

EMBRACING THE CLOUD

An Executive Brief by Mark Porter, CTO

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Introduction

In the digital economy, the success of an enterprise can be measured by how quickly and reliably it deploys and updates internal and external applications. Customers demand agility and competitors quickly take advantage of stagnation.

But the path for executives is not clear. Moving to the cloud indeed gives flexibility. But should an enterprise “lift and shift” legacy applications? Or re-architect them while moving? Are managed services the right choice — or is lock-in something to be concerned about? What are the fundamental cultural impacts that executives need to address? In short, how can companies accelerate their digital transformation by embracing the cloud in the right way?

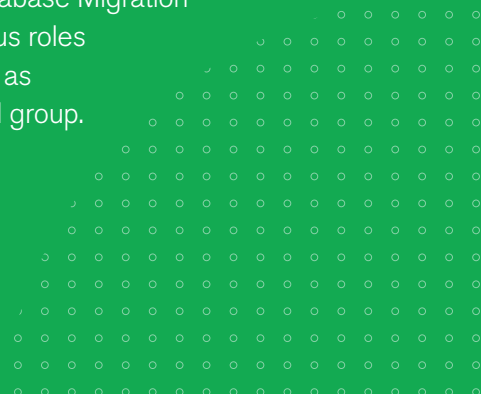
There is no simple recipe. However, a set of questions and criteria can help every C-suite navigate these decisions. The goal of this executive brief is to expose you to the breadth of issues that all enterprises are facing and arm you with a set of questions and considerations to take back to your organisation so you can iterate and validate your strategy.



About the Author

Mark Porter is the Chief Technical Officer of MongoDB, where he is responsible for crafting the long-term technology roadmap and vision for the company. Prior to MongoDB, Mark was CTO of Core Technology and Transport at Grab, Southeast Asia's super app that provides everyday services such as ride-hailing, food, package, grocery delivery, mobile payments and financial services to millions of people.

Previously, Mark was a General Manager at Amazon Web Services, where he led the Relational Database Service (RDS), Amazon Aurora and RDS for PostgreSQL, the AWS Database Migration Service, and the AWS Schema Conversion Tool. Prior to Amazon, Mark held various roles including CTO of a division of NewsCorp and VP of Engineering at Oracle, as well as working at NASA/JPL and being an early member of the Oracle Database Kernel group.



Cloud Adoption:

What CIOs and CTOs Need to Think About

There are many compelling and well understood reasons to think about moving applications to the cloud, and a lot of things to be concerned about at the same time.

While the list of reasons and concerns can be exhaustive, from my experience there are two topics that repeatedly rise to the top of conversations, and so you should start by focusing there:

1. SPEED

No matter what software stacks your teams are using, you should ask yourself what is the speed of my organization and how can the cloud help us move faster? As a C-level executive, it can sometimes be hard to measure this.

2. RISK

Relating specifically to compliance and security, does the cloud introduce new risk vectors to the business, or does it remove them?

As with all things in technology, the answers to these topics are not simple.





Five Key Questions for Your Team

At a high level, it's easy to agree that quickly ideating, prototyping, deploying, and evolving applications is key. You want to be faster than the market expects and faster than your competitors can keep pace with.

You also want to ensure you have the appropriate risk mitigation controls in place. However this is not particularly actionable. So how can you measure it? I've found five questions and their corresponding metrics to be useful when talking to my teams:

1. How fast can we deploy a new feature or even a non-mission-critical new application to production? It is important to listen to the units – you're hoping they give you days, but weeks might be acceptable. Months definitely are not. For urgent features, your teams should take no longer than 30 days to deploy them.
2. How fast can we experiment with our current applications in production? Specifically, you should seek to understand if they can run A/B tests and how quickly they get their data back from the business analysts.

3. How fast can we change our data models? "Rolling Schema" is one of the slowest and hardest things a company does when it's building and evolving applications – and it's often the limiting factor in speed of innovation
4. How fast can we scale the application if and when we have something wildly successful, i.e., does it take a re-architecture to go from proof-of-concept to production?
5. What is the plan for securing the application data, the API, and meeting regulatory compliance standards? You want to understand if the team has a full (and tested) playbook for access controls, encryption everywhere, auditing, backups, disaster recovery, resilience, and incident management.

After asking these questions, I'm typically concerned. However, the responses provide a quick scorecard for how application teams are thinking about speed and risk, and where the pain points are that need to be actioned.





Balancing Speed and Risk

As leaders, we are charged with managing risk while still doing “risky things.” We are investing in constant innovation to stay ahead of customer expectations and out-manuever competitors. We are trying to create something new and that will always incur risk. We also have to recognize there are many more ways to fail than succeed.

The reality is that we can't eliminate risk. The key is how to monitor and manage it – letting it exist where it needs to and eliminating it where we must.

When it comes to developers we don't want to deny them the freedom to use tools and technologies that help them build better applications faster. What we do need to do however is maintain oversight of the technologies and the vendors they are using. We need to ensure we institutionalize proper governance to technology selection. There are several specific actions we can take to drive the right behavior:

1. Have our developers and architects work together when defining new applications.
2. Involve the security teams early on in the project.
3. Talk to our peers in the industry to capture best practices and learnings.

From a cultural standpoint, we need to help our teams think about risk in the right way. It's totally acceptable to deploy a prototype

app without all of the security controls; but how do we make sure it doesn't accidentally get loaded with production data? It's more about guardrails than it is about perfect controls.

Unfortunately, most of the engineers who work for us want everything perfectly and precisely defined – that's why they love being engineers! So help them understand that failure is acceptable, as long as it's fast and inexpensive and doesn't expose the business or it's data to unnecessary risk.

From my time at AWS, I learned to have security partners assigned to every team and have a security steward defined as an overlay role. This ensured that there was at least one security representative working with each team. In addition, make sure your security team is a software engineering team in its own right; doing things like building tools for detection and mitigation, onboarding technology, and creating a quarterly roadmap for automation and controls.

These measures ensure we have the right governance in place to balance speed and risk. The growing emphasis on privacy means traditionally different approaches to risk seen in industries such as Financial Services and Gaming are now converging around more common standards. However regulatory environments remain different across these industries, and so this needs to be factored into your governance model.





Best Practices for Cloud Adoption

From my experience, a typical four-step roadmap for cloud adoption looks like the following:

Stage 1: A compute and storage extension of your current workloads, typically for dev/test environments.

Stage 2: Lift and shift of production workloads from your on-premises environment to the cloud without changing anything.

Stage 3: Start using managed services along with automated deployment pipelines and deep monitoring. It is at this stage that the real agility and cost benefits of cloud computing start to accrue.

Stage 4: Rearchitect your applications as “cloud-native.” This enables them to exploit the fundamental constructs of the cloud – for example low-cost, elastic, scale out compute and storage infrastructure, in-built resilience, geographic distribution, identity-based security and managed services.

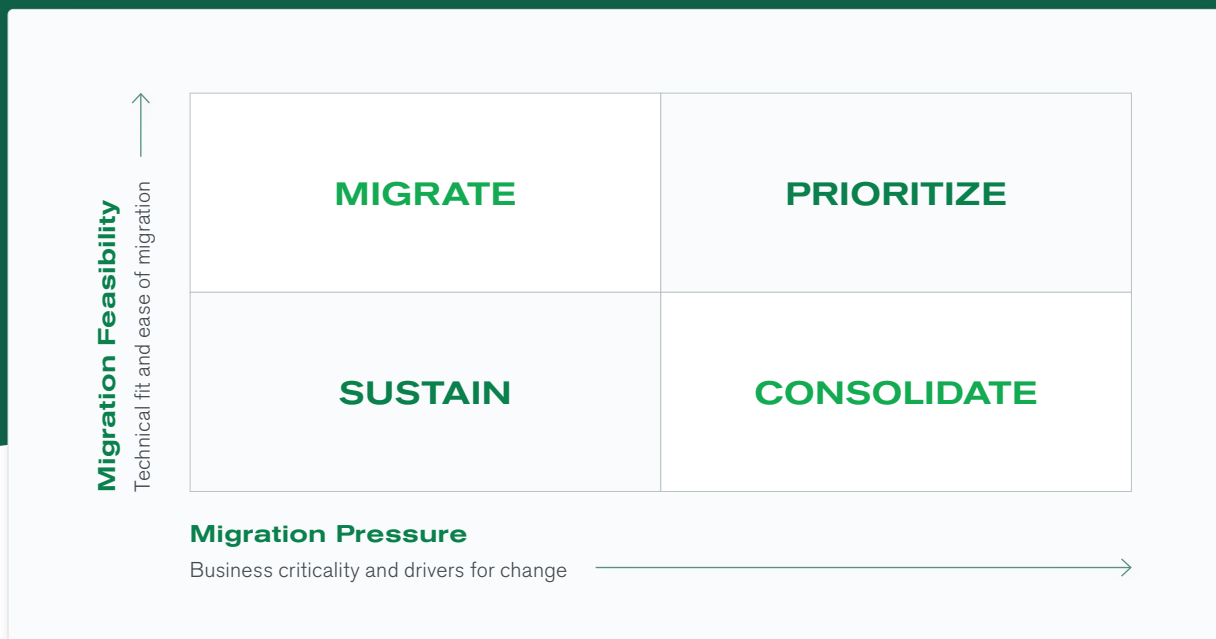


Figure 1: Assess and understand your current application estate.



Benefits can be gained at each stage as you stop doing things unrelated to your core business expertise and focus more on your company's unique value proposition. While this roadmap looks structured, the reality is that cloud adoption is different for every organization.

For example, every company has monolithic legacy apps that it doesn't make sense to revise; instead just keep them running until the business does something new.

As a C-level executive responsible for the what/when/how of cloud adoption, the very first thing I'd recommend is to take an inventory of your applications. I haven't yet had somebody not be surprised by the number and diversity of their existing application base.

Figure 1 is a useful framework developed by MongoDB to help identify and prioritize applications that should be the target for [modernization and migration](#) to the cloud.

Lift and Shift

For applications that do make sense to move to the cloud, a simple “lift and shift” often sounds like an attractive option.



However these migrations largely just replicate what your teams have had to work with on-premise. Taking databases as an example, developers will still be wrangling with multiple classes of data systems to cover the gamut of transactional, operational, and analytical workloads every business needs to build.

Lift and shift also does little to address inefficiencies in team structures or operational processes. Development and ops teams still often live in separate silos with request tickets bouncing between them. As a result, application delivery times rarely improve.

Unless you are facing a compelling event, such as a data center lease imminently expiring, lift and shift is going to cost you a lot of money

to move and a lot of company disruption. And when you're done with the lift and shift, you'll have the same legacy application that doesn't serve your needs for agility and speed – but at least it will be in the cloud! However you won't be able to exploit the cloud-native benefits discussed earlier or the massive investments the cloud vendors and SaaS companies like MongoDB have put into areas like resilience, security, and compliance.

The cost and disruption that comes from lift and shift rarely moves your business forward – your customers don't realize any benefits, and your organization gains little advantage. So, lift and shift if you must, but in most cases be aware that all you are doing is kicking the can down the road.



Thinking Beyond Lift and Shift

As leaders, we must drive transformation, and that means we sometimes have to be bold – doing things that others are afraid to tackle. The inventory of applications and databases discussed earlier is your friend in this situation.

At AWS we found companies succeeded when they selected applications to re-architect that drove the highest business value. What does that look like? Don't pick small applications

that don't save you money or large, complex applications that take years to move. A good rule of thumb is to have each department start with a department-specific application.



The Move to Managed Services

Managed services represent a step forward for most companies, and managed database services are no exception.

Self managed databases (yes, even MongoDB) can be hard to operate, scale, and maintain. That is the reason why back in 2016 we launched MongoDB Atlas, our fully managed and automated global database

service available in 70+ regions on AWS, Azure, and Google Cloud.

Why are managed services the wayforward? The first advantage is predictability – specifically stability and reliability.



Predictability



Every CIO and CTO I have ever spoken with has had to deal with database downtime. I recall one CTO who told me that while databases were only 2% of his company's IT costs, they were responsible for 40% of the company's minutes of downtime.

When we further explored the reasons for this we found that with every outage there followed a post-mortem, and after a week or so, the company's engineers had identified exactly what went wrong, and exactly what they were going to do to remediate it. Then several months later, they experienced another outage leading to another post-mortem and another set of remediation measures. This situation is not uncommon.

Of course, every outage will feel special to your operations team, so listen carefully to how they describe it and see if you think a managed service would have suffered that outage.

Managed services are run at great scale, serving a vast array of different customers and use cases. By definition, they are

constantly exposed to potential availability issues and anomalies that only happen once in a thousand or more days when running a single deployment in a single company. The cloud vendor has then either fixed the issue or mitigated it with operational procedures that work around it.

If you use a well designed managed service, you effectively have the vendor's engineers and architects working for you – keeping pace with the latest in operational excellence and applying it to the service they are managing on your behalf. You are benefiting from that – by all the outages you don't have. It's hard to measure, but it's real.





Risk Mitigation

The next major benefit of a managed service is risk mitigation, which falls into two areas – process reliability and security.

Process reliability means things like standing up a replica in another region. This process can be hundreds of commands if done manually, but a couple clicks or API calls in a managed service is safer.

Secondly, every cloud vendor, including MongoDB, has security teams that are probably larger and/or more specialized than the teams you have access to in-house.

Much like availability discussed earlier, these teams work across many different applications serving many different industries that are subject to a breadth of industry or geo-specific compliance regulations and threat actors that no one single company has to deal with. They can focus exclusively on the security surface area, on patching systems, and on keeping pace with the latest in infosec excellence and compliance, managing it all on your behalf. In theory you can do much of this yourself. In practice, it rarely works out.

Architecting for Adaptability: Multi-Cloud

Based on [industry research](#) 85% of enterprises today are embarking on a multi-cloud strategy.

Doing so enables the enterprise to exploit the best features of each cloud provider, and provides significant flexibility to meet their geographical and compliance requirements. Of course it also reduces concerns around cloud lock-in.

My team at MongoDB was recently working with a major European automotive manufacturer. They had a corporate standard to use one particular cloud provider. But what's the fun

in corporate standards if you can't break them! So some teams used another cloud provider, resulting in the company now having two cloud platforms to support. In addition, they had a lot of development teams in China, and didn't want to run on the public cloud because of local restrictions. As a result all development was on top of on-premise systems.

The ability for the company to use a database that allowed them to move the application from on-premises in development and then run it in production on any major cloud platform, without having to change a single line of application code, was a huge benefit for them.

Addressing Cultural Barriers to the Cloud

Beyond technology change, the largest blocker to cloud adoption cited to me is cultural change. Many organizations struggle with building a cloud operating model that defines and develops the processes and skills needed for cloud success. What is key in driving cultural change is enabling and empowering our teams.



Defining a Cloud Operating Model

We all understand that the cloud fundamentally changes the nature of how applications are developed and consumed. Organizationally this requires some re-thinking to ensure that:

- The benefits of the cloud deliver maximum value for the business.
- Development and deployment time is reduced.
- Applications are fully supported, secure, compliant, resilient, and scalable.

A Cloud Operating Model should describe the People, Process, and Platform dimensions necessary to deliver cloud-first enterprise applications:

- 1. People:**
How does the cloud change the structure of the IT organization, its relationship with the business, and the requisite skills for people and teams within the organization?
- 2. Process:**
How does the cloud change workflows, processes, checks and balances?
- 3. Platform:**
How does the cloud change enterprise technology standards?

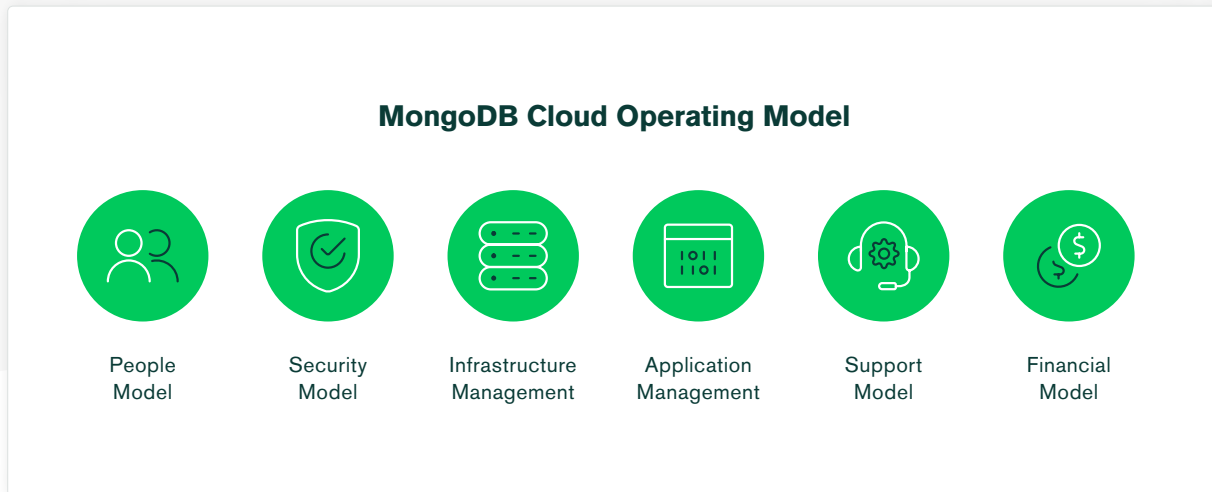


Figure 2: Defining the People, Processes, and Platforms for cloud adoption

For MongoDB projects, our consultants have created a [Cloud Operating Model](#) comprising six core pillars that we define and implement with you to meet your organization's specific goals. This model can be applied beyond MongoDB projects to cover broader cloud adoption initiatives.

The cloud operating model should demonstrate to your teams how the cloud can help them innovate faster with greater reliability and repeatability. Doing this well will remove the friction and fear that is a natural reaction in all of us when facing change.

Getting the People Model right is the first step. Hiring new talent is expensive, risky, complex, time-consuming, and in many cases, unnecessary. Instead you will always find a lot of the talent you need already exists internally. To unlock it, you need to:

- 1. Enable** your team by building a culture of continuous growth and development where people can upskill to new processes and technologies.
- 2. Empower** your team by giving them more autonomy, allowing them to experiment and learn from success and from failure.

To do this you should allow your developers to speak directly with the business so they can get a clean line of sight into how the work they do directly impacts customer experience. With the cloud, they can get levels of observability they never had with their on-premise systems, so they can create instant feedback loops on the effectiveness of products and features they've built. This will also help them understand that it is no longer enough to just write code, but they have to think about how those applications are run as well.



Within each pillar, your cloud operating model should seek to define as much of the following as possible:

- **People Model:**
Team structure; skills development; roles and responsibilities.
- **Security Model:**
Data classification levels; data sovereignty and compliance requirements; standard security configuration templates; users and roles; logging; isolation requirements and VPCs.
- **Application Management:**
Deployment pipelines; data migration; backups; auto-scaling policies; network configuration.
- **Infrastructure Management:**
Standard templates for compute, storage, and network; serverless compute and container orchestration; upgrade management; patching; process automation; monitoring; infrastructure versioning.
- **Support Model:**
First line support; internal escalation path; vendor escalation path.
- **Financial Model:**
Chargeback model; systems and processes; usage reporting; cost optimization.

What all of this adds up to is that if your teams see the benefits, the roadmap to achieving them, and the outcomes for both themselves and the business, then they will come on the

cloud journey with you, rather than fight it. While the journey to the cloud may be long, complex, and at times uncertain, doing nothing is not an option for any business today.



We Can Help

We are the company that builds and runs MongoDB. Over 18,400 organizations rely on our commercial products. We offer cloud services and software to make your life easier:

[MongoDB Atlas](#) is the global cloud database service for modern applications. Deploy fully managed MongoDB across AWS, Azure, or Google Cloud with best-in-class automation and proven practices that guarantee availability, scalability, and compliance with security standards.

[MongoDB Enterprise Advanced](#) is the best way to run MongoDB on your own infrastructure. It's a finely-tuned package of advanced software, support, certifications, and other services designed for the way you do business.

[MongoDB Atlas Data Lake](#) allows you to quickly and easily query data in any format on Amazon S3 using the MongoDB Query Language and tools. You don't have to move data anywhere, you can work with complex data immediately in its native form, and with its fully-managed, serverless architecture, you control costs and remove the operational burden.

[MongoDB Charts](#) is the best way to create, share and embed visualizations of MongoDB data. Build visualizations quickly and easily to analyze complex, nested data. Embed individual charts into any web application or assemble them into live dashboards for sharing.

[Realm Mobile Database](#) allows developers to store data locally on iOS and Android devices using a rich data model that's intuitive to them. Combined with the MongoDB Realm sync-to-Atlas, Realm makes it simple to build reactive, reliable apps that work even when users are offline.

[MongoDB Realm](#) allows developers to validate and build key features quickly. Application development services like Realm Sync for mobile and Realm's GraphQL service, can be used with Realm Functions, Triggers, and Data Access Rules – simplifying the code required to build secure and performant apps.

[MongoDB Cloud Manager](#) is a cloud-based tool that helps you manage MongoDB on your own infrastructure. With automated provisioning, fine-grained monitoring, and continuous backups, you get a full management suite that reduces operational overhead, while maintaining full control over your databases.

[MongoDB Consulting](#) packages get you to production faster, help you tune performance in production, help you scale, 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.

Contact us to learn more
about how MongoDB can help

For more information, please visit mongodb.com.