Sm@rtOneBank

Integrated Banking Solution White Paper

CONTENTS

List of figures

Preface

In today's rapidly evolving financial landscape, traditional core banking systems are increasingly unable to meet the demands for agility, scalability, and resilience. This white paper briefly introduces Digital China Information Services Group Co., Ltd. [hereinafter referred to as "DCITS"] advanced one-stop banking overall solution Sm@rtOneBank. The solution uses microservices and distributed technologies, combines the latest achievements of open banking and digital transformation in the financial industry, and is based on the advanced concepts and best practices of DCITS in the field of international finance. The primary objectives of the integrated banking solution encompass three key aspects:

- **With the goal of business innovation, help banks achieve digital transformation:**

  The banking solution adopts an open banking perspective, centered on clients, with financial services and products as its foundation. It aims to facilitate commercial banks' business innovation and digital transformation, targeting digital operations and management, and adapting to the rapid development and changes in future businesses and markets.

- **Aiming at architectural transformation and realizing core banking cloud-migration:**

  In line with the latest global technology trends, the solution employs microservices, distributed technologies, and advanced design concepts such as standardization, componentization, and parameterization. It is tailored for the transformation of bank IT architectures, focusing on cost-effective engineering practices, and is designed to be a future-proof banking transaction processing system.

- **Quickly build an integrated system capability, and comprehensively upgrade the scientific and technological strength:**

  Boasting scalability and flexibility in its design, the solution caters to banks of all sizes and types.It ensures that banks can maintain streamlined and efficient operational infrastructure while quickly adapting to changes as their business grows. By adopting this "all-in-one" solution, banks can focus on delivering exceptional client service and innovation, confident in the robustness and future-readiness of their technological infrastructure.

The digital transformation of commercial banks is a protracted journey, with the achievement of agile, intelligent, resilient, and secure architectures for bank infrastructure and business systems being the most crucial milestones. The transition to cloud-native and digital-native IT architectures represents a pivotal step in the future development of banking systems. We aspire for the integrated banking solution to provide a "All in One" and "Out-of-the-Box" experience to a broader range of overseas clients and financial institutions.

Transformation and Upgrading Trends in the Financial Industry

With the rapid changes in global financial markets and the soaring development of technology, traditional banking is confronting unprecedented challenges and opportunities. Digitization and intelligence have emerged as key drivers for the transformation and upgrading of the banking sector.

Transformation and Upgrading of the Financial Industry and China’s experience

Digital Transformation Places New Demands on Financial Business Systems

Currently, the digital economy has become a critical choice for countries to accelerate socio-economic transformation. Nations are accelerating the introduction and implementation of digital economy development strategies and policies, further promoting the development of the digital economy. China has released the "Overall Layout Plan for the Construction of Digital China," which will further consolidate the foundation for building Digital China from a top-level design and strengthen its key capabilities. The UK has unveiled a new "UK Digital Strategy," focusing on six key areas: improving digital infrastructure, developing creativity and intellectual property, enhancing digital skills and talent development, facilitating financing channels, improving economic and social service capabilities, and elevating international status, to make the UK's digital economy more resilient, competitive, and innovative. Australia has published the "Digital Economy Strategy Update 2022," outlining a framework and direction to achieve its 2030 vision. Germany has updated its "Digital Strategy 2025," covering digital skills, infrastructure and equipment, innovation and digital transformation, and talent cultivation, to further enhance Germany's digital development capabilities.

In today's era of "constant change and continuous innovation," the impact of change and innovation on banking information technology cannot be overlooked. Over the past 30 years, with the rapid development of the Internet and mobile payments, particularly the bold innovations and experiments of internet companies like Alibaba and Tencent in financial payments and open finance, Chinese banking has embraced unprecedented opportunities and challenges. Over the past decade, China's financial industry, with its vast user base, substantial market, and enormous asset scale, has fueled unprecedented upgrades and vitality in China's banking sector. Chinese banks such as China Construction Bank, Industrial and Commercial Bank of China, Agricultural Bank of China, and Bank of China have continued to innovate and forge ahead, undergoing significant and profound transformations in corporate governance, IT governance, financial technology, and other aspects, making China one of the most dynamic regions and battlegrounds in international financial technology. These transformations and upgrades can be categorized into two aspects:

On the one hand, there is the transformation of business models and concepts:

- Branch Transformation: Shifting from traditional physical branches to "online cloud branches," enabling the remote completion of processes that were previously only available at physical counters through remote video banking.
- Channel Transformation: Expanding from traditional self-service channels like ATMs and STMs to proactive client-driven channels like online mobile banking, WeChat banking, and social banking.
- Open Banking: Embedding financial services into diverse user scenarios encompassing clothing, food, housing, utilities, and transportation, making finance an integral part of daily life.

On the other hand, there are three major trends in the transformation of the IT architecture of the financial industry:

- The evolution from centralized to distributed architecture: Distributed architecture addresses the issues of high requirements for basic hardware facilities and inflexible system architecture, satisfying high concurrency and low latency business needs.
- The progression from single-core computing to "CPU+GPU" and other diverse computing: With the gradual maturity and deployment of "big model" technologies, traditional single-core CPU computing power has gradually become insufficient, leading to the gradual adoption of CPU+GPU diverse computing.
- The shift from traditional technology stacks to cloud-native: Cloud-native technology facilitates the construction and operation of elastically scalable applications, enabling financial institutions to build, deploy, and manage applications more quickly and efficiently.

Like China, financial industries worldwide are undergoing profound changes, representing not just technological advancements but also a revolution in thinking. In this transformation, we witness how financial institutions leverage technological forces to redefine service models, enhance client experiences, and stand out in fierce market competition. High-quality development in finance necessitates "new-quality productivity."

U.S. Case: After introducing cloud computing, big data, and AI technologies, a major U.S. bank achieved a 20% increase in client satisfaction and a 15% reduction in operating costs.

European Case: A renowned European bank implemented a digital strategy, achieving seamless cross-channel services, reducing client churn by 10%, and achieving a 25% growth rate in new business.

Financial Industry Architecture Transformation Trends and China's Experience

Amid the wave of digital transformation, the transformation of financial industry architectures has become a global consensus, with traditional centralized architectures evolving into flexible and scalable new-type architectures such as distributed and cloud-native. China's financial industry has demonstrated unique experience and achievements in digital and architectural transformation.

Leading the World in Smart Banking: China's banking sector prioritizes smart banking in advancing digital transformation. By incorporating advanced technologies like big data and AI, banks have achieved business process intelligentization and automation. According to statistics, China's major banks are globally leading in applications of smart client service, smart risk control, and smart investment advisory services.

Widespread Adoption of Cloud-Native Architectures: China's financial industry actively embraces cloud-native technology in architectural transformation. With its elasticity, high availability, and rapid iteration capabilities, cloud-native architecture has become the preferred choice for digital transformation in the financial sector. Chinese banks have successfully applied cloud-native technology to core business systems, enabling flexible resource allocation and rapid business response.

Implementation of Open Banking Strategies: During architectural transformation, Chinese banks actively pursue open banking strategies. Leveraging APIs, SDKs, and other technologies, they embed financial services into various scenarios, ensuring ubiquitous financial services. This not only enhances client experiences but also fosters innovation and development in the financial industry.

Construction of Financial Technology Ecosystems: In the process of digital transformation, China's financial industry emphasizes the construction of financial technology ecosystems. Through close collaboration with technology companies, internet companies, and other partners, they jointly promote financial technology innovation and application. This ecosystem model not only accelerates the rapid development of the financial industry but also injects new vitality into it.

Data-Driven Business Model Innovation: China's financial industry focuses on data-driven business model innovation in digital transformation. By collecting, integrating, and analyzing various data, it uncovers client needs and market opportunities, driving innovation in financial products and services. This data-driven business model innovation has become a significant development direction for China's financial industry.

In summary, China's financial industry has accumulated rich experience in digital and architectural transformation. These experiences have not only improved banks' operational efficiency and service quality but also provided valuable insights for the global financial industry. In the future, China's financial industry will continue to explore and practice new paths and models for digital and architectural transformation, injecting new vitality and momentum into the development of the banking sector.

New Concepts, Architectures, Technologies lead the development of financial innovation

Leading-Edge Financial "New Concepts"

-- Digitization, Intelligence, and Ecosystem Integration

Digitization has become the cornerstone of financial institutions. Imagine completing financial transactions easily anytime, anywhere. China Construction Bank's comprehensive digital transformation has achieved seamless integration of online and offline services. With just a few taps on their phones, clients can handle complex financial transactions, significantly enhancing user experience.

Intelligence makes financial services more personalized and efficient. China Construction Bank's intelligent client service system is a prime example. AI not only answers clients' common questions but also provides tailored financial product recommendations based on their behavior data. A bank advisor that understands you and is available 24/7 is undoubtedly a revolutionary experience.

Ecosystem integration extends financial services to every corner of life. Bank of China has collaborated with various third parties through open APIs to build a comprehensive financial ecosystem. Whether it's payments, wealth management, or loans, clients can find the most suitable solutions on a single platform. This ecosystem-based service model not only enriches client choices but also enhances overall service levels.

"New Architectures" Supporting Financial Business

-- Cloud-Native, Mobile, Multi-Active Multi-Center, and Coreless

Cloud-native technology enables financial systems to be as flexible as Transformers. Agricultural Bank of China's cloud-native architecture facilitates rapid system deployment and elastic scaling, enabling swift responses to market changes. This flexibility allows banks to calmly handle emergencies.

Mobile architectures put financial services in your pocket. China Construction Bank's mobile banking app, with its comprehensive features and intelligent design, enhances user experience. Clients can check account balances, transfer funds, and purchase financial products anytime, anywhere, truly realizing financial services on demand.

Multi-active multi-center architectures ensure system reliability. Industrial and Commercial Bank of China's multi-active multi-center setup ensures cross-regional data synchronization and business continuity. Even if a data center fails, the system seamlessly switches over, ensuring uninterrupted service.

Coreless architectures make systems lighter and more flexible. Bank of China's Coreless architecture decomposes some functions

"New Technologies" Driving Financial Innovation

-- Distributed Architecture, Microservices, AIGC, Big Data

Distributed architecture enables the system to function like a vast network, capable of carrying massive amounts of data and handling high concurrency requests. Originating from the demands of high concurrency and security in the internet era, distributed technology architecture and distributed databases are now being researched and utilized by major state-owned large banks and national joint-stock banks in China. This has facilitated the efficient processing and storage of massive transaction data, ensuring high performance and availability of the system while significantly reducing production and operational costs.

Microservices architecture, on the other hand, renders the system as flexible as Lego blocks. By adopting a microservices architecture, Agricultural Bank of China has decomposed complex business systems into multiple independent service modules, each of which can be developed, deployed, and maintained independently. This significantly enhances the system's flexibility and response speed.

AIGC technology brings data to life. By introducing AIGC technology, Industrial and Commercial Bank of China has realized the construction and analysis of client relationship networks, enabling more precise identification of client needs and risk points, thereby enhancing the effectiveness of marketing and risk control.

Big data technology empowers more informed decision-making. Through its big data platform, Agricultural Bank of China conducts real-time analysis of client behavior data, providing robust support for precision marketing and risk management.

Introduction to Sm@rtOneBank Integrated Banking Solution

Why Launch the "Sm@rtOneBank Integrated Banking Solution"

Through research and project experiences with banks in regions such as Southeast Asia, the Middle East, and Central Asia, we have found that developing countries and regions suffer from inadequate formal financial services and outdated infrastructure, resulting in a significant population with no or inadequate bank accounts. Among the 400 million adults in Southeast Asia, only around 25% have accessed financial services such as bank accounts, credit cards, investments, and insurance. Therefore, banking institutions need to rapidly expand their client reach through digital technology, as the potential of the digital financial market is immense.

Stable social and economic growth has fueled rapid development in local financial and fintech services. Regulatory agencies in these regions have successively introduced innovative regulatory approaches and financial licenses, lowering the barriers to financial entry. At the same time, they have highly recognized technologies such as digital currencies, AI, and cloud computing. The emergence of numerous new institutions has also generated clear demand for fintech services.

For many banks, particularly those in developing countries, the next decade will see a comprehensive upgrade of their core banking systems. Additionally, some domestic capital will venture into the overseas financial industry to establish new banks. These two types of banks have weak technological foundations in fintech and focus on comprehensive system coverage of business needs, adoption of new technologies, and IT system support for the internet and scenario-based finance. They generally prefer vendors to provide holistic solutions.

"Each is beautiful in its own way, and the beauty of one enriches the beauty of all." China's financial industry practices and experiences provide valuable insights and references for the digital transformation of global financial institutions. As a fintech enterprise deeply rooted in China's financial industry, DCITS, with a profound understanding of China's financial industry's architectural transformation, has developed the "Sm@rtOneBank Holistic Solution" for international banks. We are eager to share China's experiences with international peers and the financial industry, making finance more technological and intelligent.

Design Objectives of the Sm@rtOneBank Integrated Banking Solution

The Sm@rtOneBank Integrated Banking Solution aims to provide clients with an "all-in-one," "out-of-the-box," flexibly deployable, modularly combined, and high-performance full-featured banking system that meets the complex needs of modern financial institutions and helps clients achieve short-cycle implementation and rapid launch. This objective inspired the name of our product.

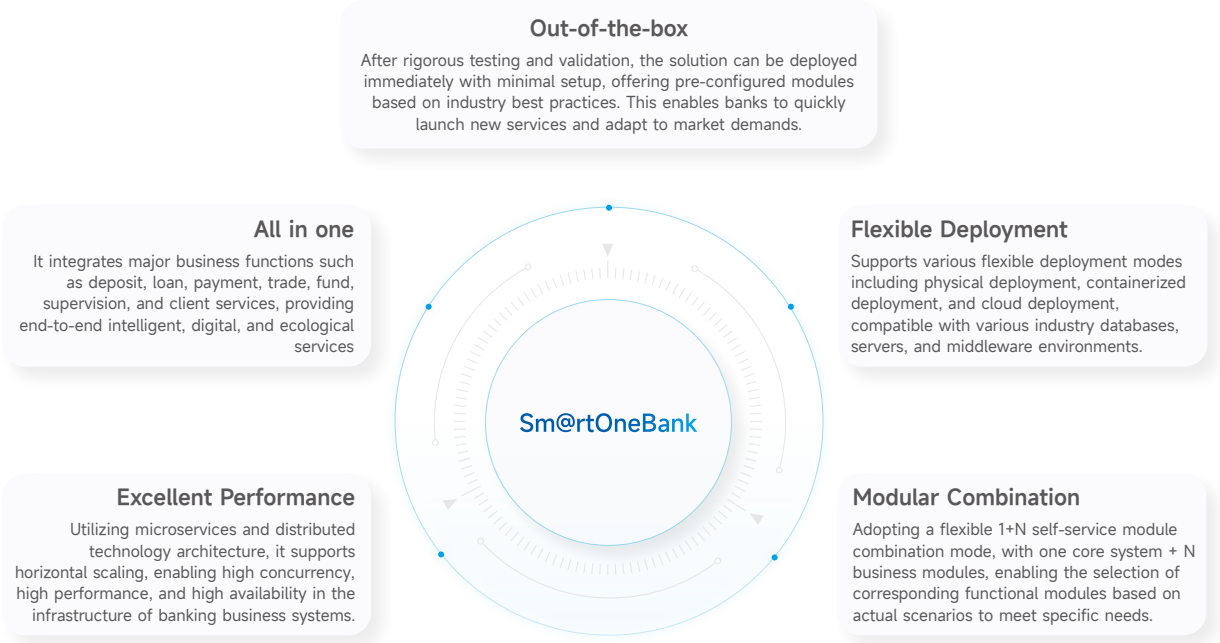

Figure-1 Design Objective of Sm@rtOneBank

"All-in-One": The Sm@rtOneBank Integrated Banking Solution integrates core banking functions such as deposits/loans, credit, payments, trade finance, treasury management, and compliance into a single, unified platform. Its "all-in-one" feature ensures that banks can manage their entire operational ecosystem. By adopting this solution, banks can focus on delivering exceptional client service and innovation, thereby reducing integration challenges and operational costs.

"Out-of-the-Box": This means that Sm@rtOneBank can be deployed immediately with minimal setup, offering preconfigured modules based on industry best practices. This enables banks to rapidly introduce new services and adapt to market demands without extensive customization. The intuitive interface and robust automation capabilities enhance efficiency from the outset, reduce manual processes, and ensure compliance.

"Flexible Deployment": The solution is designed with scalability and flexibility, suitable for banks of all sizes. It ensures that banks maintain lean and efficient operational infrastructures while adapting to business growth and changes. Sm@rtOneBank supports various deployment modes, including on-premise, containerized, and cloud-based deployments, and is compatible with various industry databases, servers, and middleware environments, ensuring a robust and future-oriented technical infrastructure.

"Modular Combination": In recent years, China's banking system has been undergoing significant upgrades, particularly in terms of modularity, productization, microservices, and distributed architecture. DCITS has actively participated in this process and accumulated rich experience in assisting domestic banks' upgrades and transformations. We are eager to leverage Sm@rtOneBank to share China's development achievements, enabling these advanced concepts and successful practices to help banks in other countries and regions rapidly achieve digital transformation and better support business evolution.

"High Performance": Facing the waves of digitization and internetization, China's banking industry has achieved remarkable results in exploring and practicing microservices and distributed architectures to address the challenges of big data, high concurrency, and high availability in the financial sector. DCITS is proud to have been a part of this journey and has gained valuable insights.

Introduction to Sm@rtOneBank Integrated Banking Solution

Key Capabilities of Sm@rtOneBank

The Sm@rtOneBank solution offers a comprehensive and advanced solution for banks or financial institutions, designed to help them maintain competitiveness in a rapidly changing market through four key capabilities. These capabilities—Service Interaction, Core Service, Business Innovation, and Technology System—collectively form a robust and flexible platform capable of addressing various challenges and needs in the banking industry.

Service Interaction Capability

The Service Interaction Capability ensures accurate and consistent data access for clients or tellers across different terminals and channels. Clients can obtain the same services (including products and promotions) and similar experiences across channels (branches, self-service devices, online banking, and mobile banking). Service transitions between channels are seamless, uninterrupted by changes in channels or service personnel, significantly enhancing the overall client experience. This is primarily reflected in:

- Integrated Client Service: Reduces interaction frequency through business information sharing and integration, enabling seamless business processing across channels and enhancing client experience.
- Contextual Business Functions: Integrates business scenarios to streamline similar transactions at the counter, reducing repeated entry of business elements and passwords.
- Intelligent Business Guidance: Provides function entry points based on client personalization settings and historical behavior.
- Digital Operation Management: Provides data statistics from a full-process client service perspective.

Core Service Capability

The Core Service Capability helps financial institutions provide comprehensive, secure, efficient, and exceptional client services, including but not limited to:

- Retail, corporate, and interbank deposits, debit card services.
- Full loan lifecycle processing (pre-loan, mid-loan, post-loan).
- General ledger processing capabilities.
- External financial payment capabilities and digital currency processing.
- Basic accounting reports and various inquiry services.
- Virtual account management capabilities.
- Daily operational management capabilities for institutions, tellers, cash, vouchers, etc.
- Online batch and hot account processing capabilities.

Business Innovation Capability

The Business Innovation Capability empowers banks to rapidly develop and deploy new products, helping them maintain a leading position in the market. Our modular architecture design allows banks to quickly customize products based on market demands, significantly shortening time-to-market for new products. This innovation capability is crucial for attracting new clients and maintaining client loyalty. It is mainly reflected in:

- Fully parameterized business function management.
- Support for flexible product configuration.
- Support for various pricing capabilities.
- Support for limit and operational risk control.
- Support for multi-level account system innovation.
- Support for scenario integration with partners through open banking.
- Support for a developer portal for unified microservice secondary development and function expansion.

Technology System Capability

The Technology System Capability provides a solid foundation for the platform, ensuring high scalability, security, and future adaptability. We adopt a distributed microservice technology platform to provide lasting vitality and stability to the system. The design of the technical framework considers the need for continuous updates and improvements, enabling the platform to evolve with the bank's business growth and technological advancements. Key capabilities include:

- Unified microservice management capabilities.
- Unified OpenAPI and SDK management capabilities.
- Support for distributed technical components.
- Unified low-code development capabilities.
- Microservice component asset management capabilities.
- Rapid deployment capabilities for physical machines, VMs, and cloud environments.
- Support for DevOps integrated management.
- Heterogeneous system sidecar access capabilities.

Sm@rtOneBank Application Architecture

The Sm@rtOneBank solution is a holistic solution for commercial banking system construction, consisting of three technology platforms, nine application systems, one optional system, and two partner systems.

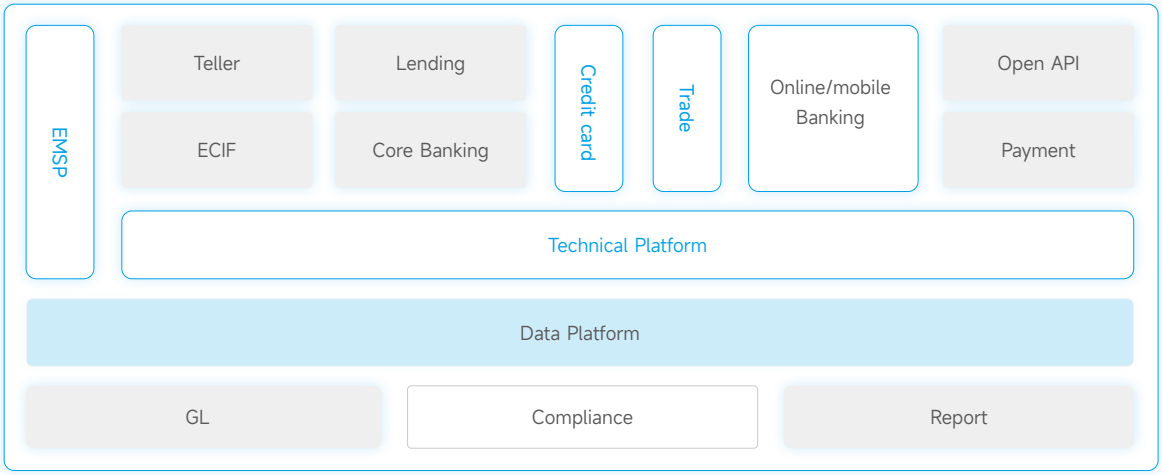

Figure-2 Application Architecture of Sm@rtOneBank

1. Three Technology Platforms

- Technical Platform: Provides various microservice distributed technical components, financial service technology frameworks, and a unified development platform.
- Data Platform: Provides various data service components, ODS, big data platforms, and data warehouse domain management functions.
- EMSP: Provides service docking, file transfer, EDA mechanisms, and overall microservice management functions between heterogeneous systems.

2. Nine Application Systems

- Teller: Provides highly intelligent teller operation and interaction functions, integrating employee channels across the bank.
- Lending: Provides credit, personal loans, small and micro-enterprise loans, and online loan pre-approval, mid-loan management, and post-loan processing functions.
- Core Banking: Provides basic financial services such as deposits, loans, debit cards, and daily management functions for parameters, products, pricing, operations, etc.
- Online/Mobile Banking: Provides client service interaction functions based on online and mobile banking.
- Open Banking: Provides financial services based on partner scenarios and OpenAPI management functions.
- Payment: Provides external fund payment and remittance functions, Swift, MEPS,G3,FAST,etc.
- Trade Finance: Provides trade-backed payment, financing services, including letters of credit, guarantees, factoring, collections, acceptances, and various trade and document-based financing businesses.
- GL: Provides general ledger processing functions and manual bookkeeping services based on client services.
- Report: Provides basic banking report functions and customized report development and generation.

3. One Optional System

- ECIF: Provides enterprise-level client management functions.

4. Two Partner Systems

- Credit Card: Provides credit card management and service functions.
- Compliance: Provides customized functions based on local regulatory requirements.

Sm@rtOneBank Functional Architecture

From the perspective of functional deployment, the Sm@rtOneBank's overall solution architecture comprises four layers:

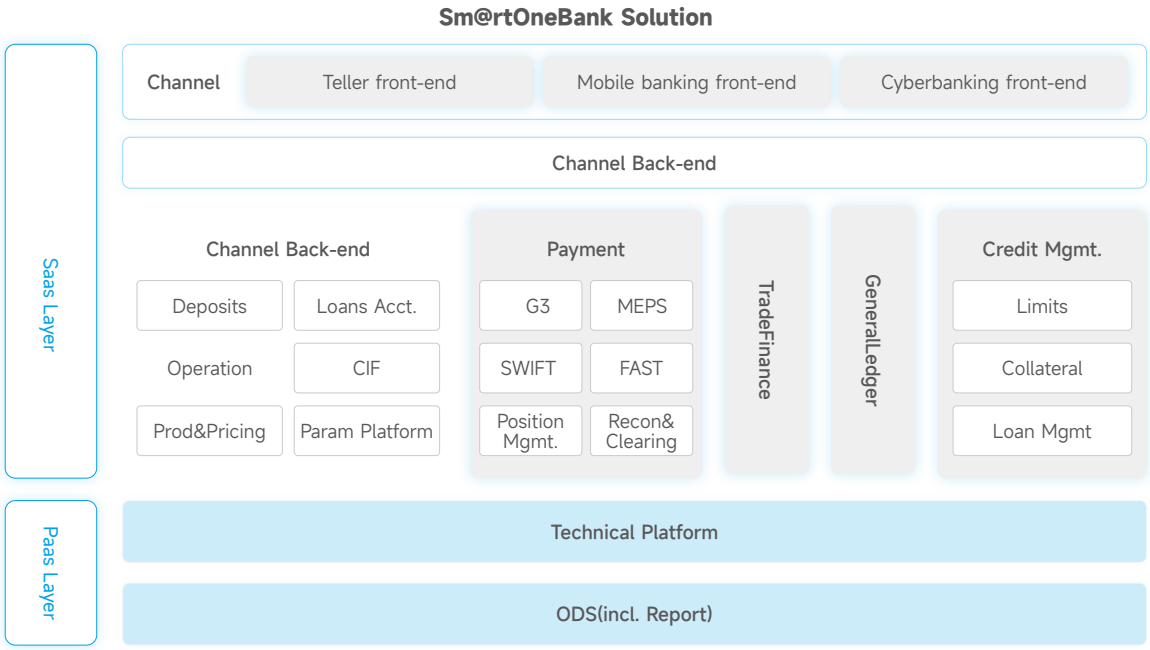

Figure-3 Functional Architecture of Sm@rtOneBank

The first layer is the presentation layer, providing business display and user interaction, including teller services, mobile banking, and online banking.

The second layer is the business service layer, offering componentized business services and serving as the implementation layer for the bank's primary business logic. It encompasses core banking, payments, general ledger, credit, trade finance, client information, open banking, and more.

The third layer is the technology platform layer, providing technical support for cloud-native, containerization, unitization, distribution, and microservices.

The fourth layer is the data platform layer, offering data services such as data integration, storage, processing, file management, and report generation.

Sm@rtOneBank Technical Architecture

Sm@rtOneBank employs the mature Sm@rtGalaxy technology platform from DCITS, which utilizes stable and reliable software platforms and proven development technologies to ensure high reliability and stability of the system, guaranteeing its smooth operation. Sm@rtGalaxy is a distributed microservice technology platform from DCITS, built upon the Spring framework. It is an SOA-based, distributed, and microservice processing framework that provides components like application runtime frameworks, service access gateways, system operation and maintenance monitoring, and accompanying management tools. It only requires a JVM runtime environment for execution. The system adopts an open architecture design, fully supporting cloud deployment and achieving independence from hardware, operating systems, and databases. The platform is characterized by openness, versatility, standardization, and security.

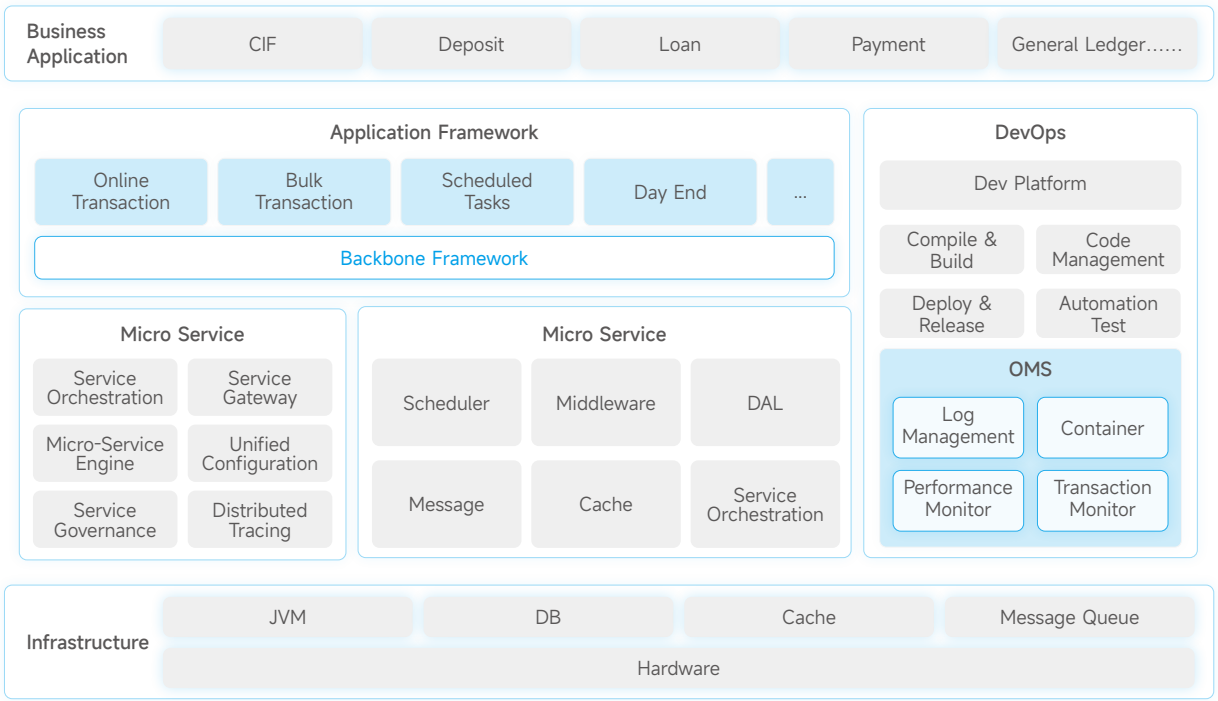

Figure-4 Technical Architecture of Sm@rtOneBank

The platform system is designed based on SOA, distributed, and microservice architecture specifications, using the JAVA language, ensuring good versatility, openness, and portability. It employs an open architecture design independent of middleware and database platforms, with no reliance on application middleware (such as Weblogic, WAS, etc.). The system hardware supports PC servers, minicomputers, virtual machines, cloud environments, etc. The operating system supports mainstream operating systems (UNIX, LINUX, WINDOWS), and the database supports mainstream commercial relational databases (ORACLE, DB2, SQL Server, etc.) as well as other open-source and distributed database products (MySQL, OceanBase, TDSQL, GaussDB, etc.).

It supports virtualized and containerized deployment, but this is not mandatory. VMware is typically used in production environments, but other vendors' virtualization solutions are also supported. Additionally, core business systems can be deployed in Docker containers and run in virtualized or containerized modes in private cloud environments such as Google Cloud, Microsoft Azure, Amazon Web Services, Alibaba Cloud, Huawei Cloud, Tencent Cloud, etc.

The system adopts a multi-data source design approach for database access, enabling multi-data source routing access at the transaction level and implementing a deployment strategy that separates transaction databases from query databases. For large database tables, it supports partitioning, sharding, and sharding + partitioning storage and access modes.

Sm@rtOneBank Deployment Architecture

The Sm@rtOneBank solution supports the deployment mode for multiple data centers, such as same region, remote, and two regions with three centers. Dual-active deployment requirements can be achieved between dual data centers in the same region. In dual-active mode, load balancing equipment and service gateways are used as the primary scheduling and business allocation mechanisms. They can provide service-to-service communication based on a three-tier routing network environment and offer service health status monitoring. When an application node experiences an abnormality, the load balancing equipment automatically isolates the faulty node, ensuring high availability and stability of the system. Both data centers can simultaneously carry business loads or serve as disaster recovery sites for the same applications in the other data center. Each server node operates securely and independently, without affecting each other, enabling hot-swapping functionality for convenient system maintenance and adjustments. The third data center (remote disaster recovery) can be deployed in cold or hot standby mode to ensure feasibility and timeliness of failover in case of anomalies.

Database servers also implement a clustered deployment scheme, with each data center utilizing a database cluster that supports horizontal scaling to ensure concurrent operation and load balancing across multiple database nodes. Database cluster technology ensures data consistency, integrity, and resource conflict resolution across nodes. When a single database node encounters an abnormality, the application automatically isolates the faulty node and generates an alarm, safeguarding business continuity and uninterrupted operation. The system supports automatic reconnection mechanisms for databases, allowing flexible configuration of reconnection attempts and timeout periods. It possesses system detection and error recovery capabilities after database downtime, enabling automatic and rapid switching between read and write databases. The system employs database replication technology for database synchronization between data centers, combined with the application's multi-database data source strategy. Each database vendor has implemented multi-replica data consistency solutions.

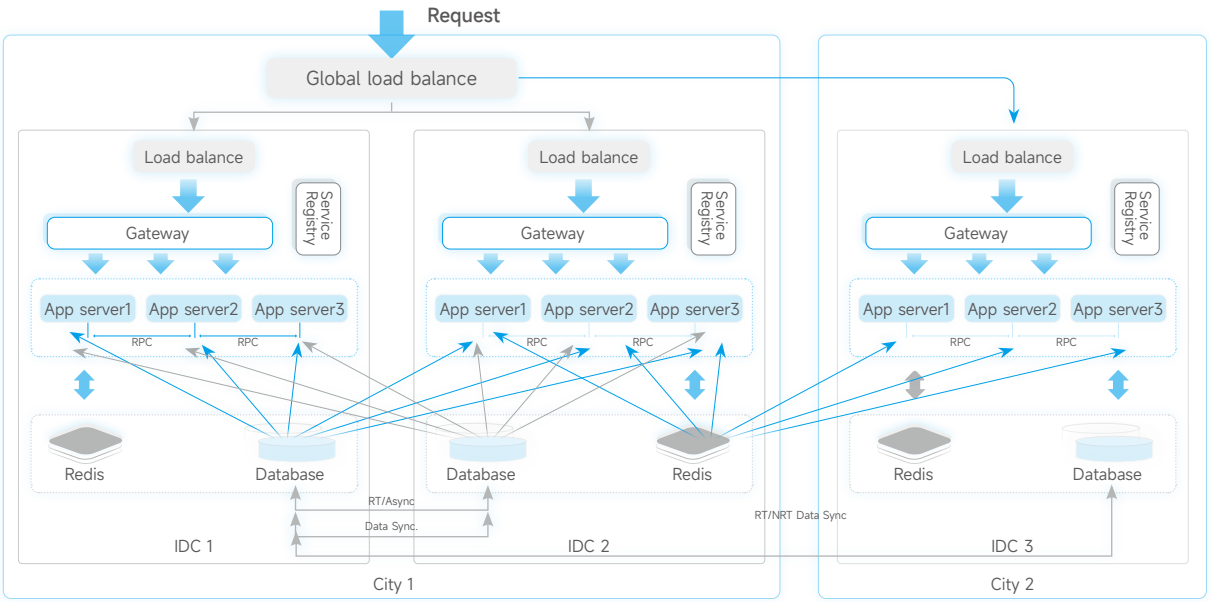

Figure-5 Distrbuted Deployment Solution of Sm@rtOneBank

For large-scale banks, the Sm@rtOneBank solution also supports unitized deployment, allowing banks to choose this approach based on their business scale and future growth projections. Unit segmentation is recommended based on client numbers, supporting segmentation by legal entity + client number, with business data under each unit segmented by client number.

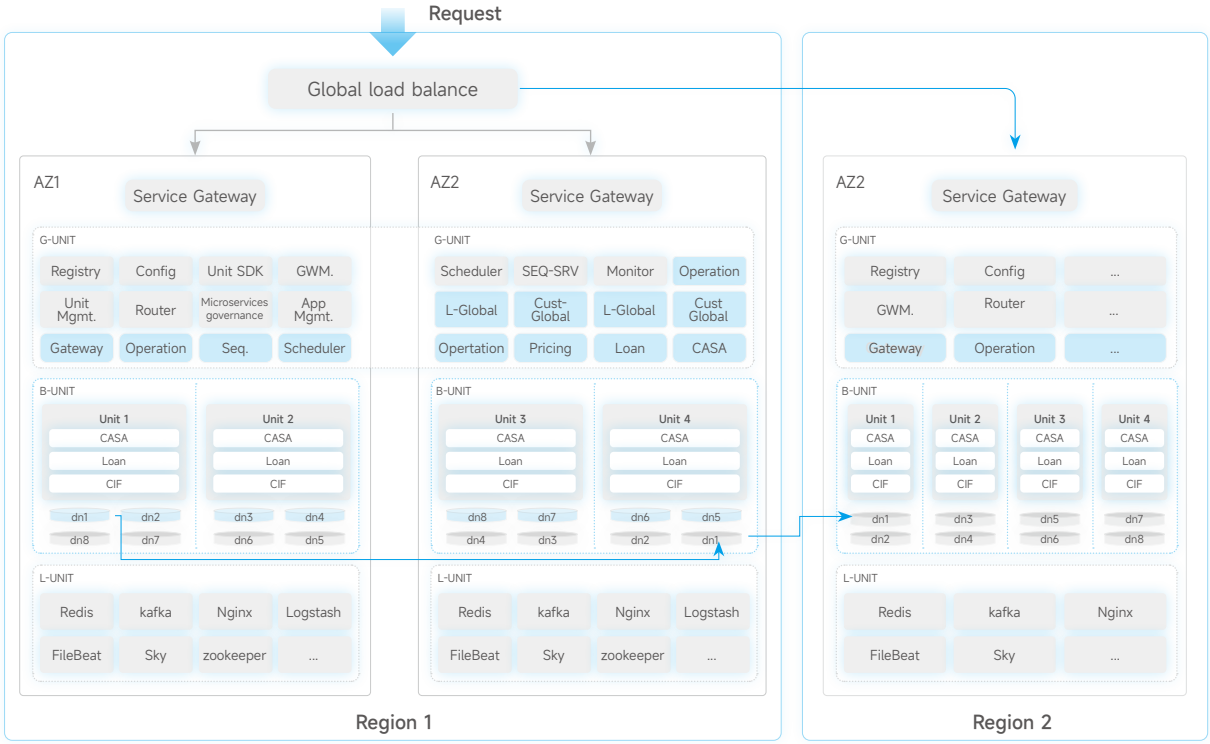

Figure-6 Unitized Deployment Solution of Sm@rtOneBank

Sm@rtOneBank Solution Features

Sm@rtOneBank adopts a unified distributed, microservice technology platform as its foundation, integrating existing bank core systems, counter systems, mobile banking systems, online banking systems, payment systems, credit systems, and wealth management systems. It aims to provide banks with a comprehensive, unified, and efficient solution.

During the integration process, through a combination of technical and business refactoring, it becomes more flexible and scalable, effectively addressing the challenges brought by the PC-based and cloudification of infrastructure. PC-based enables business applications to run on general-purpose hardware, while cloudification provides on-demand scalability. The combination of these two not only improves system performance and reliability but also reduces maintenance costs. The benefits of refactoring include:

- **Higher Flexibility:** The system can quickly adapt to changes in business requirements, supporting rapid iteration and deployment.
- **Reduced Risk:** Through microservice splitting and containerization, the risk of single points of failure in the system is reduced, enhancing overall reliability.

- **Improved Resource Utilization:** Cloud-native and containerization technologies help enterprises utilize computing resources more effectively, enabling on-demand scaling.
- **Enhanced Business Competitiveness:** The reconstructed system and business processes are more flexible and efficient, enabling enterprises to respond quickly to market changes and seize new business opportunities.

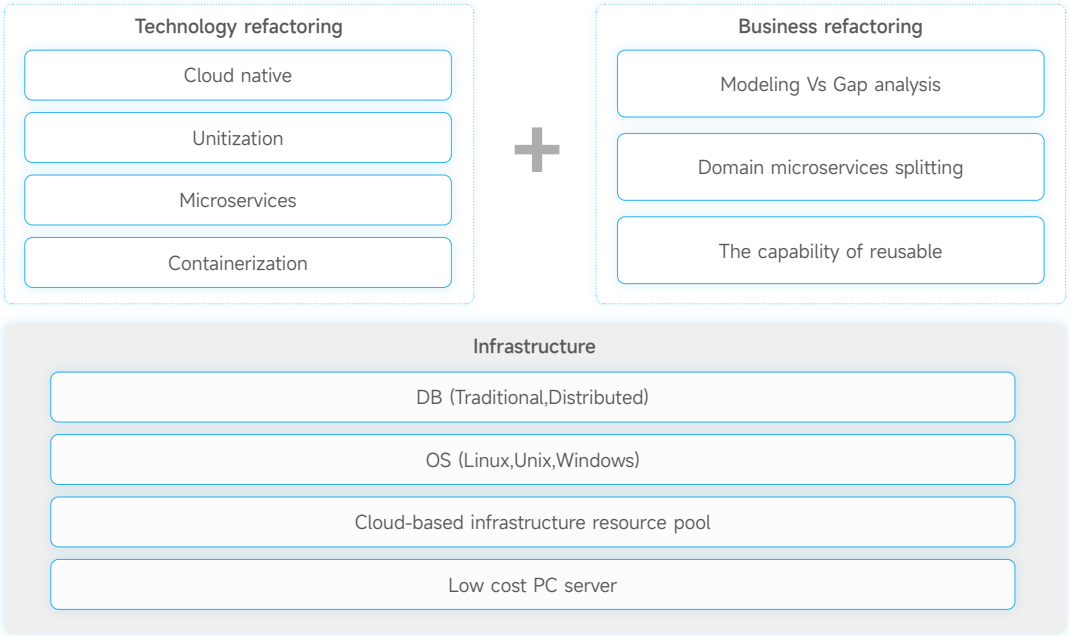

Figure-7 Key Technical Features of Sm@rtOneBank

Through the dual refactoring of technology and business, the product has the following main features:

1. Modularization, Parameterization, and Componentization of Business Functions:

By modularizing, componentizing, and parametrically assembling business rules, the standardization of business processes is separated from product features to meet the evolving and diverse needs of mechanisms and businesses.

In component design, we draw on Domain-Driven Design (DDD) and BIAN's best practices in banking, adhering to the BIAN Capability Model and Framework, including Service Landscape, Business Area, Business Domain, and Service Domain specifications.

2. Client-Centric Marketing and Services:

Following a client-centric design philosophy, the design of financial products and services throughout the system revolves around clients, achieving a close correlation between client information and financial products. Comprehensive client information and transaction activities provide banks with all-round decision-making information, enabling them to truly achieve client-centric marketing and service goals.

3. Coreless, Lightweight Core Business:

The trend of Coreless lightweight core systems reflects the transformation of bank system architecture from

traditional centralized, monolithic designs to modern, distributed designs. By splitting traditional monolithic systems into multiple independent modules or microservices, these microservices can be developed, deployed, and maintained independently, making the system more flexible and able to quickly respond to changes in business requirements. This not only improves system flexibility and scalability but also enables banks to better cope with changing market environments and technological challenges.

4. Unified Account Model:

A unified account model is adopted in the design of each business module, enhancing the standardization of business processing logic while providing more flexible business integration and functional expansion.

5. Flexible and Convenient Product Innovation:

The system provides a centralized financial product design and management platform, through which product management departments can conveniently, quickly, and flexibly plan, configure, and release financial products. The product factory achieves rapid derivation of new products through the assembly and configuration of different levels based on product parameters, indicators, events, and hierarchical management concepts.

6. Multi-dimensional Differentiated Pricing:

The pricing system achieves unified and centralized management of interest rates, fees, and exchange rates. Through a professional rules engine, a differentiated, multi-dimensional, and multi-objective pricing methodology system is established, truly realizing the requirements of multi-dimensional and differentiated price management.

7. Separation of Transactions and Accounting:

The system truly achieves complete separation and independent deployment of the transaction system and accounting system. The transaction system focuses on providing financial product services to clients and generating business scenario data, while the accounting system focuses on formulating accounting rules based on business scenarios and obtaining key elements required for accounting from the business scenario data generated by the transaction system according to the rules. This completely separates the transaction system from the accounting system, making subsequent business expansion simpler and faster.
The accounting engine introduces various accounting elements such as profit centers, marketing products, business products, accounting products, transactions, events, and tellers based on traditional institutions, accounts, and currencies. It also provides accounting auxiliary measurement functions, supporting the maintenance and setting of various business types: expense amortization, expense accrual, revenue amortization, revenue accrual, and amortized cost measurement. Based on the set information, it automatically completes the accounting auxiliary measurement function, meeting the functional requirements of business systems and financial systems for accounting measurement.

8. Multi-Entity Support:

Support for the multi-entity business model enables banks to achieve independent management and operation of different legal entities, meeting the differentiated business needs of each legal entity and enhancing overall

operational capabilities.

Through dedicated switch parameters, the system can customize whether client information is shared across the entire system, regardless of whether it is in data independence mode or data sharing mode. System parameters support independent or shared use by each legal entity. The system supports internal and external integration through multi-entity settings, enabling comprehensive operations and fully supporting banking business.

9. Unified Receipt/Statement:

The receipt/statement system fully integrates the resources of the bank's existing channels, providing more user-friendly services to clients through a variety of receipt processing channels. It supports flexible access to online, offline, and open Internet channels. Common receipt processing channels include counter channels, self-service channels (self-service receipt printers), and digital banking channels (personal/corporate online banking, mobile banking, official websites, etc.).

10. Unified Reporting and Data Analysis Processing:

The unified ODS product group includes big data graphical job scheduling software (Octopus), a reporting platform, and a visual query management system. Octopus primarily targets two scenarios: traditional data warehouses and emerging distributed platforms, providing comprehensive management and control functions for offline job batch processing and source files. The reporting platform realizes centralized processing, storage, distribution, and management of batch reports from various application systems.

11. Process Engine:

The configurable process engine fully supports process-based business processing in counters, e-banking, credit, and other areas. With the process engine as the core, paired with business function components and tools, various business processes can be quickly assembled.

12. Omni-channel Payment Capabilities:

Connecting with mainstream payment channels such as SWIFT, CIPS, FAST, and RTGS, the system opens up the bank's funding chain and fully realizes straight-through processing.

13. OpenAPI Support:

Complying with the BIAN Service Domain standard interface specifications, it can provide OpenAPI services that conform to the BIAN application interface standards.

14. AI Application:

Introducing AI technology, AI is applied in various aspects such as credit, position management, risk control, client experience, and marketing. Through intelligent means such as human-computer interaction, data analysis, intelligent algorithms, RPA support, and OCR applications, it enhances business intelligence capabilities, improves user experience, increases risk control capabilities, and reduces operating costs.

Sm@rtOneBank Security and Compliance

Security is the core of our architecture. The platform implements robust security measures that meet the latest regulations and requirements of regulatory authorities for encryption algorithms, supporting national cryptographic algorithms, international key algorithms, and other mainstream encryption algorithms.

The product complies with the following specifications (including but not limited to):

- ISO/IEC standards: such as ISO/IEC 8484, ISO 15022, ISO 8583, etc.
- SWIFT (Society for Worldwide Interbank Financial Telecommunication) standards
- UCP 600 by the International Chamber of Commerce (ICC): These are the fundamental rules for credit operations in international settlements
- Online banking security standards: including but not limited to ISO/IEC 27001 (Information Security Management System requirements), PCI DSS (if payment card transactions are involved), etc.
- Electronic certification service standards: such as ISO/IEC 29115 (requirements for certification bodies providing electronic certification services), these standards regulate the implementation and management of electronic certification services in online banking systems
- SYSC8 Requirements of Chapter 8 of the UK Financial Conduct Authority Handbook
- EBA Requirements of the European Banking Authority
- PSD2 Requirements of the European Payment Services Directive 2
- GDPR Requirements of the European General Data Protection Regulation
- Anti-money laundering and counter-terrorism financing (AML/CTF) standards
- Basel Accords: mainly targeting bank supervision and risk management, these set out requirements for the robustness and risk management of banking systems.

The product has a comprehensive logging system that provides logging for all system operations, including query, print, and backup functions. It includes statistical logs for statistical analysis and report generation, diagnostic logs for troubleshooting, and audit logs for management operations.

Advantages of Sm@rtOneBank Products

Compared to the traditional banking industry's independent deployment of each business system, the integrated banking solution brings numerous significant advantages and values to bank clients:

1. Full-featured Integration:

- By seamlessly integrating multiple standalone systems, the full-featured banking system achieves comprehensive coverage of banking operations, avoiding duplicate construction and data silos among multiple systems.
- Provides unified data management and business processes, simplifying system maintenance and upgrades, and enhancing overall operational efficiency.

2. Unified Management System:

The system offers all business modules, including core, counter, credit, etc., with:

- Unified client management. Adhering to a client-centric design philosophy, the design of financial products and services throughout the system revolves around clients, enabling close association between client information and financial products. Ensures consistency and sharing of client information across modules, realizing client-centric, comprehensive service product management capabilities.
- Unified account model. Adopts a unified account model in the design of various business modules, enhancing standardization of business processing logic while providing more flexible business integration and functional expansion.
- Utilizes a unified parameter platform. Centralizes and flexibly configures various parameters such as interest rates, fees, exchange rates, and tax rates, enabling multi-dimensional differentiated pricing.
- Provides unified product management functions. Offers a centralized financial product design and management platform, enabling rapid and flexible product planning, configuration, and release through parametric and hierarchical management, supporting rapid derivation and innovation of financial products.

3. Increased Efficiency:

- The integrated system better coordinates and optimizes various internal banking business processes, reducing the complexity of manual operations and management.
- Through a unified interface and operation platform, employees can more efficiently handle client needs and business operations, enhancing work efficiency and client satisfaction.
- The integrated system reduces the need for cross-system data transmission and interface development, lowering the complexity and cost of system integration. Direct communication between business modules and the adoption of RPC invocation mode for microservices ensure high system performance, reliability, and scalability.

4. Rapid Market Response:

- The modular architecture allows banks to quickly introduce new features and services, enabling them to gain a competitive advantage in a dynamic market.
- The system has a high degree of parameterization and a flexible product factory that can help banks quickly meet market needs.

5. Cost Savings:

- Compared to banks separately procuring and maintaining multiple systems, purchasing a full-featured banking system significantly reduces initial investment and ongoing operational costs.
- By adopting our platform, banks can significantly reduce operational costs through automation, improved resource utilization, and reduced downtime.

6. Enhanced Client Experience:

- Through the integrated system, banks can provide a consistent and comprehensive client experience, enhancing client stickiness and loyalty.
- Leveraging easy scalability and multi-channel integration, banks can offer seamless and personalized

experiences to clients.

7. Future-Proofing:

- Our platform design evolves with the development of the banking industry. Using open standards combined with a flexible architecture ensures that the system can adapt to future technological advancements and regulatory changes.

Application Scenarios of Sm@rtOneBank Solution

When deploying Sm@rtOneBank solutions for overseas banks, we have integrated the latest business and technological achievements that DCITS has gained both domestically and internationally. Meanwhile, various implementation models can be adopted according to client needs.

Complete Output to Replace Existing Bank Systems: Generally suitable for small-scale overseas banks with the need for an overall system replacement. We utilize the integrated banking solution, which encompasses all systems and modules, to replace the bank's underlying technology to key application systems in one go. In this model, we also provide related data migration services for the bank's systems.

Complete Output to Help Banks Open Swiftly: Typically applied to newly established overseas banks created by domestic capital venturing abroad. We employ the Sm@rtOneBank total solution to rapidly establish an IT system and overall IT architecture for the bank, simultaneously setting up fundamental application systems to meet operational requirements. This model offers a comprehensive package of services, including consulting and planning, system construction, testing, business training, regulatory acceptance support, and subsequent production operations.

Partial Subsystem Replacement within Sm@rtOneBank for Selected Bank Systems: Commonly suited for medium-sized or larger overseas banks with complex and extensive system architectures, where only partial application systems require replacement and a full IT system replacement is not intended. We utilize the corresponding international version of specialized application systems within Sm@rtOneBank to replace those applications in urgent need of upgrading. In this model, we provide integration services with the bank's existing other systems and data migration services specifically for the subsystem.

Utilizing Sm@rtOneBank Technical Platform to Update Overseas Banks' Technology Systems and Build a Future-Oriented New Technology Foundation: Primarily applicable to medium and large-scale overseas banks undergoing underlying technology reconstruction. We can provide different technical components or the entire technical platform from the Sm@rtOneBank total solution as needed, assisting banks in replacing and updating their original technology components. In this model, we offer overall technical planning, component adaptation, and optimization of key application systems.

Positioning and Target Clients of Sm@rtOneBank

Through years of research and practice in overseas markets, DCITS has gained a deep understanding of financial market demands and regulatory requirements in various countries and regions. Collaborating with outstanding infrastructure enterprises like Huawei, we have jointly developed the Sm@rtOneBank solution, enabling DCITS to provide integrated solutions tailored to the actual needs of overseas clients. Our primary target clients include:

- Globally Operated Multinational Banking Groups: By introducing industry-leading professional products into their business scenarios, these groups can achieve upgrades to their underlying technology stacks, establish and implement group technology standards, and implement technology governance for heterogeneous systems across multiple regions worldwide. Characteristics: Professional, Leading.

- Newly Established Digital Banks Overseas: Responding to the demands of licensed financial institutions to rapidly establish digital banks and commence operations, we swiftly build end-to-end digital banking systems for these banks, providing a technology-driven digital banking foundation for their basic business operations. Rapid implementation and long-term, low-cost technology operation and maintenance services are also provided. Characteristics: Comprehensive, Fast.

- Digital Transformation of Traditional Banks: Targeting core, credit, and other key business systems of overseas banks that have been operational for a long time and have outdated technology stacks, unable to adapt to the rapid development of internet users and businesses. Urgent upgrades and replacements of key business systems are required while ensuring uninterrupted business operations. Characteristics: Smooth Iteration, Comprehensive Functionality, Rapid Deployment.

Practice of Sm@rtOneBank Integrated Banking Solution

Value Proposition and Domestic Practice of DCITS

The "Sm@rtOneBank Integrated Banking Solution" launched by DCITS is a commercial banking solution based on advanced technologies such as cloud-native, mobility, and multi-active multi-center capabilities. Prior to its launch, DCITS's related solutions and products have been widely applied in China and achieved remarkable results.

Since participating in financial informatization in 1987, DCITS has adhered to independent innovation and honing core technologies for over 30 years. Through independent R&D, it has developed eight major financial product families, covering over 300 financial software solution products. It has served more than 1,900 financial institutions, including large commercial banks such as Bank of China, Industrial and Commercial Bank of China, China Construction Bank, Agricultural Bank of China, Postal Savings Bank of China, Shanghai Pudong Development Bank, China CITIC Bank, China Merchants Bank, China Everbright Bank, Industrial Bank, Huaxia Bank, China Bohai Bank, China Guangfa Bank, Bank of Beijing, Bank of Ningbo, and Bank of Shanghai. Additionally, it has been selected as one of the IDC FinTech 100 for five consecutive years and has consistently ranked first in market share in China's segment markets for bank core business systems, channel management systems, and open banking.

DCITS's "Sm@rtOneBank Integrated Banking Solution" for commercial banks aligns with the development trends of modern banking, adopting "new concepts," "new architectures," and "new technologies." It is characterized by advanced business concepts, leading architectures, low overall costs, high system reliability, and high security.

Overseas Typical Cases and Value Creation

Simultaneously, DCITS actively promotes the experience of China's banking architecture transformation, expands overseas markets, and introduces relevant banking solutions into the international market, providing advanced digital transformation services to overseas banks. By mid-2024, DCITS has provided core banking, digital banking, payment, teller systems and e-Banking products to more than 20 international banks. DCITS's banking solutions have demonstrated great adaptability and flexibility in global practices.

DCITS actively cooperates with local financial institutions, technology companies, and other partners in Southeast Asia, Central Asia, Africa, Europe, and other regions to jointly promote the digital transformation and innovative development of the banking industry.

A large internation bank(China) New Core Banking Project - UK

Project Background:

This bank is a leading international commercial bank, providing extensive retail and commercial banking services worldwide through its core banking system. Leveraging an internationally connected network powered by advanced technologies, including rapidly growing e-commerce capabilities, The bank offers comprehensive financial services, including personal financial services, commercial banking, corporate, investment banking, and markets, private banking, and other activities, forming a solid foundation for efficient client service.

However, it is noted that most of the core banking systems are monolithic applications developed with outdated technologies. They are costly to operate, unable to adapt quickly to the launch of new market products and changes in business processes, and difficult to scale. These limitations have reduced the bank's flexibility, lowered its responsiveness to the market, increased risks, and hindered its long-term digital vision. To address these issues, a plan has been initiated to provide a future component-based banking architecture that operates at the speed of fintech and supports emerging business models in retail and commercial banking.

The vision for the future platform is to create a technology stack that supports the bank’s core functions and provides critical capabilities for the business, such as flexibility, scalability, resilience, and competitiveness. The target platform should provide enterprises with the ability to manage all core products (e.g., current/savings accounts, loans, etc.).

Project Content:

The Financial Product Factory provided by DCITS's core business system has fundamentally deviated from the traditional approach to business innovation. It not only shortens the time-to-market for new products, reduces system redevelopment, testing, and upgrading, but also avoids system architecture changes due to increasing business needs, enabling product customization and unified management of all bank products. Additionally, a graphical interface is provided for product configuration, facilitating product parameter configuration by business personnel and supporting modifications to operation and configuration interfaces based on bank-specific operating habits.

Currently, our company undertakes the core system renovation for the bank, encompassing systems such as product engineering, client management, deposits, loans, general ledger, counter services, receipts, credit, limits, collateral, file transfer platform, EDA, channel management, open platform, OPP, and more. We will continue to undertake the overall renovation of the bank's branches across the Asia-Pacific region and globally, significantly enhancing our company's overseas influence.

Project Value:

- Leveraging this core migration project, we unified the IT architecture planning, clarifying the boundaries and business scope of the bank's core banking systems.
- Established a unified client information management system for the bank, responsible for storing and serving as the primary source of client information data across the bank. Other business systems' client information data are duplicates.
- Utilizing the new core's distributed architecture and microservices, we support grayscale releases, fault isolation between different nodes, and single-service upgrades without impacting others, significantly improving efficiency.
- The core system is developed in JAVA, and the entire technology stack is based on the Spring Cloud system, supporting container and cloud deployments and service meshes. These technologies will be leveraged to gradually replace outdated architectures within the bank's internal systems.
- Leveraging DCITS's 7*24-hour service mechanism and batchless design philosophy for the core system, we address high availability issues.
- Adhering to the bank's internal BIAN capability model and framework, ensuring low coupling of components and enabling plug-and-play reusable designs.

GoldBank Core Banking Project - Nigeria

Project Content:

GoldBank is a commercial bank located in Nigeria. The overall solution contains client information, deposits, smart deposits, accounting engines, and back-office platforms, etc.

Project Value:

Conducted banking operations in Nigeria, including client registration, account management, and smart deposit marketing. It solved the problem of financial isolation caused by clients relying solely on small loan companies for financial services, enabling intra-group fund circulation.

Sm@rtOneBank solution help the bank to build basis technology platform and business system. By bringing the system online in the shortest possible time, it achieved significant time and cost savings.

Sea Group Core Banking Project - Seabank, Indonesia

Project Content:

Cooperated with Sea Group to provide core system solutions for its Sea Bank's digital banks in Singapore, Malaysia, Indonesia and the Philippines. The project contains core banking, online lending, risk control, payment platforms, data warehouses, regulatory reporting, and more.

Project Value:

By cooperating with Sea Group's group to standardize the core system, it is convenient to quickly replicate innovative business models in various countries, improve the group's management effectiveness, and reduce the preparation time and technology operating costs of digital banks in various countries.

Assisted clients in completing the launch of a new bank, supporting various online businesses, including new client acquisitions, deposits, transfers, and more, while interfacing with local interbank payment channels such as RTGS. Completed integration with SPL to support online lending operations. Established a data warehouse and customized regulatory reports according to local regulatory requirements. Developed a customized back-office system to support various in-bank operational management tasks.

Gulf Bank Core Banking Project Group - Bahrain, Singapore

Project Content:

The digital bank jointly invested by the Bahrain Sovereign Fund and the Huangpu Group is being implemented in Bahrain and Singapore. The project uses the Sm@rtOneBank solution to build banking technology system capabilities, including mobile banking channels, core business systems, accounting and regulatory reporting modules. Realize the digitization of the whole business process from client account opening and trading, to financial management, regulatory reporting, etc.

Project Value:

As a technology partner, DCITS participates in the application preparation and technology planning of digital banks, and provides comprehensive scientific and technological capacity building solutions combining "software + hardware + people + methodology" after obtaining a financial license. Through mature core, mobile banking, accounting, reporting and other business systems, combined with public cloud and IT management services, we help the client complete the preparation for opening within 6 months.

Hibank Digital Dual-Core Project - Hibank, a subsidiary of BNI, Indonesia

Project Content:

DCITS has built a digital dual core for Hibank, a subsidiary of BNI. The project is based on Sm@rtOneBank's modular advanced architecture design, and selects four main modules of credit risk management, core, payment and reporting to form a digital retail loan solution according to client needs. In addition to the client's existing application system, build a new generation of cloud-native business system to support the bank's retail loan and payment business.

Project Value:

- Full functions: Through multiple systems to form the solution which provides full-process and digital application system capabilities for business development, and realizes 100% client experience digitalization; With rich parameter configuration functions, the launch of new loan products only needs parameter configuration, which can be completed within 15 minutes and take effect in real time.
- Advanced technology: Cloud native using public cloud deployment; Distributed processing, with a peak TPS greater than 400. High availability, the system availability rate is higher than 99.996%.
- Fast go-live: The project was completed within 9 months, which is more than 50% less than the traditional core system project.
- Future-oriented: After the project is launched, it will continue to provide production support and upgrade work to support the continuous upgrading and innovation of the banking business.

Looking Forward to Exploring Together

The digital transformation of the banking industry involves the transformation of architecture, business, concepts, and talent, forming a complex systematic project. As a long-term professional partner dedicated to banking digital transformation, DCITS invites you to explore how our integrated banking solution can bring about changes to your organization. Please contact us immediately to arrange a demonstration or discuss how to customize our solution to your specific needs.

Company: Digital China Information Service Group Co., Ltd.
Headquarter: Building 18, East Zone, No.10 Xibeiwang East Road, Haidian District, Beijing, China, 100094
Shenzhen Office: 3905, East Tower , International Innovation Center of Digital China, 82 Shenwan 2nd Road, Dongfang Community, Shahe Street, Nanshan District, Shenzhen, China, 518058
Company: Digital China Information Technology Singapore PTE. LTD.
Singapore Office: 63, Market Street, #04-02, Bank of Singapore Centre, Singapore, 048942
Website: en.dcits.com

International Business Official Email: intlbusiness@dcits.com
China Contact: Ryan Zhang zhangruiao@dcits.com
Overseas Contact:Belle Koe khl@dcits.com
Headquarter Contact: Francis Li liweiaac@dcits.com

DCITS

Digital China Information Service Group Co., Ltd.

Digital China Information Technology Singapore PTE. LTD.

Website: en.dcits.com