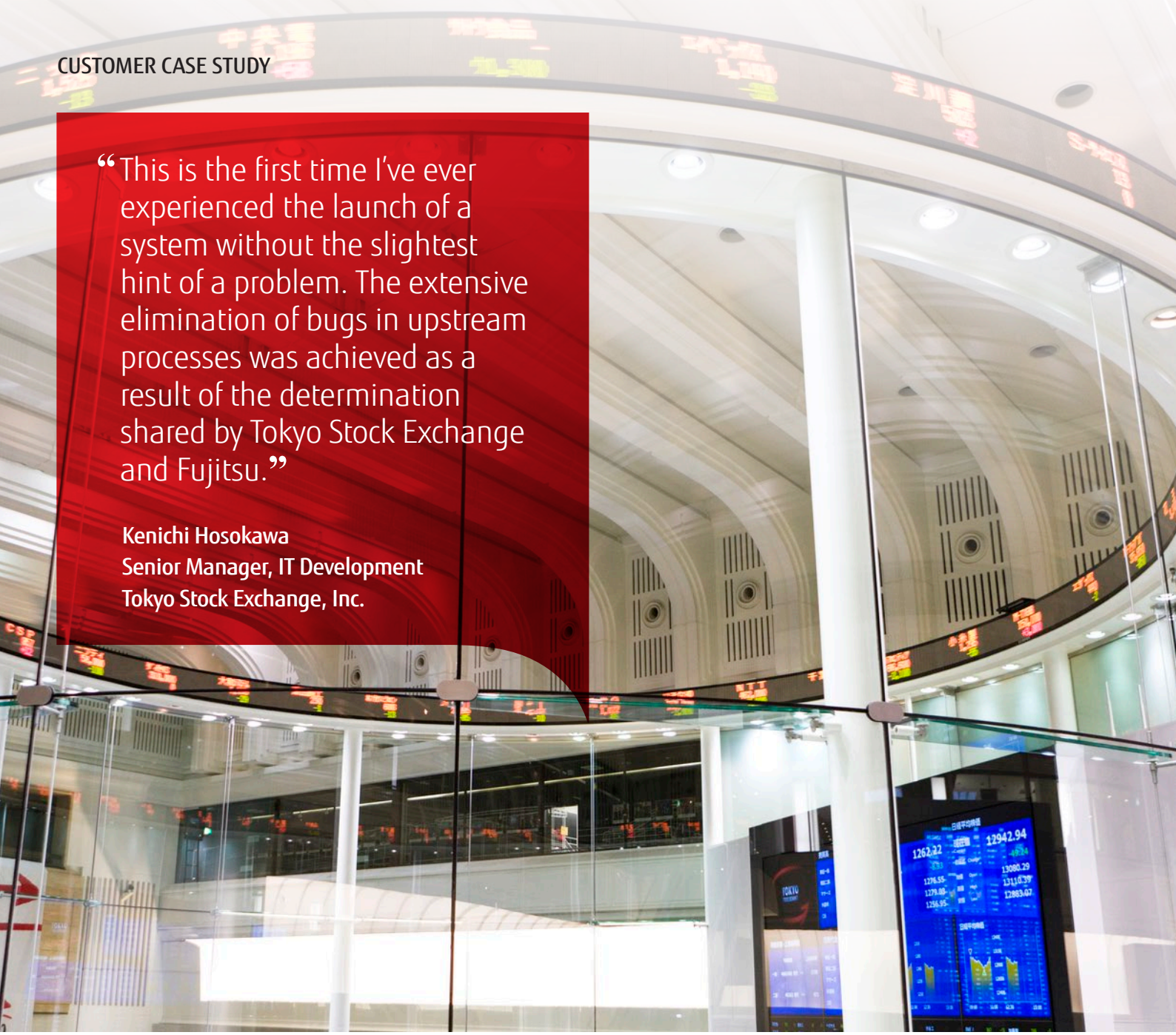
CUSTOMER CASE STUDY



> "This is the first time I've ever experienced the launch of a system without the slightest hint of a problem. The extensive elimination of bugs in upstream processes was achieved as a result of the determination shared by Tokyo Stock Exchange and Fujitsu."

Kenichi Hosokawa
Senior Manager, IT Development
Tokyo Stock Exchange, Inc.

Tokyo Stock Exchange, Inc. upgrades cash market trading platform 'arrowhead' in the quest for world-class reliability with Fujitsu.

At a glance

Country: Japan
Industry: Finance
Founded: 1949
Employees: 429 (as of March 31, 2015)
Website: www.jpx.co.jp/english/

Challenge

Embarked on a plan to revamp the existing 'arrowhead' cash market trading system to increase order processing speeds and ensure stability and security of the increasing number of orders.

Solution

Conducted a review of the arrowhead platform, including its hardware, software and processing logic. Deployed approximately 200 FUJITSU Server PRIMERGY units and the FUJITSU Software Primesoft Server to enable high reliability and high speed.

Benefit

- The system processes over 100 million orders per day, and at peak times receives as many as 1.4 million orders per minute
- 90 percent reduction in the number of bugs found in downstream processes
- Delivers high speed and reliability
- Achieved a processing speed of 300 microseconds, three times faster than the old system

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Customer

Tokyo Stock Exchange, Inc. (TSE) is one of the world's top bourses, and it lists around 3,800 brands, including local and overseas equities, ETFs, and REITs. Daily trading value exceeds three trillion yen. The cash market trading system supporting such high transaction volumes is known as 'arrowhead'. Developed together with Fujitsu under the slogan Challenge "10" msec, arrowhead sought to achieve a response time per order of less than 10 milliseconds, but ultimately achieved two milliseconds.

Products and services

- 200 x FUJITSU Server PRIMERGY
- FUJITSU Software Primesoft Server

Challenge

Having achieved this performance, five times faster than the original target, the system was launched in January 2010 and was then continuously enhanced to reach one millisecond response time. Among the stock exchanges around the world competing to outdo each other in terms of order processing speeds, this performance placed arrowhead among the world's most advanced securities trading systems and TSE went on to play a key role in the global economy.

In addition to its order processing speed, arrowhead also had a proud track record in terms of its system security. However, TSE embarked on a plan to revamp the system in December 2012. In explaining the reasons for taking the bold step of overhauling the system a mere three years after it went into production, Kenichi Hosokawa, Senior Manager, IT Development of Tokyo Stock Exchange says, "It is important to continue our quest for transaction stability because the concentration of orders in a short period of time has now increased to a point where it far exceeds previous figures. At the same time, there is now a much greater need to ensure reliability and security."

Behind this move was the increasingly frequent occurrence of 'incidents' overseas that could jeopardize healthy trading in the market. For example, in August 2012, an unusual trading activity saw the price of more than 100 stocks swing sharply on the New York Stock Exchange (NYSE). The cause was a coding error in a program used by a major securities firm for the purpose of automatically entering trading orders via algorithmic trading. A massive number of erroneous orders were routed in quick succession to the NYSE, causing severe disruption to trading. This incident highlights the risks associated with stock market and trading systems that process orders in times of less than one hundredth of a second. TSE must also keep in mind that they could encounter this kind of incident.

Solution

With speed improvement an ongoing prerequisite, and stock exchange reliability and security flagged as the main priorities of the upgrade project, the TSE conducted a sweeping review of the arrowhead platform, including its hardware, software and processing logic.

The hardware deploys IA servers powered by the latest high-performance processors, a farm of approximately 200 FUJITSU Server PRIMERGY units. FUJITSU Software Primesoft Server enables both high reliability and high speed IA server infrastructure. According to Mr. Kenichi Hosokawa, "Building the infrastructure based on a combination of high-performance IA servers and software that delivers high reliability enables both speed and reliability." The system achieved a processing speed of 300 microseconds, three times faster than the old system, as well as further improvement in reliability. It is possible to stop a server that has failed and isolate it from the rest of the system, thereby allowing another server to take over processing without data loss.

TSE also added a new processing logic in anticipation of erroneous orders and other factors. In the event that a program of a particular securities firm was to cause erroneous orders, the orders from that firm could be suspended according to a configuration set by that firm while processed orders can be canceled automatically. This logic is designed to prevent a widespread impact on the market.

Benefit

There have been no major glitches in the new arrowhead system since its launch in September 2015. On days with high volumes of transactions, the system processes over 100 million orders per day, and at peak times receives as many as 1.4 million orders per minute. The secret to ensuring quality lies in the way the project was handled.

When the policy to eliminate bugs during the upstream processes of the project was announced, the responsibilities were clarified as: "Requirements definition - TSE"; "Design - Fujitsu". Each and every one of the 80 TSE staff and 300 Fujitsu engineers engaged diligently in the elimination of bugs in the upstream processes. This saw a 90 percent reduction in the number of bugs found in the downstream processes as compared with the previous project, allowing the new arrowhead platform to be launched after sufficient testing. Mr. Kenichi Hosokawa praised the performance of all project members by saying: "This is the first time I've ever experienced a system launch that has been totally free of problems."

TSE intends to build advanced intelligence into arrowhead, enhancing it with innovations such as AI-based functionality and big data technologies.

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