

Thematic Intelligence: Banking

# Cloud Computing in Banking

*Special extract from the complete Cloud Computing in Banking Thematic Intelligence report.*

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# Executive Summary

## Cloud spending by retail banks will reach \$83 billion by 2026

According to GlobalData forecasts, global spending by retail banks on cloud computing in 2022 amounted to \$39 billion. It is expected to reach \$83 billion by the end of 2026.

## Cloud computing is essential for digital transformation

The advantages of using cloud computing in the banking industry are extensive. It can help companies modernize infrastructure, scale operations, reduce costs, improve resiliency, and build new revenue streams and services. Cloud-based systems have helped banks adapt to the rise in remote working, increased customer app use, and associated security and fraud risks. It is now a question of how not if banks should migrate to the cloud. Ensuring a smooth, tailored, and targeted cloud migration is essential, especially in a heavily regulated industry like banking.

## The market is moving to a mix of clouds

A siloed approach to banking IT management is outdated and unsuitable. Different approaches to choosing infrastructure include multi-cloud, public cloud, hybrid cloud, and private cloud. Deciding on which to use means compromising between system control and customization and scalability, leading to the rule of thumb: deploy on private and scale on public. Some banks use a hybrid approach, including on-premise, private, and public clouds. This offers control, flexibility, and easy scaling but comes at a price, as on-premise hardware must still be maintained.

## Mitigating risk during migration

Key considerations during cloud migration include governance, cybersecurity, vendor lock-in, maintaining interoperability, compliance, and resiliency. This is especially true when using third-party providers offering pre-built solutions. Risk integration and rigorous testing must be at the core of cloud migration plan development to ensure that enterprise risk and performance standards are upheld. This has led to the development of cloud migration advisory frameworks like IBM's Cloud Framework for Financial Services.

## Leaders

### Digital banks:

N26, Monzo, Revolut, Starling.

### Incumbent banks:

Bank of America, DBS Bank, Capital One, UBS, JP Morgan, Goldman Sachs, China Construction Bank.

### Specialist cloud vendors for banking:

Apprenda, Amdocs, Avaloq, FIS Profile, Fiserv, Infosys, Mambu, SDK.finance, Temenos, Thought Machine.

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## Report type

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# Cloud Computing Value Chain

This section provides an overview of cloud computing, broken down into our value chain framework. For more detail, please download the [single theme cloud report](#).

## Key players in the cloud computing value chain

The traditional IT stack has shifted to the cloud computing stack. The graphic below shows the leading vendors and adopters of cloud in banking, categorized by their position in the cloud computing value chain.

Key players in the cloud computing value chain						
Cloud computing stack	Leading cloud vendors		Specialist cloud vendors in banking		Leading cloud adopters in banking	
<b>Software as a service (SaaS)</b>	Salesforce	Zendesk	Avaloq	TCS	N26	Deutsche Bank
	Microsoft	ServiceNow	Fiserv	Temenos	Bank of America	American Express
	SAP	Box	Alphabet	Hi Sun FinTech Global	BBVA	HSBC
<b>Platform as a service (PaaS)</b>	Oracle	Dropbox	Infosys	iGTB	Banca Generali	Starling
	Alphabet	Datadog	Mambu	Thought Machine	JPMorgan Chase	Morgan Stanley
	Workday	New Relic	SDK.finance	10x Banking	Wells Fargo	Standard Chartered
<b>Infrastructure as a service (IaaS)</b>	Infor	Intuit	FIS Profile	Oracle	Barclays	UBS
	Adobe	Xero	Oracle			
	Alphabet	Microsoft	Huawei	Mirantis	N26	Santander
<b>Cloud professional services</b>	Oracle	Salesforce (Heroku)	IBM	Portainer	Bank of America	Wells Fargo
	IBM (Red Hat)	VMware (Pivotal)	Oracle	CloudFoundry	Capital One	
	Amazon		Apprenda		ING Bank	
<b>Cloud brokerage</b>	Amazon	Huawei	Amazon	Verizon	DBS Bank	JP Morgan
	Microsoft	Kyndryl	Microsoft	VMware	Capital One	Goldman Sachs
	Alphabet	Oracle	Alphabet	SAP	Barclays	Citigroup
<b>Cloud integration</b>	Alibaba	Tencent	Adobe	HPE	Wells Fargo	Bank of America
	IBM	DXC Technology	IBM		JPMorgan Chase	
	Accenture	Wipro	Accenture		Goldman Sachs	
<b>Managed cloud services</b>	TCS	HCL	TCS		Bank of America	
	Informatica	NTT	FIS Profile	Boomi	TD Bank	BNY Mellon
	Cognizant	Infosys	Mambu	Salesforce	Barclays	BBVA
<b>Cloud professional services</b>	Atos	TCS	Orange Business	Talend	Citigroup	UBS
			Amdocs	CGI		
	Cognizant	Infosys	CSI	SAP	National Bank of Australia	
	Kyndryl	DXC Technology	Temenos	Salesforce	JPMorgan Chase	
	TCS		Infosys	FIS Profile	Deutsche Bank	

Source: GlobalData

Enterprise cloud spending falls into three broad categories. The first of these, cloud infrastructure, includes the hardware and software used to build, operate, and manage a cloud environment, whether it is public, private, or hybrid. Enterprises invest in infrastructure for building and operating a private cloud for various reasons, including data compliance obligations, data privacy, and maintaining guaranteed performance levels. Some enterprises build their own private cloud, while others invest in a turnkey private cloud solution.

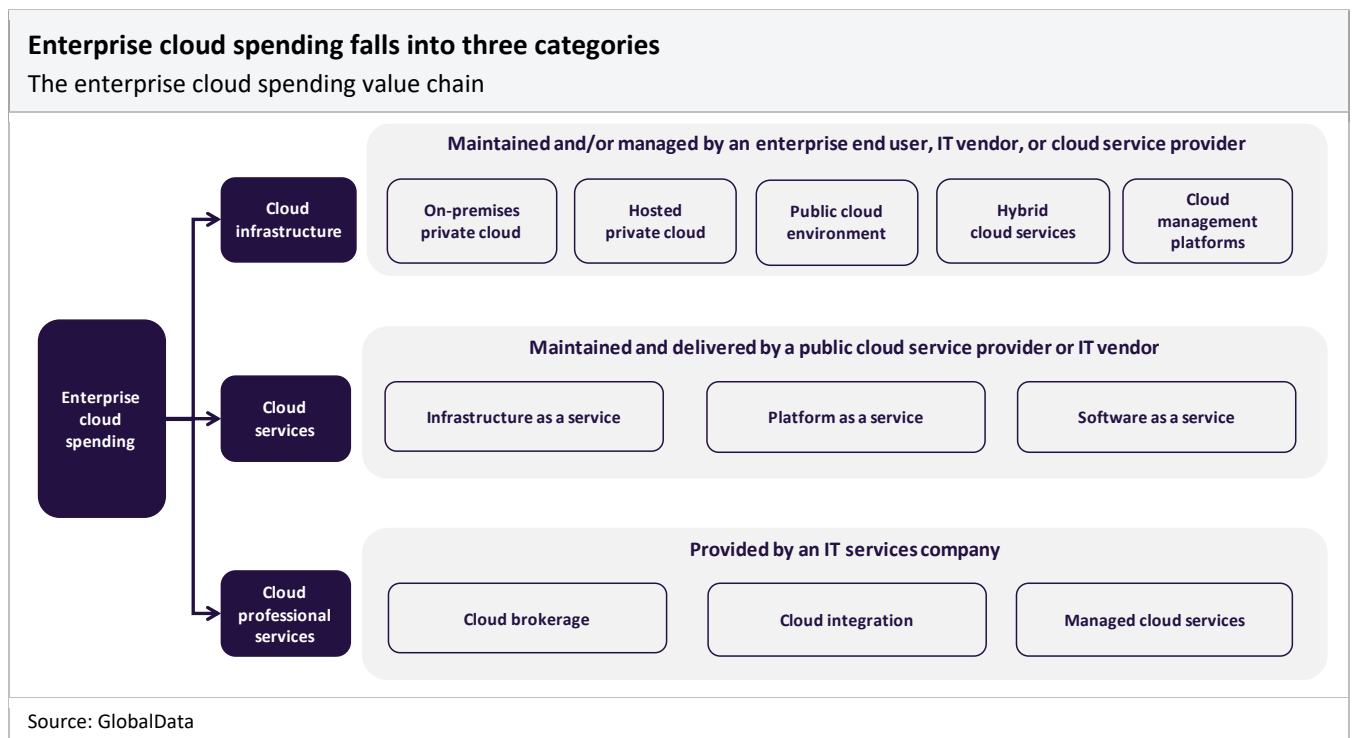
A distinction can be made between the location of the cloud infrastructure and who manages and maintains it. In the case of an on-premises private cloud, the hardware and software are deployed and maintained behind the enterprise firewall. The private cloud environment can then be managed and maintained by the enterprise end user, an IT vendor, or a service provider. Alternatively, enterprises can opt for a hosted private cloud—one where the hardware and software reside within the data center of an IT vendor or service provider. Hosted private clouds can be managed by the enterprise or by the vendor or service provider.

Public cloud providers like AWS, Microsoft, Google, and Alibaba are also important investors in cloud infrastructure, which they use to build and operate the public cloud service environments on which their businesses are based.

Cloud management platforms comprise another important cloud infrastructure category attracting growing investment from enterprises. Cloud management platforms include solutions for monitoring and managing cloud spending, providing insights into cloud service usage, and enforcing security and compliance.

The second broad category of enterprise cloud spending is that of cloud services. Cloud services include infrastructure-as-a-service (IaaS) offerings for IT resources such as compute, storage, and backup and disaster recovery; platform-as-a-service (PaaS) offerings, which allow application developers to create, run, and manage applications without the complexity of building and maintaining their application development environments; and software-as-a-service (SaaS) offerings, which allow IT software to be purchased and consumed on a subscription basis.

The third broad category of enterprise cloud spending is cloud professional services. These services support the procurement, deployment, and ongoing management of diverse cloud-based resources. Cloud professional services include cloud brokerage, cloud integration and advisory services, and managed cloud services that include managed databases, managed middleware, managed cloud security, and managed business applications.

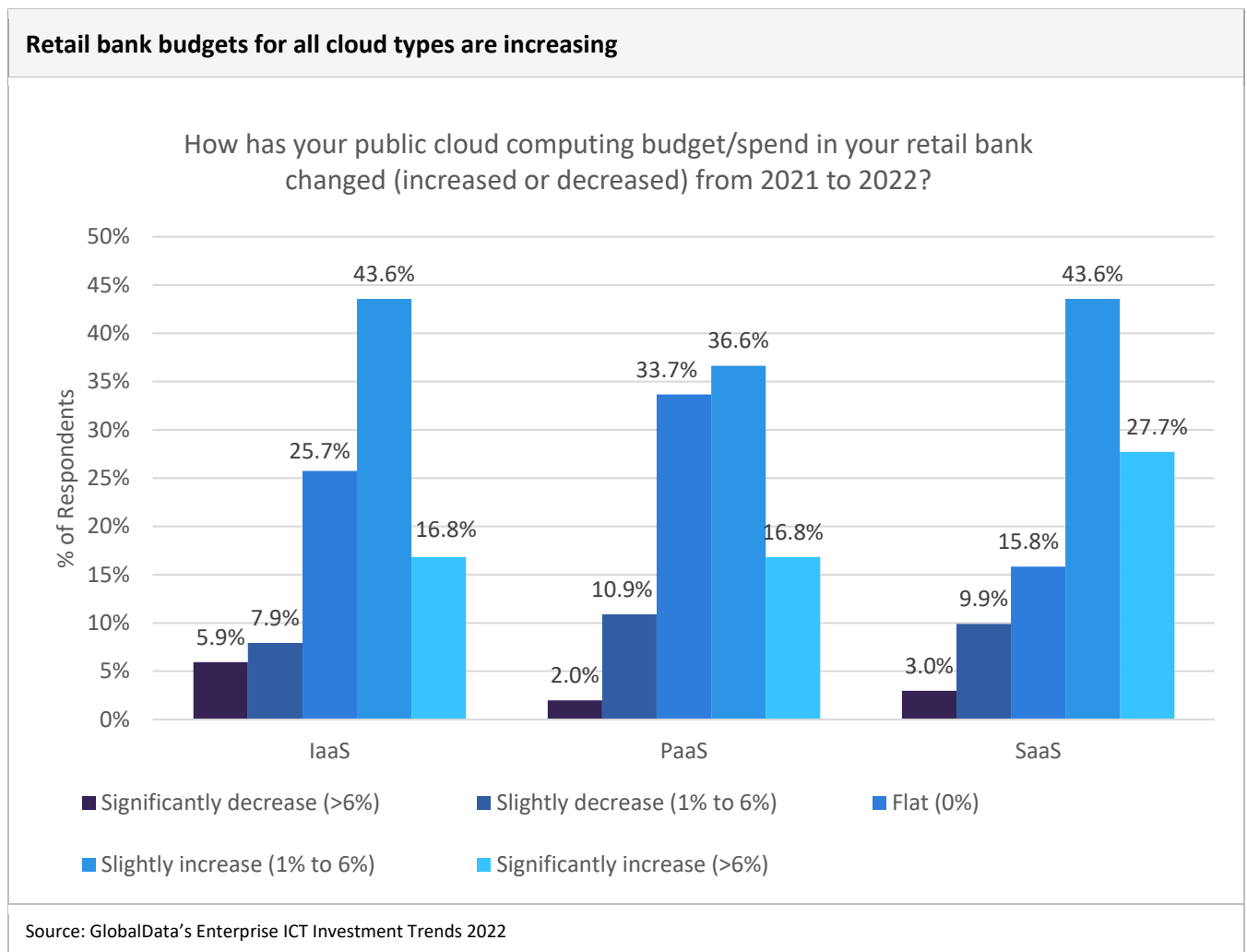


In the following sections, we will look more closely at each value chain segment.

# Banking Challenges

Cloud computing has become a key technology enabler for retail banks. They typically deploy and use cloud infrastructure to store data and applications, and provide remote access to the same systems. Furthermore, cloud computing provides enterprises in the retail banking sector with a more flexible business model and lowers operational costs. Usage-based billing, business continuity, and business agility are some of the other benefits offered by cloud compared to implementing ICT solutions on-premise.

GlobalData’s Enterprise ICT Investment Trends 2022 survey found that most retail banks already have considerable exposure to cloud infrastructure and are continuing with their cloud implementations. Half of the respondents said that their ICT budget for cloud computing slightly increased (by between 1% and 6%) in 2022 compared to 2021. Moreover, 21.8% confirmed their ICT budget for cloud computing significantly increased (my more than 6%) in 2022 versus 2021.



Within the rapidly evolving retail banking market, most companies prefer deploying their enterprise applications through a SaaS arrangement for better product agility, flexibility, and customer engagement.





















GlobalData’s survey found that 43% of retail banks had slightly increased (1% to 6%) their enterprise ICT budget allocation on SaaS in 2022 compared to the previous year.

One of the main drivers of the increase in SaaS spending is the increasing demand for digital banking services, which require banks to access a wide range of software applications and services. SaaS allows banks to access software

applications and services on a subscription basis rather than investing in expensive software licenses. This allows banks to reduce their IT costs and improve their scalability. SaaS also allows banks to access the latest software applications quickly and easily, which helps them to stay competitive in a rapidly changing technological landscape. SaaS also allows banks to scale and customize their services, integrate them with other systems, and provide flexibility and security.

Although there are significant benefits to cloud adoption, some key considerations must be factored in during migration or adoption. Not advancing cautiously and failing to adopt cloud services in a resourceful and efficient manner could considerably harm banks. For example, in 2018, TSB Bank left its customers unable to access their banking services and allowed some customers to see the details of other transactions due to a botched cloud migration. The aftermath of this cost the bank almost GBP200 million (\$236 million) on top of the statutory loss of GBP107.4 million (\$130 million). After an independent review in December 2022, the bank was fined a further GBP48.6 million (\$60 million) as the review concluded there was insufficient oversight of their suppliers.

**Some key considerations for banks before and during cloud adoption**  
 Cloud adoption needs to balance business and technology focus

KEY DRIVERS							
 DATA CENTER CONSOLIDATION	 SYSTEM SCALABILITY AND SPEED	 CUSTOMER EXPERIENCE	 BUSINESS / DIGITAL TRANSFORMATION	 NEW REVENUE STREAMS	 CONSUMPTION BASED BUSINESS MODEL		
KEY BENEFITS							
 CAPACITY AGILITY AND RELIABILITY	 INNOVATION AND ROI	 REDUCED COSTS AND TIME TO MARKET	 FLEXIBILITY AND SCALABILITY	 ENTERPRISE COLLABORATION	 DATA SECURITY		
KEY PITFALLS							
 ASSUMING AN ALL APPLICATION MIGRATION	 BEING UNAWARE OF ACTUAL END BENEFITS	 FAILING TO MAP USER INTERACTION	 MIGRATING APPLICATIONS WITH SENSITIVE INFORMATION	 DISREGARDING CLOUD DATA LOCATION AND AVAILABILITY	 OVERLOOKING DISASTER RECOVERY PLAN	 FAILING TO CONDUCT PROPER COST ANALYSIS	 LACK OF INTERNAL IT SKILLS

Source: GlobalData

The table below highlights the key challenges facing the banking sector.

Challenge	What's happening?
<b>Cybersecurity and fraud risks</b>	<p>The need to move quickly, especially amid COVID-19, has created heightened fraud and cybersecurity risks for banks. The pandemic created well-documented opportunities for fraudulent access to COVID-19 loans, the full extent of which will only become apparent in time. Banks must protect their networks and customers' proprietary data from theft, corruption, or breaches. Failure to properly secure customer data can result in regulatory violations that can be expensive and extremely damaging to a firm's reputation.</p> <p>Jorge Blanco, global head of security solutions at BBVA, said, "There are three factors working against us in banking. First, as a financial institution, we're a very attractive target because we have two things the bad actors want: money and customer data. Second, our transformation has changed the way we do things technologically, which has increased our attack surface. And third, the environment has changed as cyberattacks have become more sophisticated."</p>
<b>Personalization</b>	<p>The pandemic accentuated the need for personalization, as it had a highly individual impact on customers and sectors. Machine learning algorithms that learn over time to inform product propensity models have helped providers develop customized engagement strategies to increase conversion rates. Meaningful personalization that drives customer advocacy must extend beyond the next best product offer (i.e., the quick sale) to all customer experience dimensions that help consumers achieve their financial goals (i.e., the long-term relationship). However, the financial services industry has taken longer to harvest the potential of what the modern internet can and should be to support a personalized, intuitive customer experience. Banks suffer in comparison to best-in-class online retailers, and Big Tech companies moving ever deeper into financial services with highly personalized drip-fed tips and advice.</p>
<b>Channel shift</b>	<p>COVID-19 drove a decade of channel shift in as little as 12 months. However, even before the pandemic, banks were grappling with the speed at which channel shifts were occurring. The shift is away from something banks control, like traditional proprietary channels, to third-party platforms in which the bank may be just one participant or voice, such as Instagram or TikTok. Each new platform raises questions of whether it is potentially a bank channel, somewhere providers are obliged to maintain a presence and deliver a service, and if so, what are the related risks? What are the technology dependencies? Those banks that guess wrong or decide late risk alienating current or prospective customers. Meanwhile, COVID-induced branch closures forced banks to offer more help and support through digital touchpoints, which presented not just new tech capabilities, but the expense of re-training and redeploying branch staff. In addition, many customers were forced to use digital channels for the first time. But despite all this change, there is striking continuity around the enduring need for human help and support in important or sensitive moments. This has led to widespread innovation in call center management and branch formats. Notably, post-pandemic, a number of banks, such as ANZ New Zealand and Barclays in the UK, experimented with "pod" formats. These transportable structures can be erected in public spaces like shopping centers and offer a private space to talk with a banking professional. Their purpose is to deliver human support with fewer "bricks."</p>

Challenge	What's happening?
<b>Embedded finance and dissemination</b>	<p>Ongoing digitalization, supported by regulatory initiatives like open banking, has enabled various over-the-top digital services from new entrants. For example, digital front ends for banking with no banking license, non-FS corporates offering financial services, such as credit cards or loans, or buy now, pay later (BNPL) finance. In response, embedded finance enables new routes to market for incumbent banks, so they can protect themselves from disintermediation by those ahead of them in the value chain. Examples include a bank offering a car loan on a car dealer's website or mortgage products on a property search site. Embedded finance also creates a more multi-dimensional view of the value banks can provide. No longer just about traditional lending products, but various otherwise fixed costs in tech infrastructure can be disaggregated and made available as a service. Related to this trend, banks are also seeking to orchestrate non-financial ecosystems around financial products and get paid at the interplay of these two scenarios. For example, DBS supports mortgage lending by offering a site where customers can insure, renovate, and furnish their new home. OCBC, Tinkoff Bank, and Nubank are pursuing similar ecosystems. These are examples of banks seeking to become the platform and guard against being relegated to dumb pipes by focusing on broader consumer life goals, not products.</p>
<b>Cost containment and revenue generation</b>	<p>Cost-income ratios in banking are considerably higher than in other industries, most of which reside in bloated branch networks and legacy systems. N26 and OakNorth have cost-income ratios of 30%. Many incumbent banks sit closer to 70%. Branch-heavy banks, such as Metro Bank, are pushing 90%. Return on equity in banking is also much lower than in other industries, typically around 5% to 10%. In contrast, the tech companies with which venture capital backers are so enamored typically sit at 30%-plus, making cost structures especially untenable.</p>
<b>ESG</b>	<p>Interest in ESG has increased in recent years due to consumers' and investors' desire to see companies reflect their values. According to GlobalData's Job Analytics, recruiting for ESG roles in the financial services industry has increased as more companies focus on that area. Between January and December of 2022, ESG roles worldwide increased from 150,000 to 190,000. Some companies are integrating ESG into their operations. This is the approach that Visa and Mastercard adopted as both decided to tie their executive-employee compensation to the company's ESG goals. Currently, multiple ESG frameworks allow companies to address their ESG issues, but there is still no standardized ESG framework. This makes it difficult to establish a benchmark and quantitatively compare companies' ESG efforts. There are concerns about greenwashing practices in the sector, with companies reporting ESG initiatives that turn out not to be genuine.</p> <p>Adhering to compliance and regulation has also never been more important for banks to ensure they operate within legal and ethical guidelines, protect customers' assets and data, and maintain the stability and integrity of the financial system. Failure to comply can result in hefty fines, risk legal action, ruin reputations, and erode customer trust.</p>
Source: GlobalData	



## How cloud computing helps resolve the channel shift

Cloud computing can help banks to improve the efficiency, effectiveness, and scalability of their call center operations while providing a better customer experience. Cloud-based call center software can help banks manage their operations more efficiently by providing real-time call monitoring, call routing, and call recording. It also allows banks to use advanced analytics and machine learning to analyze customer interactions and identify common issues or areas for improvement. By using cloud-based call center management solutions, banks can also allow customers to use self-service options such as interactive voice response (IVR) systems or chatbots, reducing the volume of calls to the call center. Cloud-based call center management solutions also allow other systems to access customer information and history, which can improve customer service.

For example, BBVA uses Amazon Connect to manage and route calls to customer service representatives and track metrics such as call wait times and customer satisfaction. It uses the platform to store customer information, such as account details and call history, allowing customer service representatives to access the information they need to assist customers. This has helped them to improve the customer experience by reducing call wait times and providing greater personalization. It has also allowed the bank to save on costs by eliminating the need for expensive on-premises call center infrastructure.

BBVA has also deployed Genesys Cloud CX solution and claims that, since 2019, it has reduced customer waiting times by 42% and shortened response times by 45% in countries such as Peru. BBVA says it is resolving 82% of interactions automatically in the first instance. For BBVA in Spain, this technology has helped to reduce the time taken to resolve non-urgent customer requests from 7 to 2.5 days.

## How cloud computing helps tackle cost containment and revenue generation

Banks can potentially save a lot of money through cloud services' pay-as-you-go model. This allows banks to scale their IT resources up or down based on changing business requirements. Cloud can also eliminate the need for expensive in-house IT staff and maintenance costs associated with on-premises IT systems. Costs can also be reduced, especially in the long term, by increasing efficiency. This can be done through cloud-facilitated automation of routine IT tasks. This can help to reduce human error and avoid expensive mistakes.

Banks can also use cloud services to generate new revenue streams, such as creating digital banking services and platforms in the cloud. Banks can also use cloud-based payment processing platforms to offer ecommerce and mobile payment services, which can increase revenue from transaction fees. For example, Capital One offers Spark Pay, which enables merchants to accept payments online, in-store, and on mobile devices. It provides a range of features such as a payment gateway, card reader and virtual terminal, recurring payments, and fraud detection. Using Spark Pay, merchants can process payments and increase their revenue by reducing transaction fees and increasing sales through online and mobile channels. Capital One also benefits from revenue generated by transaction fees and interest on funds held in merchant accounts.

However, cloud computing does not guarantee cost efficiency. A cloud strategy requires the same level of IT governance as on-premise systems. A haphazard and poorly managed approach to cloud can increase management time and overall costs. Banks must ensure their cloud strategies include rigorous attention to planning, architecture, integration, and security.

## How cloud computing helps resolve the challenge of ESG

ESG intersects with all other themes, including cloud computing. As the use of cloud services increases, so do energy demands. Companies must focus on cloud and data center efficiency to minimize that increase. In fact, cloud computing technology can help monitor energy use. Some service providers, such as Microsoft, Google, SAP, and Salesforce, offer carbon emission monitoring as part of their cloud packages. Cloud computing can help companies improve their ESG performance in other ways. For example, cloud can help large organizations standardize their processes and data management, which can help improve security, auditing, and overall governance.

See [GlobalData's ESG Framework](#).

## Case Studies

In the following section, we present selected case studies highlighting the use of cloud computing in banking.

### Amdocs' 'at scale' cloud model is deployed across 12 global banks

GlobalData spoke to the CTO of Amdocs Cloud, who explained its Cloud at Scale approach. Its solution is best positioned for banks that have moved their first few applications to the cloud and are ready to move their remaining workloads, often in the many hundreds. The three core areas of the Cloud at Scale approach include:

- **Workload:** This describes the resources needed to run workloads like computing, storage, data, and supporting services.
- **Control:** This involves designing and managing the public cloud control systems (threat modeling, control engineering, and control testing).
- **Foundations:** Multi-tenant resources and systems, and central tooling.

The CTO from Amdocs highlighted several key messages.

#### Understand your structure

A cloud center of excellence (CCoE) is a central authority responsible for the cloud whose members comprise advocates, high-performers, and forward-thinkers from across the organization.

It is vital to understand the different layers of engineering and the different layers of skills, capabilities, and components that you have to service around public ecosystems. This is because instead of going to separate application vendors, companies can now satisfy all its needs with a single hyperscale vendor. These now run the full gamut of technology services from foundational services, up to SaaS and business logic apps. This means you must break down the different areas of concern and engineering for these providers, as it is not as clearly separated.

#### Set targets and a plan on how to achieve them

It is important to assess how many applications need to be moved and in how many days.

"To me, it's simple mathematics. If you want to move 500 applications in five years, that means you're moving 100 applications a year. You have 210 working days. That means you're moving one application every two point one working days. Now, you tell most banking executives they have to move an application every two business days, and people will fall off the back of the office chair, right?"

#### Make workflow teams with their own targets

To manage this type of activity, Amdocs recommends setting up groups that all work in parallel so that targets are achievable. Amdocs call these workflow teams or application pods. All pods or groups also need to be set very specific targets that align with the desired outcome. However, if each application pod has its own objectives and designed work rate velocity, it will be easy to manage the process targets and expectations.

#### Begin with governance and regulation

Teams can build excellent functionality and business capability but have no idea how to explain or govern the platform. This is because they do not understand what a tier-one regulated application means and do not understand the availability, durability, scalability, and control requirements. They also do not understand how to articulate them upstream to regulators. This means the process will most likely be paused late into the project.

#### Retire old assets

It is important to conduct proper testing and monitoring before decommissioning retired assets to ensure that no functionalities or dependencies are mistakenly left to cause systems failures when they are retired. However, it is important not to keep both running. Retiring the old asset can also have benefits like helping to reduce operational costs.

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