

How a Database Can Make Your Organization Faster, Better, Leaner

Examples and Guidelines for the Enterprise Decision Maker

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Introduction

Organizations spend too much time and money on databases – over \$40B per year – and still more on the resources required to manage them. Infrastructure, applications and the data itself have undergone massive change over the past 30 years. Despite these changes, the underlying data management tool – the relational database – has remained the same, and in many cases, the organizations that use them are not aware of how it is holding them back.

But many companies are seeking a new way, and there are now viable options to the relational database. MongoDB is a general purpose, document database that provides the first viable alternative to the relational database, empowering businesses to be more agile and scalable. Fortune 500 companies and startups are using MongoDB to create new types of applications, improve customer experience, accelerate time to market and reduce costs.

The relational database will continue to play a role for legacy systems and for applications where the relational model is appropriate (e.g., general accounting). The majority of new applications, however, can and should be developed on new

databases that are designed for how we build and run applications today.

In this paper, we describe the technological and market evolutions that have made it necessary for organizations to reconsider the relational database. We tell the stories of large enterprise customers – like MetLife and Telefonica – who have adopted MongoDB and as a result are operating faster, better, leaner. We then provide a detailed playbook for emulating these success stories with actionable steps to becoming faster, better, leaner too.

Everything Else Has Changed – Have You?

A number of forces are changing the assumptions that underlie the data management tools and techniques that enterprises have used for the past 30 years.

- **Data Volumes Have Grown.** As of 2009, companies with more than 1,000 employees had at least 200 terabytes of stored data (twice

¹ McKinsey & Company

Faster, Better, Leaner with MongoDB

Customer Success Stories

- MetLife built a 360-degree view of 100M+ customers in 3 months.
- A Tier 1 investment bank saved \$40M and improved performance by 200x.
- Mailbox reimaged the mobile inbox and scaled to over 1M users in 6 weeks.
- ADP delivered a personalized mobile app to 1M users across 17 countries with zero downtime.
- Salesforce Marketing Cloud accelerated its roadmap by 12 months.
- Telefonica improved performance by 100x, time to market by 4x and storage costs by 67%.

the size of Wal-Mart's data warehouse in 1999).¹ Many companies have at least 120 GB of data per employee.² And business data volumes are doubling every 1.2 years.³

- **Storage and Compute Costs Have Declined.** The rise of commodity servers and storage has driven down infrastructure costs, and there are new kinds of data management software that can take advantage of commodity infrastructure.
- **Cloud Is Mainstream.** Traditional on-premise architectures have some advantages and will continue to exist, but private and public cloud infrastructure provide massive benefits in cost effectiveness, elasticity and time to market. Traditional data management technologies, however, are not well-suited these environments.
- **People Are Always Online.** The proliferation of mobile devices and Internet connectivity have made continuous online presence and activity the norm. The number of simultaneous users has skyrocketed,⁴ users want access to increasing volumes and types of information, and they expect high-quality experiences globally, across all their devices, all the time.
- **New Types of Applications Are Table Stakes.** It is no longer sufficient for organizations to deliver run-of-the mill business process apps. Mobile, social and real-time analytical applications are not just potential differentiators – in many cases, they are now requisites for staying relevant.

- **New Types of Data Enter the Fold.** Applications now incorporate a wide variety of data – including rich text, user comments, geospatial data, images, video, and social media – together into a seamless user experience. This diversity is a far cry from the simple general ledger and address book applications that helped popularize the relational database.
- **Software Development Is Iterative.** The waterfall approach to software development – which has dominated projects for decades – places enormous dependency on the requirements defined upfront. Today, organizations need flexible, iterative development practices to make it easy for teams to adjust plans in response to business and market evolutions. Requirements for data management change frequently, and the underlying technologies should accommodate these changes.

Companies that Adapt Are Faster, Better, Leaner

A number of organizations are adapting to these changes and as a result, they are creating new types of applications, improving customer experience, accelerating time to market and reducing costs.

² Network World

³ KnowWPC

⁴ Cisco Visual Networking Index

⁵ E.g., see GigaOm

METLIFE

360-Degree View of the Customer

MetLife is one of the world's largest insurance companies. The data supporting its business, however, is siloed, which makes it difficult for call center representatives to resolve customer issues efficiently. It makes the experience for customers unnecessarily complex, and makes it hard for representatives to upsell and cross-sell products. MetLife is taking on a massive investment in technology to become faster, better, leaner – and MongoDB is at the core of this effort.

Evolution

- **Early Adoption.** MetLife started a project in 2011 to bring together its troves of data under a single umbrella. The goal was to streamline the experience for customers, to improve call center efficiency, and to create new cross-sell and upsell opportunities. MetLife started its project with a relational database, but after almost two years and millions of dollars of investment, it opted for MongoDB. Within two weeks the team shipped a prototype. After 90 days the application was in production. The application – called The Wall – aggregates data from over 100 million customers, 100 products and over 70 source systems into a single data hub. It presents the data in an intuitive, Facebook-like interface for customer service representatives. Using MongoDB, MetLife was able to liberate its data and reimagine the customer experience.

The Wall is viewed by MetLife and the industry as a whole as an overwhelming success.⁵ The iterative approach and the speed with which MetLife brought the project online was especially remarkable. In fact, the service was so successful that representatives who did not have access to The Wall during its initial rollout sent instant messages to the representatives using it in order to resolve customer issues faster.

- **Broad Use.** With MongoDB at the foundation, MetLife has a variety of applications in store to build on top of its aggregate data hub. It has since expanded – and continues to expand – the breadth of customers and regions in The Wall, as well as the number of representatives that have access to it. It built The Research Wall, a tool for business analysts to mine customer data to guide

strategy. It is also building a predictive churn engine, which predicts when a customer is likely to leave MetLife and prompt a representative to reach out proactively. Separately, MetLife also built a developer-specific recruiting application on MongoDB.

The Wall was the beginning of MetLife's data liberation effort. Given its success, visibility to executives, and the expertise that its teams developed, the company quickly identified a number of other areas in which MongoDB can drive business value and address the shortcomings of previous relational approaches.

“When we built the Wall, we didn't spend \$1 million and take months to do it; we spent \$20,000 and built a prototype in two weeks.”

Gary Hoberman, CIO, MetLife

Organizational Keys to Success

- **Executive Sponsorship.** MetLife has made an institutional commitment to invest in technological innovation. This aligns executives and goals appropriately, making it easy for MetLife CIO Gary Hoberman to facilitate cooperation across numerous groups and to shepherd the project to completion.
- **SWAT Team.** MetLife has a SWAT team – a group of top notch engineers, operations and business professionals that parachute into various project scenarios to help break through obstacles and provide extra resources as needed. The SWAT team helped The Wall's project team address some key questions, such as how to match customer names and policies across different systems.
- **Developer Appeal.** As part of its investment in technology, MetLife is also taking explicit steps to attract the best developers. MetLife moved its development hub to the Research

Triangle in North Carolina, recruits at developer conferences, and empowers its developers to use a variety of leading edge, open-source technologies like MongoDB.

The Wall exemplifies an increasingly appealing use case for MongoDB among not only insurance companies, but among organizations across all verticals – the 360-degree view. Other companies face the same challenges as MetLife. This applies to retail customers, patients in health care, telco subscribers and many other users. Manufacturers are interested in a 360-degree view of the supply chain; governments want a 360-degree view of military assets; hotels need a 360-degree view of staff and facilities. With The Wall, MetLife has set the stage for a wave of new 360-degree view applications to come built on MongoDB.

TELEFONICA

Unlocking Subscriber Data to Enable New Products

Telefonica is a top five global telco, with over 315 million customers spread across more than 20 countries in Europe, Latin America and the United States. But as landline markets shrink, wireless markets mature, and over-the-top entrants compete for wallet share, Telefonica is under increasing pressure to find new revenue streams.

Evolution

- **Early Adoption.** Telefonica wanted to build new applications and services – like location-based advertising – on top of its existing customer data. The data, however, was spread across multiple distinct systems and in different formats. Each product or line of business had its own data store and schema (e.g., wireless service, landline service, IPTV, app store). Telefonica needed to collect all the data into a single repository. It tried at first to consolidate the data into a relational database. It took 20 technologists, 15 months, and 3 iterations before the team eventually turned to MongoDB. Standardizing across numerous schemas was taxing, and the relational database did not perform at scale. With MongoDB, the team built a robust platform in 4 months, increased performance by 100x and

reduce storage costs by 67% – with just one fifth the development team.

The project was completed at a breakneck pace with a reduced budget. Not only did the organization view it as a success, but the project team gained experience with MongoDB and quickly saw its potential use across the rest of the company. Since that project 3 years ago, the lead developer has not used a relational database.

- **Broad Use.** Telefonica has shifted a number of strategic projects to MongoDB. For instance, using MongoDB it built a Machine-to-Machine (M2M) platform, a product that can ingest, store, manage and analyze billions of sensor readings per customer. The beta customer is a power company collecting readings from electric meters every few minutes, eliminating the need to dispatch technicians and allowing the company to keep a closer eye on household-level usage in its distribution network. It also used MongoDB for Firefox OS, a project on which Mozilla and Telefonica are collaborating to increase openness and competition in the mobile market. The underlying push notifications system is one of potentially many that will run on MongoDB.

As MongoDB had already demonstrated its stability and robustness in a carrier-grade environment, the company felt comfortable deploying it to new strategic projects. The M2M and Firefox OS projects were appealing uses for MongoDB because they were new projects that would not require any migration and because they had high requirements for flexibility and scalability. MongoDB is now becoming a growing area of expertise for Telefonica developers and the go-to datastore for new, strategic initiatives.

Organizational Keys to Success

- **MongoDB Ecosystem.** The Telefonica team leveraged the wealth of resources available – such as online documentation, Google Groups and free online education – to ramp up on the technology. Additionally, it used MongoDB Management Service (MMS) to help optimize its deployments. The team cites the availability of resources as immensely helpful in completing the project under a tight timeframe.
- **MongoDB Support.** The team engaged collaboratively with MongoDB support. Rather than waiting until the application went into

“Since three years ago, I only work with MongoDB and I think it would be really really hard to go back.”

Pablo Enfedaque, R&D SW Engineer,
Telefonica Digital

production, Telefonica reached out to MongoDB proactively during development, which helped keep the project moving forward.

- **Quick Iterations.** The team had previously been accustomed to long software development cycles of at least 4 or 5 months. With MongoDB, however, they were able to iterate fast and frequently, which not only helped them accelerate time to market, but also enabled them to add additional features that were previously infeasible.

Thousands of other organizations have become faster, better, leaner with MongoDB. What follows are some of the best practices these companies use to be successful.

A Playbook for Being Faster, Better, Leaner

- **Prioritize Development Initiatives.** Sometimes it is strategic for an organization to replatform legacy applications that no longer meet current business needs (discussed later in this paper). For instance, Shutterfly, one of the largest photo-sharing websites in the world, migrated off Oracle to MongoDB due to unacceptably high costs and performance bottlenecks. In other cases, it may be acceptable for legacy applications that are in maintenance mode to remain in place. For replatforming initiatives, weigh the importance of the project relative to other potential development initiatives; and evaluate whether the cost of migration warrants the switch.
- **Use Flexible Software Development**

Methodologies. Incorporate frequent builds and checkpoints with the business to ensure the project remains aligned with business goals. Avoid waterfall methodologies with checkpoints measured in months.

- **(Low-Cost) Failure is a Tool.** Your projects should assume and budget for certain types of failure from time to time. Failure, when part of an iterative development process, can be low cost and high yield. MetLife, for instance, iterated on the data model for The Wall numerous times in the three months leading up to launch. This was possible – and even preferable – given the low cost of changing the data model. Adopt a healthy attitude toward setbacks. Encourage your team to move quickly. Instill a culture in which setbacks are part of the process, good teams learn from it and everyone moves on.
- **Use Technology to Recruit.** There is a shortage of technical talent in the market. One way to better compete for this talent is to offer a work environment that uses leading technologies that your technical teams want to use and that furthers their careers.
- **Participate in Open-Source Communities.** Many open-source software projects have communities that share experiences and collaborate on the project. Your technical teams can benefit from the experiences of others, and they can contribute back to the community in a variety of ways without compromising your competitive advantage or your confidential information. Additionally, encouraging this type of participation can also help companies build internal communities, which helps increase knowledge sharing and continuity.
- **Build New Operational Applications on MongoDB.** In most cases, new applications are a good fit for MongoDB. There are exceptions where other database technologies may be appropriate, such as applications that intrinsically require a relational data model.

Align Your Organization to Be Faster, Better, Leaner

Your new data management strategy is not only about technology. It is also about your people and how they work together.

- **Assemble a Strong Team.** Development, operations and business team members should be some of your brightest. They should also have an inclination for sharing with others. As you move beyond the first project, these initial team members will help to teach other teams how to be successful with MongoDB.
- **Allocate Ramp-Up Time.** Your team will need time to get comfortable with new technologies and processes. Plan for and encourage a measured ramp-up process, leveraging online resources, training and community events. The MongoDB team can help identify the best resources for your project team.
- **Leverage the Resources Available.** One of the appeals of open-source software is the availability of resources to help project teams be more productive. These include online product documentation, community presentations and events, Google Groups, StackOverflow, documented best practices, training, professional services and support.
- **Choose a First Project That is Meaningful but Modest in Scope.** The technology and the organizational approaches may be new to your team. Pick a modest first project that will help everyone gain familiarity with the tools and process. The project should be meaningful but should not impact a critical business process. Examples might include: a mobile app for an existing business process; an internal collaboration app similar to Dropbox; an internal social app for knowledge sharing; an internal systems monitoring app.
- **Engage with MongoDB.** Start to build a relationship with MongoDB early. Help the team understand your project goals, delivery milestones, system architecture and how you plan to use MongoDB (e.g., schema design,

sharding and indexing strategies). Support should be most useful during the application development phase, not in production. And if issues do arise in production, the MongoDB team will be better equipped to help resolve those issues.

“When we looked at Mongo early on, we engaged MongoDB for its support of new technology ...but we talked to them about everything from server to apps. They helped us really think through the direction we’re going.”

Gary Hoberman, CIO, MetLife

Expanding MongoDB in the Organization

Once your team has some experience with MongoDB, you can begin to apply it to many projects and to multiply your impact across the entire organization. Integrating new knowledge-sharing practices into your organization provides value to diverse business groups and improves efficiency when adopting new technologies. Best practices for collaboration and learning include:

- **Internal Social Networks.** Encourage communication within and across teams through an internal social network. Post interesting articles, tutorials and presentations you find through the MongoDB Newsletter, blogs, Twitter or Facebook feeds to encourage your colleagues to think outside of their current technical paradigms.
- **Innovation Time.** Offer developers the opportunity to spend a certain percentage of their time on new projects. Google is famous for offering its development teams ‘20% time’

for new initiatives, which has produced a number of key innovations, such as Gmail and Google Groups.

- **Hackathons.** Dedicate a block of time, typically one working day or a full day over the weekend, to rapidly prototyping new projects with new technologies. For development teams, a hackathon offers a large amount of time for testing new technologies and workflows. Facebook is known for running lots of hackathons, many of which have led to popular features, like Facebook Timeline. MongoDB is excellent fodder for hackathons due to its ease of use and dynamic schema.
- **Tech Talks.** Offer an opportunity for developers to share their knowledge and expertise in a public forum. Friday afternoon tech talks have become a standard at many startups in Silicon Valley. Dedicate a day of the week or month to these tech talks, pick your best teammates to lead with a presentation and invite multiple groups. This is another good forum to showcase projects created during the Innovation time or at a Hackathon.
- **Evening User Groups.** Host a monthly evening event for company employees to share new tools or products they are building.

Because MongoDB is general purpose, many organizations are interested in what types of applications are ideal for expanding adoption within the organization. Here are a few example applications that other companies have built that are especially well-suited to MongoDB's ease of use, dynamic schema and scalability. These might serve as the second wave of projects you undertake with MongoDB:

- **Enable Mobile for Your Apps.** Employees increasingly spend more time on mobile devices. If your internal applications are not mobile-enabled, you are not maximizing your employees' productivity. Similarly, you can increase customer engagement by offering them content and services on their devices of choice. *ADP built a mobile app to provide end-users a view of all HR services – payroll, T&E, benefits and others – within a single, elegant design. Since launching over two years ago, the app has amassed over one million users across 41,000 clients. ADP CIO Mike Capone contends that this mobile app, along with others, has helped drive a 20% increase in sales productivity.*

- **Bring the Backoffice Forward.** Enterprises frequently have troves of data spread across disparate systems. This data is often stored in different formats, on different infrastructure and for different purposes. Consequently, it can be challenging to build new applications that leverage this data. There can be immense value, however, in this data, and in order to build new applications that do so, enterprises are 'bringing their backoffices forward' using MongoDB as a data hub. That is, they push the data from legacy, siloed systems into MongoDB, and build new applications on top of it. *MetLife's The Wall is a textbook example of this use case, helping increase customer satisfaction, reduce customer churn and improve call center efficiency.*
- **Migrating Legacy Applications to MongoDB.** In some cases it makes sense for legacy applications that are in maintenance mode to remain in place. But increasingly, organizations are finding it is no longer cost effective to keep these applications on relational databases; or perhaps they can no longer meet performance SLAs. The database often inhibits them at a business level, like not having the ability to add new features or extract data for analysis. Replatforming applications from a relational database to MongoDB helps decrease the ongoing cost of running applications while also enabling the business to improve performance and agility. *Shutterfly, one of the largest photo-sharing websites in the world, realized a 900% performance improvement and an 80% cost reduction by migrating from Oracle to MongoDB; it also drastically decreased time-to-market for developing and deploying new applications.*
- **360-Degree View of the Customer.** Business are increasingly interacting with their customers in new ways, such as via social media, websites and mobile applications. Traditional customer relationship management (CRM) systems, however, are ill-equipped to capture these interactions, and more importantly, to unlock their value. The data involved is often highly unstructured, comes into systems very fast (e.g., clickstreams), and grows quickly. Enterprises are turning to MongoDB to understand their customers better because of its superior ability to address the aforementioned challenges. *Salesforce Marketing Cloud, a leader in customer*

Shutterfly, one of the largest photo-sharing websites in the world, realized a 900% performance improvement and an 80% cost reduction by migrating from Oracle to MongoDB; it also drastically decreased time-to-market for developing and deploying new applications.

sentiment analysis, runs on MongoDB. Moreover, switching to MongoDB enabled Salesforce to accelerate its roadmap by 12 months while saving hundred of thousands of dollars per year on operations.

- **360-Degree View of Your Infrastructure.** Many large organization have hundreds and even thousands of internal systems. These systems are often critical to business operations, and maintaining uptime and performance is paramount. Monitoring is a complex process that involves processing and analyzing numerous signals from diverse subsystems, including storage, network, system components and software processes. *MongoDB's free monitoring product, MongoDB Monitoring Service, runs on MongoDB, processing billions of system events per day for over 20,000 users.*
- **The Real-Time Enterprise.** Dropbox, Box, Google Drive and other online apps have become popular collaboration tools for end users. Employees have become accustomed to these tools and expect similar applications to use in the enterprise. Some employees may even be using these tools for data that should not be allowed outside the organization. This app provides key features such as secure, reliable storage of documents; rich entitlements management; rich metadata management; document and metadata search; replication across global data centers; browser and mobile interfaces. *Goldman Sachs built a secure, internal file sharing and collaboration tool to improve the productivity of bankers making pitches in the field.*

Moving Through the Stages of MongoDB Adoption

MongoDB began with single project concepts at MetLife and Telefonica, and since then, these companies have expanded the use of MongoDB within their organizations. From our experiences working with these customers and others, we've distilled the evolution of MongoDB adoption into the following stages. They are ordered in increasing maturity of adoption, and each step typically includes the prior steps.

FIRST MONGODB PROJECT

You are just getting started with an initial effort.

- **MongoDB Engagement.** Training for Developers and DBAs. Subscription, Onboarding and Production Readiness Assessments. Consulting on schema design, architecture review and introductory best practices.
- **Customer Activities.** Identify target team members in development, operations and business teams. Give teams time to ramp up on technology, making use of online resources like MongoDB Documentation and Online Training, as well as in-person resources like MongoDB conferences and users groups. Engage early with MongoDB to identify any problems, concerns or other issues that may hamper project progression.

MULTIPLE MONGODB PROJECTS

You have several projects spread across your organization, but you have not yet devised internal best practices or centralized resources.

- **MongoDB Engagement.** Consulting if the projects address different use cases. Technical Account Manager (TAM), a named, experienced MongoDB expert that provides advisory services to your teams on development and operations on an ongoing basis.
- **Customer Activities.** Get MongoDB onto the approved vendor list; understand criteria

for inclusion and let us help you show that MongoDB can meet the requirements. Share knowledge within the organization, through internal presentations and hackathons. Engage with the community, presenting at MongoDB conferences and user groups. Begin to establish preliminary best practices, such as preferred hardware configurations and how to integrate with existing systems.

MONGODB CENTER OF EXCELLENCE (COE)

You have several projects using or evaluating MongoDB and having a centralized body of expertise on the technology will greatly reduce the time for project teams.

- **MongoDB Engagement.** Advanced Operations Training. Facilitate introductions to other members of the community that have created MongoDB Centers of Excellence. Facilitate development of MongoDB Platform-as-a-Service (Paas).
- **Customer Activities.** Identify a group of individuals across different functional areas to document best practices for MongoDB, to facilitate knowledge sharing and to help teams understand when to use MongoDB. This includes integration strategies, sizing recommendations, existing deployment details and other resources to help teams understand how MongoDB is used in the organization.

MONGODB-FIRST POLICY

You have developed expertise in MongoDB in development and operations and believe that most applications are well suited for MongoDB. While other technologies are appropriate at times, MongoDB is the default technology for all new applications.

- **MongoDB Engagement.** Participate in MongoDB Customer Advisory Boards. Facilitate introductions to other members of the community that have created MongoDB-First policies.
- **Customer Activities.** Disseminate information on the CoE and best practices throughout the organization. Put systems in place for teams to update this information as they develop more expertise and as new features are

added to MongoDB. Ensure that teams have the resources they need to execute projects successfully using MongoDB, including integrations with all necessary technologies and systems used in-house. Create process for defining exception applications that can and should use other databases.

Conclusion

Organizations have an enormous opportunity to become faster, better, leaner by adopting new approaches to technology, beginning with the database. In this paper, we describe how companies are already doing so, and we provide a playbook for using MongoDB to change the way you do business. Let us work with you to help you become faster, better, leaner too.

About MongoDB

MongoDB (from *humongous*) is reinventing data management and powering big data as the leading NoSQL database. Designed for how we build and run applications today, it empowers organizations to be more agile and scalable. MongoDB enables new types of applications, better customer experience, faster time to market and lower costs. It has a thriving global community with over 5 million downloads, 100,000 online education registrations, 20,000 user group members and 20,000 MongoDB Days attendees. The company has more than 600 customers, including many of the world's largest organizations.

Resources

For more information, please visit mongodb.com or mongodb.org, or contact us at sales@mongodb.com.

Resource	Website URL
MongoDB Enterprise Download	mongodb.com/download
Free Online Training	education.mongodb.com
Webinars and Events	mongodb.com/events
White Papers	mongodb.com/white-papers
Case Studies	mongodb.com/customers
Presentations	mongodb.com/presentations
Documentation	docs.mongodb.org



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