



# Expansion of payment services on cloud

November 2021



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# Foreword

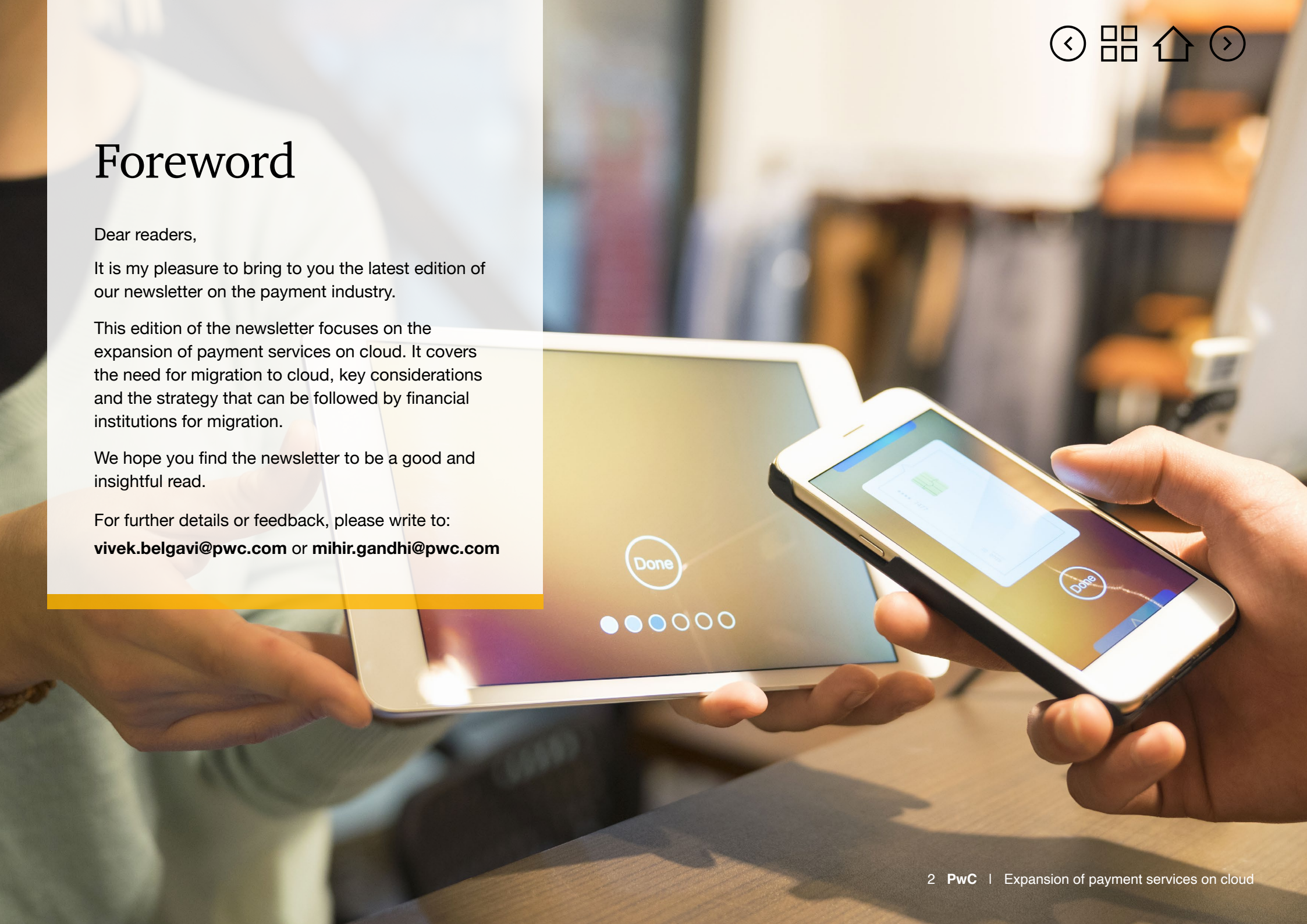
Dear readers,

It is my pleasure to bring to you the latest edition of our newsletter on the payment industry.

This edition of the newsletter focuses on the expansion of payment services on cloud. It covers the need for migration to cloud, key considerations and the strategy that can be followed by financial institutions for migration.

We hope you find the newsletter to be a good and insightful read.

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The payment industry is seeing a remarkable pace of innovation. Financial institutions (FIs) are adapting to the changing requirements and evolving challenges by adopting multiple technologies, one of which is migration to cloud. FIs have started moving away from established on-premise infrastructure to embrace the next-generation benefits offered by technologies such as cloud computing.

The cloud revolution for FIs began a few years ago in areas like sales and marketing which later expanded to enterprise systems like HR and finance. Further, as customer interactions become digital, the new wave of the banking revolution will aim at the migration of core applications and processes. As one of the crucial domains, payments would be a priority for 'cloudification'.

Prior to cloudification, FIs had legacy systems running as on-premise infrastructure which needs to be set up for individual organisations and is accessible at a specific location. A failure such as a power outage or disruption in the server could result in huge losses. Moreover, sharing of information among organisations was a complicated process. To overcome these challenges, FIs started looking at the outsourcing model offered by technology service providers to optimise cost. Thereafter, in 2006, cloud technology was introduced and FIs started migrating to cloud. This migration has brought many benefits, including higher infrastructure availability levels. In fact, a payment merchant in India was able to reach infrastructure availability levels ranging from 97% to 99.999% through cloud migration.

Cloud computing applications provide FIs the ability to scale up services and improve customer experiences, one of the essential applications of a payment system. They also provide FIs with various services like storage or development platforms on demand through off-site data centres that are connected to the internet. This serves as a feasible and efficient approach to resolve the challenges in existing payment systems. It also helps FIs to keep pace with the increasing number of transactions.

The benefits of cloud migration are also evident from the fact that cloud-based payment companies have grown at a faster rate than many large banks. Some challenger banks are also embracing cloud to support their customer offerings, including payments.

They use platform-as-a-service (PaaS) models to allow developers to easily design, host, and deploy applications without having to worry about setting up and managing their own server. However, PaaS models are not the only option for cloud migration as FIs with sufficient resources can opt to conduct multiple core and non-core banking functions directly on cloud to meet various customer expectations.

In defining a cloud strategy for payments, we have identified different applications in the payment lifecycle ranging from onboarding, issuance, authorisation and post-transaction processing. Analysis of these factors will help in prioritising the critical functions to be migrated.

With proper implementation, a cloud-based payment system will provide not only greater convenience to FIs but also enhanced data security and lower costs.

The answer to many of the challenges FIs face today lies in cloud migration. Issues such as scalability, security, high technology costs, agility, speed of change and real-time processing have a significant impact on banks. Cloud migration could help in resolving some of the issues of the on-premise models.

## 1. Challenges in the on-premise (non-cloud) system

### a. Scalability and elasticity:

Scalability and elasticity are important elements in banking because FIs are witnessing tremendous growth in a short period of time and need to support multiple transactions and products/services offered. For example, faster payment systems that provide near real-time settlement can handle thousands of transactions per second. However, peak transaction processing happens only for a small fraction of the total running time, so the additional resources are utilised during this time only. Hence, system needs to be more elastic and optimise resources to meet this tremendous growth. Although scalability and elasticity can be achieved with the on-premise model through installation of new servers and host location, this is a very costly and lengthy process with no scope for resource optimisation.

### b. Agility and managing speed of change:

The volume of transactions is increasing at an average compound annual growth rate (CAGR) of 23%.<sup>1</sup> The launch of new and innovative

payment products like Unified Payments Interface (UPI), National Electronic Toll Collection (NETC) and Bharat Bill Pay Service (BBPS) has firmly placed the digital payment industry on an upward growth trajectory. Moreover, payment systems are being augmented due to trending technologies such as artificial intelligence (AI)/machine learning (ML), containerisation, blockchain and open-source project management platforms. These offerings can enhance the quality of deployment as well as the productivity of the overall system. To support these innovations and products, FIs need to have adequate infrastructure or else even a simple request can quickly turn difficult when dealing with high-volume processes. This agility is difficult to achieve in an on-premise model as it does not allow constant change after a certain level of system capacity. Expansion of the system then becomes very costly and time-consuming as a new server and firewalls need to be installed and physically maintained for security and other features.

### c. High capex cost:

Capital expenditure is higher in the in on-premise model as expenses are borne for a marginally longer period of time. These expenses include storage requirements, infrastructure maintenance, cost of upgrade, electricity cost and software/hardware costs. Moreover, a business needs to develop a strategic capex model because if it doesn't invest enough, its computing capabilities will be limited. On the other hand, if it invests too much and does not utilise the capacity fully, it ends up paying for the installation and maintenance of excess services.

<sup>1</sup> <https://www.pwc.in/assets/pdfs/consulting/financial-services/fintech/payments-transformation/the-indian-payments-handbook-2020-2025.pdf>





## 2. Benefits of migration to cloud

Moving to cloud architecture can help banks and FIs cope with significant growth in payment volumes while simultaneously handling the inevitable peaks and troughs of transaction flows.

Cloud seems to be the future of payments in the current digital transformation era. Here are some of the advantages of cloud over legacy systems.

### a. Resilience and scalability:

Cloud computing allows a business to scale up its infrastructure to meet demand without having to invest in costly redundant capacity. A business can utilise any number of resources on demand as per its requirements because the cloud system allows the utilisation of services on a pay-per-use basis. This will make the system more elastic, and the resources can be optimised effortlessly as well.

### b. Agility and faster upgrade:

As discussed earlier, the payment system is growing along with modernisation due to evolving technologies. This requires the payment infrastructure to be upgraded, regardless of whether this is done on cloud or on premise. There are several other changes being adopted by FIs like change in payment architecture, renewing RTGS for high-value payments and migrating to ISO 20022. These changes can be achieved with cloud as it enables provision or de-provision of any service in a few minutes unlike the on-premise system wherein implementing changes can take a few days to months.

Moreover, cloud service providers have in-built modules for these advancements which can be accessed as per a business's requirements. These services make the payment system faster and more efficient. For example, some FIs have implemented AI applications which are helping in fraud detection and offer benefits in terms of speed and efficiency of payments, KYC process, regulations, etc. So, to achieve a more agile system which can provide continuous improvements in the face of market disruptions, FIs need to adopt cloud.

### c. Low capex cost:

Unlike the on-premise model, the capex costs in the cloud model are designed for a shorter duration. The offered services can be accessed at any point of time in the business cycle on a pay-per-use basis, even if these services were not opted for the time of installation. Hence, it eliminates the issue of redundant resources while optimising cost. Moreover, cloud service providers offer two types of infrastructure deployment – one within the country (on-soil cloud) and another outside the country (global cloud):

- **On-soil cloud:** In the case of on-soil cloud the concept of data sovereignty applies, i.e. the data is subject to the laws and regulatory guidelines of the country. So, the cloud set-up needs to be within the country in this kind of infrastructure deployment.
- **Global cloud:** The data can be extended across borders. So, the cloud set-up can be at different geographical areas and accessed through the internet.

Also, as per the RBI development policy announced on 8 December 2021,<sup>2</sup> for low-value transactions via UPI, an ‘on-device’ wallet will be maintained which will segregate the workload and prevent transaction failures because it will not utilise significant system capacity.

However, cloud can still be beneficial in handling the remaining workload of high-value transactions.

### d. Outsourcing capability:

FIs are now outsourcing the core functions of payment transactions such as transaction management, payment processing, risk management, information technology and information security management, etc., via various service models like PaaS payments which is a combination of the IaaS and SaaS domains. Through the PaaS model, cloud service providers are offering specialised services such as payment system hosting, reconciliation and settlement, cross-border payments, and cash withdrawals to FIs/companies. These models can be deployed quickly with high scalability. Also, they can create an intelligent billing and payment network that can digitise receivables, automate processing, reduce time to cash and transaction costs, and generate new revenue.

For example, a business started using the PaaS model for the development and deployment of services on cloud. Doing so enabled it to off-load monitoring, scaling and operations, which in turn helped it focus on business differentiators. The other benefits were cost savings and simplified payments and procurement. Moreover, it was able to launch a few new products in a year as this model supports provides quicker deployment.

<sup>2</sup> [https://www.business-standard.com/article/finance/rbi-to-have-on-device-wallets-in-upi-apps-for-small-ticket-transactions-121120800446\\_1.html](https://www.business-standard.com/article/finance/rbi-to-have-on-device-wallets-in-upi-apps-for-small-ticket-transactions-121120800446_1.html)

# 03 Key considerations



As the demand for more efficient systems at reasonable costs increases, FIs are gradually shifting their workload to cloud. Pre-migration planning is just as crucial as the actual migration. Before migrating to cloud, an FI needs to have a migration strategy in place. It includes identification and evaluation of applications to be migrated to cloud, strategical modelling of cost benefits and resource utilisation, and capacity assessment. These considerations are discussed below.

## 1. Identification and evaluation of processes to be migrated

The first step towards migration of payments to cloud is to assess the current payment model. The classic payment model involves multiple entities which are utilised for various processes such as onboarding, transaction processing and post-transaction processes.

Banks need to evaluate these processes for scalability, cost benefits and latency as the primary checks and set a hierarchy of migration for the modules that need to be migrated to cloud based on this analysis.

**a. Onboarding process:** Generally, this does not include many dynamic processes. As a result, it may not be very cost-effective to migrate it to cloud. The static data of the onboarding process can be stored efficiently on an on-premise system as well.

**b. Transaction processing:** This involves several participants and is a culmination of multiple steps like payment initiation through routing switch and an authentication and authorisation engines. So, given the steps involved and timeframe, this process requires dynamic scaling as utility can vary as per demand, method of processing, gateways, etc. This should be the top priority while migrating to cloud to enable greater cost efficiency, scalability and efficiency.

**c. Post-transaction processing:** This is also a crucial part of the payment cycle as it includes actual movement of funds. Some of these processes are dynamic, while some are too linear to move to cloud. Based on the attributes of these processes, settlement, rejection and reconciliation require upgraded scaling and need to be time and cost efficient as well. Hence, they may be considered for migration to cloud. On the other hand, maintenance of bill records and management of disputes/claims could be done through the on-premise model.

## 2. Cost-benefit analysis

After identifying and evaluating of applications to be migrated to cloud, the various costs involved, transaction volume changes, processing time and other mandatory attributes related to specific segments should be assessed comprehensively.

The costing model will include:

**a. Capex cost:** As discussed earlier, the capex cost of the cloud model is much lower than that of the on-premise model due to its dynamic scaling feature. The cost of availing resources for cloud services is shared across multiple players, thereby reducing the overall spending, which includes the cost of data centres, electricity and skilled manpower. So, the initial cost incurred on the cloud model will be lower .

**b. Opex cost:** The opex cost for the cloud system is slightly lower than that of the on-premise model. This is because in the case of cloud services, the FI needs to pay a subscription cost to the cloud service provider for the required services. In contrast, the opex cost for the on-premise model comprises cost elements such as hardware, software and network support, storage warranty, power, admin, labour and employee training.



### 3. Capacity assessment

It should be conducted to gain a better understanding of the existing and desired system and to identify gaps in business as usual (BAU). This assessment needs to be done with a few considerations like trends followed by market leaders, objectives of migration strategy, peak transaction volumes and evaluation of various aspects of post-migration operations.

### 4. Demonstration of cloud operating model

This model will demonstrate how the present workflow and operations will be altered by the cloud computing. The model should be based on the FI's migration strategy and should present the post-migration operations as well. The different models are discussed later in the section on migration strategy.

### 5. Assessment of challenges in cloud migration

As with any other system, there are some cons associated with the cloud system too. These disadvantages must be carefully considered before migration.

- This is an internet-dependent service, so in case of network outage, it may result in production loss.
- The cloud model is vulnerable to security threats as it contains a large amount of information from multiple companies.
- Data mobility will be slow and completely dependent upon network bandwidth if information needs to be migrated from cloud to the FI's systems.
- The public cloud model comes with certain loss of control as an FI has no other alternative but to upgrade in case a specific version of an application is decommissioned by the cloud service provider.
- There is very limited control over maintenance and FIs are dependent on the service provider to resolve any issue in the system.

### 6. Cloud readiness assessment

This evaluation enables a bank to turn a hazy plan for cloud migration into a structured one. Below are some tips for a successful evaluation of cloud readiness:

#### a. Budget and timeline estimation:

It is important to plan and design a realistic timeframe and estimating the budget prior to the migration.

#### b. Ordering of applications to be migrated:

Migrating the entire system at the same time is not a good decision and involves a lot of risks. Thus, FIs should prioritise applications or workloads to migrate first by doing a strategic portfolio study.

#### c. Test adequately:

The payment architecture design, data migration and testing should be thoroughly assessed. Moreover, a disaster recovery plan should be in place.

#### d. Significance of security:

The cloud provider and consumer should prepare comprehensive and robust security rules that will ensure success after the migration.

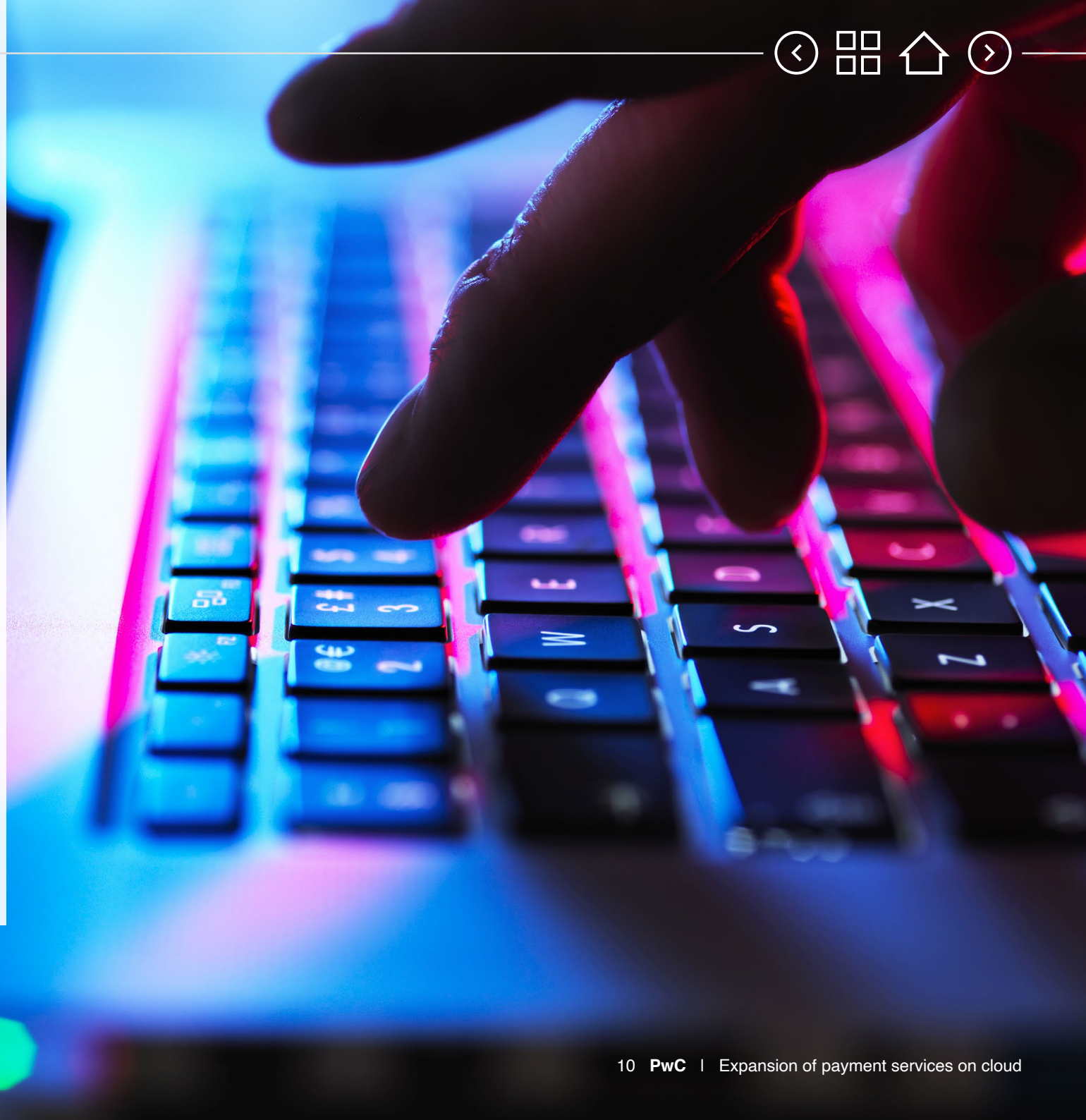
### 7. Upskilling of workforce for cloud migration

To maximise the return on investment from cloud, it's important that FIs develop a comprehensive cloud training programme to upskill and reskill their employees. The onus is on the organisation to choose a mix of upskilling, reskilling and cross-functional skilling that will work for its team. It is vital to invest in an upskilling programme that reimagines IT for cloud-empowered, strategic roles that could function as the very backbone of a modern enterprise.

## 8. Data privacy/regulations for cloud migration:

If an application is being migrated to cloud, then only relevant processes should be processed and stored in those cloud regions that meet compliance requirements. In addition, as an application is being migrated, the data flow should be mapped throughout the cloud architecture. This will help in keeping track of how customer data is being used and in staying on the right side of privacy legislation. Migration to cloud also calls for a new distributed approach to software design, where the overall application is segregated into smaller components known as microservices, with each deployed on its own dedicated resource. This will provide more granular control over workload capacity requirements, helping to improve cost efficiency and track down compliance requirements.

Based on the above key considerations, a decision on whether cloud migration will be aligned to business requirements should be taken.



# 04 Migration strategy

Once the decision to migrate to cloud is taken, the process of moving digital assets like data, workloads and core and non-core banking functions to the new system will begin. The different approaches that can be considered are as follows:

## 1. Migration process:

Depending on the scale of business and number of applications, there are three standardised migration processes.

### a. Big bang migration:

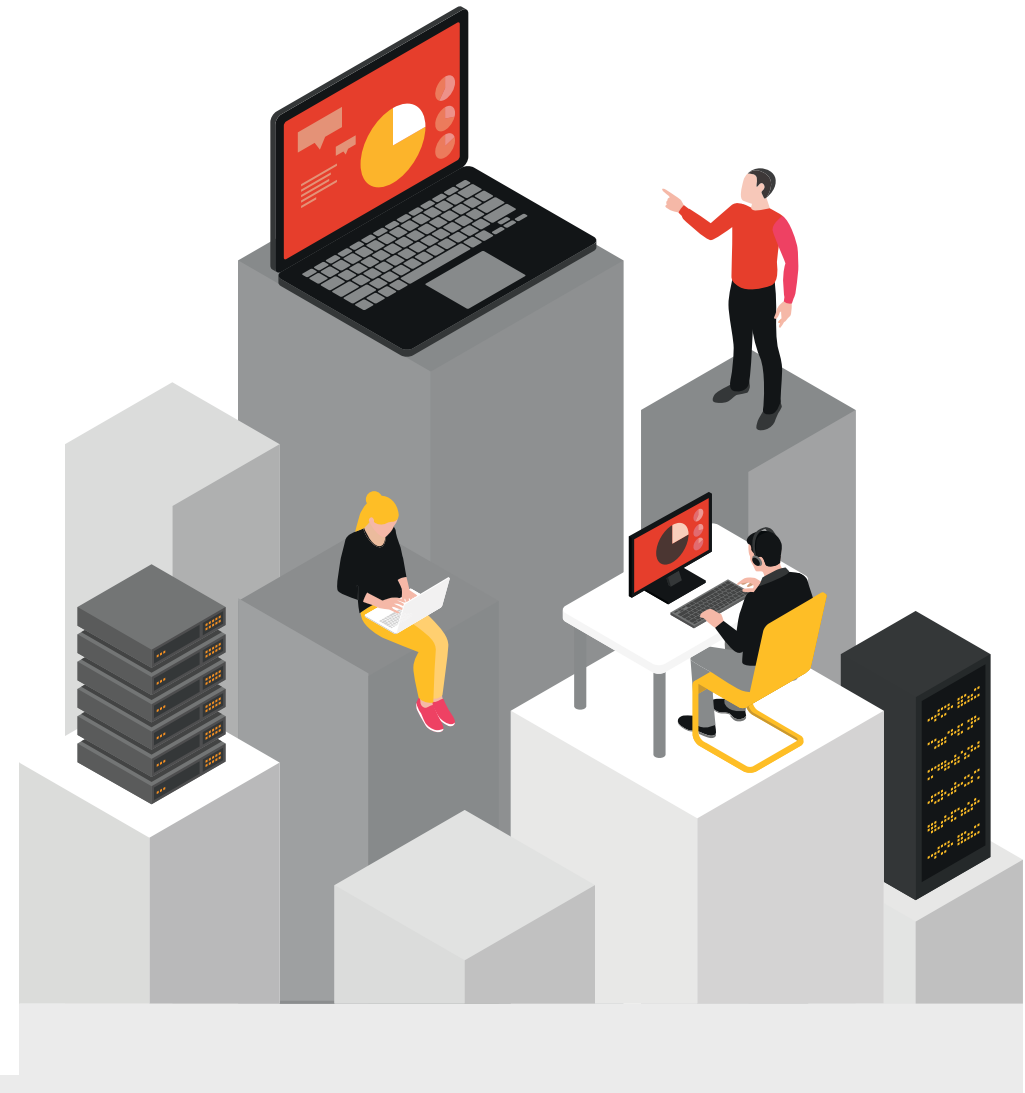
It's the process of migrating existing physical payment infrastructure (apps, data and settings) to cloud. The ultimate result of this migration is the same infrastructure that employees are familiar with, but it is now hosted on cloud. Because their IT systems are not as vast as those of companies, small and middle-sized banks frequently opt for full migration. The execution usually takes a few days and is relatively risk free. The drawback of this approach is that not all cloud features are available. This is suitable for small-scale business as the entire data will be migrated in one operation.

### b. Parallel migration:

Also known as the module-wise approach, it involves moving only a portion of the payment systems and data to cloud. This is a good option to evaluate cloud services. Large banks usually adopt this method.

### c. Partial migration:

It refers to the ability to continue using the current payment method while migrating to cloud. This is also known as the hybrid approach. The unique aspect of this migration method is that organisations will have to maintain two systems at the same time. This approach can be adopted by both small- and large-scale companies.







## 2. Delivery roadmap:

The most suitable way to implement migration is through the creation of an agile delivery plan which should clearly depict the sprints. The selection of a minimum viable product (MVP) will enable the tracking of progress and iterations very smoothly. Also, the cloud service provider and business integration tests should be included in the sprints for proper implementation.

## 3. Cloud deployment model:

The essential environment parameters such as accessibility and proprietorship of the deployment infrastructure and storage size should be considered before selecting the cloud model to be adopted. The various deployment models available are as follows.

### a. Public cloud:

Data is created and stored on third-party servers that belong to service providers. This model provides benefits such as hassle-free infrastructure management and reduced costs. But it provides only standardised service operations and hence cannot accommodate complex operations. Businesses with low privacy concerns opt for this model.

### b. Private cloud:

This is similar in architecture to public cloud but is available to only one specific company. The server can be hosted on premise or externally and is managed on a designated private network. As the number of consumers is limited in this case, this model is opted for when data security and privacy are priorities. While this model offers bespoke services and is more flexible, the cost is very high.

### c. Community cloud:

This model is like the private cloud model but the number of consumers is higher than that in private cloud. This is because services are utilised by several companies. This model is suitable for the companies with similar backgrounds.

### d. Hybrid cloud:

It is a combination of the above models to improve security and privacy at a reasonable price. This is suitable for companies where migration is categorised based on criticality, sensitivity, etc.

## 1. Cloud adoption by an Indian payment gateway

A top payment gateway service provider which has more than 30% market share opted for a cloud service model after using the on-premise model for ten years. This payment gateway service offers more than 70 online payment modes.

Before migrating to cloud, the business merged with another leading payment technology business and was facing challenges in terms of scaling. It estimated that the existing infrastructure needed to be scaled up fourfold. So, it ran proofs of concept and decided to opt for a full-featured cloud service.

It implemented a database, production environment and associated system on cloud and was able to achieve following benefits:

- The infrastructure has the ability to be scaled up fourfold which will support a growing increase in consumers, transaction volumes and other various merchant clients. The provider recorded infrastructure availability of 99.999% compared to the earlier availability of 97%, which made the system better accessible.
- The quality of upgraded software releases has improved through dry runs of the system design during the development phase.
- The deployment of new products was very speedy and efficient as a very efficient product was deployed in just two weeks.

## 2. Cloud adoption by a payment solution provider

An Indian payment solution provider was running three mainstream business applications in an on-premise set-up in a hybrid model of physical and virtual machines. As it had both B2B and B2C applications, the company was looking for a public cloud platform which could support growth based on the expanding user base. As part of the migration, 90+ servers across ten applications were moved to cloud. A detailed operating model was set up with monitoring and backup needs. The entire migration of applications and databases was completed with very minimal downtime and negligible impact on the business. The entire solution that was stitched together and implemented met the criteria of security best practices. The migration to cloud brought about superior performance of all the applications, to the tune of an 8% overall benefit.



The pandemic has increased the rate of change in digital payments, serving as a key test for cloud systems and a favourable opportunity for migration to cloud. This has also cleared the path for improved digital infrastructure, which has resulted in improved payment applications. The present generation is tech savvy, and this has led to an increase in the number of overall digital payment transactions.

The following are some of the key reasons for the migration of payments to cloud:

- greater flexibility, agility and scaling capabilities, enabling businesses to keep up with the ever-changing demand for digital payments
- deep insights and exceptional analytical capabilities, enabling FIs to track and scale up overall digital payment transactions and to target the proper set of clients
- reduction in overall capex costs, leading to higher revenues and increased profits
- reduction in overall system downtime, thereby increasing availability of digital payment applications
- ease of deployment as cloud has various innovative modules and capabilities, increasing qualitative and quantitative productivity.

Payment companies can gain a host of benefits from a well-thought-out strategy and implementation. The economic benefits of payment cloud services are vast. For FIs that take advantage of these services, cloud could prove to be a game changer in the new payment landscape.





# Payment technology updates



## Guard time: Digital payments have a scalability problem

The Fintech Times

The pandemic has acted as a digital catalyst in the financial world, as companies have realised the need for digitisation. Sadly, digitisation is not a simple procedure that will solve all problems within the payments industry: scalability is a huge factor that must be taken into consideration as some companies, having made their solution/platform more accessible, do not have the resources.

[Know more.](#)

## How the cloud became the platform for payments innovation

American Banker

Payments technology has advanced quickly in the past decade because newcomers in the industry have operated fully, or at least partially, in the cloud. The cloud of 2021 is nothing like that of 2010. Cloud computing has become more of an API-driven, software- or platform-as-a-service technology.

[Know more.](#)

## Deep dive: Harnessing cloud technology to accelerate and secure real-time payments

PYMNTS

The payments economy is continuously growing and becoming more digital. The global mobile payments market was valued at more than \$3.7 trillion in 2019 and is expected to grow to \$12.4 trillion by 2025 — an increase of more than 235 percent.

[Know more.](#)

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