

Study Of Soochow Securities Co., Ltd Digital Intelligence Transformation -- Observations Based on Trading and Operational Systems

Peiyin Lyu^{1,*}, Yilin Tian² and Zhenpeng Wu³

¹ School of Management, Lanzhou University, 730000 Lanzhou, China

² School of Economics and Management, Southwest Petroleum University, 610500 Nanchong, China

³ Department of International College, Nanjing Audit University, 211815 Nanjing, China

* Corresponding Author Email: lvy2021@lzu.edu.cn

Abstract. This article takes Soochow Securities Co., Ltd as an example to explore the practice and innovation of digitalization in financial management. Through the research on topics such as data mart and Tencent Cloud distributed database TDSQL, the application and effect of these technologies in financial management are analyzed. The study found that Soochow Securities Co., Ltd realized centralized storage and efficient query of financial data by building a data mart, which improved the efficiency and accuracy of data processing. At the same time, using Tencent Cloud distributed database TDSQL, Soochow Securities Co., Ltd ensured the security and stability of financial data, providing reliable data support for the company's decision-making. Through in-depth research on Soochow Securities Co., Ltd, this article aims to provide other financial enterprises with referenceable experience in digitalization of financial management, and provide empirical evidence and theoretical reference to promote the digital transformation process of the financial industry.

Keywords: Soochow Securities Co., Ltd; digitalization of financial management; data mart; Tencent Cloud; TDSQL.

1. Introduction

With the increasingly fierce competition in the securities industry and the continuous development of financial technology, securities companies are constantly promoting digital and intelligent transformation, and striving to achieve their own high-quality development. In the field of financial management, the use of digital technology is particularly important. The traditional financial management model has been difficult to meet the complex needs of modern enterprises, and financial management digitization can not only improve the efficiency and accuracy of data processing, but also provide strong support for enterprise decision-making.

In recent years, with the wide application of big data, cloud computing and other technologies, the digital process of financial management has been accelerating. As an important part of big data applications, the data mart provides efficient data integration and query capabilities for enterprises, enabling financial managers to obtain the required information more quickly. At the same time, the popularity of cloud computing technologies such as Tencent cloud database provides a more secure and stable environment for data storage and processing of financial management.

Soochow Securities Co., Ltd. (stock code is 601555) was listed on the Shanghai Stock Exchange in 2011. It is mainly engaged in securities brokerage and margin trading business, providing financial services for individuals and institutions. Soochow Securities has been rated as a Class A securities company by the China Securities Regulatory Commission for many years and has a good reputation and a high level of compliance in the industry. As a leading securities company in China, the practice and innovation of Soochow Securities in the digitization of financial management are particularly concerned. The enterprise actively embraces digital transformation and uses advanced technologies such as data mart and Tencent cloud distributed database TDSQL to continuously improve the intelligent level of financial management, which provides a strong guarantee for the steady

development of the company. This report will study the digital intelligence scheme and effectiveness of Soochow Securities in the trading system and operation system and provide empirical evidence for the digital intelligence transformation of securities companies.

The main reasons for choosing Soochow Securities as a research case are as follows : First of all, Soochow Securities has achieved remarkable results in the digitization of financial management, and its successful experience has high reference significance for other enterprises ; secondly, the application of advanced technology in Soochow Securities is more extensive and in-depth, especially in the application of data mart and Tencent cloud distributed database TDSQL, which provides rich materials and cases for the research. Finally, as a representative of the securities industry, Soochow Securities ' practice of financial management digitization also has a certain demonstration and leading role for the entire financial industry.

2. Trading system: Soochow Securities Joins hands with Tencent Cloud TDSQL to Build a Distributed Database

Soochow Securities Co., Ltd has partnered with Tencent Cloud TDSQL to build a distributed database. Securities trading has a real-time impact on user profits and losses, and fluctuations in market conditions often cause unpredictable transaction concurrency. Therefore, the core trading system has extremely stringent requirements for the underlying database that stores key data such as customer information, transaction records, and transaction flow, in terms of reliability, consistency, performance, and operational quality.

In the traditional model, the core transaction system database of securities companies is mainly based on foreign commercial databases. Traditional centralized storage has many drawbacks, such as high space costs, subsequent need for expansion and upgrading, etc. In recent years, in order to ensure the security of financial information technology, financial institutions have begun to promote the application of autonomous and controllable technologies on their core systems, and the database of the core transaction system is the top priority [1].

Soochow Securities Co., Ltd began exploring the deployment of virtualization in 2013. In 2015, the company began the OpenStack project; in early 2017, the company stored cloud platform data on commercial distributed storage; in 2019, Soochow Securities Co., Ltd launched the introduction of container cloud platform [1]. After years of updates and iterations, Soochow Securities Co., Ltd gradually introduced suitable commercial distributed storage solutions. In 2021, Soochow Securities Co., Ltd partnered with Tencent Cloud to build a distributed database.

2.1. Introduction to TDSQL

TDSQL is a distributed database built by Tencent cloud for the financial industry. At present, it has covered many fields such as banking and securities. TDSQL has powerful functions: for example, through the active/standby deployment mode, TDSQLagent, scheduler and other modules, it can ensure the storage and recovery of data, and achieve complete autonomy, controllability and strong data consistency; The red rabbit management platform is used to realize monitoring data collection, alarm, daily operation and maintenance, etc. [2] These features provide a strong guarantee for TDSQL to meet the requirements of high availability, high reliability and operation and maintenance of the database in the financial business scenario [3].

2.2. Business Peak Guard: Distributed Architecture and Elastic Scaling Strategy of TDSQL

As shown in Figure 1, TDSQL effectively solves the system performance bottleneck problem faced by Soochow Securities Co., Ltd during the peak period of business through its distributed architecture and elastic scalability, and realizes the association and connection with Soochow Securities Co., Ltd ' data center system, and solves the difficult technical problems such as environmental adaptation, system compatible operation and data collection in heterogeneous environments.

The distributed architecture of TDSQL achieves data parallel processing and load balancing by distributing data to multiple independent database nodes. The peak period of Soochow Securities Co., Ltd business is often accompanied by a large number of transaction requests and data processing requirements. The traditional single database architecture is difficult to meet this high concurrency requirement. The distributed architecture of TDSQL can distribute requests to multiple nodes, which improves the processing capacity of the whole system and effectively alleviates the system performance bottleneck [4].

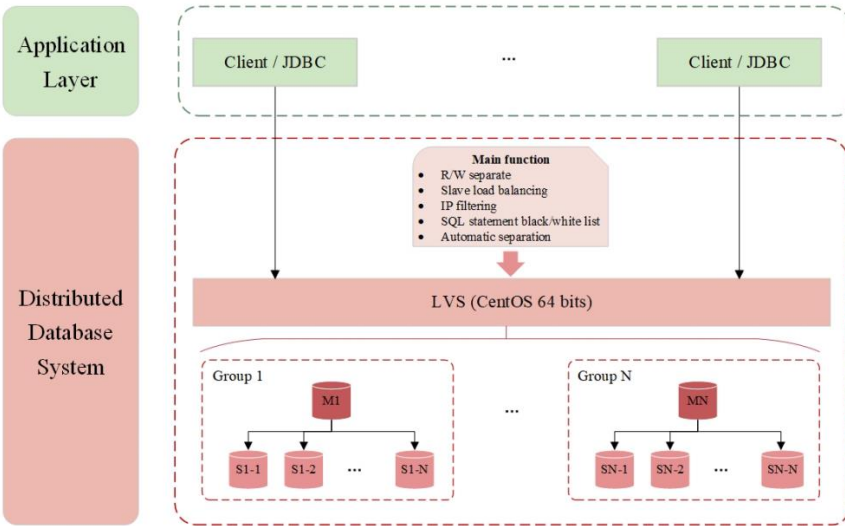


Figure 1. Distributed architecture of TDSQL (Picture Credit: Original)

Secondly, the flexibility of TDSQL allows it to dynamically increase or decrease database nodes according to the actual business load, so as to achieve flexible scheduling of system resources (see Figure 2). For example, the amount of data and transaction requests during the peak period of business often show explosive growth. If the system cannot expand resources in time, it will lead to performance degradation or even downtime. The elastic scalability of TDSQL can ensure that when the system load increases, nodes are automatically added to share the load, so as to maintain the stability and high performance of the system [5].

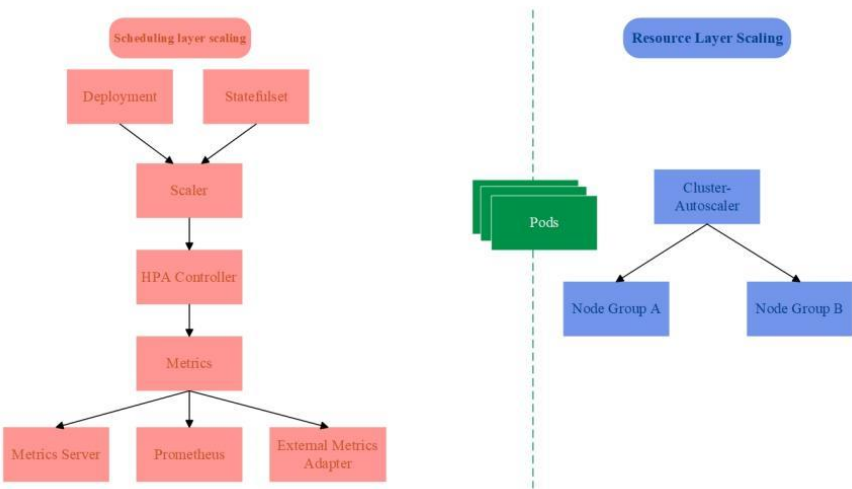


Figure 2. Elastic scalability of TDSQL (Picture Credit: Original)

2.3. Innovation Effect: Performance Leap and Efficient Compatibility Realization

According to the data, based on the collaborative optimization of Tencent cloud TDSQL and the system developer zenith software, the overall concurrent processing capacity of Soochow Securities Co., Ltd ' new system has increased by 10 times compared with the previous one. The concurrency of single node business has increased to at least 100000 transactions per second, and the average transaction delay has also increased from the original 10 milliseconds to less than 1 millisecond, and it can support tens of millions of transaction orders. After the system goes online, the database load will remain below 10% during the peak period, which can effectively meet the business growth needs of Soochow Securities Co., Ltd in the next three to five years [6].

In the process of system construction, the application code of the core system of vertex software reflects good compatibility on Tencent cloud TDSQL, reduces the complexity of adaptation and transformation, and provides more time for the verification of architecture design, business functions and performance. Among them, Tencent cloud TDSQL also completed scene verification at the minute level in the key scenarios of core systems such as playing and commissioning, with the setting of tens of millions of users.

As early as 2021, Soochow Securities cooperated with Tencent cloud to successfully pilot the application of Tencent cloud TDSQL in the new generation of core trading system of Soochow Securities Co., Ltd , steadily carrying more than 160000 customers' real offer transactions, with an average daily trading volume of nearly 100 million yuan and the maximum number of entrusted transactions of nearly 100000, realizing the first implementation of the national database in the core system of the securities industry. In 2021, the net profit of Soochow Securities reached 2.412 billion, a significant year-on-year increase of 40.78% compared with 1.714 billion in 2020. The fully independent innovation core trading system, which will be cooperated again in 2023, is a further step on the basis of the preliminary water test. Through the full system TDSQL replacement, it will finally achieve a comprehensive breakthrough and technological change in the independent innovation of the production of the core trading system, marking the implementation of the industry's first independent innovation construction of the securities core trading system and its official and comprehensive launch.

3. Operation system: Soochow Securities Joint Sail Soft Construction Data Mart

With the rapid development of business showing explosive growth, the traditional data system and support methods have been difficult to adapt to the complex business needs. Soochow Securities has the following problems in data operation: data dispersion, high complexity of data processing, data security and hidden risks.

The digital operation support system architecture of Soochow Securities is divided into four parts: 'thin front desk', 'thick middle desk', 'strong base' and 'data source'. Among them, the data mart is an important part of the " thick middle platform, " which helps to connect the data islands within the enterprise (see Figure 3).

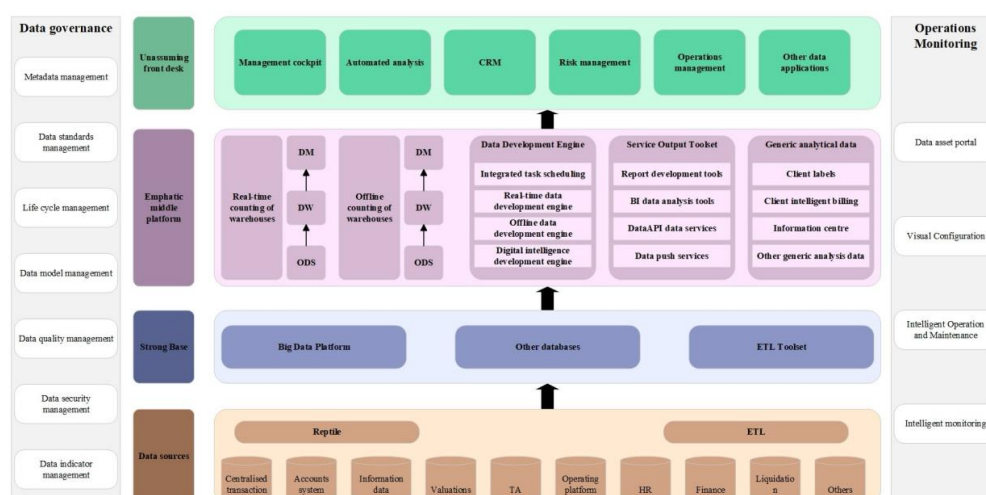


Figure 3. Digital Operation Support System Architecture (Picture Credit: Original)

3.1. Operation Support System: Data Mart Solution of Soochow Securities

Starting from the needs of data processing, the data mart builds a separate application data mart with the help of data governance tools. The data mart of Soochow Securities ensures that the requirements of data integrity, timeliness, accuracy and consistency are met, and professional and efficient services are provided for various systems. The architecture of the whole data mart combines the actual situation of Soochow Securities data, refers to the market technology hot spots and the construction of the same industry, follows the principle of on-demand construction and benign evolution, and carries out unified planning and construction according to the future development needs [7].

In the construction of the data mart, the company makes full use of the tools and systems, the front business department and the background digital support department technical personnel reasonable division of labor, close cooperation. The digital support department mainly provides data-based platform and tool development support, data governance landing research and development, construction of data mart, and use of reporting tools to develop fixed data reports; the business department uses BI tools to analyze data on the basis of its own data mart [8].

Relying on the data mart, Soochow Securities has explored ways to clean, organize, transform, integrate, and visualize basic data, which has greatly improved the efficiency of data operations [9]. The data mart of Soochow Securities is based on the theme construction, mainly including brokerage data mart, risk data mart, credit risk mart, compliance mart, financial mart and so on. Among them, the brokerage business data mart is based on the four elements of the brokerage customer service process, designed as customer theme, product theme, team theme and channel theme. Risk data mart is a data mart with risk as the theme, covering comprehensive business, various risks and risk measurement indicators. The risk management department can manage the same customer with the help of the market, and query and display multi-dimensional data [10,11]. The credit risk bazaar is combined with the management cockpit to unify the reporting caliber and optimize the reporting work, thereby reducing the workload of credit business personnel [8]. The credit business personnel department can quickly complete the operation of some reports by clicking on the relevant function menu.

3.2. Innovation results: digital productivity transformation and operational efficiency upgrading

With the help of soft products, Soochow Securities has achieved the following achievements:

(1) Improve the company's big data platform, improve the quality of business processing and the timeliness of reports: The construction of the data mart has saved the workload of 3 person days per

month and converted the data into digital operational productivity. At present, the data is centralized and provides more than 80 API services for more than 6 application systems, providing more than 800,000 daily calls at the highest time [11].

(2) Improve the overall data quality: With the help of the FineReport, Soochow Securities has done a lot of data governance work in the early stage, sorted out the metadata of the company's main 80+ sets of systems, combined with various business departments, sorted out and issued 1200+ data indicators, sorted out 100+ data quality verification rules and carried out data quality verification, which laid a foundation for the construction of subsequent data systems and data applications.

(3) Unified data center service: Centralize the data and provide standard unified data services. At present, it has provided 80+ API services for 6+ application systems, with a maximum of more than 800,000 daily calls.

(4) Emancipating manpower to release data value: Through the efficient use of tools, the efficiency of data department personnel is improved by more than 50 %, and more energy is used for deep mining of data.

(5) Effectively reach users with data results: under the support of excellent data rendering ability of sail soft products and rich and colorful data expression forms, the daily average traffic of management cockpit applications such as mobile war room and business display large screen reaches 4500 times, the monthly use report is more than 500, and the monthly active users are close to 400, so as to become an effective channel for data work results to reach customers, management and employees.

4. Conclusion

Soochow Securities joins hands with Tencent Cloud and FineReport for digital intelligence transformation and realized the comprehensive upgrading of the trading system and operation system. On the trading system, TDSQL's distributed architecture and elastic scalability significantly improved the system's performance and flexibly responded to business peaks. In addition, the good compatibility of vertex software application code and TDSQL simplifies the adaptation process, improves the verification efficiency, and provides solid technical support for the digital intelligence transformation of Soochow Securities Co., Ltd. In the operation system, Soochow Securities Co., Ltd built a data mart as a "thick platform" in the transformation of digital intelligence to effectively solve the problem of data island, ensure data quality and provide efficient services for various systems.

These measures not only improve the company's business processing ability and data application ability, but also provide a useful reference for the digital intelligence transformation of the securities industry. With the continuous development of science and technology, Soochow Securities Co., Ltd will continue to deepen the transformation of digital intelligence, provide investors with more efficient and convenient services, improve the productivity of the company and promote the high-quality development of the company.

Authors Contribution

All the authors contributed equally, and their names were listed in alphabetical order.

References

- [1] Hua Renjie. The road of enterprise storage transformation of Soochow Securities [J]. Financial electronization, 2020, (11): 66-67.
- [2] CSDN.Tencent financial-grade distributed database solution. (2022-04-30) [2024-03-15]. Retrieved from: https://blog.csdn.net/nalnait/category_579172.html
- [3] Hu Liming. The application and prospect of distributed database in the financial industry [J]. The era of financial technology, 2020, (05): 25-33.

- [4] nalnait (CSDN). Architecture and Application of Tencent Financial Database TDSQL. (2019-02-01) [2024-03-15]. Retrieved from: <https://blog.csdn.net/linuxheik/article/details/52819426>
- [5] Chen Zhi.Independent innovation of the core trading system of securities firms started the key technology of financial institutions to 'move forward' [N]. 21st Century Economic Report, 2023-11-07 (008).
- [6] Tencent Cloud Developer Community. Tencent Cloud TDSQL helps Soochow Securities release the industry 's first fully independent innovation core trading system, with a performance improvement of 10 times. (2023-11-05) [2024-03-15]
- [7] Fang Xing, Zeng Wei, Yang Yiming and so on. Design ideas and exploration of data mart for the securities industry [J]. China Financial Computer, 2023, (11): 65-69.
- [8] The sail is soft. Soochow Securities Co., Ltd: data management enabling operation, independent development and cost reduction of 1.5 million yuan. 2019, 2024.3.19. Retrieved from: <https://www.fanruan.com/cases/view?cid=67>
- [9] Wang Jun, Shan Shulan, Zhang Wenjun, etc. Application of data mart in financial information management and control project [J]. State-owned enterprise management, 2018, (03): 80-85.
- [10] Soft sail. Soochow Securities Co., Ltd: release data value, innovative construction of digital operation support system. 2022.2024.3.19. Retrieved from: <https://www.fanruan.com/cases/view?cid=397>
- [11] Soft sail. Soochow Securities Co., Ltd: data governance + data mart, self-help analysis to use the data! (2020) [2024-3-19]. Retrieved from: <https://www.fanruan.com/cases/view?cid=174>