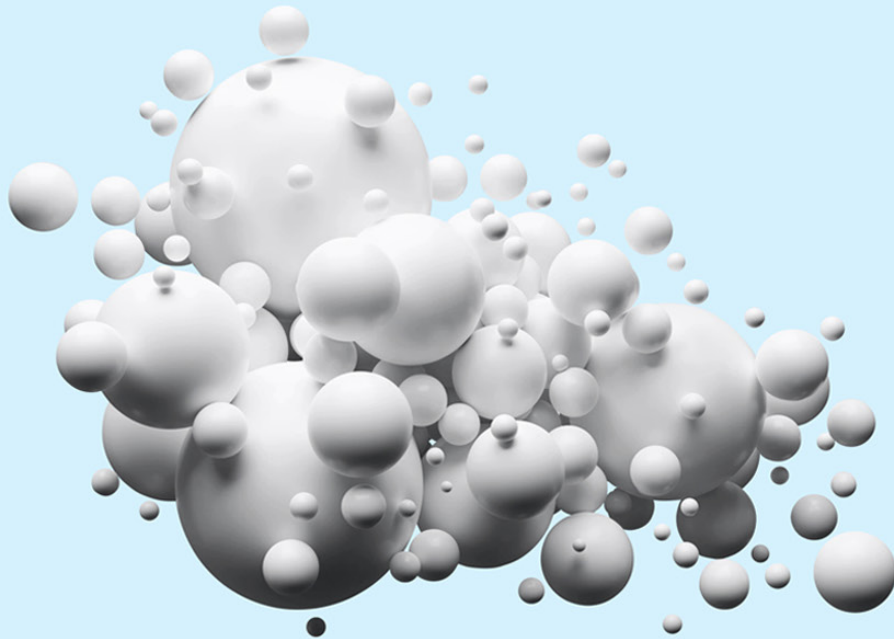# McKinsey & Company

McKinsey Explainers

What is cloud computing?

Cloud computing is the use of comprehensive digital capabilities delivered via the internet for organizations to operate, innovate, and serve customers. It eliminates the need for organizations to host digital applications on their own servers.

With cloud computing, organizations essentially buy a range of services offered by cloud service providers (CSPs). The CSP's servers host all the client's applications. Organizations can enhance their computing power more quickly and cheaply via the cloud than by purchasing, installing, and maintaining their own servers.

The cloud-computing model is helping organizations to scale new digital solutions with greater speed and agility—and to create value more quickly. Developers use cloud services to build and run custom applications and to maintain infrastructure and networks for companies of virtually all sizes—especially large global ones. CSPs offer services, such as analytics, to handle and manipulate vast amounts of data. Time to market accelerates, speeding innovation to deliver better products and services across the world.

What are examples of cloud computing's uses?

Cloud computing came on the scene well before the global pandemic hit, in 2020, but the ensuing digital dash helped demonstrate its power and utility. Here are some examples of how businesses and other organizations employ the cloud:

— A fast-casual restaurant chain's online orders multiplied exponentially during the 2020 pandemic lockdowns, climbing to 400,000 a day, from 50,000. One pleasant surprise? The company's online-ordering system could handle the volume—because it had already migrated to the cloud. Thanks to this success, the organization's leadership decided to accelerate its five-year migration plan to less than one year.

— A biotech company harnessed cloud computing to deliver the first clinical batch of a COVID-19 vaccine candidate for Phase I trials in just 42 days—thanks in part to breakthrough innovations using scalable cloud data storage and computing to facilitate processes ensuring the drug's safety and efficacy.

— Banks use the cloud for several aspects of customer-service management. They automate transaction calls using voice recognition algorithms and cognitive agents (AI-based online self-service assistants directing customers to helpful information or to a human representative when necessary). In fraud and debt analytics, cloud solutions enhance the predictive power of traditional early-warning systems. To reduce churn, they encourage customer loyalty through holistic retention programs managed entirely in the cloud.

— Automakers are also along for the cloud ride. One company uses a common cloud platform that serves 124 plants, 500 warehouses, and 1,500 suppliers to consolidate real-time data from machines and systems and to track logistics and offer insights on shop floor processes. Use of the cloud could shave 30 percent off factory costs by 2025—and spark innovation at the same time.

That's not to mention experiences we all take for granted: using apps on a smartphone, streaming shows and movies, participating in videoconferences. All of these things can happen in the cloud.

How has cloud computing evolved?

Going back a few years, legacy infrastructure dominated IT-hosting budgets. Enterprises planned to move a mere 45 percent of their IT-hosting expenditures to the cloud by 2021. Enter COVID-19, and 65 percent of the decision makers surveyed by McKinsey increased their cloud budgets. An additional 55 percent ended up moving more workloads than initially planned. Having witnessed the cloud's benefits firsthand, 40 percent of companies expect to pick up the pace of implementation.

The cloud revolution has actually been going on for years—more than 20, if you think the takeoff point was the founding of Salesforce, widely seen as the

first software as a service (SaaS) company. Today, the next generation of cloud, including capabilities such as serverless computing, makes it easier for software developers to tweak software functions independently, accelerating the pace of release, and to do so more efficiently. Businesses can therefore serve customers and launch products in a more agile fashion. And the cloud continues to evolve.

Cost savings are commonly seen as the primary reason for moving to the cloud but managing those costs requires a different and more dynamic approach focused on opex rather than capex. Financial-operations (or FinOps) capabilities can indeed enable the continuous management and optimization of cloud costs. But CSPs have developed their offerings so that the cloud's greatest value opportunity is primarily through business innovation and optimization. In 2020, the top-three CSPs reached $100 billion in combined revenues—a minor share of the global $2.4 trillion market for enterprise IT services—leaving huge value to be captured. To go beyond merely realizing cost savings, companies must activate three symbiotic rings of cloud value creation: strategy and management, business domain adoption, and foundational capabilities.

What's the main reason to move to the cloud?

The pandemic demonstrated that the digital transformation can no longer be delayed—and can happen much more quickly than previously imagined. Nothing is more critical to a corporate digital transformation than becoming a cloud-first business. The benefits are faster time to market, simplified innovation and scalability, and reduced risk when effectively managed. The cloud lets companies provide customers with novel digital experiences—in days, not months—and delivers analytics absent on legacy platforms. But to transition to a cloud-first operating model, organizations must make a collective effort that starts at the top. Here are three actions CEOs can

take to increase the value their companies get from cloud computing:

1. Establish a sustainable funding model.

2. Develop a new business technology operating model.

3. Set up policies to attract and retain the right engineering talent.

How much value will the cloud create?

Fortune 500 companies adopting the cloud could realize more than $1 trillion in value by 2030, and not from IT cost reductions alone, according to McKinsey's analysis of 700 use cases.

For example, the cloud speeds up design, build, and ramp-up, shortening time to market when companies have strong DevOps (the combination of development and operations) processes in place; groups of software developers customize and deploy software for operations that support the business. The cloud's global infrastructure lets companies scale products almost instantly to reach new customers, geographies, and channels. Finally, digital-first companies use the cloud to adopt emerging technologies and innovate aggressively, using digital capabilities as a competitive differentiator to launch and build businesses.

If companies pursue the cloud's vast potential in the right ways, they will realize huge value. Companies across diverse industries have implemented the public cloud and seen promising results. The successful ones defined a value-oriented strategy across IT and the business, acquired hands-on experience operating in the cloud, adopted a technology-first approach, and developed a cloud-literate workforce.

What is the cloud cost/ procurement model?

Some cloud services, such as server space, are leased. Leasing requires much less capital up front than buying, offers greater flexibility to switch and expand the use of services, cuts the basic cost of buying hardware and software upfront, and reduces the difficulties of upkeep and ownership. Organizations pay only for the infrastructure and computing services that meet their evolving needs. But an outsourcing model is more apt than other analogies: the computing business issues of cloud customers are addressed by third-party providers that deliver innovative computing services on demand to a wide variety of customers, adapt those services to fit specific needs, and work to constantly improve the offering.

What are cloud risks?

The cloud offers huge cost savings and potential for innovation. However, when companies migrate to the cloud, the simple lift-and-shift approach doesn't reduce costs, so companies must remediate their existing applications to take advantage of cloud services.

For instance, a major financial-services organization wanted to move more than 50 percent of its applications to the public cloud within five years. Its goals were to improve resiliency, time to market, and productivity. But not all its business units needed to transition at the same pace. The IT leadership therefore defined varying adoption archetypes to meet each unit's technical, risk, and operating-model needs.

Legacy cybersecurity architectures and operating models can also pose problems when companies shift to the cloud. The resulting problems, however, involve misconfigurations rather than inherent cloud security vulnerabilities. One powerful solution? Securing cloud workloads for speed and agility: automated security architectures and processes enable workloads to be processed at a much faster tempo.

What kind of cloud talent is needed?

The talent demands of the cloud differ from those of legacy IT. While cloud computing can improve the productivity of your technology, it requires specialized and sometimes hard-to-find talent—including full-stack developers, data engineers, cloud-security engineers, identity- and access-management specialists, and cloud engineers. The cloud talent model should thus be revisited as you move forward.

Six practical actions can help your organization build the cloud talent you need:

1. Find engineering talent with broad experience and skills.

2. Balance talent maturity levels and the composition of teams.

3. Build an extensive and mandatory upskilling program focused on need.

4. Build an engineering culture that optimizes the developer experience.

5. Consider using partners to accelerate development and assign your best cloud leaders as owners.

6. Retain top talent by focusing on what motivates them.

How do different industries use the cloud?

Different industries are expected to see dramatically different benefits from the cloud. High-tech, retail, and healthcare organizations occupy the top end of the value capture continuum. Electronics and semiconductors, consumer-packaged-goods, and

media companies make up the middle. Materials, chemicals, and infrastructure organizations cluster at the lower end.

Nevertheless, myriad use cases provide opportunities to unlock value across industries, as the following examples show:

— a retailer enhancing omnichannel fulfillment, using AI to optimize inventory across channels and to provide a seamless customer experience

— a healthcare organization implementing remote heath monitoring to conduct virtual trials and improve adherence

— a high-tech company using chatbots to provide premier-level support combining phone, email, and chat

— an oil and gas company employing automated forecasting to automate supply- and-demand modeling and reduce the need for manual analysis

— a financial-services organization implementing customer call optimization using real-time voice recognition algorithms to direct customers in distress to experienced representatives for retention offers

— a financial-services provider moving applications in customer-facing business domains to the public cloud to penetrate promising markets more quickly and at minimal cost

— a health insurance carrier accelerating the capture of billions of dollars in new revenues by moving systems to the cloud to interact with providers through easier onboarding

The cloud is evolving to meet the industry-specific needs of companies. From 2021 to 2024, public-cloud spending on vertical applications (such as warehouse management in retailing and enterprise risk management in banking) is expected to grow by more than 40 percent annually. Spending on horizontal workloads (such as customer relationship management) is expected to grow by 25 percent. Healthcare and manufacturing organizations, for instance, plan to spend around twice as much on vertical applications as on horizontal ones.

What are the biggest cloud myths?

Views on cloud computing can be clouded by misconceptions. Here are seven common myths about the cloud—all of which can be debunked:

1. The cloud's value lies primarily in reducing costs.

2. Cloud computing costs more than in-house computing.

3. On-premises data centers are more secure than the cloud.

4. Applications run more slowly in the cloud.

5. The cloud eliminates the need for infrastructure.

6. The best way to move to the cloud is to focus on applications or data centers.

7. You must lift and shift applications as is or totally refactor them.

How large must my organization be to benefit from the cloud?

Here's one more huge misconception: the cloud is just for big multinational companies. In fact, cloud can help make small local companies *become* multinational. A company's benefits from implementing the cloud are not constrained by its size. In fact, the cloud shifts barrier to entry to skill rather than scale, making it possible for a company of any size to compete if it has people with the right skills. With cloud, highly skilled small companies can take on established competitors. To realize the

cloud's immense potential value fully, organizations must take a thoughtful approach, with IT and the businesses working together.

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