



REIMAGINING FINANCIAL SYSTEMS

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INTRODUCTION

There was a time, not that long ago, where financial transactions could only be requested at a select few brick-and-mortar locations for limited periods during a weekday. The prevailing norm was a working day of 10 am to 3 pm, commonly referred to as “bankers’ hours.” In the early 1960s, digitization of back office records allowed the hours of a financial day to be extended by replacing tedious, manual account reconciliation with automated overnight ‘batch’ processes. On the customer-facing side, the advent of ATMs shifted the conversation from digitization to digital access. Fast forward some 30 years later, and the internet changed everything — opening the doors for online digital access to financial accounts.

Today the conversation is no longer about digitization or digital access — the dynamic has turned into something deeper. Customers’ financial expectations are now in line with the digital experiences in other aspects of their native digital lives. They are no longer satisfied with accessing traditional financial products offered by multiple vendors, they want to work with companies that can provide them with a consolidated, personalized financial experience.

Couple this change in customer interactions and expectations with an environment where increased regulatory demands, competitive pressures on the bottom line, and challenges such as cyber attacks, and the stress on financial infrastructures is unprecedented. The cracks already present in banking infrastructures have been thrown even more into the limelight in the last couple of years as the pandemic, geopolitical events, and macro-economic shocks have further buffeted banks. Financial institutions have no choice but to change, and to change dramatically.

Another dynamic that puts pressure on long-established companies is new entrants to the banking and financial services space, whether niche competitors or digital-only banks looking to provide services without branch networks and technical debt, or decentralized financial organizations trying to disrupt the fabric of the financial sector. From stable coins and cryptocurrencies to new payment rails, the technology landscape for banking’s core functions is evolving at a pace never seen in the industry’s history.

Regardless of the technology at play, finance and banking at its core are no longer simply about profit, but also about enhancing, expanding, and profiting from personal relationships. There is now an expectation that customers’ financial services — loans, cash, payments, electronic wallets, paying bills — are integrated and can be managed from a single mobile device that is always with them. Fundamentally, this seismic shift requires a new look at how the business of banking is shaped, and how technology can best support new business models.



EXECUTIVE SUMMARY

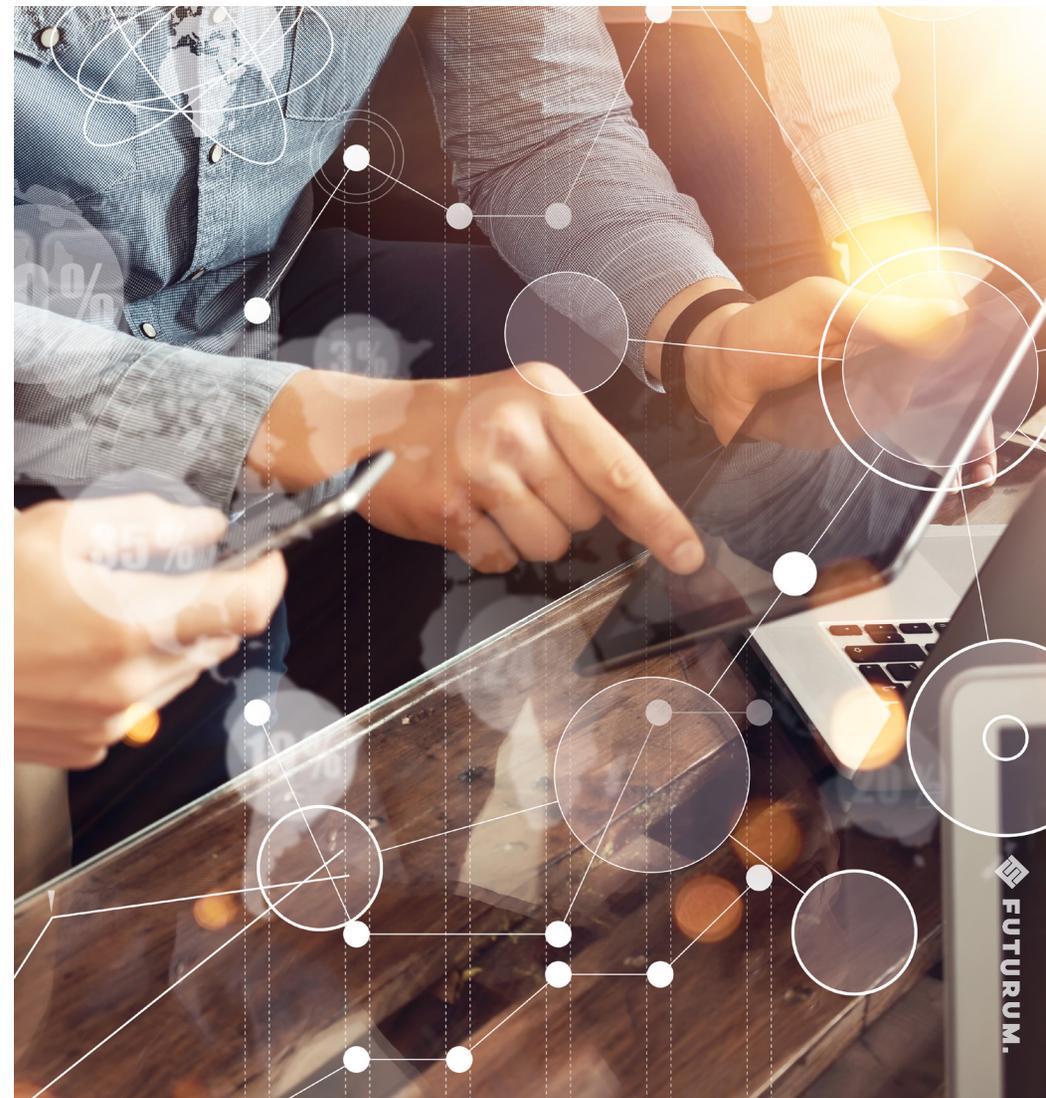
The landscape for banking and financial services is more dynamic than at any time in the history of the sector. Whether new services, access platforms, new rails, and/or new entrants, change is happening on every vector. To further complicate the landscape, the macro-economic and geopolitical landscape is more turbulent than any point in recent history. To compete and win in this marketplace, banks and financial institutions must learn to operate at the pace of a crypto startup and also continue to deliver hard-earned trust and integrity at scale.

However, this shift in operations is fraught with challenges at the technology level that include a shift from product provisioning to service orchestration, a shift from static processes to dynamic architecture, and a shift from standalone platforms to the hybrid cloud. Reimagined financial systems require infrastructure that supports seamless integration of in-house offerings with partner services, as well as provide low entry cost and high elasticity to support an agile response to the market. Financial institutions that successfully deliver against these three vectors are going to see outsized returns, enhanced customer adoption, and improved margins and operating profits.

The underlying infrastructure in many financial institutions relies on core systems powered by the mainframe. At Futurum Research, we believe that the mainframe can play a valuable role here. Coupled with a dynamic hybrid cloud architecture, the right security posture, a robust API network, and IT operations that rely on new technologies like AI, the mainframe is positioned to drive financial transformation without sacrificing the power of existing operations.

To succeed in today's highly competitive banking and financial services business environment, financial institutions must make the right technology investment decisions. This requires evaluating

their current environments, taking a fresh look at the strategic nature of core platforms towards the goal of increasing agility, and expanding as possible their role in reimagined financial infrastructures. This will set them up for success moving forward.



THE SHIFTING LANDSCAPE FOR FINANCIAL INSTITUTIONS

Financial institutions have faced immense outside pressure from changing customer demands, a shifting geopolitical landscape, dynamic regulatory frameworks, and an increase in cyber security risk. In this era of digital transformation, these pressures are also leading to additional challenges within financial organizations. These include:

Product Provisioning to Service Orchestration. Even after decades of digitization opportunities, many banks, financial services companies, and insurers have not progressed further than delivering digital access to routine account transactions. This access was initially provided by the internet and subsequently mobile devices. This alone does not represent a fundamental shift in customer experience. In fact, far from it.

The inability of traditional incumbents to react quickly to changing market conditions has given rise to an entirely new generation of companies — Fintechs. These organizations have capitalized on the need to shift financial business models from discrete offerings, oftentimes solely delivered with human involvement, to a complete end-to-end digital orchestration of secure, experiential interactions that deliver a holistic ecosystem of financial products. The challenges are not only coming from Fintechs, but also tech companies looking to encroach on the traditional domain of finance under the banner of Techfins. Examples of this include Apple Pay and Google Pay, but for the sake of clarity, we will use Fintech to cover the entirety of this space.

Fintechs are fundamentally digital-only natives, unencumbered by branch or ATM networks and are not weighed down by the technical debt associated with batch processes built for traditional banking. This allows a greenfield opportunity for reimagining financial processes. Despite Fintechs producing innovative solutions to specific banking problems, think Venmo or Square,

customers increasingly want secure, comprehensive, omnichannel, highly personalized experiences from a single provider. This means that incumbents need to find a way to move beyond their outdated product-centric approach toward finance and begin acting more like orchestrators and relationship managers, adopting the innovations of Fintech as additions to existing portfolios and facilitating access to the most innovative and useful services regardless of how they are sourced.

Static Processes to Dynamic Architecture. As the COVID pandemic reshaped the public consciousness, few lenders would have envisioned that in mere months a massive new loan market would emerge. Yet that is exactly what happened when the CARES Act set aside hundreds of billions of dollars for Paycheck Protection Program (PPP) loans.

Those lenders who had already begun transitioning their business and IT models to a more responsive approach reaped immediate benefit, as they were able to immediately pivot from zero to tens of billions in loans and quickly and easily manage the majority of this opportunity.

Retail banks, brokers, and insurance firms similarly had to pivot overnight from walk-in services to full digital support for their customers. Against this backdrop, traditional approaches toward getting new applications and services to market are not adequate for responding to rapidly changing business conditions. Therefore, both financial processes and financial systems must be modernized with agile methodologies and componentized processes focused on managing customer partnerships — not products — resulting in a flexible framework that is responsive to change and scalable on demand, while still delivering on security and privacy demanded by customers and regulatory bodies.

Standalone Platforms Shift to Hybrid Clouds. There is clear value in updating financial systems with portable, modular, componentized applications built using modern cloud native application development principles and tools. Fintech offerings are usually cloud-native services, as cloud architectures were built to support self-serve, on demand computing needs, delivering elasticity that translates into faster time to market for new applications and a nearly unlimited ability to rapidly scale up or down.

Reimagined financial systems require infrastructure that supports seamless integration of partner services, as well as providing low entry cost and high elasticity to support an agile response to the market. Cloud is the answer, but organizations need to take a balanced and hybrid cloud approach: using public clouds for optimum performance, along with up to date on-premises assets. Hybrid cloud can give incumbent organizations the same benefits as Fintechs that were born in the cloud, without sacrificing what helped them build their brands.

Financial institutions that successfully deliver against these three vectors are going to see outsized returns, enhanced customer adoption, and improved margins and operating profits.



DRIVING AGILITY INTO CORE SYSTEMS WITHOUT BREAKING THE BANK

Essential financial infrastructure provides for the security, privacy, compliance, and durability that has helped build an organization's reputation, and should be top of mind when building out the resilient and responsive infrastructure that modern banking requires.

In many organizations, the underlying core infrastructure relies on the mainframe, a transaction platform that is uniquely positioned to help organizations kick-start the transformation journey without sacrificing the power of existing operations. Adopting a dynamic, hybrid cloud architecture to support a customer-centric business model melds the power of the mainframe with the flexibility of cloud native choices.

In order to take advantage of this shift, financial institutions must consider their current environments, with a fresh look at the strategic nature of core platforms towards the goal of increasing agility, and also explore opportunities to expand their role in reimagined financial infrastructures.

The Mainframe at the Core

When looking at the role of the mainframe in organizations, we must acknowledge that the mainframe architecture is unchallenged in its optimization for transactional throughput. From its inception, mainframe platform architecture has focused almost exclusively on four vectors: performance, availability, scalability, and security of transactions. While other platforms also can claim these inherent characteristics to varying degrees, the mainframe is obsessively constructed to deliver in the most demanding environments on these four vectors.

At a foundational level, regardless of user experience (UX) and user interface (UI) design innovation and digital transformation across multiple access platforms that has happened over the last decade, transactions are the lifeblood of all forms of finance. This is true as it relates to traditional banks, payments providers, and Fintechs. Shiny new technologies such as distributed ledger technology (DLT) and decentralized finance (DeFi) are gaining traction and are considered by many from the cryptocurrency space to be wholesale replacements for the traditional financial services space. That said, we don't believe traditional transactional systems will be replaced, even in the long term, by DeFi and DLT, as the need for core bank-owned systems of record sit at the heart of what it means for a bank to be a bank.

As such, from a transactional perspective, then, the mainframe is almost uniquely positioned to perform as a system of record. When looking at the current generation mainframe, the IBM z16, the system can handle many billions of encrypted business transactions each day.

Given the foundational importance of transactions, the technologies that operate this layer are vital, if not always front and center. We acknowledge that skewed perceptions can be a challenge, especially when allocating IT budgets, but we must stress that organizations can place themselves in significant risk if they fail to appropriately invest in the back end 'system of record' platform.

In the always-on world, where customer service must be offered (and guaranteed) 24 hours a day, seven days a week, 365 days a year, core financial systems remain always on because the mainframes on which they run have been engineered to support this very purpose.

Cementing the Mainframe's Role in the Hybrid Cloud

Reimagined financial systems will not run on a single platform. As mentioned earlier, we believe in a nuanced hybrid cloud workload placement approach where workloads are deployed on-premises or in the public cloud depending on their best fit. Our view is that core system of record platforms are not best suited to the public cloud.

As a result, it's important to examine how the mainframe, and the mission critical data that it supports, can be connected to systems of engagement and insight in a hybrid cloud environment. The mainframe is no longer a siloed entity, disconnected from the rest of the IT landscape. Over the last decade, the connectivity of the mainframe has exploded through the evolution of rich APIs and connectivity frameworks that have exposed the mainframe to systems oftentimes hosted in the public cloud or increasingly in private cloud architectures. Therefore, the right question to ask when evaluating your current situation is: *has your organization kept up with mainframe advancements so that they will thrive in the hybrid cloud environment supporting a vision of reimagined financial systems?*

We assert that mainframe systems can and must represent a key tenant of a hybrid cloud strategy. If this is not acknowledged by senior leaders, it is most often due to a disconnect because of inaccurate and outdated perceptions of the mainframe. We suggest there are three important ways an organization can ensure that its mainframes are properly modernized to be first-class citizens of a hybrid cloud environment. These include:

Zero Trust and Systems of Record. Core systems, by their very nature as the system of record, often hold the most sensitive Personal Identifying Information (PII) and therefore represent the most lucrative target for hackers. Until recently, these core systems had robust role based access and control functionality that allowed the tight control of privileged users and fine-grained control as to which users could access what information.

However, two key trends have upended the status quo. First, the rise of social engineering and insider hacks occurring as a result of disgruntled admins with elevated access levels has grown rapidly. Consensus estimates now put this type of insider hack as contributing to as much as 40 percent of the number of breaches. Second, the level of sophistication of the threat surface area has increased. We have seen significant breaches result from what is referred to as supply chain hacks. Malicious actors gain access to the CI/CD pipeline and insert malicious code into the development lifecycle, bypassing traditional controls.

These threats that have emerged over the last few years have forced a rethink when it comes to securing core systems to ensure that the security strategy in place covers the entire mainframe security lifecycle. We are observing new approaches emerge almost daily to respond to the ever-changing landscape. The best organizations are the ones that remain both vigilant and continually evaluate new technologies and approaches.

As such, Zero Trust and Confidential Computing are starting to gain traction in the lexicon of non-IT leaders as it becomes imperative that approaches must be adopted to ensure the overall security posture of an organization. Zero Trust, meaning never

trust and always verify, ensures that the right people have access for the right amount of time and under the right circumstances. Adopting a Zero Trust strategy that includes core systems is a journey and one that won't happen overnight, but is critical nonetheless.

API Economy – Opening up the Core. The complexity and evolution of banking services are reflected in the IT systems that support these services. After decades of evolution, market changes, technology shifts, and M&A activity, senior executives have been left with a level of systems complexity that is untenable given the pace of market driven digital transformation. This complexity, commonly referred to as technical debt, not only ties up a huge portion of IT budgets but leaves IT organizations struggling to support the ambitions of the line-of-business driven projects.

While it may seem appealing to just rip out this complexity and affect a bulk move to a brand new cloud native architecture — and in one motion remove the mountains of technical debt — this approach is too risky an undertaking for many CIOs and CTOs. In fact, we have observed many failed rehosting projects and a corresponding number of former technical leaders wishing they had never undertaken such a project.

A more pragmatic and far less risky approach is to implement a layer of RESTful API frameworks that can shield businesses from the complexity of systems of record and the data sources they represent and allow them to unlock the full potential of the most secure, stable, and data rich mainframe systems forming the backbone of an organization. This is one of the easiest ways financial institutions can begin creating new forms of value.

A great place to start is through the use of Zowe — an open source interface that connects the mainframe to off-platform tooling and automation. Zowe allows mainframers comfortable with legacy code and next-gen developers comfortable with newer tools to work on the same codebase. Exposing mainframe based core financial systems via open APIs like Zowe can deliver dramatic improvements in core systems agility, resulting in greater business value without putting current operations at risk.

This approach allows customers to keep up with the relentless pace of innovation dictated by digital transformation projects while not risking replatform and refactoring projects that are both lengthy to execute and which often provide little material business advantage.

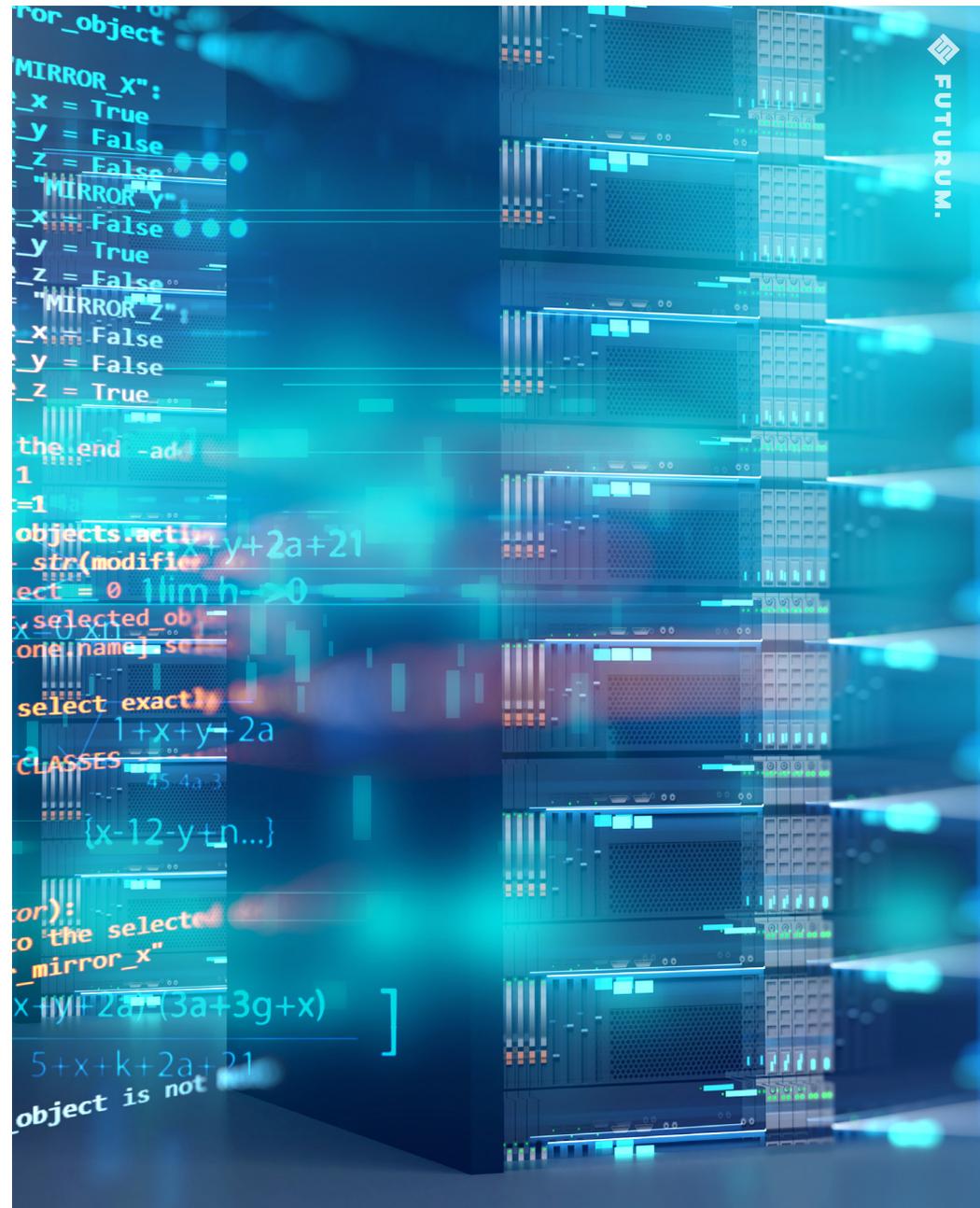
Evolution of Operations. The IT landscape has changed dramatically over the last decade. Where once all IT systems were in a single datacenter, today systems are in hybrid environments, spanning public and private clouds as well as traditional datacenters. When this diversity of location is coupled with the explosion of Internet of Things (IoT) and edge computing devices deployed in non-traditional IT scenarios, both the scale and complexity of the IT architecture are radically different.

As IT has become more complex and IT operations have evolved beyond the confines of the datacenter traditional IT operations tools, procedures and policies have struggled to keep up. The classic console and alerting systems are no longer fit for purpose due to both the scale and complexity of the architectures they are tasked with monitoring. Companies must rapidly adopt new paradigms just to stand still — let alone drive innovation. We are seeing an increasing number of companies consider an AIOps

approach to IT operations, applying augmented intelligence in order to combine big data, machine learning, and automation with human expertise so as to navigate the complex environment in and across systems.

AIOps enables organizations to analyze issues and diagnose root causes faster, proactively anticipate problems to resolve or avoid them before business impact, automate along the way to reduce manual effort, and also increase efficiency.

Modern mainframe platforms are still the unchallenged leader in processing transactions, but they are no longer just about transactions — they have transformed into versatile workhorses that have embraced the best of DevSecOps, CI/CD pipeline driven development, AI and ML, and the cloud native paradigms of containers and Kubernetes. In short, the mainframe in today's environment is a platform built for sustaining financial innovation.



CONCLUSIONS AND CONSIDERATIONS

The topic of mainframe modernization is currently in vogue as hyperscale cloud providers and global system integrators (GSIs) look to entice mainframe clients to wholesale migration of workloads to the public cloud. And while we believe refactoring and re-platforming may make sense for certain workloads, we are more skeptical about bulk migrations when it comes to core banking system of record deployments.

Against the wider backdrop of whether to remain on the mainframe or re-platform, we advise clients to examine their mainframe along the lines of the following vectors:

Workload Evaluation. Evaluate mainframe workloads for non-functional requirements around security, performance, availability, and scalability, and assess whether a proposed migration will be able to deliver on these four criteria fully in the suggested target platform. A disciplined, non-biased approach to workload evaluation will often remove the desire to take on risky migration projects where cost savings are overstated.

Network and Latency Requirements. Core system of record mainframe deployments are by their very definition already heavily connected to systems of engagement and analytical platforms. If these platforms are on-premises or dispersed across multiple public cloud platforms, latency requirements should be fully factored into any evaluation. One of the major areas to evaluate in any proposed public cloud migration is the significant cost associated with data ingest to move data to a public cloud.

Skills beyond code and platform. Skills aging-out is often a lightning rod for a mainframe deployment and up until recently, this was a valid concern for many mainframe customers. However, top mainframe vendors have made significant strides in addressing this by offering their customers educational programs. They

have also made impressive strides in working collaboratively with higher education and professional training organizations in an effort to radically change the skills landscape relating to the mainframe. In addition, open source efforts such as Zowe from the Linux Foundation's Open Mainframe Project have changed the developer experience for mainframe developers.

Once foundational evaluations have been made on retaining the mainframe as the platform to support core banking applications, then mainframe customers should turn their attention to consideration of which vendors they will work with to underpin their mainframe modernization efforts. We believe that mainframe customers should weigh factors such as level of investment in code development, engagement in the open source community, and vendor provided programs that extend beyond the software into the realm of skills. We also feel that mainframe customers should look for vendors that are able to address the requirements of:

- ▶ **Zero Trust.** Against an increasingly dynamic geopolitical landscape where the types of threats are also rapidly evolving, it is highly recommended that mainframe customers work with a vendor that can support their migration to a Zero Trust based model.
- ▶ **Modern Developer Experience.** For the mainframe to thrive as a first tier participant in a holistic digital transformation journey, mainframe customers need to enable the mainframe to be accessed by RESTful APIs and delight developers coding for the platforms. In our opinion, this means embracing open source efforts such as Zowe and modern IDEs that enable non-mainframe developers to get access to the platform without the barriers that constrained the mainframe as a platform as little as five years ago.

- ▶ **AIOps.** As mainframe workloads scale and the need for automation grows, there comes a time where monitoring systems must be augmented by AI-based capabilities to improve the predictive nature of mainframe operations.

Overall, we believe that mainframe customers have an opportunity to renovate and reinvigorate their mainframe deployments and position these mission critical systems to underpin the wider digital transformation projects many customers are embarking upon.

Through measured and well thought out investment cycles, the mainframe as a system of record is well-positioned to deliver the non-functional requirements critical for such applications. In addition, if mainframe customers choose their mainframe software partners carefully, they can support their objectives both now and in the future.



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