# Revolutionizing Instant Payments with MongoDB

AI-Driven Enrichment, Application-Driven Analytics, and more.

July 2023

MongoDB.

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# Abstract

The payment industry is experiencing a revolutionary shift, with traditional transaction timelines reduced from days to seconds. This white paper explores the critical role played by MongoDB as the fundamental data foundation for instant payment processing, exploring the following:

**Instant Payment Transformation:** We introduce the payment landscape and discuss how financial institutions are transforming their underlying instant payment technologies. We also discuss the benefits of instant payments such as improved liquidity, enhanced visibility and more.

**Instant Payment Process with MongoDB:** We present a comprehensive seven-step payment process that demonstrates how MongoDB seamlessly integrates into the realm of instant payments. Explore the benefits of using MongoDB as the underlying technology for efficient and reliable payment processing.

**Instant Payment Capabilities with MongoDB:** We share some of MongoDB's instant payment capabilities that include data enrichment, application-driven analytics, mobile-first and always-on functionality, as well as an API-driven approach for seamless integration.

**Pick your Integration:** We discuss the three distinct payment integration mechanisms that MongoDB supports, empowering organizations to streamline their payment processes in whichever way they choose. Gain insights into the options available and how they can empower financial institutions to streamline their payment processes effectively.

Let's get started!

# Instant Payment Transformation

The payments industry is currently undergoing a revolutionary shift, where traditional transaction timelines have been dramatically reduced from days to mere seconds. Financial institutions recognize the vital importance of providing the best instant payment experience to stay ahead and maintain their market share. As a result, the demand for instant payments has prompted these institutions to reassess their innovation priorities and shift their focus towards the underlying data infrastructure that powers these lightning-fast transactions. This data infrastructure must seamlessly integrate with artificial intelligence and machine learning tools, enabling fraud detection and prevention while delivering personalized experiences. It's a whole new ballgame, and financial institutions are stepping up their game to meet and exceed customer expectations.

In this fast-evolving payment landscape, MongoDB offers financial institutions a JSON-based data foundation to build their instant payment platforms upon. With MongoDB's powerful capabilities, financial institutions can personalize payments, leverage real-time analytics for data-driven decision-making, automate processes, and implement advanced fraud prevention measures. MongoDB's developer data platform ensures compliance with sanctions regulations while seamlessly integrating payment processes, settlement, and real-time execution. As the payment industry continues to evolve, MongoDB remains dedicated to evolving alongside the financial services industry, empowering institutions to fully embrace the future of payments.

# Beyond Instant Payment Transformation

By leveraging MongoDB's developer data platform, financial institutions can unlock the benefits of offering instant payments with unparalleled speed and efficiency. These benefits encompass various advantages for businesses, including improved cash flow, enhanced visibility into payments, simplified operations, strengthened business relationships, and increased innovation.

Instant payments provide businesses with the ability to access much-needed cash precisely when it is required, thereby enhancing cash flow and ensuring prompt payments. Moreover, they offer valuable insights into spending patterns, enabling businesses to improve their financial management practices. With streamlined workflows and enhanced liquidity, businesses can save costs and concentrate on vital operational aspects. Additionally, instant payments contribute to fostering robust relationships with vendors and clients by eliminating uncertainties and delays, thereby promoting trust and

facilitating smoother collaboration and innovation. Ultimately, real-time payments pave the way for disruptive innovation, giving rise to novel business models and applications. MongoDB serves as the core data foundation powering these instant payment capabilities.

# Simplified Instant Payments with MongoDB

So, how does MongoDB work with instant payments? MongoDB's developer data platform offers a flexible document data model that helps payment platforms get to market faster as well as reduce data fragmentation and unnecessary complexity. With its JSON-like format, the document data model at the heart of MongoDB and its multi-cloud database MongoDB Atlas allow you to alter the structure, format, location, and storage of your data in response to changing information and requirements. This leads to an enriched payments experience with data in any format or structure. For established enterprises interested in modernizing their payment landscape, MongoDB lets you build new services and products rapidly using existing data via an Operational Data Layer.

Let's go through a quick overview of instant payments with MongoDB and explore Figure 1 step by step!

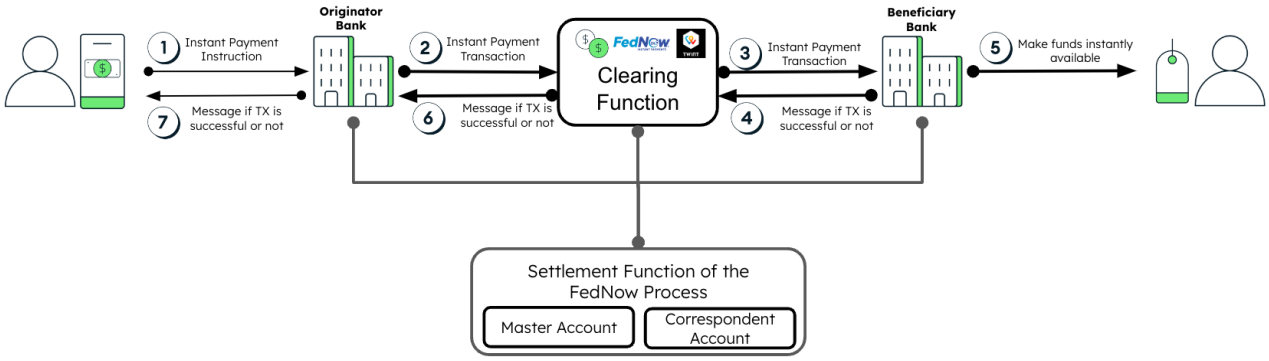


Figure 1: Simplified Instant Payment

The instant payment process, underlined by MongoDB as the data foundation, involves seven steps. Let's consider the scenario of sending $10 to your friend Luca. You will send a payment instruction of $10 from your mobile phone to your bank. This payment instruction will then be sent to a clearing function like FedNow. Because of MongoDB's JSON model, your financial institution doesn't have to worry about translating data structures from the bank to the clearing function, instead MongoDB seamlessly integrates with instant payment infrastructures like FedNow, ensuring secure transmission of payment instructions using a

standardized JSON format. Additionally, throughout the transaction, MongoDB captures and enriches payment data, optimizing the flow by processing and retrieving information efficiently.

MongoDB's role extends to the beneficiary bank, providing secure storage and retrieval of payment details while efficiently handling high transaction volumes. When it's time to make the funds instantly available to Luca, MongoDB ensures a seamless experience by capturing and enriching data with crucial information such as classification, invoice, accounting, and risk scoring data. Its flexible document model accommodates this enriched data, enhancing transparency and accuracy. Throughout the journey, MongoDB facilitates efficient and secure communication among the beneficiary bank, clearing function, and originator bank. Notifications, clearance confirmations, and updates flow seamlessly, enriching the payment data and enabling a smooth payment lifecycle. With MongoDB, financial services are armed with a reliable, secure, and efficient data foundation for instant payments.

**For more information on the technical aspects of instant payments, check out the following webinar Payments modernization – architectures shaping the future.**

## Instant Payment Capabilities with MongoDB

MongoDB offers instant payment capabilities that include data enrichment, real-time analytics, mobile-first and always-on functionality, as well as an API-driven approach for seamless integration and support for open banking initiatives. These capabilities empower financial services institutions to enhance payment processes, gain valuable insights, ensure smooth mobile experiences, and enable secure and efficient payment interactions in the digital economy. Let’s explore each capability a bit further.

## Enrichment

**Enrichment through Rules-Based Ingest:** As part of the enrichment process, financial institutions can rely on MongoDB's Realm rules services and aggregation pipeline in the initial stage to prevent fraud and authorize payments via MongoDB change streams. By leveraging MongoDB's features, including its flexible document model, financial institutions can enrich payment data with additional information, such as transaction volume thresholds. This enrichment enables better fraud detection and enhances the overall security of the payment pipeline.

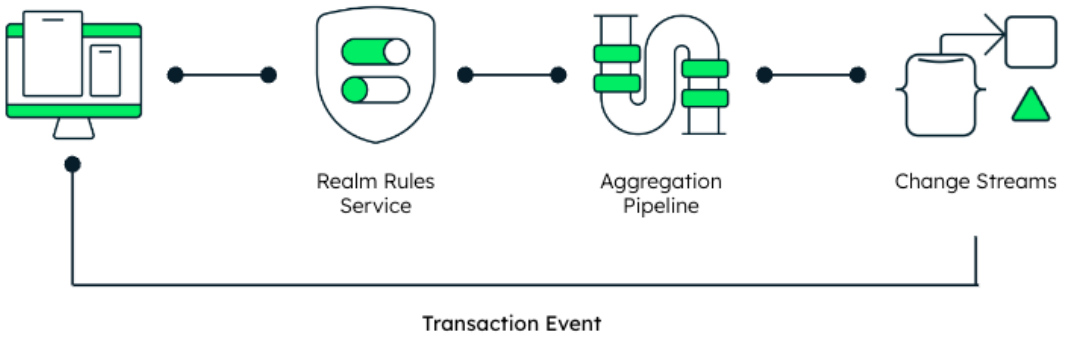


Figure 2: Rules Based Ingest

**Enrichment with AI/ML Integration:** Financial institutions can go beyond static rules and leverage MongoDB's integration with AI/ML platforms like Databricks.

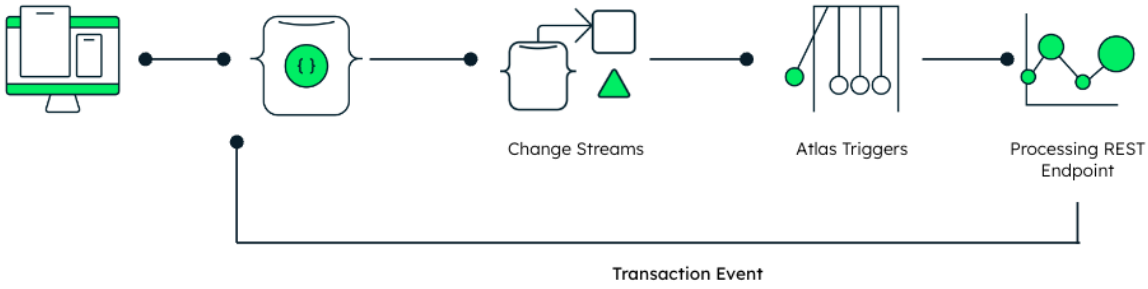


Figure 3: Generate actionable data using AI/ML

- **Card Fraud Use Case:** Card fraud is a significant problem and fear for both consumers and businesses. However, despite the seriousness of it, there are solutions that can be implemented for card fraud prevention. Financial institutions have various processes and technical solutions in place to detect and prevent card fraud, such as monitoring transactions for suspicious activity, implementing know-your-customer (KYC) procedures, and a combination of controls based on

static rules or machine learning models. These can all help, but they are not without their own challenges. Application-driven analytics for fraud detection is the solution for the very real challenges financial institutions face today. One example is a fraud solution MongoDB built with databricks. As you see in Figure 4 below, the MongoDB Spark Streaming Connector integrates Apache Spark and MongoDB. Apache Spark, hosted by Databricks, allows the processing and analysis of large amounts of data in real-time. The Spark Connector translates MongoDB data into Spark data frames and supports real time Spark streaming. By incorporating advanced technologies such as MongoDB and Databricks, organizations can improve their fraud prevention capabilities, protect sensitive data, and reduce operational headaches. With the solution proposed, organizations can take a step forward in their fraud prevention journey to achieve their goals. For more detail on this solution, check out the Real-Time Card Fraud Solution Accelerator with MongoDB and Databricks article.

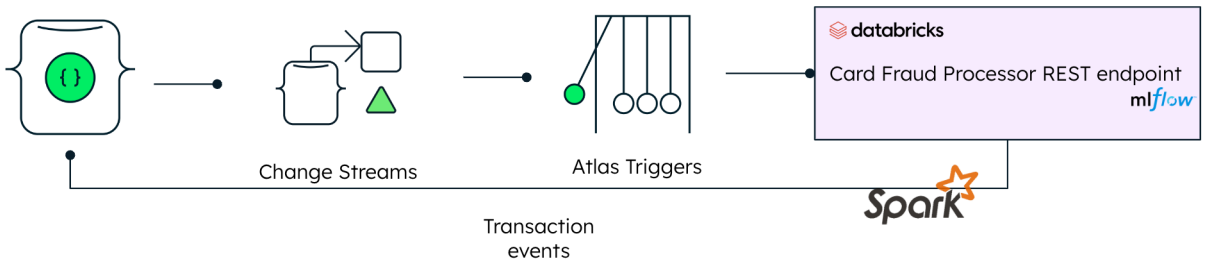


Figure 4: Example AI/ML Integration with Databricks to detect fraud

By harnessing the power of AI/ML algorithms, financial institutions can generate actionable insights from payment data, enabling them to identify evolving fraudulent activities and take proactive measures to mitigate risks. MongoDB's compatibility with AI/ML technologies empowers financial institutions to enrich their fraud prevention efforts with application-driven analytics, enabling more effective decision-making and continuous improvement in their security systems. If you are curious to learn more about AI/ML technologies with MongoDB, check out the white paper, Embedding Generative AI and Advanced Search into your Apps with MongoDB.

**Enrichment in Case Management:** When rules and models identify fraudulent activity, human intervention is often necessary. This typically involves customer support engaging directly with the customer to determine the legitimacy of the transaction. To increase resource efficiency, financial institutions can take advantage of MongoDB change streams and device sync for mobile devices. Through these capabilities, financial institutions can enrich their case management processes, ensuring accurate and timely

resolution of fraudulent activities. The enriched data obtained from customer interactions and intervention further enhances the overall effectiveness of the enrichment process and strengthens the relationship between financial institutions and their customers.

## Application-Driven Analytics

MongoDB provides financial institutions with a developer data platform, complete with MongoDB-native analytic tools and seamless integration with analytical platforms as seen in Figure 5. Let's explore how instant payments work using the transaction and analytical nodes, using the example of Luca sending $10 to his friend.

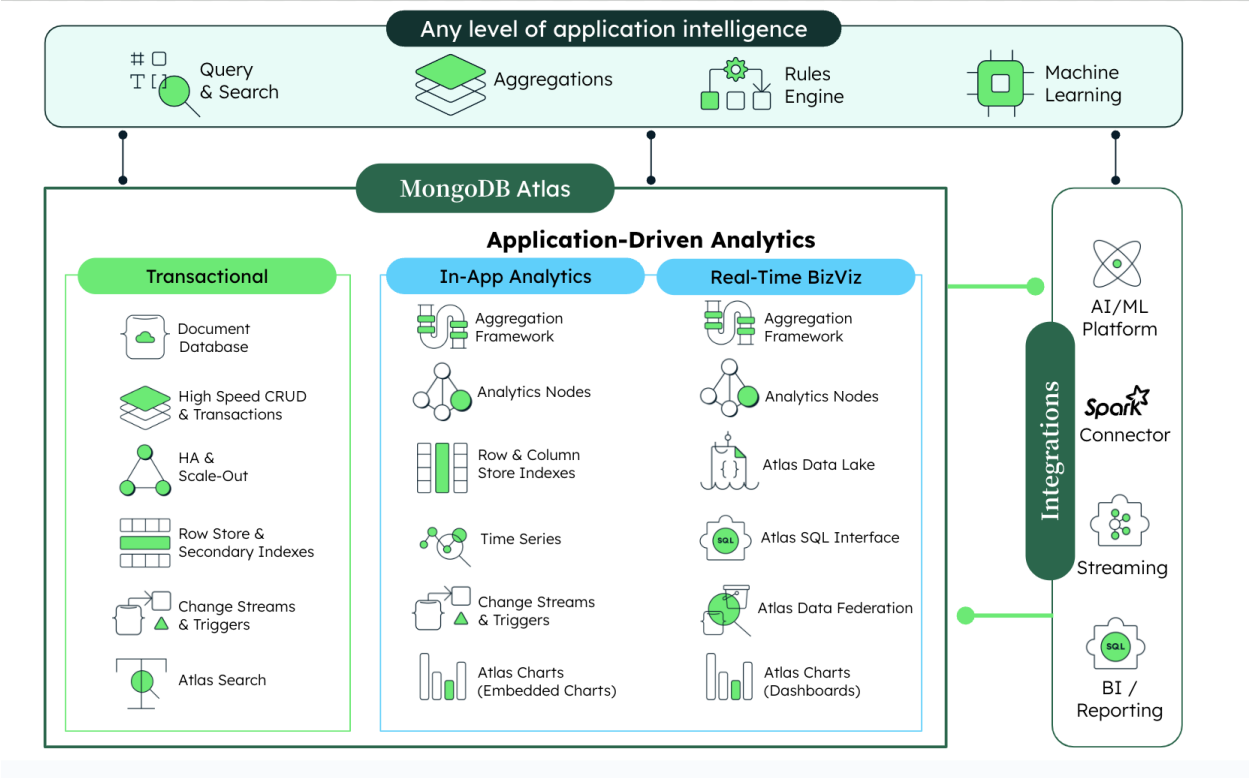


Figure 5: Application-Driven Analytics

In the world of instant payments, MongoDB's data platform offers dedicated transactional and analytical nodes. The transactional nodes are finely tuned to handle instant payment transactions with exceptional performance and security. These nodes excel at processing real-time data, ensuring the integrity and reliability of financial transactions. So, when Luca initiates a payment of $10 to his friend, MongoDB's transactional nodes handle the transaction swiftly and securely, guaranteeing a seamless payment experience.

Meanwhile, the analytical nodes cater to the more intricate aspects of data analysis. They are designed to handle complex analytics processes that require in-depth insights and comprehensive data analysis. By leveraging these analytical nodes during off-peak hours or scheduled maintenance windows, financial institutions can conduct in-depth data analysis, generate comprehensive reports, and gain valuable insights into customer behavior and market trends. For instance, financial institutions can use the analytical nodes to examine patterns in payment behavior, identify trends in consumer spending, and derive actionable insights.

By effectively separating transactional and analytical workloads across different nodes, MongoDB allows financial institutions to optimize performance and allocate resources efficiently for both application-driven analytics and instant payment processing. This approach ensures that transactional operations, such as Luca's $10 payment, are not impacted by resource-intensive analytical processes.

With MongoDB's unified data platform, financial institutions can seamlessly work with both transactional and analytical nodes on a single platform, eliminating the need for disparate database technologies. This streamlined approach simplifies operations, enhances efficiency, and empowers financial institutions to unlock the full potential of their data for instant payments and beyond.

## Mobile First/Always On

Let's go back to the example of Luca sending $10 to his friend. Since he is using a the mobile banking application to initiate the payment instruction, financial institutions need to be equipped with a mobile friendly database as seen in Figure 6.

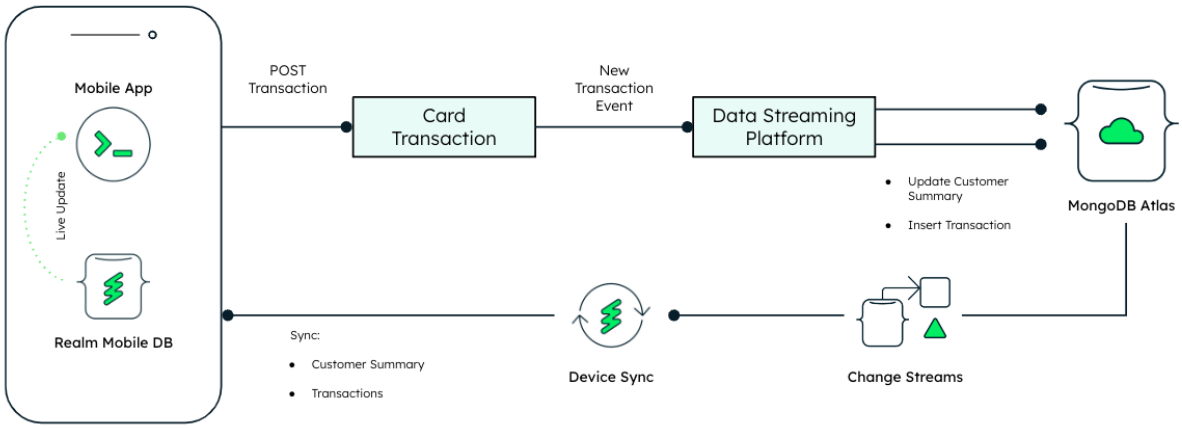


Figure 6: Card Transaction with MongoDB Realm and Atlas

This is where MongoDB Realm comes in. MongoDB Realm is MongoDB's mobile database and with it financial institutions can effectively enable instant payments by launching and scaling always-on and secure mobile applications. MongoDB Realm allows easy integration with third-party services through APIs, and accelerates approval times to meet customer expectations. The tolerance and automated data recovery capabilities of MongoDB Realm ensure that downtime and outages are eliminated, providing uninterrupted access to payment services and maintaining a seamless user experience.

Financial institutions can trust MongoDB to protect sensitive customer information and maintain the integrity of their instant payment systems. Industry-leading encryption, access controls, and data protection protocols integrated with existing practices safeguard customer data against unauthorized access and ensure compliance with regulatory requirements. MongoDB's data infrastructure and security features enable financial institutions to deliver efficient and trusted instant payment services, meeting the evolving demands and expectations of today's customers.

# Pick your Integration

There are three distinct payment integration mechanisms that MongoDB supports, empowering financial institutions to streamline their payment processes in which ever way they choose. Let's explore the options available that have been highlighted in figure 7 below and how they can empower financial institutions to streamline their instant payment processes effectively.

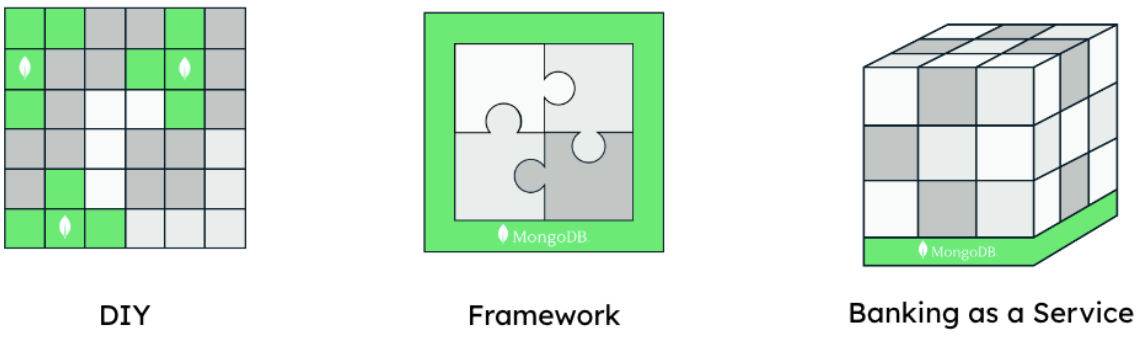


Figure 7: Integration Capabilities with MongoDB

## DIY Integration

"We went live 2 months into the COVID pandemic. A flick of the switch and payments started flowing. We've had over 3 million transactions now. No issues, it just simply worked. With this solution we can run on any cloud provider we want."

*Chris Clark, Principal Engineer, Macquarie Bank*

Macquarie, ANZ, and Nexi, notable customers of MongoDB, have chosen to adopt a DIY framework for instant payments. These organizations face specific challenges such as legacy infrastructures that hinder their cloud migration options, as well as stringent regulatory requirements. Additionally, their internal development teams have a strong preference for internal solutions rather than purchasing pre-packaged systems. By leveraging MongoDB's capabilities, these organizations can overcome infrastructure limitations, meet regulatory obligations, and empower their internal teams to build secure and scalable instant payment systems tailored to their unique needs.

## Framework

Another integration mechanism is the framework approach which allows financial institutions to build select components on MongoDB. Some customers who utilize the framework approach include CGI, Finastra, Icon Solutions, Minsait Payments, and many more. Using MongoDB has allowed them quick and efficient implementation, offering pre-built integration components and sophisticated orchestration capabilities. The framework's close cooperation with the provider enables the integration of future improvements with minimal effort, ensuring that customers can easily adopt new features and functionalities. Using a framework approach with MongoDB equips financial institutions with the necessary tools and resources to accelerate their instant payment initiatives and deliver personalized and enhanced payment experiences to their customers.

Icon Solutions architected and developed a next generation payment stack called Icon Payments Framework (IPF). Built for today's needs of real time and direct 'account to account payments', it meets the needs of a service driven, modular, collaborative payments ecosystem. IPF ignores the boundaries of traditional monolithic legacy applications and is underpinned by the database platform of choice, MongoDB.

## BaaS - Banking as a Service

"No other banking technology vendor comes close to the performance and scalability of Temenos Banking Cloud. We consistently invest more in cloud technologies and have more banks live with core banking in the cloud than any of our peers. With global non-cash transaction volumes skyrocketing in response to fast-emerging trends like BaaS, banks need a platform that allows them to elastically scale based on business demand, provide composable capabilities on-demand at a low cost, while reducing their environmental impact. This benchmark with Microsoft and MongoDB proves the capability of Temenos' platform to power the world's biggest banks and their BaaS offerings with hundreds of millions of customers, efficiently and sustainably in the cloud."

*Tony Coleman, CTO, Temenos*

MongoDB is a preferred choice for customers utilizing Banking-as-a-Service (BaaS) frameworks, including industry-leading names like Finastra, FIS, Stripe, and Temenos. These BaaS products are built on MongoDB and allow financial institutions to manage and process payments efficiently. MongoDB's flexible and scalable architecture empowers these customers to offer seamless payment experiences, integrate with various channels, and adapt to evolving customer demands.

With MongoDB's robust infrastructure and extensive range of capabilities, organizations across the payment industry can leverage the platform to meet their specific needs, regardless of their level of innovation or legacy status. MongoDB's versatility and ability to integrate with BaaS frameworks make it a trusted choice for customers seeking to drive innovation, streamline payment processes, and deliver exceptional customer experiences.

# Conclusion

The payments landscape is experiencing a transformative shift. In order to keep pace with the change, companies need to enrich and update their foundational technology. That's where MongoDB comes in. This white paper discussed how MongoDB serves as the essential data foundation for instant payments. To learn more check out these resources:

- MongoDB for payments solution page
- Webinar: Payments modernization – architectures shaping the future
- Fraud article: Real-Time Card Fraud with MongoDB and Databricks
- Fraud prevention with MongoDB solution page
- Blog: Temenos Banking Cloud Scales to Record High Transactions with MongoDB Atlas and Microsoft Azure

## About MongoDB

MongoDB empowers innovators to unleash the power of software and data. Whether deployed in the cloud or on-premises, organizations use MongoDB for trading platforms, global payment data stores, digital end-to-end loan origination and servicing solutions, general ledger system of record, regulatory risk, treasury and many other back-office processes. At the core of our developer data platform is the most advanced cloud database service on the market, MongoDB Atlas, which can run in any cloud, or even across multiple clouds to get the best from each provider with no lock-in.

To learn more about MongoDB, visit MongoDB.com

## About the authors

Thank you Ainhoa Mugica for her contributions to this white paper!

Boris Bialek, Managing Director, Industry Solutions leads the industry solution practices at MongoDB and focuses on modernization and true innovation of FSI solutions. His experiences range from core banking, payments and cards to trading and risk & treasury. He is an industry expert in data technologies and recognized speaker and author. Before joining MongoDB, he worked for a lifetime at FIS, IBM, Dell and Compaq Computers. He obtained an MS degree from the Karlsruhe Institute of Technology.

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## Resources

For more information, please visit mongodb.com or contact us at sales@mongodb.com.
Payments Page (https://www.mongodb.com/use-cases/payments)
Payments Webinar (Payment architectures shaping the future)
Fraud Blog (Real-Time Card Fraud Solution Accelerator with MongoDB and Databricks)
MongoDB Atlas database as a service for MongoDB (mongodb.com/cloud)
MongoDB for Mobile (mongodb.com/use-cases/mobile)

## Legal Notice

This document includes certain "forward-looking statements" within the meaning of Section 27A of the Securities Act of 1933, as amended, or the Securities Act, and Section 21E of the Securities Exchange Act of 1934, as amended, including statements concerning our financial guidance for the first fiscal quarter and full year fiscal 2021; the anticipated impact of the coronavirus disease (COVID-19) outbreak on our future results of operations, our future growth and the potential of MongoDB Atlas; and our ability to transform the global database industry and to capitalize on our market opportunity. These forward-looking statements include, but are not limited to, plans, objectives, expectations and intentions and other statements contained in this press release that are not historical facts and statements identified by words such as "anticipate," "believe," "continue," "could," "estimate," "expect," "intend," "may," "plan," "project," "will," "would" or the negative or plural of these words or similar expressions or variations. These forward-looking statements reflect our current views about our plans, intentions, expectations, strategies and prospects, which are based on the information currently available to us and on assumptions we have made. Although we believe that our plans, intentions, expectations, strategies and prospects as reflected in or suggested by those forward-looking statements are reasonable, we can give no assurance that the plans, intentions, expectations or strategies will be attained or achieved. Furthermore, actual results may differ materially from those described in the forward-looking statements and are subject to a variety of assumptions, uncertainties, risks and factors that are beyond our control including, without limitation: our limited operating history; our history of losses; failure of our database platform to satisfy customer demands; the effects of increased competition; our investments in new products and our ability to introduce new features, services or enhancements; our ability to effectively expand our sales and marketing organization; our ability to continue to build and maintain credibility with the developer community; our ability to add new customers or increase sales to our existing customers; our ability to maintain, protect, enforce and enhance our intellectual property; the growth and expansion of the market for database products and our ability to penetrate that market; our ability to integrate acquired businesses and technologies successfully or achieve the expected benefits of such acquisitions; our ability to maintain the security of our software and adequately address privacy concerns; our ability to manage our growth effectively and successfully recruit and retain additional highly-qualified personnel; the price volatility of our common stock; the financial impacts of the coronavirus disease (COVID-19) outbreak on our customers, our potential customers, the global financial markets and our business and future results of operations; the impact that the precautions we have taken in our business relative to the coronavirus disease (COVID-19) outbreak may have on our business and those risks detailed from time-to-time under the caption "Risk Factors" and elsewhere in our Securities and Exchange Commission ("SEC") filings and reports, including our Quarterly Report on Form 10-Q filed on December 10, 2019, as well as future filings and reports by us. Except as required by law, we undertake no duty or obligation to update any forward-looking statements contained in this release as a result of new information, future events, changes in expectations or otherwise.