



Modernizing Banking Systems and Platforms

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Is your bank ready for a cashless society? Learn more.

Executive Summary

- Modernizing core systems and adjacent platforms is essential for banks to confront the growing competition from fintechs, launch new products quickly and meet the demand for personalized customer experiences.
- Core banking software providers are evolving their business models, now offering their platforms as a service in public clouds to compete or integrate with fintechs.
- Demand for real-time, data-informed customer experiences is causing banks to reconsider the agility and automation of their cloud and app platforms and reassess their talent pool.
- Cloud native, API-abstracted architectures with data-driven designs are the primary technology-enablers in the modern banking stack.
- Two differing approaches to core system modernization are emerging: entirely replacing the traditional platform with a new tech stack or “hollowing out” the legacy platform monoliths on a function-by-function basis and replacing them with a modern, modular architecture.
- VMware offers capabilities to support banks and independent software vendors as they build or buy modern capabilities, from initial evaluation and functional design to deployment, management and optimization.

Current industry landscape

Today, customers want their banking activities to match their online retail experience. Customers not only expect their bank to process transactions in real time but to anticipate their evolving needs and provide the most competitive offers. Cloud native payment and investment apps, like Venmo, Cash App and Robinhood, are influencing customer expectations. Super-apps are also moving into the banking arena by combining a variety of digital services and activities into one app, such as mapping, shopping, socializing and banking. All the while cyberattacks grow more sophisticated, and regulatory landscapes from nation to nation are becoming more cumbersome and arduous to manage.

So how do traditional banks remain competitive?

Banks must become more agile and optimize their development and delivery processes to bring software to market faster while strengthening their security posture. To address these expectations requires integrating disparate data and applications; however, legacy banking platforms and back-office systems of record make this transformation difficult. These legacy platforms are unable to meet the evolving scale, speed and real-time requirements of today's applications and regulatory demands.

To retain customers, build loyalty, attract new clients, and compete with fintechs or other nonfinancial services start-ups requires replacing, upgrading or outsourcing a bank's core platforms and its adjacencies.

Are you ready for real-time accounting?

Banks have traditionally relied on enterprise software suites or built these systems themselves to manage financial products and business operations. These back-end systems have typically leveraged mainframes running COBOL programs that were written decades ago for long-term use, supporting batch-based processing. While these tightly engineered systems were once an advantage, software engineers and developers now have difficulty modifying existing features without affecting the entire system or monolith.

The service provider landscape is also in transition. Established providers, such as Fiserv, Finacle, Jack Henry and FIS, have been selling banking software to their customers that is installed and managed like most other 3-tier applications running the front- or back-office functions. Similar to their customers, they too have been migrating their application monoliths to cloud native frameworks to enable feature and operational agility, reduce the need for maintenance windows, and become more adaptable to growing security requirements.

New “born in the cloud” banking providers, such as Mambu, nCino and Thought Machine, have created an ecosystem around the core platforms that often contain specific business-centric applications and digital-only capabilities. Real-time banking experiences increasingly depend on capabilities within the cloud, including data lakes, APIs and application marketplaces integrated within the technology stack. This modern technology has enabled developers and emerging fintechs to build new micro-apps more easily on top of existing banking or customer relationship management systems. Thus, fintechs can complement, extend and improve banking services in a cost-effective and agile way, offering unique digital or app-driven customer experiences.



In Cornerstone's What's Going on in Banking report, 67 percent of surveyed bank executives listed the ability to attract qualified talent as their top concern in 2022—up from just 19 percent last year.²

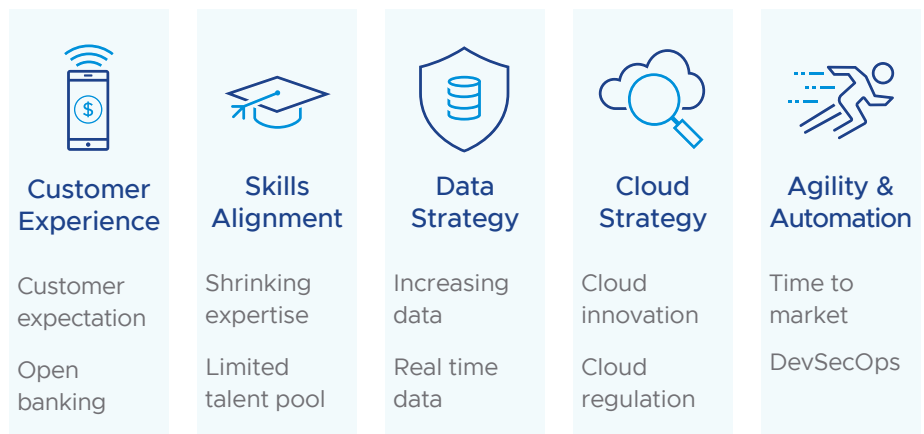
Drivers of modern banking platforms

Legacy systems are unable to keep up with the increasing amount of valuable data generated in transactional and analytical databases. A major focus of the banking platform modernization effort is meeting customer expectations by developing reusable, centralized data services that can be accessed through similar business functions across multiple channels. In a survey of 95 percent of top global banking executives, the World Retail Banking Report 2022 highlights the challenges associated with legacy systems and core banking platforms in the area of “optimizing data” and developing “customer-centric growth strategies.”¹ To gain insights from the generated data and act in real time, modernization has become an essential factor to future success. Moreover, as open banking becomes an API standard for sharing of data and services, the legacy systems cannot keep up with digital technology requirements and consumer data sovereignty rights that vary by country or geopolitical region.

Lifecycle management of legacy systems presents another set of challenges. The number of mainframe COBOL programmers in the workforce is aging out, making them scarce and costly, creating risk for the business. With programmers preferring to develop in the latest coding languages, banks are having difficulty attracting the innovators they need to remain competitive. Modernization of these systems and applications helps attract new talent and fresh approaches to customer demands.

Moreover, banks can no longer ignore the pace of innovation in the public cloud and need to adapt their operating models to quickly leverage new technical capabilities. Automation of human-centric processes is becoming increasingly critical with cloud native apps and customer-facing capabilities needing to be developed or modified at speed. Many banks are responding by adopting API-based ecosystems to manage critical integrations to new software, upgrades to current platforms, vulnerability remediation and application performance optimization.

5 Key Drivers of Core Banking Modernization



What does the modern banking stack look like?

Core and ancillary banking systems generally consist of three primary building blocks: data tier, service layer and digital channels, which act as the user interface to customers. Firms today are making decisions to build, buy or replace one or all of these simultaneously.

Some commonly debated questions are:

- Should the legacy mainframe be displaced with a modern, distributed database?
- Does a service abstraction layer make sense when multiple in-house and third-party systems can make calls to the data?
- Is there an optimal way to redesign a digital front end that can accept modular service enhancements and appeal to the next generation of customers without alienating long-standing clients?
- Which pieces should be bought for agility and scale from a software-as-a-service provider versus built for differentiation by in-house application developers?
- Which layers should be privately hosted versus extended into public clouds?
- How do you balance core system agility, maintenance and data security while operating at scale?

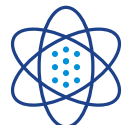
When considering a modern banking platform design, there are three primary technical enablers.



Cloud native architecture



Open or API-first approach



Data-enriched design

	Cloud native architecture	Open or API-first approach	Data-enriched design
Outcomes	Agile, scalable, highly available	Modular, collaborative, seamless	Integrated customer view, data-based insights, future-proof
Attributes	Reduces IT costs and enables agile development	Facilitates integration of banking services with open banking in mind	Enables personalized experiences and use of advanced analytics

Are your banking platforms accessible through APIs?



Cloud native architecture

Traditional core banking products employ monolithic and heavyweight architectures that are challenging to update and hardware dependent. Cloud native architectures allow for dynamic and agile application development by leveraging microservices in place of interdependent application designs with highly bespoke levels of complexity. By adopting a cloud native architecture and leveraging a microservices-based design:

- **Infrastructure, operating and maintenance costs are reduced** because less hardware is needed to support self-healing and auto-scaling cloud designs.
- **Engineering and operations staff is upskilled** and able to iterate their updates in real time because infrastructure as code is built on modular templates.
- **Real-time customer experiences are enabled** as new digital banking products are coded, tested and deployed to production quickly by application developers, unincumbered by cloud lifecycles.
- **Infrastructure is decoupled from applications** by using tools that support increased automation, management and observability (DevSecOps) and help ensure that the health, scale and performance remains steady as traffic increases.







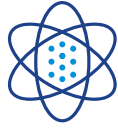
API-first approach

A modern, component-based architecture differs from a traditional one in that it is more modular, supports customer data migration, and connects to a broad ecosystem of partners for scaling and innovation. With an API-first approach, banks no longer need to purchase the entire core banking suite from a vendor or build everything internally. Components can be independently sourced and integrated without impacting the entire stack.

By using an API-first architecture, banks can unbundle their products into layers (credit cards, deposits, payments, compliance, loans and so on) and provide financial solutions as a service. For example, a nonfinancial company can access banking and payment services through APIs, enabling it to develop the solution it needs without building the entire stack themselves or maintaining the underlying technology in-house. The business can provide a seamless, end-to-end customer relationship by embedding a range of financial services.

Is your bank able to give your customers a complete view of their financial health?

Embedded Services		
<p>Embedded payments – The payment system is integrated in the software solution, eliminating the need for customers to use separate payment software.</p>		<p>Example – A variety of nontraditional businesses are incorporating embedded payments, such as ride-hailing applications.</p>
<p>Embedded lending – Lending services are provided through nonfinancial products or services, such as retail applications or food delivery services.</p>		<p>Example – Some examples include Klarna and AfterPay, which allow consumers to split payments into smaller installments.</p>
<p>Embedded investments – Companies can integrate financial market investing into their products and services. Users can invest in the financial market without leaving their social media, payment or retail application.</p>		<p>Example – PayPal provides a way for customers to invest in cryptocurrency from their account.</p>
<p>Embedded insurance – Coverage or protection is integrated in the purchase of a third-party product or service.</p>		<p>Example – Tesla offers a direct-to-customer insurance program that enables buyers to instantly purchase coverage for their vehicle.</p>
<p>Embedded banking – Nonfinancial institutions provide banking services to give customers fewer touchpoints.</p>		<p>Example – Lyft's debit card enables drivers to instantly receive payment.</p>



Data-enriched design

To remain competitive, firms need to offer personalized experiences and use advanced analytics in real time to make better decisions regarding tailored customer offerings. The key characteristics of a data-driven, customer-focused design are:

“Not tomorrow, right now—fifty-three percent of senior executives have identified data and analytics as their top investment priority in the next two years. This is an increase of 50 percent since 2020.”³

- **Integrated customer view with a single source of truth** – For truly customized banking experiences, a modern core must enable real-time, seamless integration of customer views across all applications to eliminate data silos. Multiple lines of business can also leverage this information to fulfil corporate risk management, federal reporting, and Know Your Customer (KYC) functions.
- **Insights derived from data analytics** – Data analytics capabilities integrated into a modern stack can enhance continuous data collection and provide insights into customer experience and trends. For example, by using information gathered from past interactions, machine learning can expedite the resolution of customer satisfaction issues, mitigate loan losses, and limit transaction amounts to lower default rates or reduce fraud.
- **Flexible, future-proof design** – An enterprise-grade infrastructure with scalable storage is required for banks to build innovative products that process massive amounts of data and adapt to emerging trends quickly. It is becoming more common for hybrid deployments to store sensitive transactional data on-premises and process the firm’s analytical data in the cloud. Additionally, evolving cybersecurity concerns are causing companies to extend their identity, access management, intrusion detection and prevention services into cloud-centric Zero Trust security solutions

Two approaches to modernization

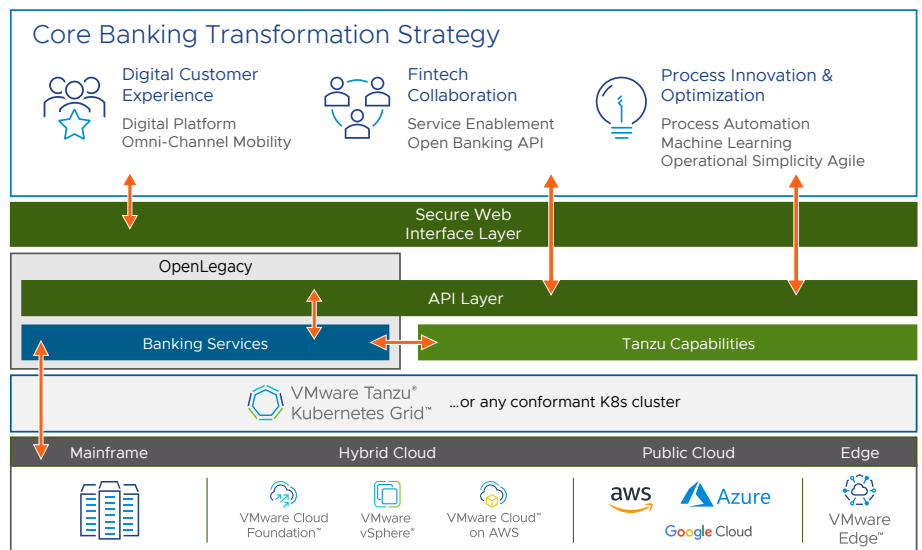
There are two key approaches to modernizing—replacing the entire core with a new technical stack or progressively modernizing functional elements over time as digital front ends are replaced. Each path carries a varying level of cost, risk and time horizons. While some banks have invested in a full replacement, most are taking a measured approach over multiple years, modernizing more complex components to extend usable life while purchasing new capabilities.⁴

Wholesale system replacement

Some firms opt to replace the entire system, often because of obsolescence or regulatory imperatives. One approach is to migrate customer data from an in-house traditional core system to a third-party core system out of concern for compatibility or skills to support next-generation platforms. Another strategy is to take a greenfield approach and move the entire tech stack to the cloud, whether it is from an established banking platform provider or a “born in the cloud” SaaS provider. This method carries a large amount of risk and upfront capital outlay but can mean a shorter duration of change for customers to adjust to.

Progressive modernization

The digital front end, user interfaces and integration layers are modernized while the core of the application monolith is retained. In this progressive approach, cloud native and modular microservices are added to the front end, often with API integration hubs to mainframes or systems of record, while transitioning away from the legacy application platforms. The back-end systems must be modern enough to be refactored and handle real-time transactions. This method carries lower risk and initial capital outlay, with iterative improvements to the customer experience. It can also mean that costs for legacy systems are carried in tandem with the new software for a longer duration, and operational complexity increases for a time until the firm completes the phase-out of legacy technology.



Evolving your banking platforms with VMware

VMware capabilities support banks at every stage of their journey, from technology and platform evaluation, development of strategy and design, to deployment, management and optimization.

Strategy and design

As banks begin their modernization journey, they must assess risk, costs and agility to determine whether they have the components to build and test their new solutions and applications quickly. VMware can assist banks in evaluating:

- Software development lifecycle
- Application and platform management
- CI/CD pipeline, platform and tooling
- Data strategy and middleware
- Systems architecture
- Infrastructure as code



Evaluation capabilities with VMware Tanzu:

- **Tanzu Labs Consulting** – Application assessment services to determine the modernization approach (re-platform, re-factor, re-write, retire); incorporation of [Swift Method](#) leveraging a set of lightweight techniques using agile and Domain Driven Design (DDD) principles that help teams plan enough to start modernizing software systems.
- **Tanzu Data Services** – Evaluation of the portfolio data strategy, including database software, middleware, messaging and caching, to support continuous development and delivery of modern banking applications.
- **Tanzu Application Platform** – Distribution and management factory of open source software development lifecycle (SDLC) tools; physical re-platforming of apps with support for Bosh and Kubernetes.



Deployment and delivery

After establishing a data strategy and modernization processes, banks can choose whether to deploy the solution on a public cloud, a private cloud, or as a hybrid approach.

With VMware, IT organizations have the flexibility to deploy and operate new digital platforms with consistent lifecycle management and operations while maintaining the integrity of the entire IT portfolio. VMware provides a common operating environment across on-premises data centers and leading public cloud service providers. Secure application and data migration to the cloud is possible for in-house solutions and hosted independent software vendor solutions. Workloads can be run the same way as on-premises without refactoring or re-platforming.



Deployment capabilities with VMware Cloud™ infrastructure:

- **VMware Cloud Foundation** – Private cloud implementation, management and observability of virtualized compute, network and security functions, and hyperconverged storage.

- **VMware Cloud Service Provider (CSP) partnerships** – VMC on Amazon Web Services, Azure VMware Solution, Google Cloud VMware Edition, Oracle Cloud VMware Solution.
- **Tanzu Kubernetes Grid** – Runtime for Kubernetes workloads across VMware Software-defined Data Centers or public cloud.
- **Tanzu Kubernetes Operations** – Mission control for Kubernetes clusters running across hybrid clouds supporting policy as code, governance and runtime configuration drift management; application layer performance observability powered by Wavefront.

Platform optimization

Following the deployment of a new system, banks must monitor and optimize the new applications, infrastructure security, scale and performance.

Management and optimization capabilities with VMware:

- **Tanzu Kubernetes Operations** – Mission control for Kubernetes clusters running across hybrid clouds supporting policy as code, governance and runtime configuration drift management; application layer performance observability powered by Wavefront.
- **CloudHealth Secure State** – Hybrid cloud cost management analysis and recommended financial optimization; monitor cloud and Kubernetes environments continuously enhancing the capability to search, understand and remediate security risks such as misconfigurations and threats from a single console and API.



VMware Tanzu® for
Kubernetes Operations

CloudHealth
by **vmware**

Is your firm ready for open banking?

Conclusion

Most banks have begun evaluating their business models and supporting legacy systems as they strive to deliver modern banking experiences and real-time interactions on digital channels of choice. As part of this process, banks are taking inventory of which technical capabilities are woven into their core competencies, what needs to be built, and what should be bought and integrated.

New capabilities and partners are emerging in the banking industry, driving firms to adopt open and cloud native architectures. For banks to take full advantage of these innovations, their core system must be modular, API-first and data-enriched.

VMware is an ideal technology partner for supporting system and platform modernization efforts because we support both 3-tier and 12-factor application stacks and have the capabilities to assist banks at all stages of their journey. VMware takes a platform-agnostic approach to help firms at every layer of the technology stack. Financial institutions have the strategic flexibility to embed and extend their products and services within the modern banking and commerce ecosystem, with resiliency and scale.

VMware has built a robust partner ecosystem that supports traditional and cloud native architectures. The Industry Solutions team continues to expand its integration partners to interconnect modern application front ends to heritage systems and data tiers to simplify and accelerate the delivery of modern digital services with monolithic legacy systems. We look forward to joining you in the journey.

For more information, contact your VMware account team.

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1. Capgemini. "[World Retail Banking Report 2022: Incumbent banks must embrace data-centric capabilities to drive personalized customer experiences.](#)" April 2022.
 2. Cornerstone Advisors. "What's Going on in Banking 2022." 2022.
 3. Ernst & Young Global Limited. "The CIO Imperative: Is your technology moving fast enough to realize your ambitions?" Jim Little, Savi Thethi, April 2022.
 4. McKinsey & Company. "[Next-generation core banking platforms: A golden ticket?](#)" Xavier Lhuer, Phil Tuddenham, Sandhosh Kumar, Brian Ledbetter, August 2019. (Based on a flash survey of over 100 banks during a banking conference in 2019.)

