Equity Trading System Reengineering

Client Overview

The client is the world's leading provider of financial services to institutional investors. With $15.3 trillion in assets under custody and $1.9 trillion under management the client operates in 26 countries and more than 100 geographic markets worldwide. Its broad and integrated range of services spans the entire investment spectrum, including research, investment management, trading services and investment servicing. In all of the markets that the client serves, it ranks among the top world wide service providers.

Business Drivers

The equity trading system is an electronic equity order routing network that provides institutional investors with direct access to global liquidity sources and is of great business value for the client. However, since the equity trading system was developed in the mid 1980s, its performance couldn't meet the new boom business requirements due to outdated architecture and weak platform support. Therefore, the reengineering project was kicked off in 2001 to restructure the equity trading system to meet the client's business growth.

Project Challenges

The equity trading system reengineering project has the following challenges:

- **Outdated Technology**: since the legacy system was developed 20 years ago, the technology was too outdated to meet the new business requirements.
- **Weak Platform Support**: The platform was outdated, and the vendor couldn't offer strong hardware/software support.
- **Unreliable Document**: Critical production issues occurred frequently, but issue analysis was difficult due to scrapped documents and messed-up code logic.
- **Unstructured Architecture**: The architecture had been disordered from long time maintenance.
- **Single-Thread Model**: Low CPU utilization could not promise high performance.
- **Standalone Model**: The standalone system was not good at high availability and horizontal scalability.

Solution/Methodology

Fifteen Hengtian developers were involved in this project in an offshore outsourced mode. The reengineering project aimed to move the legacy system into a modern platform and to use a componentized architecture with parallel computing technology.Hengtian project team developed a new Spiral Reengineering model for the projet..

The Model, which is favoured for large scale and complicated legacy system, could help get better budget control, quicker respond to requirement changes, and minimized risks through multi-prototypes and user confirmations.

Benefits

As a result of this reengineering project, about 30% of the original system was retained, mostly the interface components for the surrounding applications, while the core engine was 100% re-engineered. The reengineered system has the following advantages:

- Enhanced scalability (dealing with 600% more transactions).
- Improved system performance (500% faster).
- Greater extensibility, meaning it has the flexibility to cope with future regulatory changes more easily. Typically, there is a new release every quarter with new business features or enhanced functions.
- The trading volume reached 100 million shares daily in 2005, 400% more than before.

The Voice of the Customer

“The system is now in production with four times the previous volume and it took less than six months" -- The client’s CIO Joseph C. Antonellis described the success of this project (from “An IT Flower Blooms in China”, CIO Magazine).

“Labor savings have been significant (approximately 25% of the cost for U.S.-based staff), but savings through revamped legacy applications have been even greater, avoiding expensive replacements. Re-engineering has been achieved for less than 2% of the cost of system replacement and has saved millions of dollars.” -- From “Case Study: State Street Corp. Takes a Chinese Road to Supercharged Applications”, Gartner.

References

1 “An IT Flower Blooms in China”, Aug. 15, 2003 Issue of CIO Magazine.

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3 “Business Rules Extraction from Large Legacy Systems”, in the proceedings of the 8th IEEE European Conference on Software Maintenance and Reengineering (CSMR’04), Tampere, Finland, March 24 - 26, 2004. pp 249-258.

4 “Reengineering standalone C++ legacy systems into the J2EE partition distributed environment”, in the Proceedings of International Conference on Software Engineering (ICSE '06), 2006, pp 525-533.