Measures Required for the Banking System in the Digital Era

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Abstract

Today's rapid pace of digital transformation (DX) is greatly impacting the banking sector, including banks that handle financial services, consumers who receive these services, and also the banking system itself that serves as the point of interaction between banks and consumers. This paper looks back at past changes in the Japanese banking system and discusses the requirements for the banking system in the future to deal with competition by responding to changing customer needs using the approach taken by NEC Corporation.

Keywords

Banking system, online, Banking as a Service, open API, microservice, cloud computing

1. Introduction

In order to respond to changing customer needs and stay competitive, banks around the world are transitioning to open banking that promote linkages between banks and external businesses such as FinTechs and non-financial companies. Under this trend of open banking, digital native competitors are gaining traction and existing banks are establishing second brands one after another. This is exemplified by neobanks and major IT firms providing various FinTech services based on the open API framework.

In the Japanese banking sector, traditional financial service models and leading service providers are undergoing great changes, and existing banks are faced with the need to rapidly provide new services. Among non-financial institutions, the need for banking functions has also increased. Digital transformation (DX) is bringing great changes in the environment surrounding the banking system.

In response to the new needs arising from these banking services, NEC is leveraging its technical abilities to accelerate efforts toward achieving Banking as a Service (BaaS), which aims to adapt banking systems to changes in the external environment. The rest of this paper reflects on the evolution of the Japanese banking system and discusses the system requirements for BaaS in order to meet changing customer needs.

2. Changes in the banking system

This section describes the evolution of the Japanese banking system through successive generations.

2.1 First-generation online system

The savings deposit online system of Mitsui Bank (now Sumitomo Mitsui Banking Corporation) launched in 1965 is regarded as the first online banking system in Japan. Previous banking systems were offline and mainly based on the "punch card" system. The punch cards were collected in a business center and subjected to centralized management for improved efficiency. When the online system was introduced, the time taken for updating the ledger reduced considerably to a few tens of seconds so the job processing efficiency was improved drastically.

The online systems of this generation were characterized as single-function online systems, such as "online system for savings deposits" or "online system for loans." The main purpose of shifting to an online system was to improve efficiency and save labor on the paperwork for individual processes.

2.2 Second-generation online system

It was in the early 1970s that the "Integrated Online System" was established. This system integrated the management of customer information and enabled simultaneous processing of multiple functions by linking contract information of multiple products with the relevant customer information. The characteristic feature of the online system of this generation was the batch processing of deposits and withdrawals, which is sometimes called "center cut" processing. It was also in this generation that the account transfer operation was introduced under which the deposit/withdrawal data was provided on magnetic tape from the client and the result was returned after processing and dissemination.

It was also in this phase when construction began on interconnected bank networks to promote mutual use of cash dispensers (CD) and automatic teller machines (ATM). Although the networks in this period were not yet divided by business type, such as major/minor city banks and regional banks, the interconnected network greatly improved convenience for account holders.

2.3 Third-generation online system

The financial deregulation in the latter 1980s to early 1990s brought with it the successive development of new products and extended operating hours for regional banks, generating a need for a system with greater flexibility and scalability. As it became clear that simply modifying the existing online systems was not enough to catch up with innovations in IT technology, many banks reassessed their systems and built new systems that were more flexible and scalable. After complete overhaul of the system every decade, the online banking system was finally completed by its third-generation.

2.4 Hub-and-spoke architecture

In the early 2000s, some banks adopted the hub-and-spoke architecture, in which messages required for linking applications in individual subsystems are exchanged through a subsystem called the "hub." As the hub system can absorb the effects of replacement of an individual subsystem with another system or addition of new operations, this architecture can reduce effects on other subsystems.

2.5 Internetworking

Expansion of the Internet in the latter 1990s made it possible to carry out online banking operations over the Internet by the latter half of the 2000s. Sumitomo Bank (now Sumitomo Mitsui Banking Corporation) launched an Internet banking service in January 1997, followed in June by Asahi Bank (now Resona Bank, Ltd.), and the following year by Sanwa Bank (now MUFG Bank, Ltd.), Sakura Bank (now Sumitomo Mitsui Banking Corporation) and Fuji Bank (now Mizuho Bank, Ltd.). Initially, some banks provided only services that allowed account holders to perform transactions such as balance inquiries that did not involve the transfer of funds, but services were eventually expanded to enable transactions such as making investment trust purchases and foreign currency deposits. Account holders were able to perform nearly all transactions without having to physically go to a bank.

2.6 Open banking

Since 2000, some regional banks and secondary regional banks have been switching their core banking systems from mainframe-based systems to open systems with the aim of reducing the initial hardware/software costs and development cycle. In many cases, open systems were adopted as a shared system instead of developed independently. In 2003, NEC started operation of a core banking system in the UNIX environment for the first time in the world and, later in 2007, a system running on the Windows server was released.

3. Future of the Banking System

Traditionally, banking systems have been built in on-premises environments to achieve stability, robustness and invariability, and elements to deal with changes have been built as individual subsystems. However, the banking system in its former state is no longer able to keep up with the rapid changes in the business environment. The following are requirements[1)2)] for the banking system to continue to achieve sustainable growth in the digital era.

- Use of open API for improving linkage with external services
- Use of microservices for tracking changes in the business environment
- Use of cloud for flexible scaling

3.1 Open API for improving linkage with external services

Traditional banking systems were linked using closed interfaces, but an increased number of recent systems have adopted the open API to facilitate collaborations with external businesses and secure new sources of profit by opening the banking functions and data. Use of API in banking functions and data by building an API gateway in the system layer linked with external systems makes it possible to open banking functions and valuable data in the bank to external businesses and consumers through the API without altering the structure of existing applications. This allows the bank to form an extensive ecosystem of external partners.

The web API, which is an API based on web technology, has become the de-facto standard for linking systems. The general format of API is to express the access target resource with the URI (Uniform Resource Identifier) and request an operation of a resource using the HTTP method, and the resource status responds to the request. The style of this architecture is called REST (Representational State Transfer), and the response format generally used is JSON (JavaScript Object Notation). The methods for describing the request and response of the API are being standardized in the OpenAPI Specification. When the banking system acquires such an interface based on an open standard, it can easily link with a diversity of systems.

3.2 Microservices for tracking changes in business environment

Continual use of a core banking system is considered effective from the viewpoint of stable operation and investment protection. In the digital era, the core banking systems should advance to provide highly-reusable services enabling flexible addition of channels and operations. For this purpose, we believe it is desirable to establish a loosely-coupled architecture by revising the definition and function layout of the hierarchical structure and standardizing the inter-hierarchical linkages. The technology for implementing such a loosely-coupled architecture is the microservice technology.

In view of business strategy, applications for bank operations that need differentiation from competitors must have the ability to respond to changes. Modernizing applications through microservices makes it possible to reconstruct applications to provide a higher level of agility and flexibility. This allows banks to launch new services and projects more quickly.

Nevertheless, since a distributed system such as microservices is accompanied with the problem of securing data consistency, a configuration that can solve it is required. The core banking system should correctly manage the money flow across multiple services, and the transaction management also becomes the key issue from the viewpoint of data consistency. Based on these considerations, NEC believes that it is necessary to adopt a configuration based on orchestration by considering the transaction (service call) control.

3.3 Cloud computing for flexible scaling

Banks were initially not so enthusiastic about adopting cloud computing because of concern for security, but recent improvements in security technology is making cloud computing one of the main means of system construction for banks. In addition, opening of banking services using open API is expected to increase the transactions performed on banking systems in the future. Increase in transactions can be dealt with by reinforcing the system resources in the on-premises environment, but this would entail high system-building costs as well as time. The use of cloud computing is expected to allow banks to procure system resources as required without delay, facilitate materialization of business ideas, and reduce costs and time for providing services to customers.

NEC is leveraging its technical abilities to realize the three system requirements mentioned above and construct a BaaS that offers the capabilities to respond to changes in the external environment.

4. Conclusion

This paper looked back at the evolution of the banking system and discussed the system requirements for BaaS capable of speedy and flexible response to changing customer needs.

Future progress of technology will advance digital transformation further and is expected to also change the nature of banking systems. To prepare for new banking systems in 5 or 10 years from now, NEC is re-examining "what the banking system is" and is continuing to fully leverage its technical abilities to implement a BaaS solution with capabilities to cope with changing external conditions and thereby help banks survive and prosper in the new environment.

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