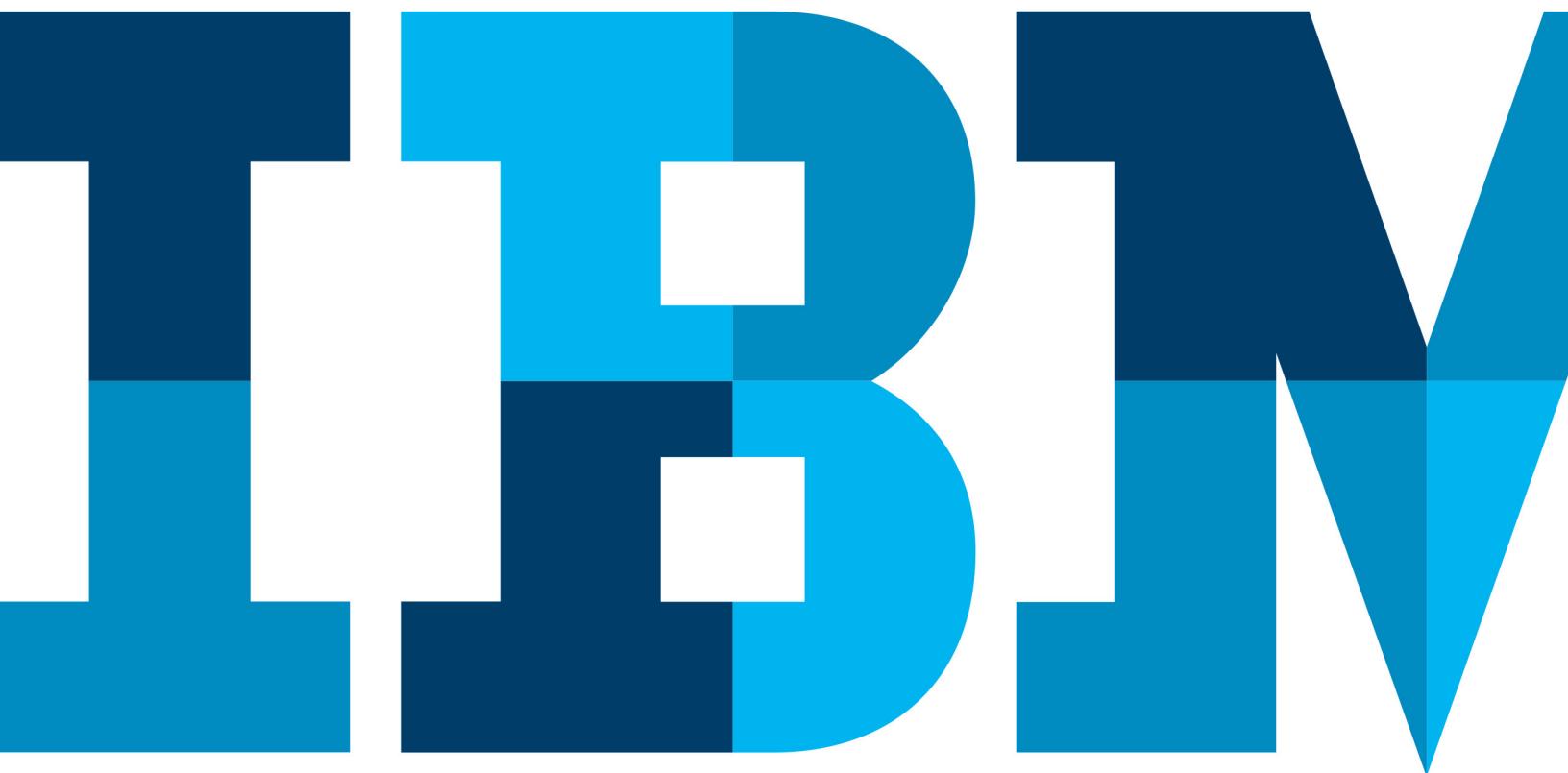# Fuel application innovation with new technologies on cloud

Empower your developers with an agile architecture and cloud-native approach to support all of your applications

IBM

Contents

→   See the interactive version of this paper on the IBM Cloud website.

Introduction

You've been charged with leading the "digital revolution" at your company. And you know that visionary companies are combining cloud computing with emerging technologies like AI, machine learning, IoT and blockchain to build innovative applications for competitive advantage.[1] How do you keep up with the dizzying pace of disruption today?

Knowing that each of your applications, workloads and data sets has its own set of specialized requirements, you recognize that you simply can't afford to be locked in with one cloud vendor or one cloud model. Whether creating new apps, or modernizing traditional ones, you need to define a strategy that delivers agility and responsiveness to meet your unique needs — now and in the future.

Strategize first for greatest success

Know the needs of your business
Common convention points to public cloud as the delivery model of choice, but when considering the right cloud architecture for your applications and workloads, you must begin with the unique needs of your business. This can include many factors such as government regulations, security, performance, data residency, service levels, time to market, architecture complexity, skills and preventing vendor lock-in. Add in the need to incorporate the emerging technologies and you can see why IT leaders are challenging the notion that moving to the cloud is easy.

Choose the right cloud for the right workload

At first glance, your cloud model choices seem simple: public, private or a hybrid mix of both. In reality, the choices are many. Public cloud can include shared, dedicated and bare metal delivery models. Fully and partially managed clouds are also options. And in some cases, especially for existing applications where architectures are too complex to move or the cost-benefit ratio is not optimal, cloud may not be the right choice. The right model depends on your workload. You should understand the pluses and minuses of each cloud deployment model and take a methodical approach to determining which workloads to move to which type of cloud for the maximum benefit.

→ Watch how to manage workloads in the cloud exactly as you would on premises.

→ Assess how private cloud can fit within your enterprise's cloud strategy. Download the eBook.

Have a knowledge of new technologies and methods

Getting started with the latest technologies like AI, machine learning, blockchain or IoT requires an understanding of how they work and what they can do.

Proven reference architectures for using them plus a knowledge of development practices such as design thinking, lean startup, agile and continuous delivery position you to design, deliver and validate your ideas quickly.

Get valuable experience and industry insights

Whether you are looking to innovate with new technologies, refresh existing applications or extend traditional IT with cloud, it's helpful to have a prescriptive approach that can factor in your unique business, industry and workload requirements – an approach built on actual experience guiding organizations like yours to the right mix of cloud models and vendors. To help you define your cloud strategy, look for experienced partners who can meet you where you are in your cloud journey, help you envision a bold future and draw a road map to get there.
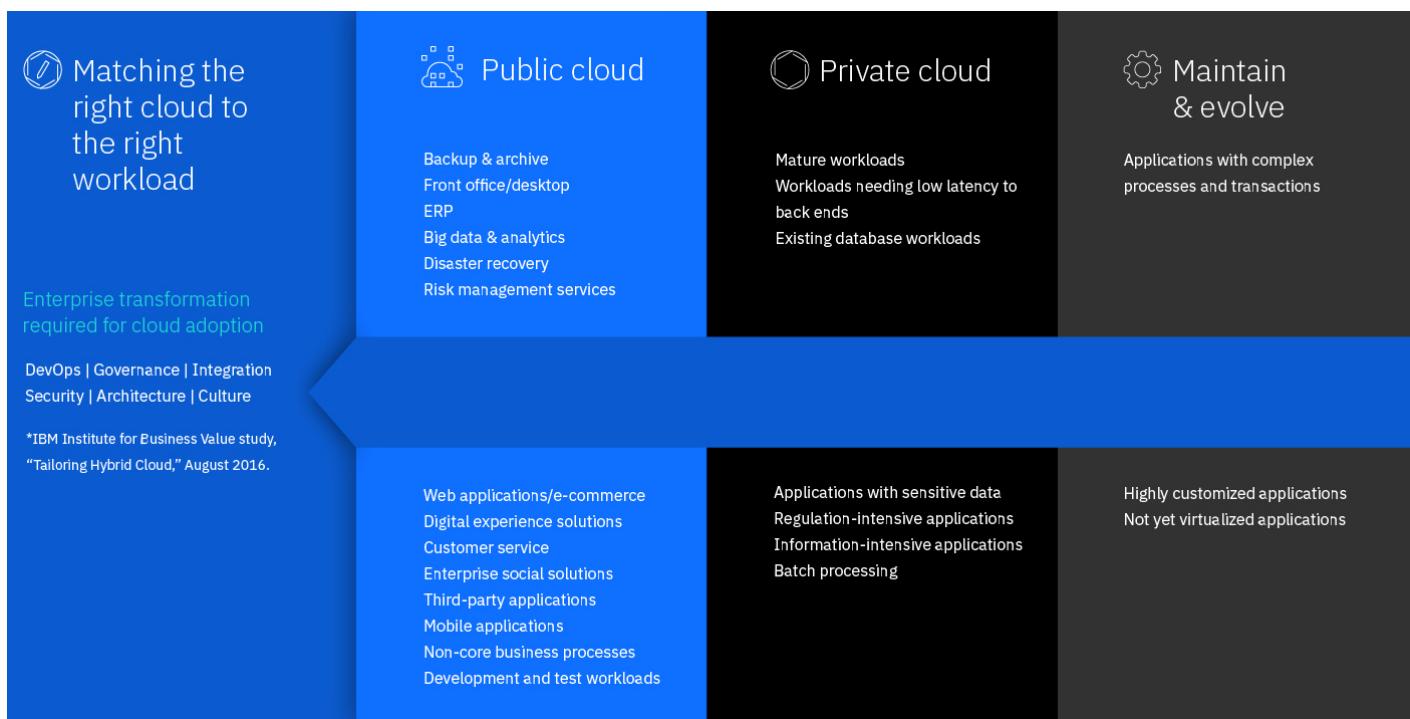
In a commissioned Forrester Consulting global study, organizations that prioritized modernizing systems of record have a 1.7x higher rate of digital transformation success than those who did not.

→ Discover the key factors of success for a flawless digital transformation. Register for the full report.

Figure 1. To transform your enterprise with cloud, you need to take the time to identify the right cloud for the right workload.

Finding the freedom to innovate

Expose new possibilities with open-based architecture

To innovate with emerging technologies, your developers need freedom to build to your unique business specifications. They can't be limited to technology from a single vendor or a single cloud delivery model. Freedom starts with open technologies. An architecture built on open standards is the foundation for innovative cloud solutions that are built for the enterprise and scale for production deployments.

An open-based architecture defies lock-in by offering portability and interoperability, giving your teams the freedom to add, upgrade or swap in the high-value services and data they need, when they need them, in any environment. You're also positioned to expand your platform and environments to include multiple vendors so that you can mix and match capabilities to meet your company's needs.

Create an infrastructure built for innovative technologies

Not only does your underlying infrastructure need to be built on open standards, but it must deliver key capabilities to accommodate these newer technologies and the data that fuels them:

- **Dominant compute power:** Solutions that combine bare metal servers with GPUs accelerate AI and other data-driven workloads with high-performance processing capabilities and rapid provisioning.

- **Rapidly scalable, affordable storage options**: With the Internet of Things alone generating massive amounts of data, storage that can scale quickly is essential to innovation. Object storage is often the best choice for accommodating big data use cases and API-driven web applications.

- **Ease of evolving to a hybrid cloud model:** Hybrid and multicloud infrastructures form the optimal base for data-driven applications. With much of enterprise data stored in on-premises systems, solutions that enable you to extend those systems to the cloud quickly and with minimal retraining of staff can help you realize the benefits of cloud sooner rather than later. Certain application servers can be run both in on-premises and cloud environments, offering yet another entry point to cloud for your legacy applications.

→ See how the right cloud infrastructure can push you past the competition. Register for the full report.

Leverage the speed and agility of cloud native

For those crafting the architecture for the future of their business, cloud native is trending as the leading approach because it maximizes cloud's potential to offer unmatched agility. With cloud-native development, you can deliver enterprise-grade products while performing like a startup. This means you can:

- Drive apps to market in days or weeks versus the traditional monolithic process where it takes months
- Meet constantly changing business demands by easily updating your apps multiple times a day
- Integrate disruptive technologies smoothly to build pioneering products that challenge your competition

A recent study found that business demands for agility and innovation will make cloud-native applications the default choice for customer-facing apps by 2020.

—Source: Building a Cloud Native Node.js application using Kubernetes, IBM Cloud blog 2018

The transforming trifecta of cloud native: Microservices, containers and orchestration

Hot topics for the last couple of years, these development technologies are core to the cloud-native approach, empowering your teams to develop and deploy enterprise applications more quickly in the cloud environments of their choice.

Small and mighty microservices. As you may have heard, microservices mean speed and quality. A microservices architecture breaks down the app into a collection of fully decoupled components that can be developed, maintained, scaled and deployed independently by small, specialized teams. Apps are developed fast and iterations are even faster without the worry of breaking the app.
For developers integrating the emerging technologies like AI, IoT and blockchain, microservices make it easier. Each component provides an API endpoint that can communicate with other components within that same app, or with other apps and services. If you are moving legacy apps to the cloud, these API endpoints can bridge your legacy on-premises apps and cloud environments.

Cut the coding with containers. Containers technology is a perfect match with a microservices architecture because it supports the smaller, faster narrative. Containers are quick to provision and offer an infrastructure that's much lighter than virtual machines, which translates to much smaller packaged applications. Containers essentially eliminate the need to manually code transfers of applications to different cloud environments, which leads to easy portability across public and private clouds as well as build pipelines. That means you can develop on one cloud model, such as public, and deploy on another, such as private, and even choose the vendor for each cloud, giving your developers flexibility and control of the environment to meet specific business requirements.

In an IBM-conducted study, 59% of the respondents reported that container-based development had improved application quality and reduced defects.

→ Read more study findings and discover what drives container development adoption. Register for the full report.

Maintain order with orchestration. You have to be able to monitor, manage and scale multiple components in a microservices architecture. Orchestration options range from an open source tool like Kubernetes for container management to platform as a service (PaaS), where developers focus on code while the underlying orchestration technology is built into the platform itself.

Iterate to innovate with DevOps

To innovate successfully with cloud native, embracing DevOps is essential. When DevOps is fully engrained in your culture, your teams and processes perform in concert with your technologies to keep up with dynamic demands.

Transform to a culture of collaboration

Cloud native changes the relationship between development and operations teams. With so many moving parts, integration is critical. DevOps fosters autonomous, cross-functional teams with approaches such as the agile methodology, which supports an environment of shared responsibility, shared decision-making, trust and collaboration. When your teams adopt a DevOps culture, they can feel more confident that they are working together to deliver the end goal.

Alleviate awkward hand-offs with automation

DevOps relies heavily on automation tools during key parts of the software delivery process to reduce the errors from awkward hand-offs and manual processes that often delay deployment. Automation frees up developer teams to focus on higher-value tasks while positioning them to iterate faster and release high-quality apps more often.

High-performing organizations have automated 30% more of their deployment processes than low-performing organizations.

— Source: 2017 State of DevOps Report, survey of 3200 cross-industry, global IT professionals, presented by puppet and DevOps Research and Assessment (DORA).

Continuously deliver with speed and quality

To make the continuous incremental iterations necessary to keep up with feedback and requirements, DevOps, with its automated testing and deployment components, is fundamental. With DevOps, releases are quick and more reliable. Deployment becomes a non-event, not another sleepless night. Continuous delivery reduces time from concept to rollout to feedback, further accelerating your time to market.

Next steps

Moving to cloud is a bit more complicated than you may have been led to believe, but leading companies are finding that it's worth the effort.[2] With the right strategy, the right cloud infrastructure, and the integration of emerging technologies, you can propel the disruption in your industry. The IBM Cloud combines virtually unmatched deployment flexibility with new technologies and powerful data capabilities to position you to build a smarter business. Choose the IBM Cloud as the agile engine for your business growth.

As you think about next steps, consider these key questions.

- Have you defined a competitive cloud strategy that extends beyond infrastructure as a service?
- Does your development team have the freedom it needs to innovate with the latest disruptive technologies from any source?
- Do you have the tools, methods and expertise to reinvent and modernize your existing enterprise applications?
- Do you have the right partner to help you craft a multicloud architecture that can easily adapt to the changing needs of your business?

Check out these resources for more details on IBM Cloud capabilities.

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[1,2] IBM Institute for Business Value, *Winning cloud strategies: How
leading companies score*, November 2017.

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