

## **London Stock Exchange PC-Trading System Down for a Day**

October 2008

On Monday, September 8, 2008, the London Stock Exchange (LSE) – the third largest stock exchange in the world – crashed for most of the day. Hundreds of millions of pounds in lost commission revenue resulted on what turned out to be one of the most hectic trading days of the year.

The LSE had recently moved its trading system from Tandem fault-tolerant computers (now HP NonStop) to a massive distributed PC-based system called TradElect. Was the crash a failure in the new PC network? Was it due to trading volume? Was it an upgrade gone wrong? Was it caused by a network failure? Who knows because the Exchange remains silent on the cause.

### **The London Stock Exchange**

The London Stock Exchange is one of the world's oldest stock exchanges and can trace its history back more than 300 years to 1698. Starting life in the coffee houses of 17th century London, the Exchange quickly grew to become one of London's most important financial institutions.

### **The Outage**

September 8th promised to be one of the most active days in trading history. The U.S. government had just announced a \$200 million bailout plan for its secondary mortgage giants, Fannie Mae and Freddie Mac.<sup>1</sup> The traders on the London Stock Exchange were ready for a very busy day and perhaps for historic commissions.

The market opened on time at 7 AM, but at 9:15 AM the LSE's TradElect trading system crashed. Trading was brought to a halt. Enraged traders were locked out of the global share-buying frenzy triggered by the bailout.

The LSE was able to bring up the system in auction mode by 11:15, but this only allowed brokers to enter trades. Trades could not be executed. It wasn't until 4 PM that afternoon that trading was restored, giving only a half-hour for traders to close out the day. The Exchange had been down for almost seven hours on a day that had promised to be one of the busiest and most lucrative days of the year.

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<sup>1</sup> Fannie Mae is the Federal National Mortgage Association (FNMA). Freddie Mac is the Federal Home Loan Mortgage Corporation (FHLMC). These companies were established by the U.S. government to create a strong secondary mortgage market. By purchasing and securitizing mortgages, these firms facilitate liquidity in the primary mortgage market by ensuring that funds are consistently available to the institutions that lend money to home buyers.

Traders estimated that lost commissions would average about £700,000 per firm, giving an overall loss measured in the millions of pounds.

This was the worst outage suffered by the LSE in eight years. The last significant outage was on April 5, 2000, the last day of the tax year in the U.K., when the trading system failed and closed the Exchange for eight hours. This outage was due to connectivity problems with the London Market Information Link.

Coincidentally, the recent September 8th outage coincided with an outage of the Intercontinental Exchange (ICE), which shut down the London commodity markets for an hour. There was, however, no link between these outages.

The damage was not limited to the London Stock Exchange. The LSE is aggressively marketing their TradElect trading system to other exchanges around the world. The Johannesburg Stock Exchange now uses TradElect, and it was similarly affected. The JSE boasts on its web site that the system has been designed to have no single point of failure.

## **The TradElect Trading System**

TradElect is a 15-month-old proprietary trading system that was launched in June, 2007. It is a massive distributed system employing over 100 HP ProLiant PCs in several locations in London. It was developed at a cost of £40 million over a four-year period for the LSE as a joint effort by Microsoft and Accenture. It is based on Windows Server 2003, SQL Server 2000, and Microsoft's .NET framework. Applications are written in C#.

TradElect had several design goals, predominant among which were significantly increased speed and capacity over the old LSE system. So far as speed is concerned, trade execution times were reduced from 140 milliseconds to ten milliseconds.

Capacity was increased by five-fold; and at the time of the system's installation, it was claimed that TradElect could handle the entire trading volume of all European equities. Furthermore, capacity could be further doubled for an additional cost that was only 20% of the system's original cost.

Another design goal was extreme reliability. Microsoft claimed that the system had "100% reliability." Dual processing sites were configured, and the system could recover from any component failure within a second. It is reported that the LSE offers a five-9s SLA (Service Level Agreement).<sup>2</sup> Unfortunately, this outage shoots the SLA for the next 84 years.

The successful launch of TradElect in 2007 followed the inauguration of the Exchange's Infolect system in October, 2005. Infolect is a market data-reporting system that can deliver the current price for any equity within two milliseconds. It broadcasts 20 million messages per day to 100,000 terminals in 100 countries. Infolect is also a massive distributed PC system using HP ProLiant computers with Microsoft SQL Server and the .Net framework.

## **What Went Wrong?**

What exactly caused the outage has never been divulged by the London Stock Exchange, at least so far as the Availability Digest knows. There have been several early statements from the Exchange and several conjectures from industry pundits. But no cause has been confirmed.

Most conjecture has focused on the possibility of a network problem. Others thought that it might have been caused by the massive volume of trades that day. Still others suspected a software

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<sup>2</sup> Five 9s is five minutes of downtime per year.

problem in the TradElect system or a problem with an upgrade. Many asked the question “Why was there no backup system that could take over?”

On September 9th, the Wall Street Journal reported that the previous day’s outage was caused by the proprietary platform from Microsoft.

One source close to the Exchange was reported as having said that it was an upgrade that had gone wrong.

The Financial Times noted that the problems were thought to have occurred on the trading gateway between the LSE’s Extranex private network (linking the exchange and its clients) and the TradElect trading platform. The gateway is implemented with Cisco equipment. Cisco had no comment.

Computerworld UK claimed that the Exchange had confirmed that a network software problem caused the outage. An LSE spokesperson told Computerworld UK that an undisclosed “fix” had been applied to the software and that the LSE was confident the systems would now function properly.

An LSE spokesperson told Reuters UK that “It was software-related, a coincidence, due to two processes we couldn’t have foreseen. We’ve introduced a fix and we’re confident it will not happen again.” The spokesperson emphasized that the outage was not due to high volumes. “That’s a red herring. We were able to eliminate that pretty quickly.”

Whatever the problem was, it has not been publicly disclosed by the Exchange. However, the preponderance of public opinion is that the problem was a software problem in the network connecting the traders to the TradElect trading platform.

## **Lessons Learned**

This problem was a huge embarrassment for the LSE. It could not have happened at a worse time. It came only days after the introduction of the European Union’s “Markets in Financial Instruments Directive” that opened up trading competition beyond traditional exchanges. The LSE is now facing intense competition from new entrants offering trading platforms backed by banks and other exchanges. Competition includes Chi-X, Turquoise, the Nasdaq OMX, and NYSE Euronext – a consortium of the New York Stock Exchange, the Paris Bourse, and other European exchanges.

Ironically, in a letter published the very morning of the outage, LSE chief executive Dame Clara Furse dismissed the challenge of the Exchange’s competitors, describing the LSE’s technology as “cutting-edge.”

What can we learn from this disaster? Not much since the Exchange has divulged little information concerning what went wrong.

But what we can say is that the London Stock Exchange has not learned the lesson that so many other large enterprises have following their own outages, as our Never Again stories continue to show. Those that communicated frequently and honestly with their clients found patience and support. Those that were noncommunicative suffered the wrath of their clients. Some of these companies learned from this experience and have since significantly improved their communication skills. Others have yet to learn this lesson. It appears that the London Stock Exchange has a way to go.

## Acknowledgements

Material for this article was obtained from the following sources:

Financial Times	Computerworld UK
Reuters UK	Computer Weekly
CNET News	The Irish Times
Times Online	Windows in Financial Services
Simple-Talk	Onwindows
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