significantly reduced and performance increased with Infolect. It is approximately 15 times faster than LMIL, with an end-to-end latency as low as 2 milliseconds for the Infolect system.

Lester says: "No other exchange is undertaking such an ambitious technology refresh programme based on next-generation Microsoft technology. We have always provided a first-class service, but now we can claim to be the fastest in the world as well."

Andrew King, Group Director of Financial Services at Microsoft, says: "Infolect is an important milestone project for Microsoft, as well as the London Stock Exchange's TRM. The ever-increasing demand for real time, business-critical data fluidity that underpins efficient trading has been answered by powerfully deployed, innovative, and scaleable Microsoft technology."

No Production Outages for Six Years
Reliability is fundamental to the London Stock Exchange value proposition for the market and continues to give its senior managers peace of mind about system uptime. There are approximately 300 customers who connect directly to the live Infolect system to receive real-time market data directly from the London Stock Exchange. The data disseminated from Infolect is then displayed on more than 107,000 terminals in more than 100 countries.

In the past six years, there have been no production outages at the London Stock Exchange, and the new systems running on Microsoft technologies are

Microsoft®

critical to maintaining this 100 per cent reliability record.

The London Stock Exchange has a mission critical programme in place with Microsoft, which covers ongoing support. Lester says: "Our testing regime makes us very sure Infolect will meet its targets. The level of technical failure testing was very high, and the scenarios from which we have proven resilience are extensive."

One Hundred Per Cent Reliability for Traders on High-Volume Trading Days
Infolect has three times more capacity than LMIL and has proven its resilience on some of the highest-volume trading days in London Stock Exchange history.

Infolect currently has the capacity for message dissemination of 3,500 messages a second, with an ability to scale to more than 100,000 messages per second.

This capacity and latency reduction has underpinned significant volume growth on the London Stock Exchange. Of the Exchange's 50 highest-volume trading days, 49 have happened since Infolect went live in 2005.

Additionally, high-speed, real-time price dissemination leads to greater order execution certainty, which, in turn, generates increased transaction volumes. The "virtuous circle"

concept is core to the vision driving the implementation of the TRM.

Exchange Managers Gain Cost Advantage over Competitors
In a highly competitive environment, the London Stock Exchange is gaining a considerable cost advantage over its competitors by using the .NET Framework and Visual C# .NET.

Paine says: "The TRM gives us a significant cost advantage over our competitors for global liquidity. It will help us to continue investing in new products and services while minimising technology cost of operations. "

When the TRM is completed in 2007, Paine expects running costs will reduce on a like-for-like basis and scale upgrades cost a fraction of the pre-TRM cost.

Traders to Get New Platform in Q2 2007
The final leg of the TRM, the new trading system called TradElect, will be implemented in mid 2007 using the same tried-and-tested Microsoft technologies currently deployed within Infolect. Developed over the last 18 months in the U.K. and India, the system has been delivered to London, where a team of 80 people are currently engaged in functional and technical testing.

Lester says: "Early testing already demonstrates world-leading levels of latency, performance, and scalability for order entry and execution

For More Information

For more information about Microsoft products and services, call the Microsoft Sales Information Center at (800) 426-9400. In Canada, call the Microsoft Canada Information Centre at (877) 568-2495. Customers who are deaf or hard-of-hearing can reach Microsoft text telephone (TTY/TDD) services at (800) 892-5234 in the United States or (905) 568-9641 in Canada. Outside the 50 United States and Canada, please contact your local Microsoft subsidiary. To access information using the World Wide Web, go to: www.microsoft.com

For more information about Accenture products and services, call 1 (877) 889-9009 or visit the Web site at: www.accenture.com

For more information about London Stock Exchange products and services, call +44 (0) 20 7797 1000 or visit the Web site at: www.londonstockexchange.com

services. From its rollout to customers in the second quarter of 2007, the TRM will meet our market's hunger for extra capacity and greater speed, with multi-asset class capability on the trading platform at a fifth of today's cost."

Windows Server 2003

The Windows Server 2003 family helps organizations do more with less. Now you can run your IT infrastructure more efficiently, build better applications faster, and deliver the best infrastructure for enhancing user productivity. And you can do all this faster, more securely, and at lower cost.

For more information about Windows Server 2003, please visit: www.microsoft.com/windowsserver2003

Software and Services
- Microsoft Server Product Portfolio
  – Windows Server 2003
  – Microsoft Operations Manager
  – Microsoft SQL Server 2000
  – Microsoft SQL Server 2005
- Microsoft Visual Studio
  – Microsoft Visual C# .NET
  – Microsoft Visual Studio .NET 2003
  – Microsoft Visual Studio 2005
- Technologies
  – Microsoft .NET Framework

Partners
- Accenture

Microsoft®