EBOOK

MongoDB. Google Cloud

Data Evolution with MongoDB and Google Cloud

How to transform your database to address real-time data, AI and ML, and other modern application use cases

Introduction

As an IT leader or architect, you may be battling performance, scalability, and flexibility issues in your software architecture. A traditional SQL database can limit you from easily scaling horizontally, and rigid table schemas lock you into restrictive data models. You may be considering moving your datastore from a mainframe or RDBMS to a more modern database to take advantage of advanced analytics and AI, scale at a faster rate, accelerate development, and cut costs. Your team may even be experimenting with MongoDB Community Server on test cases. But if you are considering the migration of an existing system or expanding MongoDB use for a new project, there is a clear path to success with MongoDB Atlas and Google Cloud.

Since the 1980s, relational databases such as PostgreSQL and Oracle have served as the go-to data management backbone for enterprise-grade applications. As a replacement for the mainframe hierarchical data stores and flat files of early computers, these relational databases greatly improved implementation and administration.

But software has come a long way since then. The requirements of modern software development have evolved. Rapid data growth, new design paradigms, and complex use cases are exposing the limitations of older database systems. Operating with on-prem legacy relational database management systems (RDBMS) now carries downsides such as lack of flexibility, limited scalability, difficulty handling diverse data formats, and challenges with integrating AI and real-time data streaming into applications.

Outdated data paradigms are a major barrier to digital transformation. For many teams, the path forward is to switch to a modern, document-based database that operates in the cloud – e.g., MongoDB Atlas on Google Cloud.

At MongoDB, we've seen more than 22,000 customers switch from an on-prem, SQL-based database to a modern, document-based model to take advantage of a more flexible and intuitive database designed for the developers who use it. This guide is designed for teams that want to understand why and how those customers made the switch – whether they were migrating existing apps or building new ones from scratch.

First, we'll look at why you need to modernize your database and the key differences between RDBMS and MongoDB Atlas. Then, we'll outline the steps you need to take to successfully migrate your data and where to get more personalized help.

The case for migration

An on-prem RDBMS is a popular choice for many applications due to its long history and mainstream usage. Often, it's simply the database most people know. As a result, your organization has likely built processes – and maybe even entire teams – around maintaining and managing these legacy systems. This can make it complicated for leadership to face the need for change.

However, the issues of these legacy data systems will only continue to compound. As newer architectures such as microservices, scale-out, serverless, and real-time streaming take precedence and data types such as unstructured, IoT (time-series), graph, geospatial, and edge data proliferate, organizations find that outdated legacy databases hold modernization efforts back.

You need a system that can evolve alongside your needs, not an aging and inflexible infrastructure that creates a barrier to technology innovation. Rigid databases simply don't support digital transformation. Your data should map to how you want to interact with it in your application – not the other way around. As your applications require new features, you will feel the constraints of data stored in an outdated format, particularly when you have a table that experiences dynamic growth or need to bring in unstructured or semi-structured data sources.

The absence of agility, the incurrence of high costs, and the potential compliance risks of running your own infrastructure – as well as barriers to scalability – are just a few of the reasons to turn to a more modern solution.

The solution: MongoDB Atlas on Google Cloud

To address these issues, an increasing number of companies are moving to a modern cloud-native database. This solution not only reduces the operational complexity of managing infrastructure and eliminates scalability issues, but also provides teams with access to on-demand services that give them the agility and scale they need to meet faster application development cycles.

MongoDB Atlas is designed to meet the demands of modern apps with a reliable and powerful foundation that:

1. Stores your data as documents rather than rows and columns, **providing greater flexibility** for software developers and improved performance for application users
2. Offers a distributed system design that scales **horizontally or vertically without additional management**
3. Provides a **tightly integrated collection of data and application infrastructure blocks** – including search, charts, APIs, triggers, and functions – so your teams can quickly deploy the architectures they need to build any data-driven application

Together, MongoDB Atlas and Google Cloud give you a fully managed, modern, cloud-native database platform that is ideal for building powerful, data-driven applications, deploying advanced data analytics, exploring AI, and maximizing the value of business data. Key benefits include:

- **Comprehensive monitoring and managed backup capabilities** so that you don't need administrators or operations engineers to take care of your database maintenance
- **Cutting-edge operational automation and serverless platform services** managed by experts who free your team to concentrate on the features that matter for your business
- **Data securely stored and managed end-to-end** on Google Cloud with Zero Trust architecture that ensures secure access to data while protecting against threats with built-in regulatory compliance to abide by HIPAA, GDPR, and other government ordinances
- **Tight integrations with Google Cloud services like BigQuery and Vertex AI** that make building data-rich applications more efficient
- **A simple document-based format for data** that can be easily retrieved by developers
- **Lower latency for global-scale applications** with Google's secure private network backbone
- **Multi-region replication and global clusters** that ensure your customers see quick responses
- **Automated handling of patches, upgrades, scaling, and provisioning** to free your developers' time and accelerate builds
- **Lower total cost of ownership (TCO)** and an accelerated time to value as compared to running your own hardware. Google Cloud's compute infrastructure offers higher IOPS at a lower cost
- **Greater redundancy and fail-over sequences** with Google Cloud's at least three-zone coverage in each available region
- **Fine-tuned metrics and guidance** from MongoDB Atlas' performance advisor
- **Access to smart analytics and AI solutions** to democratize access to data across your organization and accelerate time-to-insights

The shift to MongoDB Atlas on Google Cloud gives developers best-in-class automation, workload intelligence, and proven practices that guarantee availability, scalability, security, and compliance. It also helps users prioritize developer agility, productivity, and time-to-market.

Let's now look in detail at some of the advantages of MongoDB Atlas on Google Cloud over RDBMS – specifically scalability, developer productivity, data-sharing across devices, and performance.

For example, by using MongoDB Atlas and Google Cloud, beauty giant L'Oréal improved latencies by nearly 40x on a critical forecasting and analytical tool. Global delivery platform Delivery Hero built an AI-driven tool for real-time, hyper-personalized out-of-stock product recommendations.

Intuitive architecture empowers developers and maximizes productivity

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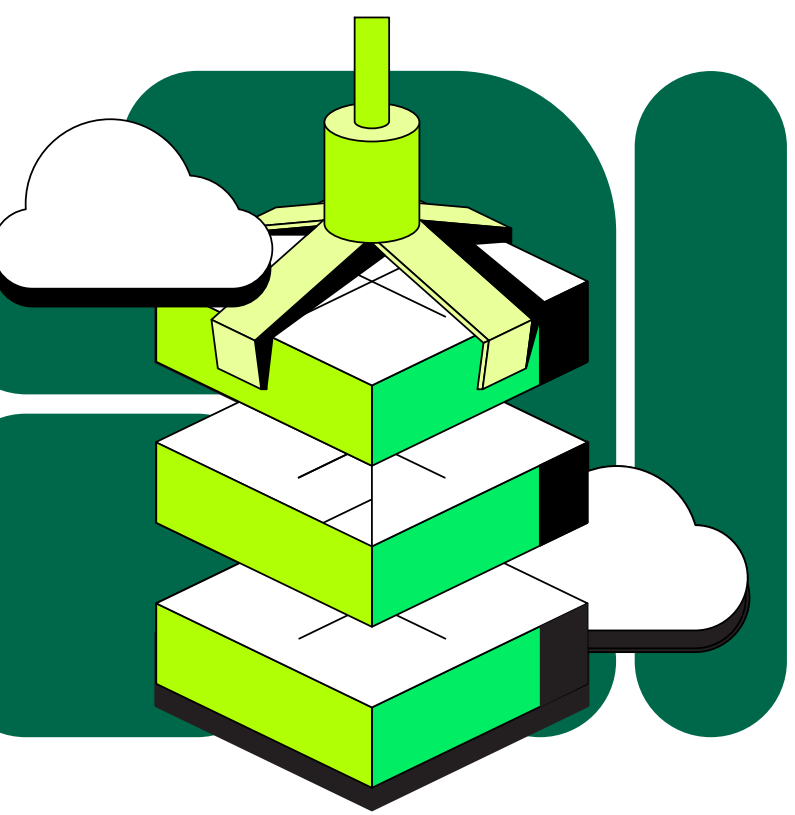
This simplification lets developers focus on writing application code quickly without worrying about crafting performant database queries.

Furthermore, running MongoDB Atlas on Google Cloud provides developers with a clean, modern experience that allows them to build and innovate quickly.



Seamless scalability enables expansion and helps you meet key workload requirements

One of the key strengths of a document-based database system like MongoDB Atlas is that the documents exist as entirely self-contained objects. This means that data can be partitioned into manageable chunks and distributed across multiple nodes – a process called sharding. MongoDB's native support for sharding makes it possible to achieve horizontal scalability without any additional configuration. Data stored across nodes doesn't suffer from additional performance penalties.

MongoDB is optimized for frequently accessed (or "hot") data. Long-term data storage ("cold data") and analytical workloads can reside in Google's BigQuery infrastructure, which is optimized for less frequent, but often long-running queries, or to be used with other Google Cloud services like VertexAI.

It's not just MongoDB that's built to scale. Google Cloud is designed for easily deploying cloud services at hyperscale – which means that no matter how your business evolves or what kind of data you have, MongoDB Atlas on Google Cloud has the right solution for you. In addition, MongoDB Atlas on Google Cloud offers easier access to Google's numerous other cloud service offerings to meet any additional application or workload requirements, such as streaming, IoT, ETL, analytics, and AI/ML.

Shared data across devices

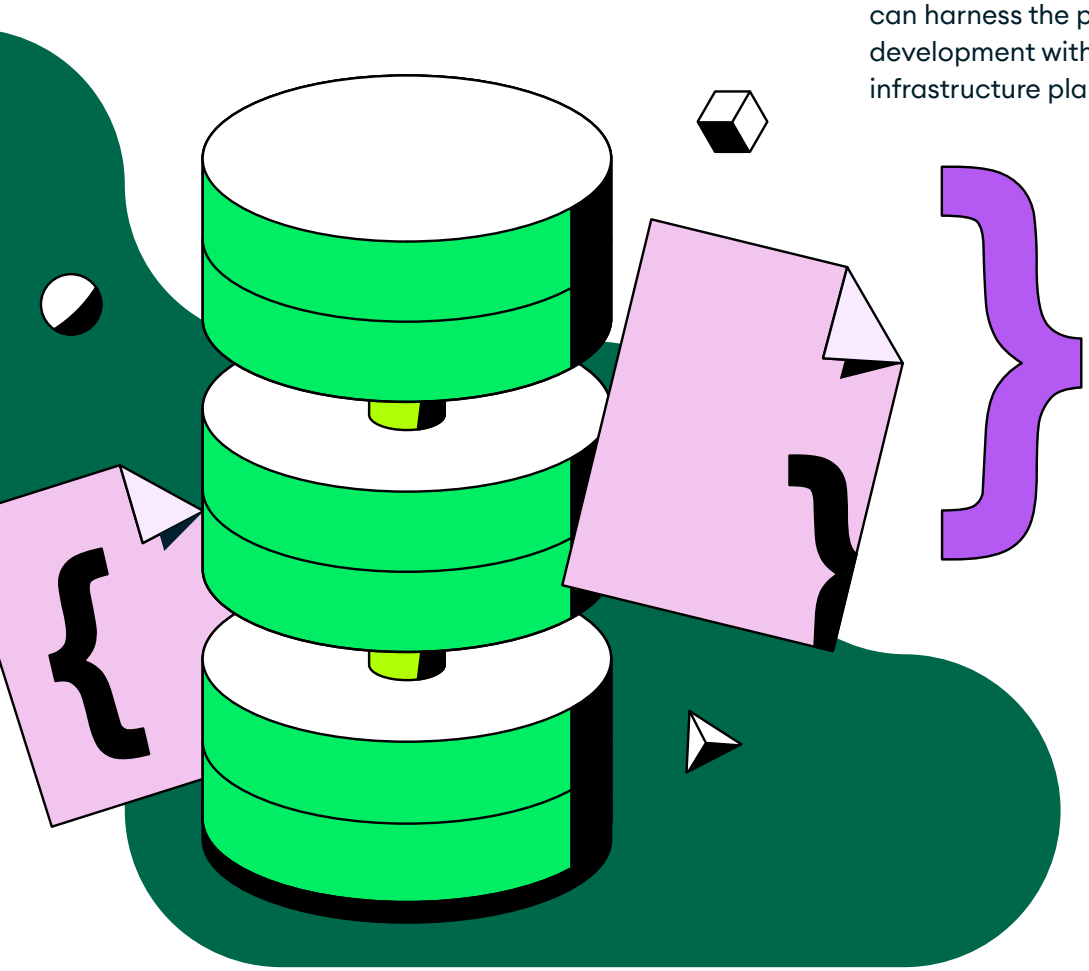
MongoDB Atlas can be configured with Atlas App Services, which synchronizes data updates across devices. Whether your users are interacting with your app on mobile, desktop, or in the cloud, Atlas App Services manages the receipt and delivery of any data changes in real-time. If internet connectivity is lost, Atlas App Services is intelligent enough to batch pending updates, and it even handles merging between disparate timestamped data. All of this is available as part of MongoDB's native feature set.

Atlas App Services, in conjunction with the speed and reliability of Google Cloud, automates conflict resolution and network recovery, ensuring that every user is accessing the most up-to-date version of their data.

Faster intelligence and speed to market

MongoDB's document model is optimized for how an application accesses data. These days, unstructured data that can be leveraged for generative AI and other uses is best kept in a document-based model like MongoDB instead of a table. Rather than fretting about designing the perfect table schema, MongoDB's BSON documents permit you to develop features quickly – without the restriction of fitting data into rigid columns. MongoDB's flexible document model means that your database can grow alongside your application and your users' needs without costly migrations and downtime.

Running on Google Cloud infrastructure offers MongoDB Atlas customers maximum flexibility to quickly adapt as their organizations evolve. Using Google's ecosystem of tools, customers can harness the power of data and AI for faster development without having to perform long-term infrastructure planning.



Where to get more help

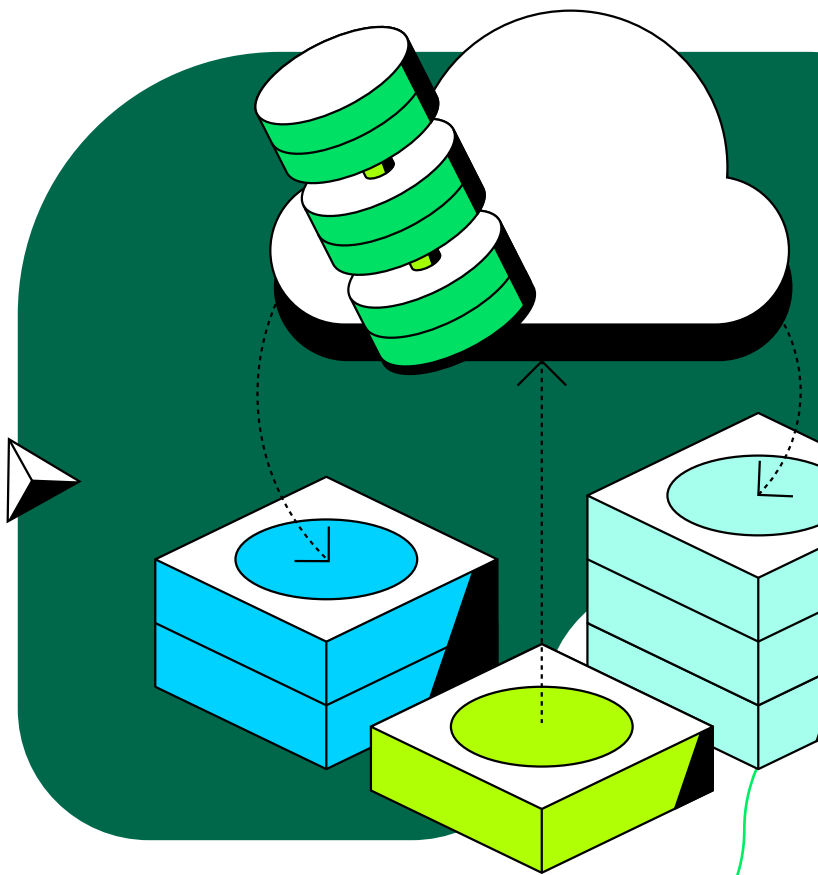
Data modeling is an expansive topic. To help you make the right decisions, here's a summary of key resources to review:

- **MongoDB documentation's extensive section** on data modeling starts from high-level concepts of the documented data model before progressing to practical examples and design patterns, including more detail on referencing and embedding.
- Our "Building with Patterns" blog series will help you learn more about specific schema design best practices for different use cases, including:
    - Catalog and content management
    - IoT
    - Mobile apps
    - Analytics
    - Personalization
    - Single view, such as Customer 360

  The blog series overlays these use cases with specific schema design patterns such as versioning, bucketing, referencing, and graphs.
- MongoDB University offers a no-cost, web-based training course on data modeling. This is a great way to kick-start your learning on schema design with the document data model.
- Instructor-led MongoDB training helps you develop the expertise and confidence you need to be successful with MongoDB. Designed and led by MongoDB consultants, the training will equip your team to build solutions to complex development and operations problems.

Conclusion

A modern database is critical to success. MongoDB Atlas on Google Cloud is the best choice for the evolution of your application. By following the best practices outlined in this guide, you can feel comfortable and confident with the effort and path necessary for implementation. After your successful migration, teams can quickly start to realize a more flexible, scalable, and cost-effective infrastructure, innovating on applications that weren't possible before.



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We can help

We are the company that builds and runs MongoDB. Over 46,400 organizations rely on our commercial products. We offer the following software and services to make your life easier:

MongoDB Atlas is the database as a service (DaaS) for MongoDB on Google Cloud. It lets you focus on apps instead of ops. With MongoDB Atlas, you only pay for what you use with a convenient hourly billing model. Atlas auto-scales in response to application demand with no downtime, offering full security, resilience, and high performance.

MongoDB Atlas Charts is the best way to quickly and easily build visualizations of MongoDB data to analyze complex, nested data. Embed individual charts into any web application or assemble them into live dashboards for sharing.

MongoDB Atlas Vector Search enables you to build intelligent apps powered by semantic search and generative AI over any type of data.

MongoDB Atlas Search simplifies building full-text, relevance-based search directly into applications – at scale.

MongoDB Atlas Stream Processing unifies data in motion and at rest to transform how you build apps that require processing complex event data at scale.

MongoDB App Services make it easy for you to build powerful and engaging experiences on more devices.

MongoDB Consulting packages get you to production faster, help you scale and tune performance in production, and free you up to focus on your next release.

MongoDB Training helps you become a MongoDB expert, from design to operating mission-critical systems at scale. Whether you're a developer, DBA, or architect, we can make you better at MongoDB.

About Google Cloud

Google Cloud accelerates organizations' ability to digitally transform their business with the best infrastructure, platform, industry solutions, and expertise. We deliver enterprise-grade solutions that leverage Google's cutting-edge technology – all on the cleanest cloud in the industry. Customers in more than 200 countries and territories turn to Google Cloud as their trusted partner to enable growth and solve their most critical business problems.

For more details about MongoDB Atlas on Google Cloud, check us out on the Google Cloud Marketplace.