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CREATING INFRASTRUCTURE FOR SCALABLE FINTECH SOLUTIONS: TECHNICAL AND ORGANIZATIONAL ASPECTS

Abstract: The article focuses on the analysis of key aspects in building infrastructure for scalable fintech solutions, including both technical and organizational components. It discusses modern approaches to cloud technologies, high-speed databases, and API, as well as data security issues and the integration of legacy and new systems. Challenges related to coordination between market participants, including regulators and startups, are also explored. The article provides examples of successful cases, such as the use of cloud technologies by PayPal, and emphasizes the role of standardization and innovative technologies in ensuring flexibility and reliability of fintech solutions.

Key words: infrastructure, fintech solutions, cloud technologies, API, data security, scalability.

Language: English

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Introduction

Recently, the creation of financial technologies has been not only an important economic component but also one of the main factors that encourage changes in the global finance system. The scalability of the infrastructure of such solutions is a crucial task that provides stability, flexibility, and durability. All this requires not only the introduction of new technological solutions but also the careful development of organizational structures, regulatory mechanisms, and interaction of various market participants.

A lot of serious challenges face the development of infrastructure for fintech solutions, including ensuring security and the transparency of operations, and integrating with already existing financial systems. The creation of a technical basis able to support huge volumes of data, ensure fast processing of transactions, and a high level of information security can be included in the most important tasks. In turn, organizational aspects involve the development of clear mechanisms of coordination between various market participants, including government agencies, banks, financial companies, and technology startups. The goal of this article is to

explore the technical and organizational aspects necessary for creating scalable infrastructure tailored to fintech solutions.

Main part. Analysis of the current state of fintech infrastructure

Modern fintech infrastructure is a broad variety of technological and organizational solutions that guarantee stability, security, and flexibility of financial transactions. The most important feature of the current fintech infrastructure is scalability: the ability of the system to serve effectively the growing volume of transactions, keeping quality and speed. Nowadays, the main components of the fintech infrastructure include cloud technologies, databases, security systems, and interfaces for integration with external systems.

Cloud solutions are one of the most important technological bases of modern fintech infrastructure. With the help of cloud technologies, it is possible to promptly scale services and reduce the costs of physical resources. For example, in the USA, companies like **PayPal** actively use cloud services to ensure a high level of availability and speed for their payment systems. According to the study, more than 70% of global fintech companies use cloud solutions

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for data storage and transaction processing [1]. These technologies allow not only to reduce the time for deploying new services but also to increase the fault

tolerance of the infrastructure. Moreover, according to statistics, many banks have already transferred their structure to cloud technologies (fig. 1).

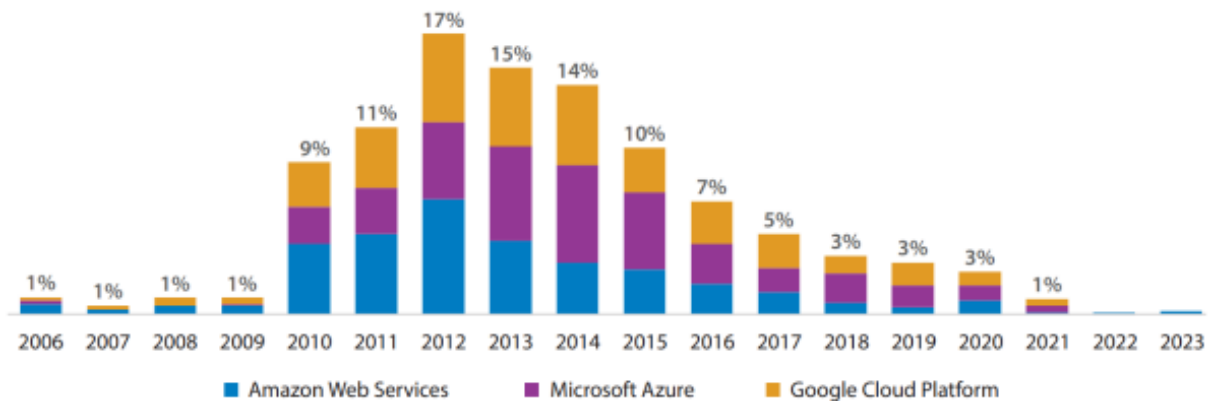


Figure 1. The process of cloud migration by year [2]

Another important aspect is the use of **high-speed and scalable databases**. While the volume of transactions increases, it is highly relevant to process and store them quickly and securely. Systems like Cassandra and MongoDB have become an important tool for any fintech company due to their ability to handle high volumes of data in real time. Since the fintech sector requires very high levels of security, a secure database and data transfer protocol are crucial for gaining and building user trust. To be precise, security systems like SSL/TLS and advanced data encryption methods have gained ground as an industry standard.

Moreover, much attention is paid to interoperability issues of systems. In the context of financial platforms' diversity, it is necessary to ensure seamless interaction of various services with one another. The successful integration example is the open banking initiative on data exchange from the **Consumer Financial Protection Bureau**, or CFPB, of the USA. In fact, the CFPB, under the **Dodd-Frank Act** [3], is working on developing a regime that allows financial institutions and third-party service providers to securely share consumer data, with consumer permission through standardized API.

Therefore, the modern condition of fintech infrastructure proves that this industry is actively responding to growing market demands and needs continuous updates in technology. One should note that scalability in successful fintech solutions depends not only on technological capabilities but also on organizational-level skills for effective communication with external partners and regulators. Among key tasks are enhancing security, integrating it with existing financial systems, and supporting data volume growth.

Technical challenges and solutions

Infrastructure development for scalable Fintech solutions faces a number of key technical challenges

in such areas as system interoperability, data security, and platform scalability. In the context of the explosive growth of the financial technology market, it is important to secure the effective interaction of various systems, but no less important is ensuring a high level of security and protection of user data.

One of the main challenges is the **compatibility and integration of various technologies**. Existing banking and financial systems usually operate on outdated technologies, while fintech companies use more flexible solutions based on microservice architecture and cloud platforms. In such conditions, the task of interoperability becomes especially important. One of the solutions to this problem is the use of API that allow you to create bridges between different systems. Modern standards such as REST and GraphQL provide convenience and efficiency of integration, providing unified access to data and the ability to flexibly scale applications. For example, the REST architecture is widely used to create reliable and easily extensible API, and GraphQL allows developers to request only the data they need, which reduces network load and improves performance. For example, Plaid in the USA actively uses API to integrate between thousands of bank accounts and fintech applications such as Venmo and Robinhood [4]. This allows companies to quickly scale their services and integrate them with banking systems, minimizing technical barriers for users.

Data security is no less important a task, since in the financial sector any breach of confidentiality can lead to serious consequences. Fintech companies are forced to use multi-layered security systems, such as encryption and tokenization, to ensure the security of transactions and data storage. For example, Square, a popular American payment processing platform, uses tokenization to protect customer bank card information [5]. This method ensures that data is not compromised when processing transactions, which is

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critical to maintaining user trust and preventing data leaks.

Scalability systems remains another significant challenge, as the number of transactions and the volume of data processed are constantly increasing. To solve this problem, cloud infrastructure is used, which allows dynamically adapting resources depending on the current needs of the system. Cloud technologies significantly reduce operating costs and allow for the efficient management of growing data volumes. An example of this approach is the use of cloud solutions by Stripe, which processes billions of transactions. Thus, between Black Friday and Cyber Monday in 2024, companies using Stripe processed more than \$ 31 billion in 465 million transactions, demonstrating the scalability and reliability of the platform [6].

Thus, the key technical challenges for fintech infrastructure are system compatibility, data security and scalability. To solve them, modern technologies such as API interfaces, cloud computing and data protection methods are actively implemented, which allows creating reliable and flexible platforms that can effectively cope with the increased market demands.

Organizational barriers and ways to overcome them

Development of infrastructure for scalable fintech solutions faces not only technical challenges but also organizational barriers. In most cases, such obstacles are a consequence of inconsistencies between different stakeholders, lack of unified standards, and slow decision-making procedures. Overcoming such barriers requires an integrated approach: coordination of market participants, implementation of standards, and the use of modern management approaches.

One of the most critical organizational barriers is a lack of coordination between regulators and market participants. In 2023, in a study conducted by McKinsey, 68% of fintech companies named complex and disparate regulatory requirements as the main challenge to scaling their services [7]. This is particularly true for global markets, where

requirements differ not only between countries but also within regions. Overcoming this barrier requires the creation of an international regulatory framework that will consider the interests of all parties and will promote the harmonization of requirements [8].

The second one is a lack of integration between large banks and fin-tech startups. Usually, big financial institutions are conservative regarding new technologies implementation, which prevents them from effectively interacting with more flexible fin-tech companies. The third important barrier is a lack of qualified personnel with skills of working at the juncture of finance and technology. This can be fixed only through the creation of more intense educational programs developing skills in blockchain, machine learning (ML), and big data. In fact, one might get the public-private partnership engaged in the issue of the retraining of specialists, and attracting related talent pool from other fields.

Thus, the main organizational barriers are the fragmentation of regulatory requirements, the lack of close cooperation between market participants, and a lack of qualified personnel. The solution to these challenges can only be achieved through the collaborative efforts of standard unification, integration of innovative solutions, and human capital development that will guarantee the sustainability and growth of the fintech industry.

Prospects for the development of scalable infrastructure in fintech

The development prospects and innovative solutions in the sphere of scalable infrastructure for fintech applications currently depend on enabling technologies, which can remarkably improve financial services in a number of aspects: efficiency, security, and availability. During the last years, the active implementation of **artificial intelligence** (AI) and **ML** technologies aimed at automatization, increasing the prediction accuracy, and optimization of customers' services has become a tangible trend. In particular, AI can contribute much to the field of risk assessment and fraud prevention in order to make transactions more reliable and secure (table 1).

Table 1. Markets and regions with the highest potential for fintech solutions [9]

Region	Growth potential	Key challenges	Local regulations and features	Examples of companies
North America	High-growth market with significant investments.	Regulatory requirements, competition.	Progressive data protection laws (GDPR, CCPA).	PayPal, Stripe
Europe	Progressive legislation, large user base.	Diversity of national regulations.	GDPR, PSD2	Revolut, N26
South Asia	Fast-growing market, high interest in mobile payments.	Limited infrastructure, weak legal framework.	Development of local regulations, support for mobile tech.	Paytm, Razorpay

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Latin America	High demand for digital financial services.	Low level of financial inclusion.	Implementation of digital currencies, mobile payments.	Nubank, Pago Market
Africa	Huge potential for mobile payments and microfinancing.	Infrastructure issues, political instability.	Adapting local regulations, mobile internet growth.	M-Pesa, Flutterwave

One of the most promising areas is the integration of blockchain technologies to increase the transparency and efficiency of financial transactions. The use of decentralized systems in the field of payments and smart contracts allows to reduce the costs of interbank transfers and speed up the process of processing transactions. Blockchain also opens up new horizons for digital currencies, which, according to forecasts, can become the basis of the global financial infrastructure in the coming decades.

Particular attention should be paid to the development of new generation payment solutions that provide faster and more convenient ways to make transactions. For example, technologies based on QR codes and NFC payments are becoming increasingly popular in mobile applications. Instant payment systems, such as Real Time Payments (RTP), are beginning to be implemented in countries with developed financial markets, allowing users to make transfers in a matter of seconds.

In addition, the implementation of cloud computing continues to be the basis for the scalability of fintech solutions. The development of cloud infrastructures and services provides companies with flexibility in resource management, improving interaction with partners and customers. Most recently, companies such as AWS and Google Cloud have announced new solutions to improve the security and scalability of services, which helps to more effectively serve a growing number of users.

Thus, the prospects for the development of the fintech infrastructure are closely linked to the further implementation of innovative technologies such as AI, blockchain, new payment systems and cloud

solutions. These technological trends not only create opportunities to optimize the operation of existing systems, but also open up new ways to transform financial services.

Conclusion

Financial sector development, in which active changes are happening under the influence of technology, involves the creation of infrastructure for scalable fintech solutions. The article considers key aspects, both technical and organizational, which will determine the success of such solutions. Cloud technologies, high-speed databases, API interfaces, and methods of data protection are all grounds for modern fintech infrastructure, which should ensure its flexibility, security, and scalability.

However, there are a number of challenges that require a comprehensive approach: integration of old and new systems, ensuring a high level of data security, interaction between various market participants, including regulators, banks, and start-ups, remain critical tasks. One of the important steps toward solving these problems is to create unified standards and increase coordination between stakeholders.

Prospects for further development of fintech solutions are related to active use and implementation of innovative technologies, including AI, blockchain, and new payment systems. Such innovations allow improving the quality of users' service, increasing speed, and reducing costs. Further on, successful implementation of scalable infrastructures will mean reliability, security, and availability of financial services to users from any part of the world.

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