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Kubernetes as The Platform for Financial Services Innovation

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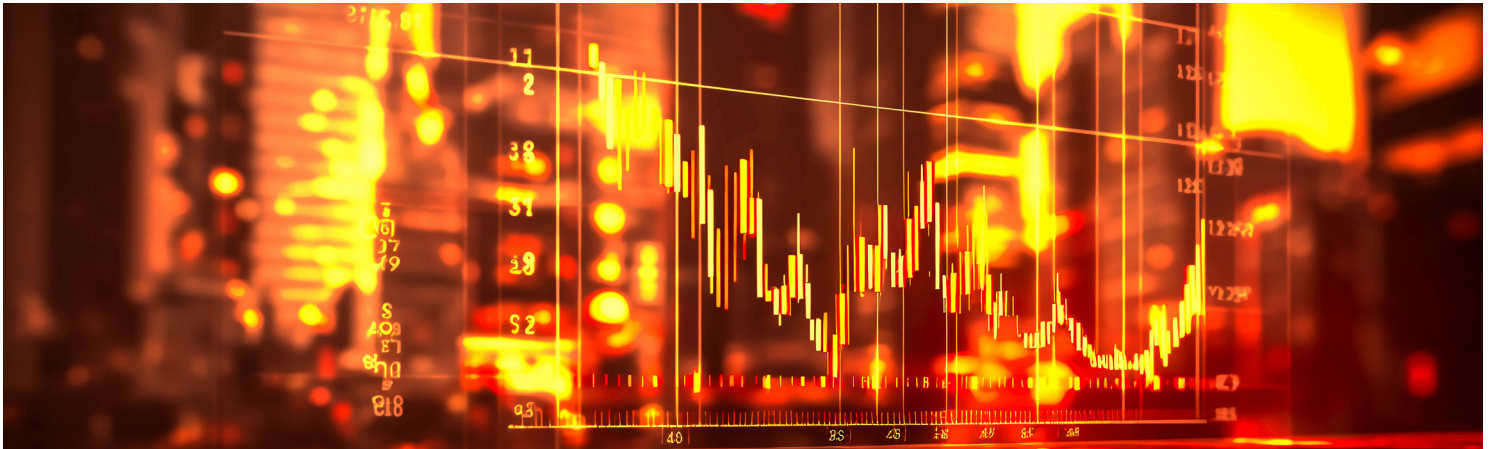and Application Development | The Futurum Group

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Introduction

No other industry grapples with the challenges of quickly creating new and more competitive offerings underpinned by digital technologies than the Financial Services Industry (FSI). FSIs are not only in competition with similar firms; they must also compete and win in the market with nimble digital-native competitors.

From ML algorithms for trading and fraud detection to highly engaging mobile banking experiences, technical leaders must leverage technologies that increase the velocity of their teams' ability to bring innovations to the market.

Tech leaders increasingly look to the speed and agility benefits of Kubernetes as a platform for rapidly creating software innovations. In a recent Futurum study, 56% of application developers stated they have adopted Kubernetes in their application deployments (DevOps Next research[1]).

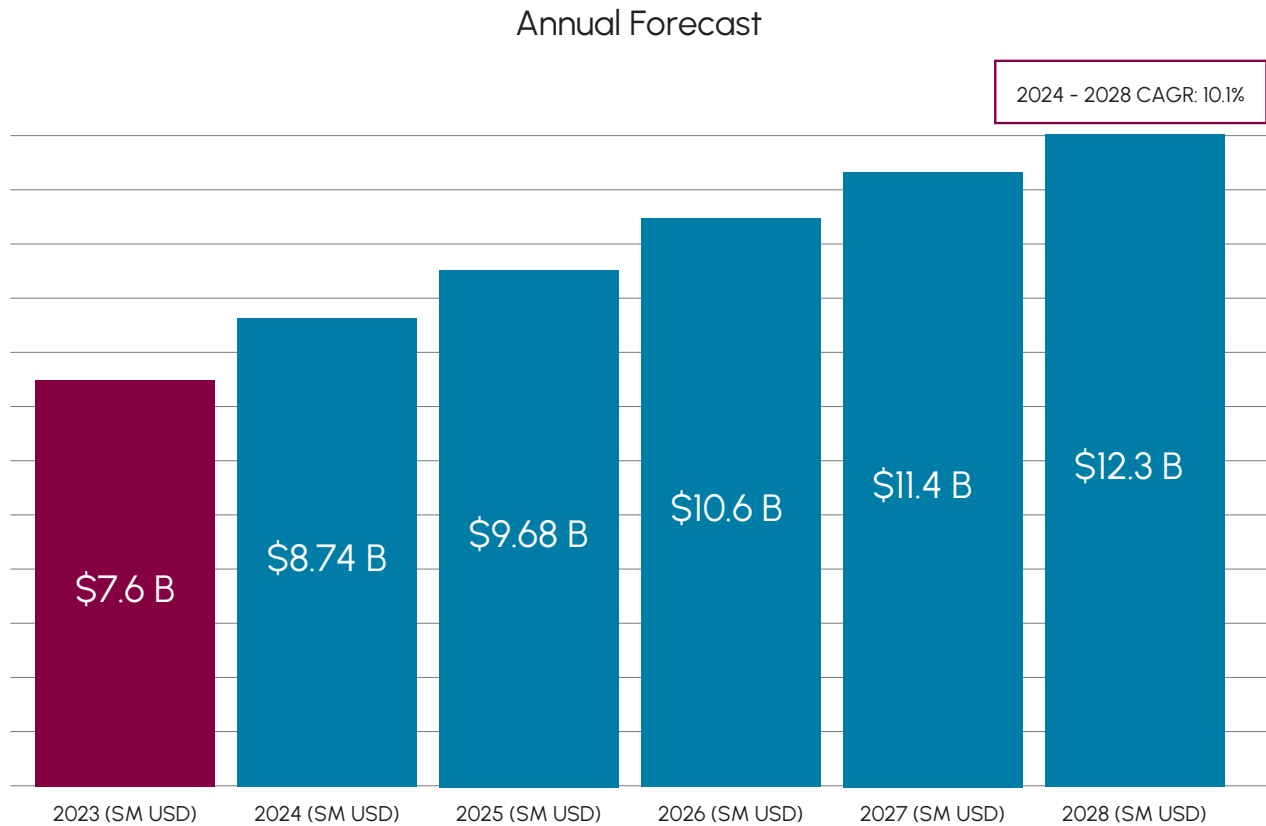The business drivers for FSI to move to Kubernetes include:

- Faster time to market to create competitive differentiation, especially with AI

- Agility to respond to opportunities and dynamically changing business conditions

- Quickly build and deliver digital multi-modal services (web, mobile, kiosk, natural language, video, text) on mobile first in many cases

- Deliver a positive, seamless customer experience through web and mobile applications

- Capitalize on valuable data for intelligent analytics and decision-making

- Meet the resilience and compliance requirements that can stress or exceed the ability of current software and technologies.

This Futurum Research Brief examines the accelerating business and technology requirements of FSIs and how using Kubernetes in applications and software development can aid in meeting these demands and expanding business opportunities.

1. DevOps Next 2024 and Beyond, July 2024, Mitch Ashley

Kubernetes Adoption and Value in FSI

With its ability to manage and orchestrate containerized applications, Kubernetes has become more prominent in modern financial services infrastructures. In 2015, Google contributed Kubernetes open source as the flagship project for the Linux Foundation's formation of the Cloud Native Computing Foundation (CNCF). Fast forward, the global market built around Kubernetes is expected to reach US$12.3B in 2028 in the banking, financial services, and insurance market sectors (DevOps and Application Development Annual Forecast, Futurum Intelligence).

Annual Forecast

2024 – 2028 CAGR: 10.1%

2023 (SM USD)	2024 (SM USD)	2025 (SM USD)	2026 (SM USD)	2027 (SM USD)	2028 (SM USD)
$7.6 B	$8.74 B	$9.68 B	$10.6 B	$11.4 B	$12.3 B

Source: Futurum Research, 2024 *Kubernetes, Cloud Native, Containerization, Service Mesh/API Connectivity and Runtime

Today, 41% of IT practitioners are already building most of their new applications on cloud-native platforms, growing to 80% in the next five years, t (The Voice of Kubernetes Experts 2024: The Top Data Trends Driving the Future of the Enterprise, independently commissioned research by Portworx by Pure Storage).

As Kubernetes matured into the definitive platform for mission-critical cloud-native workloads over the past 10 years, Kubernetes's reach has extended into the orchestration of software development pipelines, database stores, real-time analytics, and AI/ML workloads to accelerate application delivery and elevate data beyond transactional data processing. Today, mission-critical DevOps pipelines in financial firms have or are moving to operate on top of Kubernetes's high-performance, scalable technology, proven by mission-critical applications running on Kubernetes.

## Use Cases: Kubernetes in Financial Services Institutions

Real-time Analytics and Fraud Detection: Kubernetes allows for rapid deployment and scaling of data pipelines and analytics tools, which enables organizations to process large amounts of data in real time.
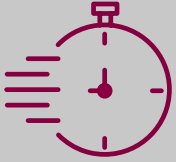
Faster, Targeted Product Delivery: By reducing monolithic application constraints, financial institutions can accelerate the development and delivery of targeted features and capabilities, accelerating the speed with which a containerized tap-to-pay microservice is created, tested, delivered, and improved.

Scale To Meet Customer Demand: Kubernetes can replicate, scale, and distribute backend workloads to quickly adapt to growing customer demand for a new mobile application payment capability.
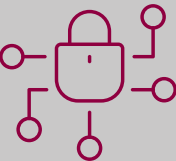
Resilient Financial Systems: Kubernetes's clusters aid FSIs in meeting resilience regulations by maintaining workloads during failures and unexpected load conditions.

Development Platforms and Flexibility: By containerizing the underlying platforms and workload elements of DevOps toolchains, Kubernetes can orchestrate developer self-service requests for images and configurations from platform engineering, load-balancing CI/CD pipelines, and containerized AI/ML models and large data resources required for ML model development.

The Value of a Unified K8s Data Platform

Challenges of Disparate Data Management in Financial Services

Financial institutions often struggle with the complexity of managing multiple data stores, each with its unique characteristics and requirements. Because of the fragmentation, data consistency issues may be created, making it difficult to guarantee data integrity across systems. Security risks are amplified when data is scattered across various environments, causing increased difficulty in protecting against unauthorized access and potential breaches.

Kubernetes's approach to persistent data storage relies on the Container Storage Interface (CSI), which can serve as a functional solution but often fails to scale to meet the growing demands of data-driven applications. The reliance on CSI plugins can lead to disparate storage capabilities across vendors, resulting in inefficiencies and potential data lock-in. CSI plugins risk becoming a bottleneck for data-intensive workloads, which is especially apparent as the volume of data input/output and disk administration increases.

The Benefits of a Unified Data Platform

Organizations are turning to unified data platforms to address the challenges of disparate data environments to manage their data. Consolidating multiple data stores into a single platform allows organizations to streamline operations, improve data consistency, and align to data governance. The overall result is more efficiency in accessing and processing data and a reduction in bottlenecks arising from fragmented systems.

One of the most promising advantages of a unified data platform is the ability to enhance data security and compliance. The centralized controls and visibility offered can help organizations better monitor access to data, enforce tight security protocols, and ensure compliance with strict regulations. By using this centralized approach, organizations reduce the complexity of aligning to regulatory requirements, all while mitigating ongoing risks.

Potential Challenges and Opportunities

While Kubernetes offers many benefits, organizations must navigate the international, national and region-specific regulatory requirements. The 2025 PCI DSS requirements introduce comprehensive updates on enhanced data protection, advanced malware and phishing prevention, and more robust authentication mechanisms across cloud and traditional IT environments.

In EMEA, strict data protection laws such as GDPR require careful management of customer data. The EU's Digital Operational Resilience Act (DORA) enforces substantial rules for information communications and technology (ICT) risk management, incident reporting, operational resilience testing, and oversight of ICT third-party risks. DORA also requires measures for detection, containment, recovery, and repair.

Kubernetes can significantly help financial services organizations prepare for PCI DSS and the DORA enforcement in 2025 by providing a robust, scalable, and secure infrastructure for managing applications and data. Kubernetes addresses these requirements with enhanced security controls, policy enforcement, and compliance monitoring while delivering increased resilience and scalability. By utilizing Kubernetes, financial institutions strategically position themselves to deliver their services to customers on a resilient, scalable, high-performance and security cloud-native platform today and continue growing their businesses well into the future

Portworx as a Unified Data Platform

Portworx is the leading enterprise-grade container data management platform designed for Kubernetes environments. It offers a comprehensive solution to manage data storage challenges at scale.

Through a wide range of features, Portworx offers an enterprise-grade solution that extends beyond CSI plugins or Open Source software with advanced replication and high availability capabilities that ensure data consistency while minimizing downtime. This is especially important for financial institutions where disruptions result in serious implications. Financial institutions using Portworx have achieved zero data loss (RPO=0) with < 2-minute failover (RTO < 2 min) in the event of primary data center loss, highlighting its role in providing availability and data recovery processes.

Beyond data resilience, Portworx also incorporates strict security measures such as encryption and access controls to help protect data while ensuring compliance. Features like these are crucial to financial services industries where data privacy laws and regulatory requirements are top priorities. Portworx can help financial institutions manage the limitations of Kubernetes standard persistent data storage and overcome the risks of data lock-in and inefficiencies that may arise from using Kubernetes CSI plugins.

Portworx Data Services offers database-as-a-service access for SQL, No-SQL, and cloud-native databases. With Portworx self-service data provisioning and management, developers and data scientists are relieved of the burden of managing storage and databases. Instead, they access "golden paths" to provision and manage storage and databases with just a few lines of code. This reduction in their cognitive load allows them to focus more intently on coding and building models.

Portworx is a critical part of any internal development platform and enables platform and DevOps teams to deliver curated storage and database "golden paths" to developers and data scientists. This SecDevOps automates the application of data protection and security policies as the code is written.

Since becoming an early leader in the space, Portworx has remained at the forefront of delivering enterprise-grade solutions. These solutions allow financial institutions to fully leverage the potential of containerized applications to drive innovation and operational efficiency throughout their infrastructure.

Analyst Recommendations and Future Outlook

Kubernetes is a strategic technology platform for financial institutions distributed across the cloud, at the edge and in on-premise data centers. Strategies built on Kubernetes speed up the creation and rapid deployment of new applications, scaling resource demands specific to each location and delivering the resilience critical to meet business and regulatory requirements.

Focusing on the strategic modernization plan involves aligning Kubernetes's migration initiatives with long-term business goals and near-term tactical benefits. With this knowledge:

Financial institutions can effectively prioritize and modernize customer-facing and data-intensive applications since these changes will see the greatest business impact.

Focus on workloads that improve agility, reduce operational costs, or enhance customer experience to ensure their Kubernetes deployments deliver value.

Additional considerations for modernization include the complexity of the application, whether it is stateful or stateless, and existing dependencies to internal and external systems and data sources.

Establish platform engineering, delivered over Kubernetes, to reduce complexity and increase security and development velocity by establishing standardized or "gold" images and configurations.
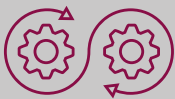
Establish an internal developer portal (IDP) for self-service access to development and testing tools, configurations, integrated DevOps toolchains, reliable runbooks, and repeatable configuration recipes.

With Portworx's unified data platform designed for Kubernetes environments, organizations can simplify the management, access, and application of Role Based Access Control (RBAC) policies for the underlying storage technology. By integrating Portworx into a Kubernetes-powered IDP, organizations can access containers, images, and data resources directly from code, requiring little knowledge or skills of the data platform.

This positions Portworx as a key tool for organizations navigating such a transition. Portworx should be leveraged for containerized applications and virtual machines to provide a smooth experience across any Kubernetes environment.

Future Outlook

FSIs must position their technology platform and software strategies to meet the following opportunities and trends:

Edge is the new Cloud: Over half of enterprises cite Edge Computing as extremely important to support Digital Transformation, IoT, and Industry 4.0 initiatives (Edge Computing Index, Futurum Research: https://futurumgroup.com/research-reports/edge-computing-index/). FSIs investing in Kubernetes as the platform for distributed computing are well-positioned to meet the computing, data, and AI demands of applications distributed to the edge.

NLP as a dominant UX: The meteoric rise and advancements of generative AI and natural language processing (NLP) are viable as a user experience to engage with FSI offerings. FSI product innovations must consider NLP for more than chatbots or basic searches within products and design applications with NLP as part of their multi-modal user experience. These UXs will require the inference processing of very large amounts of data and AI models, which will be distributed and processed on platforms such as Kubernetes.

Smartphones, more than the new bank branch: As the pandemic ushered in the closure of many bank branches and retail locations, customer interactions quickly shifted to smartphones and web browsers. FSI services must be modularized and distributed using a cloud-native architecture and orchestration platforms as new financial products and services are sidecars to or "embedded" within applications and experiences on smartphones and edge devices.

Important Information About this Report

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Pure Storage, Inc., based in Santa Clara, California, develops all-flash data storage solutions. Founded in 2009, it is transforming the storage experience and empowering innovators by simplifying how people consume and interact with data.

Portworx by Pure Storage is the leading Kubernetes Data Platform, empowering enterprises to solve storage and data management challenges with ease. It delivers scalable, resilient, and secure storage, backup, and disaster recovery solutions, enabling seamless application portability across clouds. Unlock innovation, reduce complexity, and accelerate digital transformation with Portworx.

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