Buyer Case Study

Monzo: Building a Mobile-First U.K. Digital Bank Using Cloud and Microservices Architectures

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IDC OPINION

We live in a world where customer experience can make or break a business relationship. This has made digital transformation a business imperative across all sectors including the heavily regulated banking and financial services industry.

The greatest challenge banks face is delivering a digital customer experience in a scalable manner that engages and satisfies the customer while simultaneously meeting the stringent regulatory requirements around security and data governance.

As digital transformation enters mainstream and changes customer expectations, many banks claim to have a mobile strategy, but IDC believes this normally equates simply to the implementation of point solutions with short-term goals. This needs to change if the full potential of mobility is to be realized. Banks need to develop a full-fledged mobile strategy, where mobile is viewed as the core of a digitally transformed business that can adapt to digital disruption. However, IDC notes that many European banks use regulatory and compliance requirements as excuses to defer wide-scale digital transformation, risking losing ground to innovative fintech start-ups.

U.K. start-up bank Monzo proves it is possible to build a cloud-native, mobile-first digital bank while also complying with regulations. Monzo, currently live with its limited-edition debit cards, is on course to become a fully licensed bank before the end of 2016, less than two years after it was founded in February 2015. It managed to do so because it uses 3rd Platform technologies and principles:

- Monzo uses AWS cloud to host its core banking application to leverage scale and flexibility of cloud computing as well as eliminate the guessing game around capacity, provisioning, and infrastructure management.
- It developed its core banking systems from scratch backed by microservices architecture, running across multiple virtualized servers using container tools including Docker and Kubernetes.
- Monzo does not have mainframe technology or monolithic applications.
- The microservices architecture makes its core banking application a collection of small components that can scale independently, communicate synchronously or asynchronously, are event-driven, and have application programming interfaces (APIs). The application is also platform-agnostic for easy interoperability.

IDC believes Monzo has the technology foundation to provide all the guarantees that any bank can provide, and it is now assessing how to use cloud analytics to its advantage. How Monzo aims to keep up the engaging digital customer experience as the business scales and regulatory requirements pile up in connection to standard services will determine its success as a disruptive start-up in the banking industry.

August 2016, IDC #EMEA41642116

IN THIS BUYER CASE STUDY

This IDC Buyer Case Study focuses on how the U.K.-based start-up bank Monzo built a mobile-first digital bank by leveraging AWS infrastructure and microservices architectures. It also discusses the challenges Monzo faced in building a digital bank and how it overcame these issues to meet stringent regulatory requirements in the banking sector.

SITUATION OVERVIEW

In the digital era, customer experience can have a huge impact on business success. The advance of the 3rd Platform and its four pillars — mobility, cloud, Big Data and analytics (BDA), and social business — has fundamentally altered customer expectations from services including banking services. This in turn is forcing banks and financial services companies to change how they consume and budget for IT and applications.

Furthermore, the 3rd Platform is creating the most significant opportunities for financial institutions in decades. As a result, financial institutions are increasingly leveraging these four pillars to transform their businesses. IDC estimates that worldwide financial services IT spend on mobility, cloud, and BDA reached $114 billion of the total worldwide financial services IT spend of $455 billion in 2015, meaning financial institutions are spending more than 25% of IT budgets on just these three transformative technologies. This percentage is likely to increase to almost 30% by 2019. In addition, 66% of financial services organizations in the U.K. alone have policies or plans to have policies around mobility and bring your own device (BYOD).

IDC also forecasts global public cloud infrastructure-as-a-service (IaaS) spending to more than triple, from $12.6 billion in 2015 to $43.6 billion in 2020, with a compound annual growth rate (CAGR) of 28.2% over the five-year forecast period.

But yet not all European banks and financial services organizations are truly embracing digital transformation to enhance the customer experience or effectively overcome the challenges from fintech — the emergence of new products, models, and companies in financial services — companies such as Monzo, RateSetter, and Wonga. A quick search on Twitter as regards banking experience yields results such as "terrible customer experience," "slow ATM," "horrifying 31-minute hold to speak to an executive about lost card," and "outstandingly bad customer service. Nearly 17 years with this bank — this will be the last. Underwhelmed."

Many banks claim to have a mobile strategy, but this usually refers to the implementation of point solutions with short-term goals. This needs to change if the full potential of mobility is to be realized. Banks need to develop a full-fledged mobile strategy, where mobile is viewed as the core of a digitally transformed business that can adapt to digital disruption.

In contrast, IDC observes that much of the fintech providers are spearheaded by entrepreneurs who have put digital at the heart of their strategies and are attracting millennials both as customers and workforce.

Monzo, a U.K. based bank that is currently live with limited-edition debit cards, is on course to become a fully licensed bank before the end of 2016, less than two years after it was founded in February 2015, because it effectively leverages 3rd Platform technologies and digital principles.

Organization Overview

It all started in 2015 when a team of professionals led by Tom Blomfield (currently Monzo's CEO) decided to build a digital "smart bank" after receiving feedback from millennials that interactions with banks are painful.

Monzo is a bank aimed at people who spend a lot of time with their smartphones, and for those who like to get things done in a click and do not see the need for branches and check books. "We're focused on building the best current account in the world and ultimately working with a range of other providers so that Monzo can be an intelligent hub for your entire financial life," said Blomfield at the AWS London Summit 2016 in July, explaining how it is possible to build a bank from scratch and run it on the AWS cloud platform. Blomfield said they started Monzo "because we believe that banking can be better. We're tired of hidden fees and charges, endless paper forms, and nothing quite working in the way we'd expect. So we're trying to build a bank that we'd want for ourselves, our friends, and our families."

Monzo has applied for a full banking license and the process is due for completion in the second half of 2016. Once it acquires the license, customers' money will be protected by the U.K. Financial Services Compensation Scheme (FSCS) under which up to £75,000 is guaranteed by the U.K. Government. Currently, Monzo is live with limited-edition Alpha and Beta cards (Monzo MasterCard Prepaid Debit cards) that can be topped up and used at cash machines, in-store, online, and at contactless terminals. All card transactions are processed by the MasterCard network and protected by MasterCard rules.

During this testing phase, Monzo has assured customers that their money will be held in a separate, protected account by Wirecard, its issuing bank authorized by the Financial Conduct Authority (FCA).

Challenges and Solution

Monzo's team was clear from the start that it wanted to leverage 3rd Platform technology pillars (cloud computing, Big Data analytics, mobility, and social enterprise) to build its digital banking business. It wanted to use technology as an advantage and break away from mainframes, massive centralized ledgers of all transactions, monolithic applications, and traditional datacenter architectures. In IDC's opinion, banks that build large "snowflake," heavily customized applications and spend billions on maintaining those custom applications have to overcome more budget and organizational hurdles to digitally transform their services.

The Monzo team deliberately stayed clear from the traditional approach of a monolithic banking system. The standard way banks build their core system is to get a set of developers and build an application which then gets bigger as business scales. Then the business adds some more database, search, and caching, and builds integration for everything and eventually ends up with a huge custom application that is the critical backbone of the business. The engineering efforts and investment in the monolithic application that is central to the business force banks to dedicate large portions of their IT staff and budget just to maintaining it, rather than building new revenue-generating platforms.

Go Microservices Framework

Monzo's team decided that breaking the core banking application into microservices was the best way forward. In IDC's opinion, microservices as an architectural approach draws on long-evolving experience in software engineering and system design, including the service-oriented architecture (SOA) efforts of the past two decades. But primarily, it is an architectural approach to system design that requires considerable organizational and cultural adjustment to execute successfully. Having small components that can communicate synchronously or asynchronously and are event-driven enables the business to break away from monolithic apps and have a future-ready IT architecture. The basis for building these is simple: every service needs to have just a single function and execute it efficiently and securely. This means the application components have only a few hundred lines of code, so they are easier to understand, manage, and tweak. Monzo's team also made sure the microservices are oriented around areas of business (i.e., tagging the microservice component with a specific business goal) so it is easy to understand and new developers can replace it with better functionality quite easily. The application components also use protocol buffers for well-defined interfaces.

For building its core banking application, Monzo used the Go microservices framework – a distributed programming toolkit for building microservices. Using the Go programming language, Monzo built libraries for Remote Procedure Call (RPC) itself. This way Monzo was able to build something quickly and reliably. IDC believes that enterprises should leverage the simplicity and lower overhead to easily build microservices and APIs, a practice that is becoming more critical in the digital era than ever before.

After building the core business application in an open, microservice-based architecture fit for the digital age, Monzo wanted to host the critical application in a resilient, scalable, extensible, and secure infrastructure. It was in November 2015 that the U.K. banking regulator FCA proposed a guidance for banks to use public, off-premise cloud services. As a start-up with no legacy infrastructure, Monzo decided to make the most of the new FCA regulations around cloud. In the new guidance, the financial services watchdog moved away from its reluctance in recommending public cloud for core banking IT to allowing the use of external public cloud, albeit with strong control and risk-mitigating measures.

Building the Bank on Public Cloud and Meeting Regulatory Requirements

Monzo was already using AWS cloud services for test and development applications. Being a brand-new company, test and dev apps are critical for Monzo, and moving these apps to the cloud was a key decision because these apps need agility. AWS was a natural choice for the team to host its core banking system. The bank uses AWS' EC2, S3, container services, and others.

One of the sticking points for FCA's reluctance around cloud was the need for authority to be able to access the IT architecture at all times. In case of suspected data or privacy leaks, regulators must be in the position to immediately access the systems in a datacenter and identify the issues. This has been true for traditional on-premise environments, but it is typically harder to do in a multitenant public cloud service. According to Blomfield, this is where AWS differentiates itself as a forward-thinking cloud vendor that understands enterprise concerns and works with the regulators and customers to launch new features. To allay regulators' fears, AWS has services such as CloudTrail that produce AWS API call history to enable security analysis, resource change tracking, and compliance auditing.

Monzo also uses the AWS CloudHSM service, which helps customers from heavily regulated sectors meet corporate, contractual, and regulatory compliance requirements for data security by using dedicated hardware security module (HSM) appliances within the AWS cloud. With CloudHSM, customers control the encryption keys and cryptographic operations performed by the HSM. For audit activities for security and compliance, the service allows customers to review all of the CloudHSM API calls made from the account through CloudTrail. Additionally, users can audit operations on the HSM appliance using syslog or send syslog log messages to their own collector.

Choosing a cloud provider that has the ability and appetite to invest in regional expansion means that Monzo does not have its cloud plans thrown into disarray over the Brexit impact. AWS is scheduled to launch U.K. Region (with multiple availability zones) before the end of 2016, giving sensitive customers an option to host their data in the U.K.

Overcoming Cultural Challenges to Become a Digital Bank

In a recent digital transformation executive dinner between IDC and banking and financial services organizations, there was a consensus that digital transformation is inevitable and banks need to look for measures to overcome the obstacles rather than using "regulations and compliance requirements" as excuses for not undertaking digital initiatives. Many executives admitted to IDC that oftentimes regulatory requirements are vague and not well understood within their organizations. This delays or prevents informed decisions of whether a digital initiative will lead to a breach of compliance or not. Rather than assessing the risk of a digital initiative, most often the approach is to avoid changing existing processes.

One bank executive IDC spoke to also said that when assessing cloud technologies, he found that the internal regulatory team was far more paranoid compared with the external regulators, making the change difficult.

IDC's 2016 *European Digital Transformation Survey* reveals that culture and changing people and existing processes were the top 2 organizational challenges in meeting digital transformation objectives.

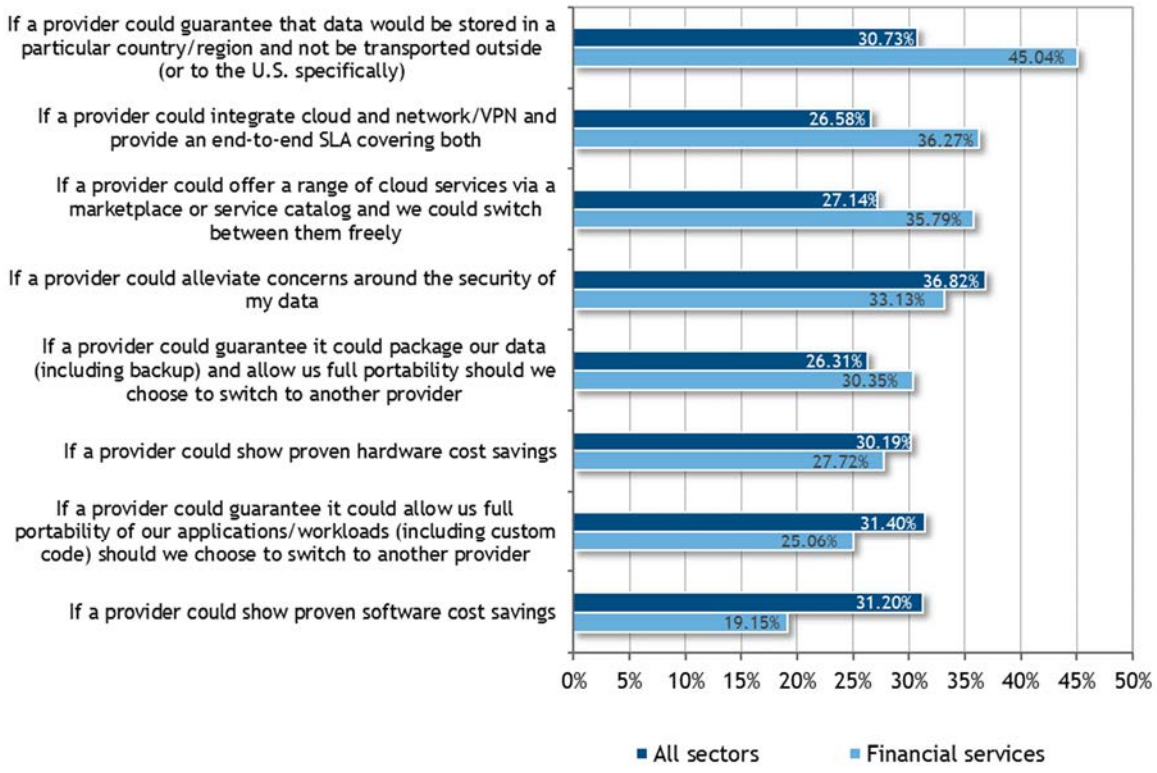
IDC's end-user cloud survey also shows that the fear around data protection, data security, and privacy is more amplified among European financial services organizations than all other verticals put together. As seen in Figure 1, the majority of the top 5 conditions that would make financial services organizations more willing to adopt public cloud services are around data storage, data security, and data portability. Over 45% respondents cited that if a provider could guarantee that data will be stored in their preferred location, they would be willing to adopt public cloud services (compared with 30.7% of overall users citing these criteria). On the contrary, fewer financial services organizations were concerned about cost savings and application portability compared with overall respondents.

"Internal compliance teams gold-plate the regulations," said Blomfield. It is the culture and organizational setup that serves as an obstacle to leveraging on public cloud. "The internal compliance teams have a different set of targets and are not encouraged to accelerate digital transformation. They are not concerned about customer experience at all," he added. To overcome such cultural challenges, Monzo has torn down the walls between different teams. It does not have an independently functioning IT, line-of-business, and compliance team, but instead everyone with individual expertise works together toward building a secure and scalable digital bank.

FIGURE 1

Financial Services Organizations' Criteria in Adopting Public Cloud Services

Q. What factors would make your organization more willing to adopt multitenant public cloud services?



Notes:

n = 421 (all sectors)

n = 58 (financial services)

Source: IDC's *European Cloud Computing Survey*, 2016

Old school ideas and a strong traditional culture can also be major inhibitors to digital initiatives, a point that fintechs have demonstrated with their stupendous growth over the past seven to eight years. They have shown how banking services and functions can take place either inside or outside of the datacenter firewall with adequate security measures applied.

The fear of data leakage is a big concern among banks transforming their enterprises, but IDC believes this fear need not block financial services organizations from transformation altogether. Using sophisticated information and access management solutions, automating access policies, and getting visibility into complete data life cycles can make meeting regulations less painstaking.

Overcoming Vendor Lock-in Challenges

A future-ready digital IT architecture is founded on the guiding principles of openness, hybrid nature, interoperability, scalability, agility, security, and cost-efficiency. Building a proprietary application and customizing it for an infrastructure will make the application complex and lock the enterprise to the application development team and infrastructure provider. Monzo used open source Go Kit from GitHub to develop its core banking applications in a microservices architecture, making the application easy to understand and manage by any developer team. It was certain it wanted to use technology that is platform-agnostic, so it was easy for Monzo to migrate its core banking application from one cloud to another or on-premise if it chose to.

Although architecturally it is possible for Monzo to migrate its core application out of AWS, the IT team feels there is no compelling reason to move out. "I trust AWS to protect and secure my estate much better than my small team could in an in-house datacenter," Blomfield told IDC. The bank is now evaluating other AWS services such as the data warehousing service RedShift and container management services.

The lead of AWS in the cloud space, the pace of innovation and feature launches (it launched over 400 new features between January and June 2016), the availability of engineering and developer teams' deep understanding of AWS architectures, the regional datacenters, and the cloud provider's willingness to work with regulators and customers to overcome adoption hurdles are what makes the AWS platform stickier to enterprises with appetite for digital transformation.

Results

Monzo now has a fully distributed IT architecture in the cloud and runs on active-active datacenter principles to avoid any failovers or downtime to its critical application. It relies on AWS security, encryption, and auditable features to remain compliant with regulatory requirements.

Monzo believes that customer experience is powered by technology more than anything else, and it wants to be in full control of technology architecture. We believe that among the dramatic shifts under way in today's IT organizations, by far the most significant is customer centricity. This sharpening focus on the customer's experience with the enterprise brand — and how IT can elevate and enhance it — is reshaping the competitive landscape for businesses today.

At the heart of Monzo's business is its underpinning technology architecture that is open, agnostic, scalable, secure, and 3rd Platform-enabled. As a byproduct of its digital-ready IT infrastructure, it was easy for Monzo to adopt newer processes such as DevOps to further its competitive edge.

IDC notes that many traditional banks either have an outsourced view of technology, making them highly dependent on the service provider, or invest in large IT teams to manage the complex critical application in-house and rely on the staff and technology vendors. This is ironic in the digital era when flexibility and open and simple architecture are the hallmarks of modern IT.

Monzo had the advantage, as a start-up, to be fully cloud-native when the U.K. FCA guidance in 2015 allowed banks to use off-premise public cloud. But we also believe that it is imperative for other banks and financial services organizations to cultivate a digital transformation mindset across the enterprise. The focus should be on overcoming challenges and obstacles specific to financial services by looking at data privacy and security through a modern, 3rd Platform lens rather than simply concluding that taking compute out of the perimeters of a traditional firewall will spell doom. To this point, IT teams must take an architectural approach to redesigning their infrastructure rather than a component-based one.

ESSENTIAL GUIDANCE

As Monzo prepares to become a fully authorized bank in the U.K., IDC believes it is well-positioned to provide all the guarantees that any bank can provide and compete effectively with large multinational banks in the country. The key is its strategy to build a mission-critical application from scratch in an open, standardized, and simple architecture so that it can be infrastructure- and service provider-agnostic and have the flexibility and choice.

As cloud computing continues to democratize IT and give a level playing field to all customers, enterprises that continually innovate their customer services will shine in the marketplace. Monzo must now assess how it can use emerging technologies such as the rising use of mobile video in customer service, IoT, and cognitive capabilities (i.e., the so-called robo advisors), real-time customer relationship management (CRM), and Big Data/predictive analytics. This will help it maintain a competitive edge among competing fintech companies and large traditional banks that are making digital transformation a CEO priority (e.g., BBVA).

How Monzo can sustain its superior digital customer experience as the business scales and how it still meets regulatory requirements as the bank evolves to provide standard services will determine its success as a disruptive agent in the banking industry.

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Related Research

- *BMC Re-Engineers Solutions and Strategies to Gain Stake in European Enterprise Digital Transformation* (IDC #EMEA41534416, June 2016)
- *Accelerating Digital Transformation: 2016 European End-User Software Spending Trends* (IDC #EMEA41310716, May 2016)
- *Aviva's Digital Transformation Journey to Become a Digital Insurer* (IDC #EMEA40394915, March 2016)

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