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Longitude

A **Financial Times** Company

Research report

Cloud Accelerated with Urgency

Research Insights on 2020, a Year That
Made Next-Generation Cloud a Necessity

Introduction

From cloud uptake to cloud ubiquity

Any doubts about the utility of the cloud were put to rest in 2020. Thanks to cloud computing capabilities, businesses maintained operations, employees worked remotely, scientists collaborated on vital research, and families and friends connected in ways that were unthinkable not long ago—all amid global health and economic crises.

Cloud adoption rates accelerated with unprecedented urgency. In April 2020 for instance, CNBC reported that daily downloads of cloud-based video communications provider Zoom's app increased 30 times year-on-year, and the number of daily users on the platform spiked at 200 million in March—up from 10 million just three months earlier.[1]

After such a landmark year, it's hard to believe that just two years ago, a McKinsey study found enterprise cloud adoption to be "low," with the average enterprise having achieved less than 20 percent public or private cloud adoption.[2] Last year's business landscape told a very different story.

Our research confirmed this trend:

- More than half (53 percent) of businesses have now migrated most or all of their crucial workloads to the cloud.

- More than two-thirds (67 percent) said that cloud native is integral to their firms' competitiveness.

- A quarter (25 percent) of businesses have deployed an autonomous database; it was a strategic priority among a further third (35 percent) of firms.

For business leaders, the message is clear:

The events of 2020 accelerated an already growing sense of urgency to capitalize on the next generation of cloud computing capabilities.

1: https://www.cnbc.com/2020/04/03/how-zoom-rose-to-the-top-during-the-coronavirus-pandemic.html

2: https://www.mckinsey.com/business-functions/mckinsey-digital/our-insights/cloud-adoption-to-accelerate-it-modernization

A new frontier
for a new normal

The first generation of cloud technology transformed businesses. Public clouds built with conventional infrastructure-as-a-service (IaaS) and platform-as-a-service (PaaS) capabilities gave existing firms new-found speed, scalability, and operational cost-efficiency. It also bred countless new firms with pioneering business models.

Now, its successor is taking shape. Next-generation cloud gives businesses the ability to master the intelligent technologies that are becoming increasingly integral to competitiveness. With new levels of automation, scaling, and security, the cloud is built to adapt. After 2020, many firms now recognize the necessity.

"Most companies were always planning on moving most of their existing workloads to the cloud over the next 5 to 10 years," said David Linthicum, chief cloud strategy officer at Deloitte. "Now, they're compressing that to 2 to 5 years."

We wanted to understand how businesses were adapting to the new normal. So we surveyed 1,150 senior executives whose firms were at different stages of cloud implementation but had at least nascent plans to move to a cloud native application environment.

In this report, we delve into the results. Where does next-generation cloud fit within their broader cloud strategy—and how is it enabling their ambitions for the digital future? Are they ready for the autonomous enterprise? And have they come to terms with the security advances and skills capabilities required to seize the opportunities ahead?

We hope that the survey results and our analysis provide some perspective and help businesses determine how next-generation cloud can help them adapt to a changing world.

At a glance

Businesses are speeding toward cloud native

The share of applications developed in the cloud is set to double by 2025. What's more, cloud native formed a core part of the cloud strategy for almost a quarter (23 percent) of firms—a select group we call the "cloud leaders."

Firms must focus on skills in conjunction with technology

Among firms' toughest obstacles to cloud adoption are skills gaps in the workforce. While survey respondents considered workforce skills to be the area of the business that is least compatible with operating in the cloud, there are ways to overcome this challenge.

Cloud security is helping crucial workload migration

Most respondents (63 percent) said the cloud has improved protection from cyberattacks without threatening the integrity of their crucial workloads.

Next-generation cloud heralds the autonomous enterprise

Cloud leaders gained an edge by adopting a vital component of enterprise autonomy: the autonomous database. While it has been deployed by 25 percent of all surveyed firms, for cloud leaders, the figure is 37 percent.

What do we mean by *next-generation cloud?*

Technology capabilities are advancing, fundamentally altering enterprise computing by changing the way organizations receive, manage, and secure business data. In tandem, intelligent automated systems are quickly taking hold in many industries. Together, these shifts are paving the way for a new generation in cloud computing—the next-generation cloud—which builds on the features and lessons of the first-generation cloud to provide a new infrastructure and a full set of platform capabilities.

One of the features of next-generation cloud is its support for a cloud native application architecture. That kind of architecture is used by a growing number of businesses that are building or recreating their applications directly in the cloud using technologies such as PaaS, microservices, containers, and autoprovisioning.

Another feature is autonomous systems. These are intelligent, self-governing information systems that are powered by artificial intelligence (AI) and machine learning (ML). This automation ensures reliability with always-on security that never stops working.

About the research

The analysis in this study is based on a survey of 1,150 senior executives, which was carried out on behalf of Oracle by Longitude, a Financial Times company, between January and March 2020.

The respondents are based in 19 countries, with the EMEA region accounting for 39 percent; Asia Pacific, 26 percent; North America, 22 percent; and Central and South America, 13 percent. Of the 14 sectors represented, the largest groups are banking, financial services, and insurance (BFSI); industrials and chemicals; real estate and construction; hospitality and leisure; professional services; and energy; mining, and utilities, each of which contributes 10 percent.

Most of the respondents are from large organizations, with 78 percent in firms earning annual revenue of US$1 billion or more and the rest in firms earning between US$500 million and US$1 billion.

And they are in senior positions. One in five (20 percent) are in C-suite roles, and the rest hold other senior positions (vice-president, director, head of department, senior manager). They work in a range of different functions, including operations and production (15 percent), procurement (15 percent), marketing (13 percent), IT (12 percent), and strategy and planning (12 percent).

To gather additional insights for this report, Longitude also undertook in-depth interviews with the following executives and subject-matter experts:

- Dr. Gerard Gorman, reader in computational science, Imperial College London

- Fred Kost, vice president of product marketing—security, Oracle

- David Linthicum, chief cloud strategy officer, Deloitte

- Chris Pasternak, managing director, Accenture

- Eliseu Rocha, head of IT and Infrastructure, Grupo DPSP

One

Going Native: Next-generation cloud wins the long game

Next-generation cloud marks a move—a shift away from traditional monolithic architectures, and toward developing applications directly in the cloud.

In that cloud native environment, companies can use microservices, containers, autoprovisioning, and PaaS to build the kind of applications that are so integral to digital competitiveness today: APIs, mobile apps, chatbots.

While this trend continues to grow, 2020's shifting business environment accelerated companies' openness to cloud native approaches.

On average, our surveyed firms developed 5 percent of their new applications in the cloud, and they expected that figure to rise to 10 percent by 2025 (see *Figure 1*). The share of their applications running open-source in the cloud, meanwhile, will rise from 8 percent to 13 percent over the same timeframe.

Firms are further ahead on migration. More than a quarter of their applications (27 percent) have been migrated to the cloud, rising to 41 percent by 2025. Many

of these will be refactored—recreated to run directly in the cloud without losing performance or capability—to run seamlessly in a cloud native environment.

The reasons for the shift are obvious. "Cloud native offers scalability, flexibility, resiliency, and simplicity," said Chris Pasternak, managing director at Accenture.

"Cloud native takes away most of the management requirements," he said. "Firms can execute their growth strategy without having to spend a lot of time planning and guessing how the business is going to grow over the next 6 or 12 months." This simplicity also contributes to faster speed to market, he said: "How much time does an organization spend standing up servers and installing software when it could deploy a data analytics platform in hours or minutes?"

Governance is another benefit, according to Deloitte's David Linthicum. "Microservices, container-based systems, configuration management—they all give you the ability to manage very complex deployments using sophisticated tools that can abstract you from the complexity."

Figure 1. Share of applications developed in or migrated to the cloud, 2020 and 2025
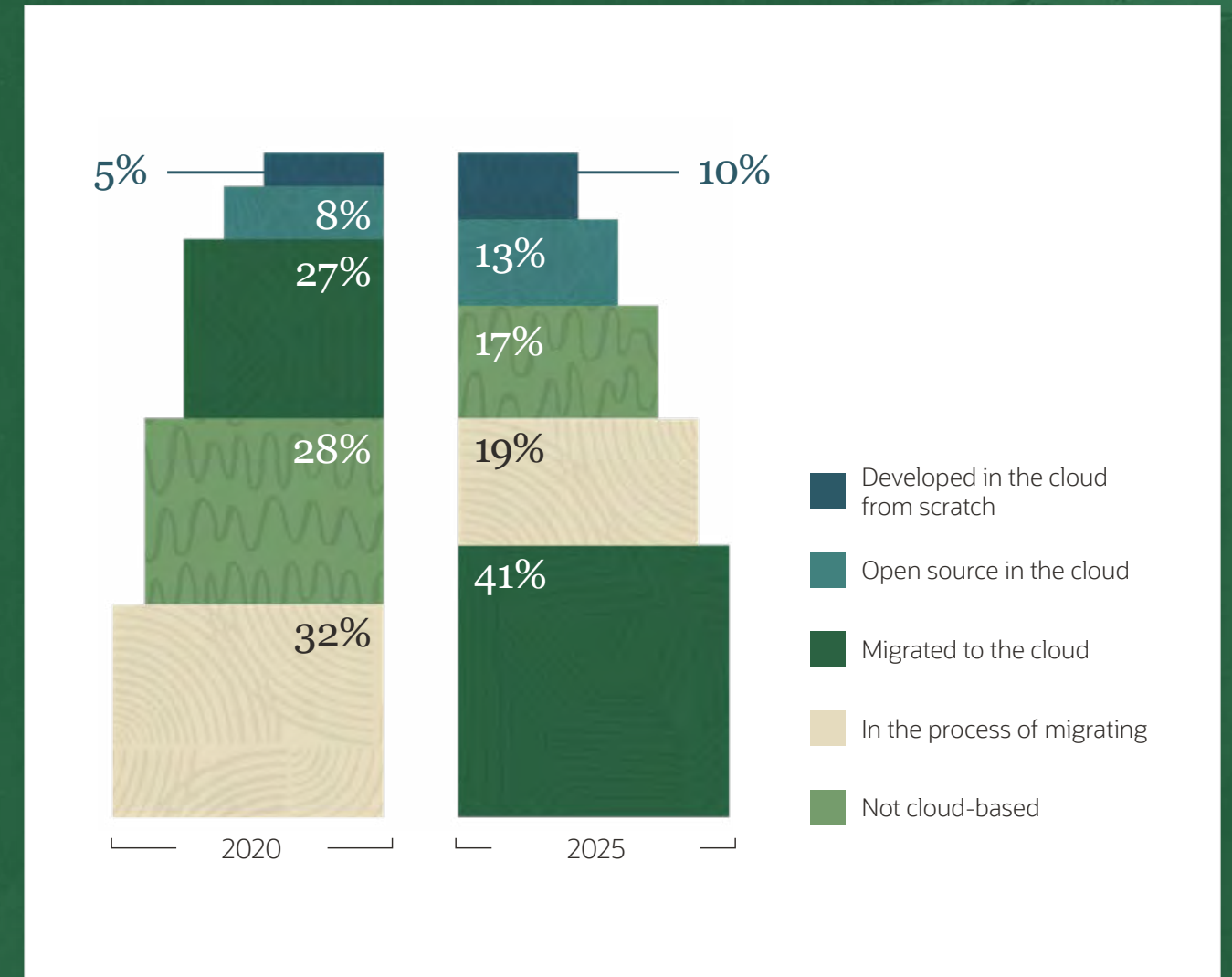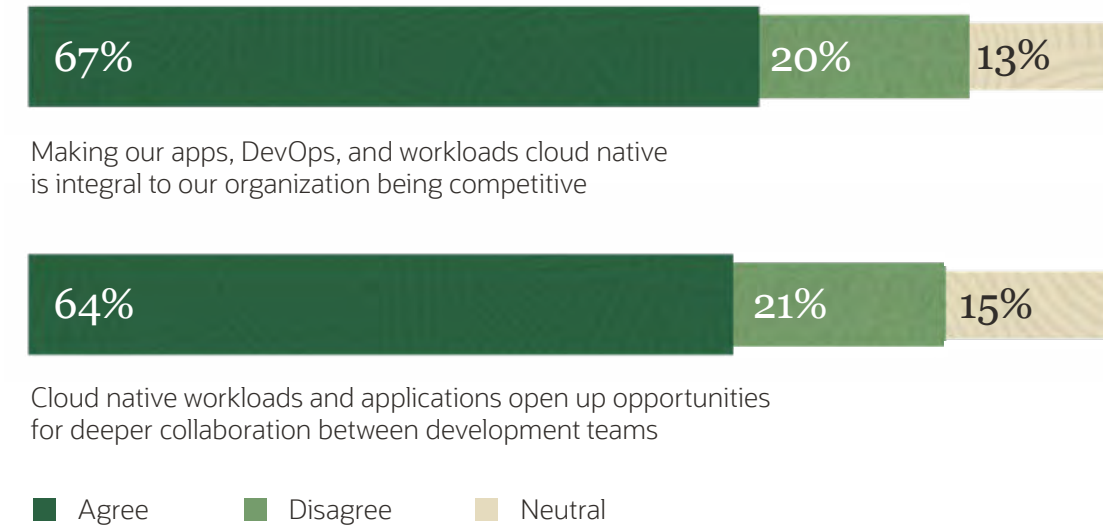
Migration maximizes performance

The migration of on-premises applications, particularly older or complex ones, can be a challenge for cloud native adoption, even in the best of times. Refactoring the applications to run in a cloud native architecture is the surest way to maximize their performance, although this can be time-consuming and, in 2020's business environment, some companies likely chose to delay it. There are options available short of refactoring, such as replatforming (rebuilding or redeploying an application on an upgraded operating system) that can confer at least some of the performance advantages the cloud offers.

And while the investment needed for businesses to establish their first- and next-generation cloud infrastructure may be high, the majority are convinced it is valuable in the long run. In fact, the majority of survey respondents agreed that investing in a cloud native future is critical to the success of their business. More than two-thirds (67 percent, and 75 percent in the banking, financial services, and insurance sector) said that shifting their applications, DevOps, and workloads to a cloud native architecture is integral to their firms' competitiveness (see *Figure 2*).

For Brazilian pharmacy retailer Grupo DPSP, the return on investment that cloud infrastructure offers is the ability to meet the time-to-market needs of the business. Eliseu Rocha, head of IT and infrastructure at Grupo DPSP, said: "Adoption of a cloud-based infrastructure that allows efficient and flexible allocation of resources and greater agility in deliveries, means that—even with the addition of new volume in demand— we can guarantee growth and levels of customer service, in addition to solving the seasonality challenges of business."

Figure 2. How respondents saw cloud native

67%	20%	13%

Making our apps, DevOps, and workloads cloud native is integral to our organization being competitive

64%	21%	15%

Cloud native workloads and applications open up opportunities for deeper collaboration between development teams

■ Agree   ■ Disagree   ■ Neutral

"Adoption of a cloud-based infrastructure means that – even with the addition of new volume in demand – we can guarantee growth and levels of customer service."

Eliseu Rocha, Head of IT and Infrastructure, Grupo DPSP

GRUPO
DPSP

Meet the leaders

In our 2020 snapshot, we identified a group of "cloud leaders," who said cloud native is a core part of their strategy. Another group, the "aspirers," are pursuing cloud native as one element of a wider cloud strategy. Then there is a third group, the "followers," whose cloud native plans are more tentative—they said they intend to test the approach (see *Figure 3*).

Figure 3. The size of the cloud leader, aspirer, and follower groups

28%
Followers

50%
Aspirers

23%
Leaders
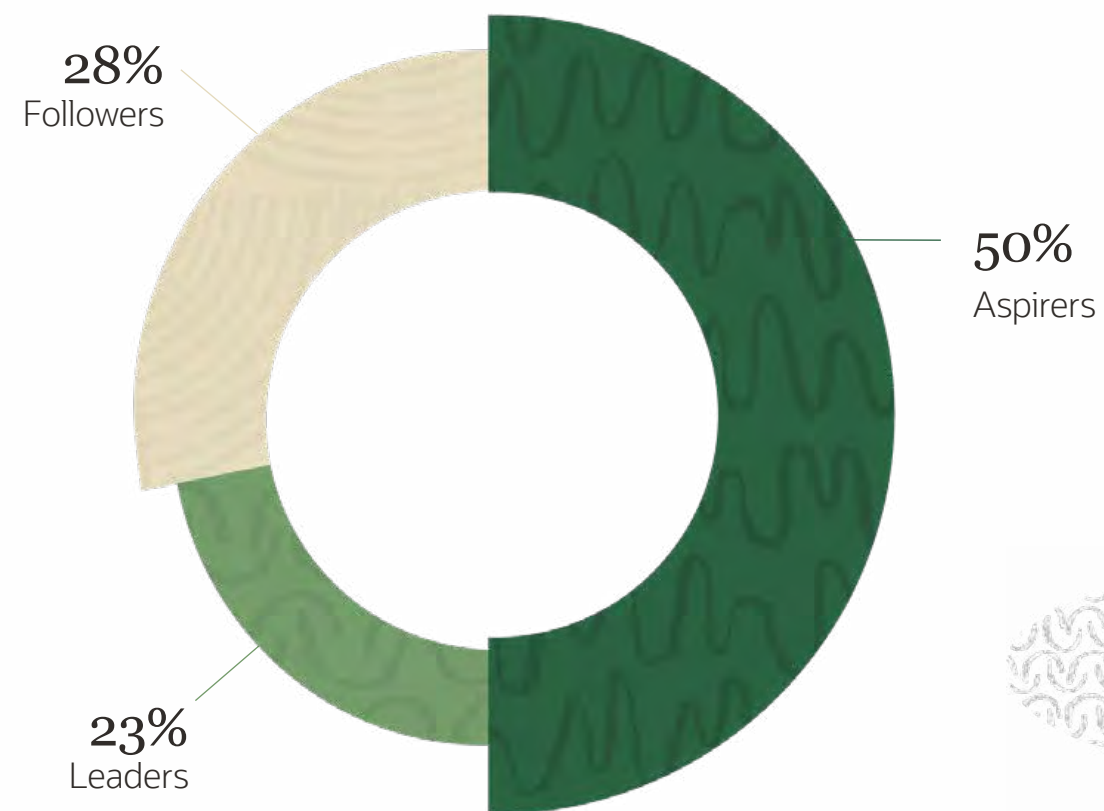
*Note: due to rounding, numbers do not add up to exactly 100%.

The leaders were:

• Ahead in developing applications in a cloud environment, or moving them to one

• Well ahead in the adoption of autonomous technologies, including autonomous database

• More advanced in their use of AI and ML

• More likely to have moved all crucial workloads to the cloud

• More likely to have said ML and data science capabilities will enhance their cloud operations

"Cloud native offers scalability, flexibility, resiliency, and simplicity."

Chris Pasternak, Managing Director, Accenture

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Next level: The age of enterprise autonomy

Asked what their businesses need most from their cloud implementation, our respondents were loud and clear. Above all, the cloud should deliver improved scalability, greater agility, lower-cost operations, and improved security (see *Figure 4*). It also said 32 percent, optimize their data management and analytics. According to respondents, this will not just deliver cost savings but will also reduce time to market, enhance innovation in products and applications, and allow experimentation with new workloads.

The cloud has proven its worth in the crisis conditions of 2020. Cloud infrastructure enabled online meeting provider Zoom, for example, to quickly provision additional capacity to handle a massive increase in daily users that began in the early months of the year. Cloud infrastructure did the same for rival conferencing provider 8x8, while at the same time significantly reducing its costs for compute and network services.

The first-generation cloud went a long way to answering those cloud requirements listed above—including improved security. Next-generation cloud, with its promise of

autonomous capabilities, gives businesses even more, by reducing the burden on IT, lowering costs, and strengthening disparate applications that ran on a variety of systems.

One company beginning to see the benefits of this more advanced cloud is Sky Brasil, a provider of satellite telecom services and 4G internet connection for rural regions of Brazil. Since moving its data management to an autonomous database—a core element of next-generation cloud—it has realized cost savings of over 60 percent on data infrastructure and reduced time to market by 90 percent.

"Moving to an autonomous database has streamlined processes and enabled us to reach our customers with the right offering at the right time," said André Nazare, IT director at Sky Brasil. With the burden of infrastructure management a thing of the past, the IT team is able to focus part of its time on advanced data modeling and analytics.
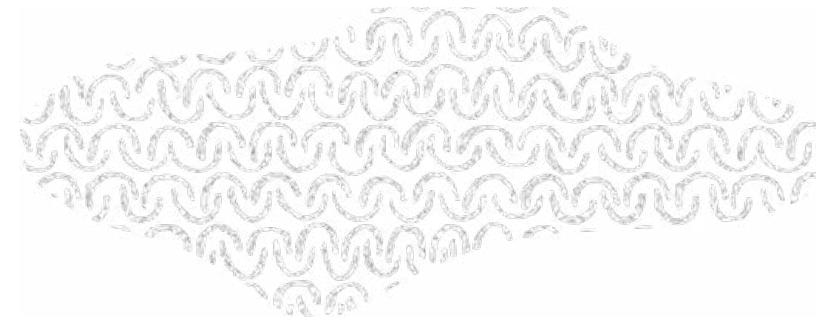
The capabilities of next-generation cloud come from AI and ML, which are fundamentally altering enterprise computing by changing the way organizations receive, manage, and secure data. In turn, autonomous capabilities will help businesses to fully exploit AI and ML technologies. Many firms have been held back by the enormous cost and complexity of their current technology environments. Next-generation cloud can remove those constraints.
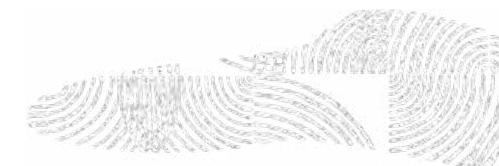
Figure 4. Firms' main drivers for cloud implementation

Driver	%
Improved scalability	46%
Greater agility	44%
Lower costs	43%
Improved security	41%
Easier deployment	33%
Optimized data and analytics	32%
Speedier innovation/time to market	31%
Improved customer experiences	26%
Accelerated time to insight	25%
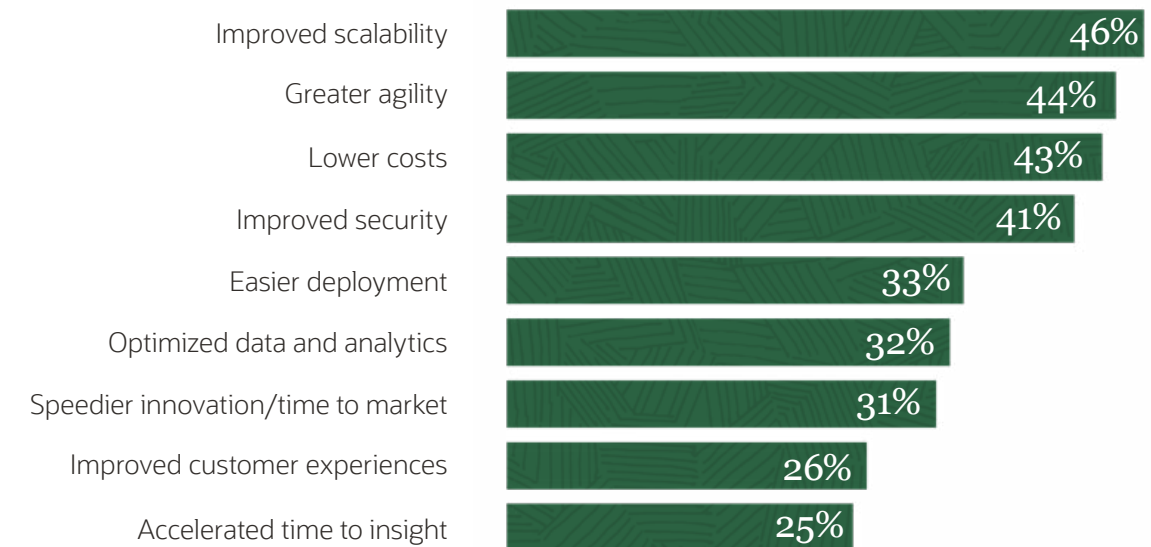
Note: Respondents were asked to select their top three choices.

Rise of the autonomous enterprise

Supported by ML, autonomous systems not only initiate automated sequences of tasks, such as configuration, tuning, scaling, and security of applications and systems, with less human error; they also self-monitor and self-correct.

"We're seeing more and more organizations asking how they can use what the cloud has to offer in low-code/no-code implementations, serverless, and self-maintaining solutions," said Accenture's Chris Pasternak.

In practice, this frees up time and resources to focus on what matters most. This is certainly the case for Grupo DPSP's Eliseu Rocha: "We use autonomous technologies to enable the automation of operational activities and allow people to focus on the company's purpose, which is to serve the customer well and generate a positive impact while taking care of what is most important: people."

Cloud leaders get this and are well ahead of the adoption curve. They are more than twice as likely as followers to be using autonomous technologies (31 percent compared with 12 percent). Leaders are also nearly four times more likely than followers to be using AI and ML (26 percent compared with 7 percent) (see *Figure 5*, next page).

Of the industries covered in our survey, banking, financial services, and insurance firms are investing most heavily in AI and ML (30 percent). The pace of disruption, regulation, and competition currently facing this sector could go a long way toward explaining why it is leading on this, along with several other aspects of cloud adoption and enterprise autonomy, as you'll see throughout this report.

How did the firms that are using autonomous technologies say they are benefiting? Prominent among their gains were cost savings and the ability to run demanding workloads with no performance concerns (see *Figure 6*).

Since it moved to autonomous data and cloud infrastructure, the IT organization of Kingold, a China-based property developer, manages 50 times more data, using less than half the human capital than was the case previously. Relieved of database administration, the IT organization is now able to provide more strategic value by building an advanced analytical platform that organizes both internet and company data.

Another advantage of autonomous technologies is the built-in security controls and processes. According to Fred Kost, vice president of product marketing—security at Oracle, there's an important lesson to learn from the first generation of the cloud: security needs to be designed into systems from the start and not layered on later. "Architects of Gen 2 Clouds recognize that," he said. "We realize that we're building not just for agility but for security, and the latter must be more integrated and built in."

Kost stressed the importance of intuitiveness and ease. "We need to build security with the intent of making it more automated," he said. "That also means helping customers automate and take care of security issues. It's been very complex, and it needs to be easier." Data encryption is one example. "It should just happen as your data moves to cloud providers," said Kost. "It should be one less thing you have to worry about."

> "We've got to continue to make security more autonomous. That also means helping customers automate and take care of security issues."
>
> **Fred Kost, Vice President of Product Marketing—Security, Oracle**

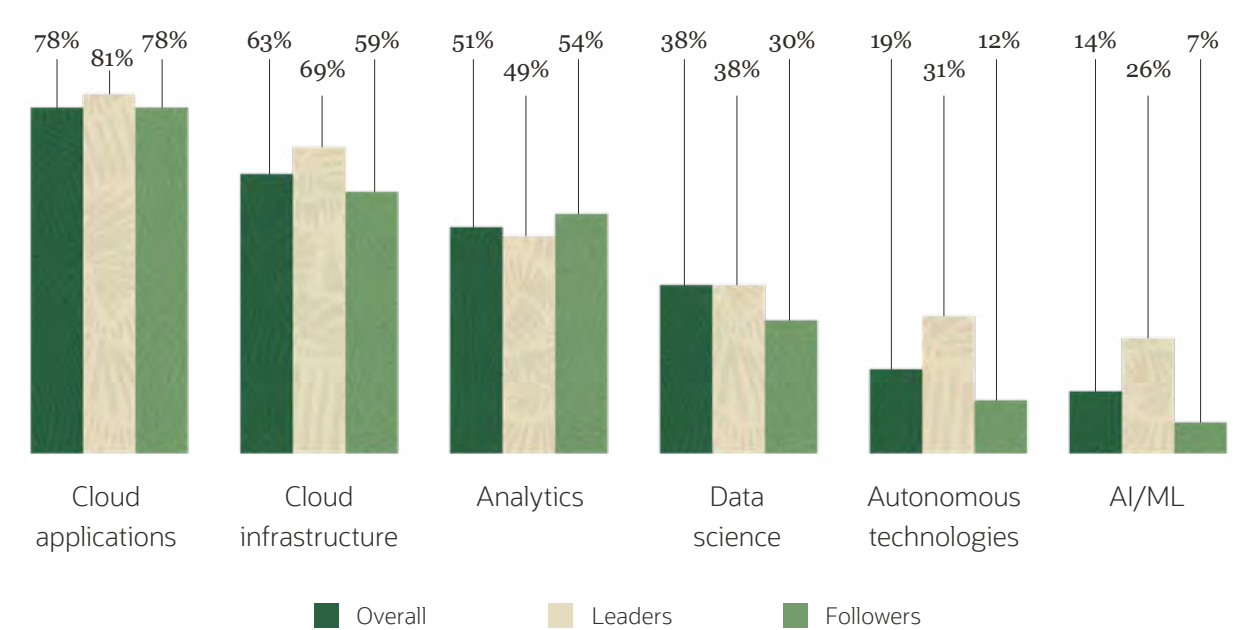ORACLE

Figure 5. The technologies used by firms

	Cloud applications	Cloud infrastructure	Analytics	Data science	Autonomous technologies	AI/ML
Overall	78%	63%	51%	38%	19%	14%
Leaders	81%	69%	49%	38%	31%	26%
Followers	78%	59%	54%	30%	12%	7%

Figure 6. Firms' main motivations for using autonomous technologies

Cost savings	21%
Ability to run demanding workloads with no performance concerns	21%
Creating efficiencies/automating manual tasks	12%
Built-in security controls and processes	10%
Access to integrated development tools	9%
Decreasing time to market	9%
Experimentation with new workloads	7%
Innovation of services/applications	7%
Improving customer experience	5%

Note: Due to rounding, numbers do not add up to exactly 100%.

Enter autonomous database

Autonomous capabilities in data management can revolutionize efficiency and business agility. "Cloud has opened up a whole new world in data management," said Pasternak. "For one thing, the stresses we used to have with capacity management are gone. For another, the intelligent tools in cloud have allowed us to get even better insight into our data."

That means autonomous databases—cloud-based autonomous data management systems that deliver automated provisioning, patching, upgrades, and tuning without human intervention. In one example, an autonomous database has given OUTFRONT Media, a US outdoor-advertising company, the ability to quickly feed terabytes of third-party data into interactive dashboards that its salesforce uses with customers for a more comprehensive view of advertising spend. Whereas two to three weeks were previously needed to merge and analyze such data from internal and external sources, this complex process now takes less than three hours and is more secure.
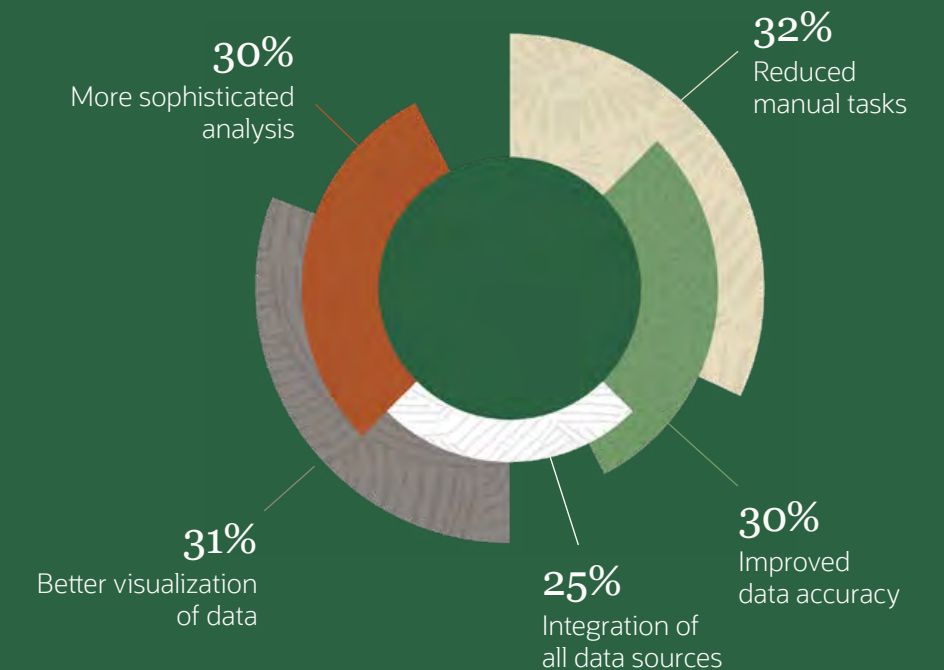
One-quarter of surveyed companies had deployed an autonomous database, and cloud leaders were ahead once again: 37 percent said an autonomous database is part of their data management approach, compared with just 20 percent of followers. Banking, financial services, and insurance is the sector that took the lead here again: Nearly one-third (31 percent) of firms have deployed an autonomous database, followed closely by pharma and biotech at 29 percent.

Forth Smart, a kiosk operator in Thailand whose 15 million users make over 2 million transactions daily, is an example of a financial services company using Oracle Autonomous Data Warehouse to gather insight and secure data without any database administrators. Before using Oracle Autonomous Data Warehouse, it used to take three or more hours for Forth Smart to run advanced data queries on customer behavior and predict how an offer would fare. Now, the same task takes only minutes. In addition, the capabilities of the analytics platform have helped the company to refine customer segmentation. "With machine learning, I'm able to do targeted ads without annoying customers, and I've doubled my conversion rate," said Pawarit (Taa) Ruengsuksilp, business development analyst at Forth Smart.

Those respondents whose organizations have deployed an autonomous database said its chief benefits are the reduction of manual tasks, better data visualization, improved data accuracy, and more sophisticated analysis (see *Figure 7*). Three-quarters of companies in the survey hadn't yet implemented an autonomous database, but almost half (47 percent) of these firms see it as a strategic priority.

Figure 7. The main benefits of an autonomous database for those firms that have deployed it

30% More sophisticated analysis

32% Reduced manual tasks

31% Better visualization of data

25% Integration of all data sources

30% Improved data accuracy

Note: Respondents were asked to select their top three choices.

"Cloud has opened up a whole new world in data management. For one thing, the stresses we used to have with capacity management are gone. For another, the intelligent tools in [the] cloud have allowed us to get even better insight into our data."

Chris Pasternak, Managing Director, Accenture

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Next-generation sects and regions

Which sectors and regions are leading on cloud strategy, cloud native adoption, and autonomous technologies?

Cloud strategy

The pharma, medical, and biotech; telecoms, media, and entertainment; and banking, financial services, and insurance sectors were most likely to say that cloud native is a core part of their cloud strategy. And those from telecoms, media, and entertainment (TME); and banking, financial services, and insurance (BFSI), along with consumer (including retail), were also more likely to say that their cloud strategy is either being fully executed or at least that implementation is well under way. In both areas of strategy, firms from Europe, the Middle East, and Africa outshone those from elsewhere.

Cloud native adoption

A look at cloud native adoption tells a slightly different story. It was real estate and construction firms that were developing the greatest number of new applications in the cloud. In a geographical comparison, cloud native application development was most advanced in North America (see *Figure 8*, next page).

Autonomous technologies

In terms of sector, hospitality and leisure used autonomous technologies the most (see *Figure 9*, next page). But when it came to AI and ML, firms in the banking, financial services, and insurance sector were a long way ahead. That sector also led the way in the adoption of autonomous databases, but was followed closely by pharma, medical, and biotech (see *Figure 10*, next page).

Figure 8. Average share of applications developed in the cloud from scratch, by region and industry among surveyed firms
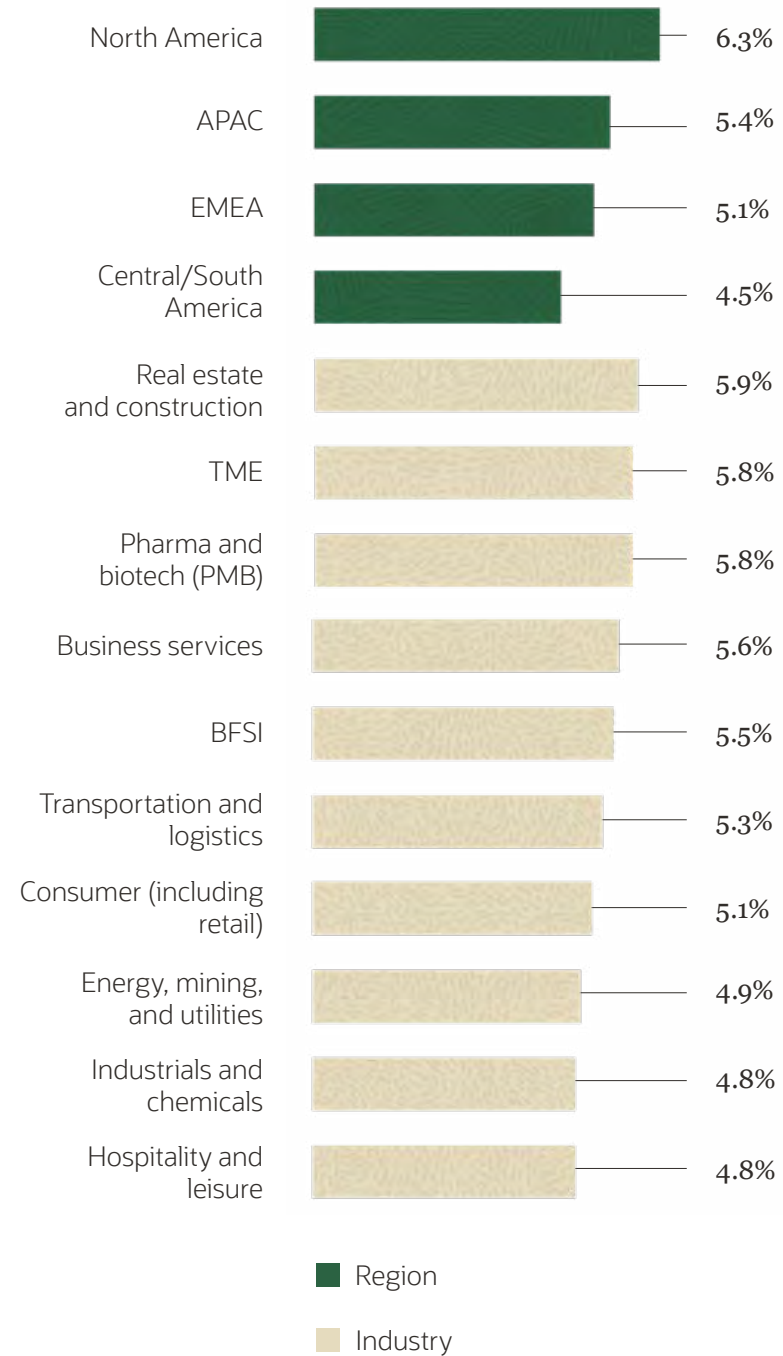
North America	6.3%
APAC	5.4%
EMEA	5.1%
Central/South America	4.5%
Real estate and construction	5.9%
TME	5.8%
Pharma and biotech (PMB)	5.8%
Business services	5.6%
BFSI	5.5%
Transportation and logistics	5.3%
Consumer (including retail)	5.1%
Energy, mining, and utilities	4.9%
Industrials and chemicals	4.8%
Hospitality and leisure	4.8%

■ Region
▨ Industry

Figure 9. Number of surveyed firms that were using autonomous technologies and AI/ML, by region and industry

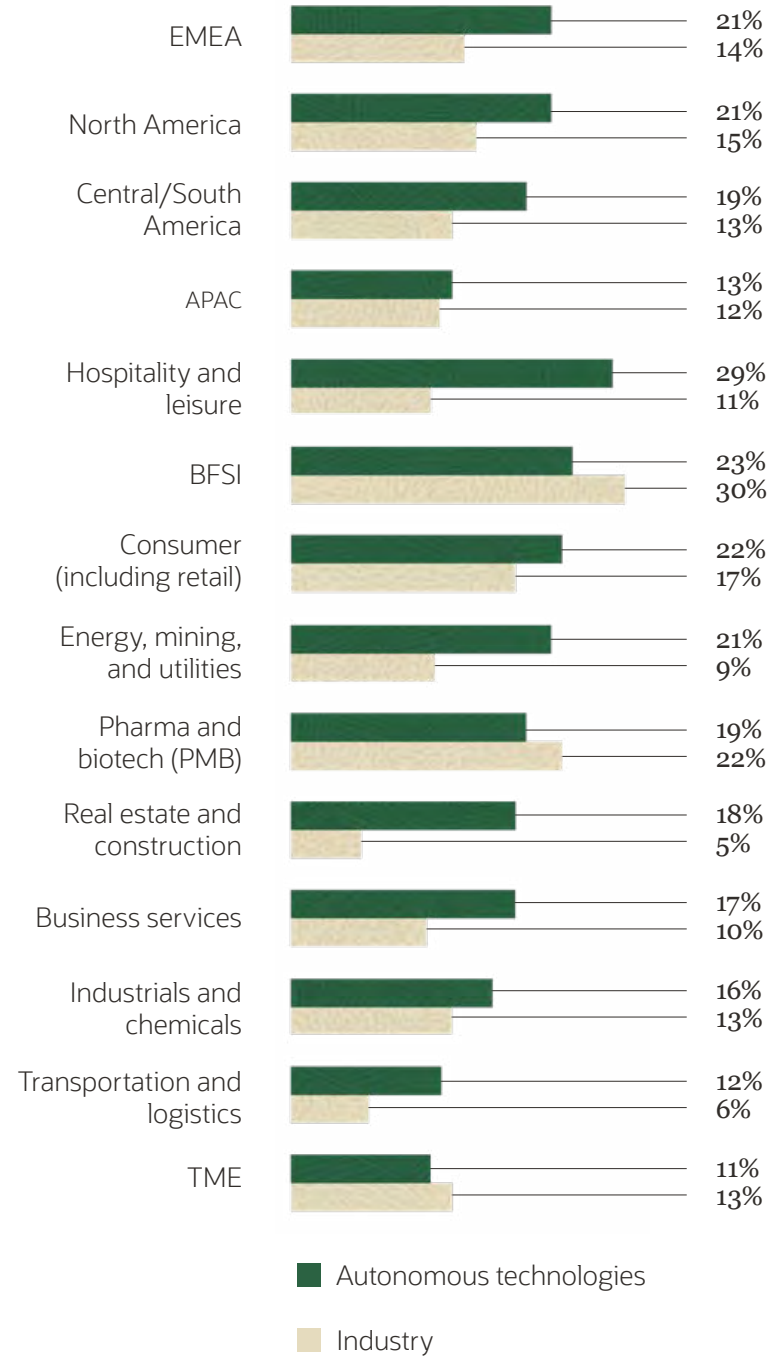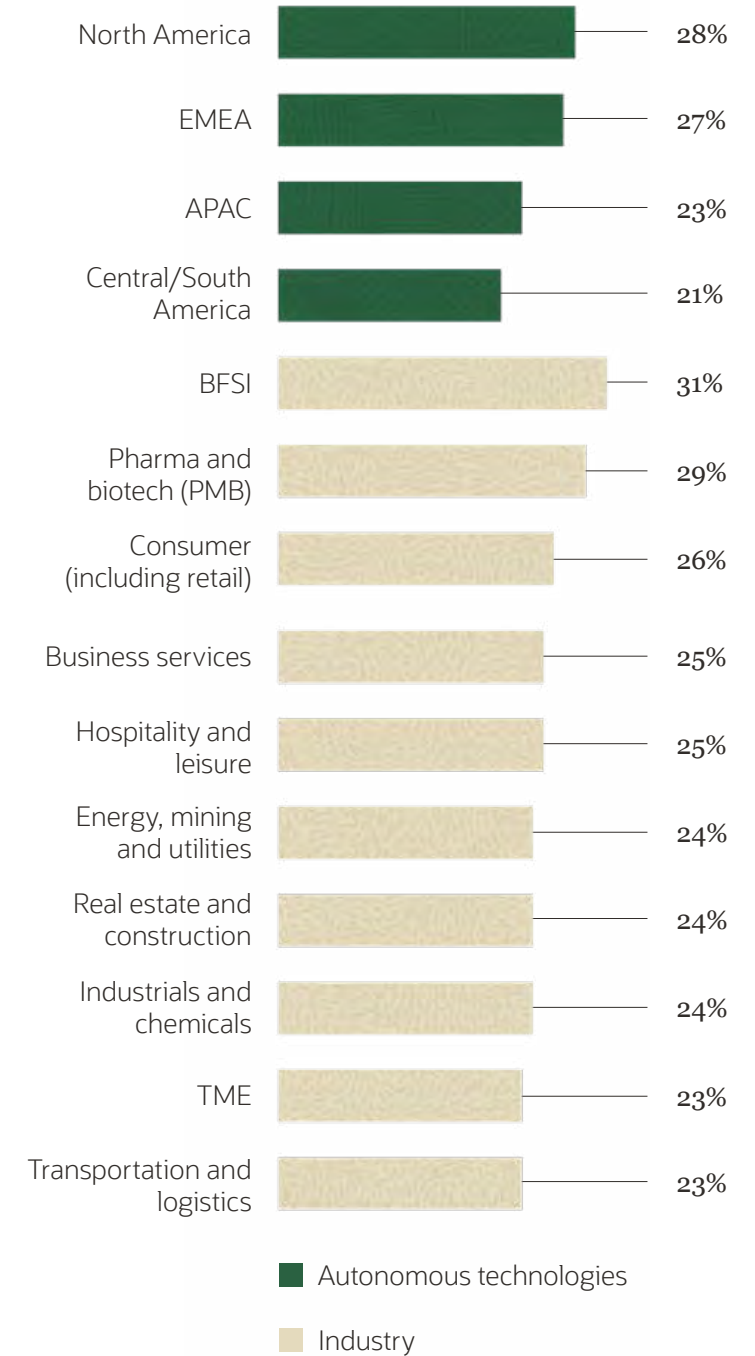|	
EMEA	21% / 14%
North America	21% / 15%
Central/South America	19% / 13%
APAC	13% / 12%
Hospitality and leisure	29% / 11%
BFSI	23% / 30%
Consumer (including retail)	22% / 17%
Energy, mining, and utilities	21% / 9%
Pharma and biotech (PMB)	19% / 22%
Real estate and construction	18% / 5%
Business services	17% / 10%
Industrials and chemicals	16% / 13%
Transportation and logistics	12% / 6%
TME	11% / 13%

■ Autonomous technologies
▨ Industry

Figure 10. Number of surveyed firms that were using autonomous database, by region and industry

North America	28%
EMEA	27%
APAC	23%
Central/South America	21%
BFSI	31%
Pharma and biotech (PMB)	29%
Consumer (including retail)	26%
Business services	25%
Hospitality and leisure	25%
Energy, mining and utilities	24%
Real estate and construction	24%
Industrials and chemicals	24%
TME	23%
Transportation and logistics	23%

■ Autonomous technologies
▨ Industry

No fear: Cloud security promotes migration of crucial workloads and applications

Not so long ago, concerns about lax cloud security prevented many CIOs and IT directors from giving public cloud migration the green light—especially when it came to their most important applications. Security challenges haven't gone away, but confidence in cloud cybersecurity defenses has increased which, in turn, helps to drive innovation.

More than half of firms in the survey (52 percent) said their cybersecurity has benefited from cloud deployment (see *Figure 11a*). And 63 percent said the cloud environment has improved their protection from cyberattacks without threatening the integrity of crucial workloads (see *Figure 11b*).

"The hesitancy customers used to have about moving to [the] cloud due to security concerns has largely passed," said Oracle's Fred Kost. "Now, most tell us they think security in the cloud is better than the security they can provide in their data centers."

This positivity helps to explain why more than half (53 percent) of respondents said their firms have moved most or all their crucial workloads and applications to the cloud.
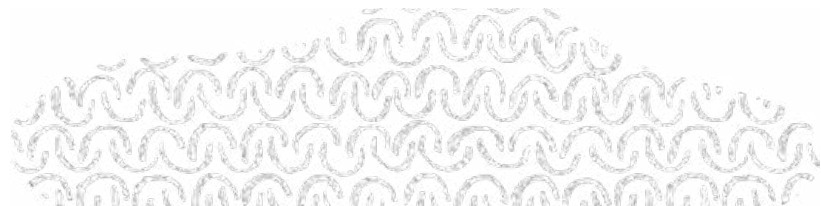
24%
Neutral

52%
Positive

24%
Negative

Figure 11a. Cloud's effect on security

The impact that our approach to cloud technology has had on cybersecurity

21%
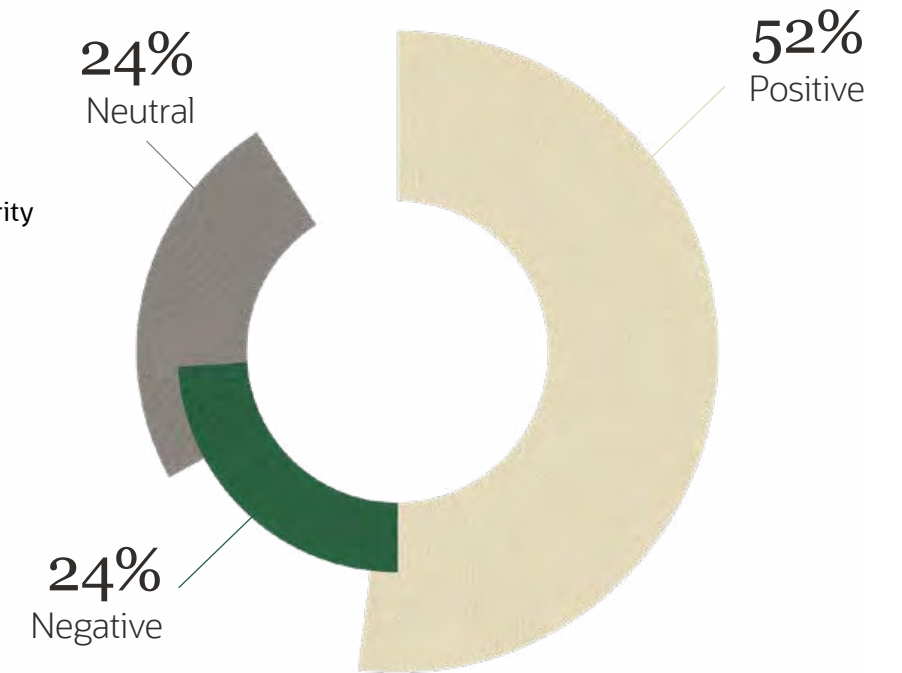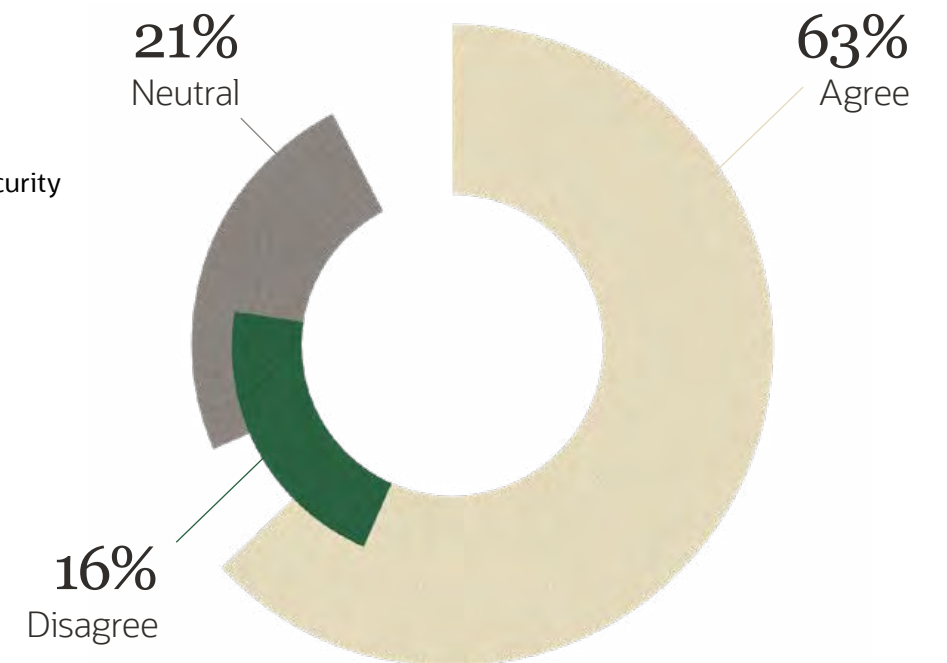Neutral

63%
Agree

16%
Disagree

Figure 11b. Cloud's effect on security

The cloud gives improved protection from cyberattacks without threatening the stability and availability of crucial workloads
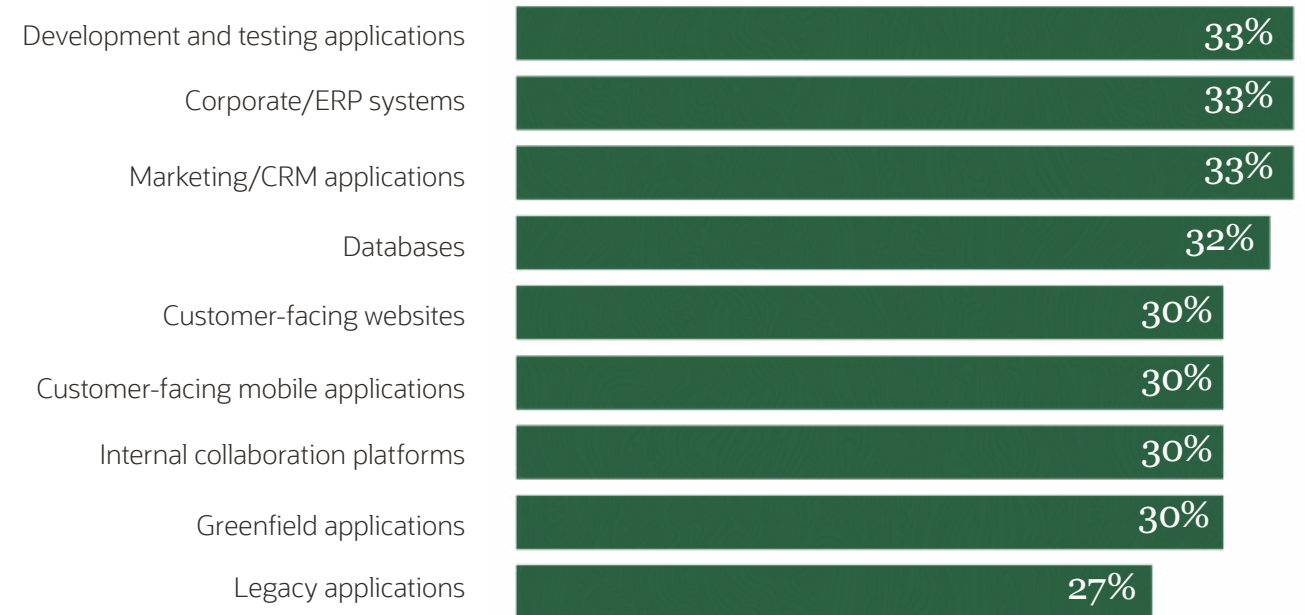
"In the vast majority of cases, you're going to achieve a much higher level of security and more resilience if you put your mission-critical applications in the cloud," said Dr. Gerard Gorman, reader in computational science at Imperial College London. He added: "This is because cloud companies tend to invest much more in security and compliance than any other business. At the flick of a switch, services can be replicated across multiple regions, providing higher performance and redundancy in the event of outages."

Deloitte's David Linthicum, meanwhile, said that this extends to the cloud native development environment. "One of the greatest advantages of cloud native is security," he said. "For instance, by using native identity access management capabilities, for example, you're able to operate in a much more secure environment than on premises."

Of course, the definition of crucial differs from one business to another. Among the surveyed firms, it's most likely to refer to development and testing of applications, ERP systems, and marketing and CRM applications (see *Figure 12*).

Figure 12. Crucial workloads and applications that were prioritized for cloud deployment

Application	%
Development and testing applications	33%
Corporate/ERP systems	33%
Marketing/CRM applications	33%
Databases	32%
Customer-facing websites	30%
Customer-facing mobile applications	30%
Internal collaboration platforms	30%
Greenfield applications	30%
Legacy applications	27%

Note: Respondents were asked to select all that apply.

"In the vast majority of cases, you're going to achieve a much higher level of security and more resilience if you put your mission-critical applications in the cloud."

Dr. Gerard Gorman, Reader in Computational Science, Imperial College London

Imperial College London

Threats old and new

None of this means, however, that businesses can relax: cyberthreats haven't gone away. Our respondents recognized this: when we asked them which developments would most help their organizations enhance their cloud approaches in the next five years, 15 percent (their top response) sought an improvement in security capabilities.

And it should come as no surprise that security was respondents' biggest challenge to implementing their overall approaches to the cloud. Security concerns were cited by one-third (34 percent) of firms, with other challenges including ineffective transition strategies, compliance issues, and skills gaps. But this might simply reflect how seriously they took the protection of their assets—in the cloud or elsewhere. After all, it is those senior executives—especially CIOs and CISOs—who are responsible for the security of their firms' data.

Security technologies with built-in automation for the cloud will help companies to address threats more effectively, supported by AI and ML. But Oracle's Kost warns that cyberattackers are using these same technologies to build more-sophisticated threats for their own purposes. "We must be able to defend against attacks at scale," he said.

Ultimately, however, the biggest threats to security are internal. Oracle predicts that, by 2025, 80 percent of security attacks will originate from inside the enterprise.[3] Many of these "attacks" will take the form of security misconfigurations caused by human error, which in turn open up vulnerabilities that attackers are able to exploit.

For these reasons, 87 percent of IT professionals saw AI and ML capabilities as a must-have for new security purchases.[4] And while three-quarters of those IT professionals viewed the public cloud as more secure than their own data centers, 92 percent did not trust that their organization was well prepared to secure public cloud services.

Imagine being able to combat those threats by using autonomous technologies that can automatically apply patches and validate system integrity around the clock. That's the benefit of next-generation cloud.

3 2020: Oracle's Top 10 Cloud Predictions
4 https://www.oracle.com/cloud/cloud-threat-report/
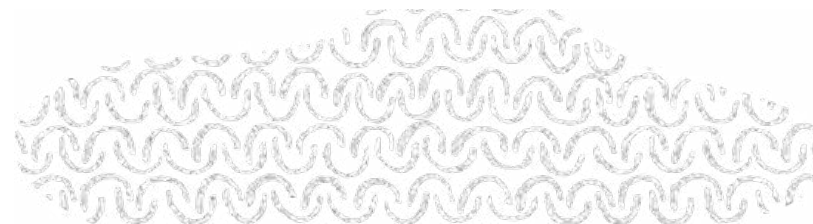
"We must be able to defend attacks at scale made by attackers that are using these same advanced technologies."

Fred Kost, Vice President of Product Marketing—Security, Oracle

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Research Conclusion
Looking ahead:
Strategy + skills = success

We've seen how firms accelerated their shift to cloud native in response to 2020's volatile business landscape, and how autonomy was the key to that shift. We've also heard that cloud security, while continuing to be a concern, was being addressed—and businesses are responding with increased confidence.

But there was another factor in successfully moving to next-generation cloud: skills. Among firms' toughest obstacles to cloud adoption were skills gaps in the workforce. Of four areas—their technology infrastructure, their organizational structure, their workplace culture, and their workforce skills—survey respondents considered the latter to be the least compatible with operating in the cloud. Skills gaps also ranked as a top obstacle to implementing a cloud strategy in more than one quarter (27 percent) of firms.

Certainly, the autonomous enterprise allows companies to perform critical tasks with tools that are easier to use and with minimal human intervention. For example, the use of autonomous database technologies has

helped Arlington Orthopedic Specialists, a Texas-based medical practice, deliver the same volume and quality of analytics as hiring five or six financial analysts, and double its patient count without adding any IT support or maintenance. Drop Tank, an Illinois-based loyalty-programs provider for gas stations and convenience stores, can scale up to 500 times the campaign volume from one day to another using an autonomous database, without having to employ database administrators.

However, the challenge of filling cloud-related skills gaps is only going to get tougher as more applications are developed in and migrated to cloud native environments, and autonomous technologies start to penetrate organizations. This reinforces the critical importance of developing skills to manage a new workforce—an imperative that intensifies when you consider that the leader firms in our study ranked integrated DevOps as the key shift that will enhance their cloud capabilities in the years ahead.

"As cloud migration accelerates, organizations are going to experience painful shortages of the people with the skills to manage cloud resources or to develop cloud native applications," said Imperial College London's Dr. Gerard Gorman.

But Gorman worried that businesses are not recognizing that shortfall or giving enough attention to the systematic retraining of their existing staff as the cloud develops. "There is not only the technical know-how but also the budgeting, procurement, and business model," he said. "In many respects, it is not vastly different from what's been done in IT before, and as it matures, cloud native development is becoming more developer-friendly, but you have to give people the training, [the] space, and the time to become experts in this area."

While skills gaps in rapidly developing areas of technology usually diminish over time as educational and training institutions build programs to nurture talent, businesses cannot afford to wait when it comes to cloud native and next-generation cloud. Fortunately, these technologies could also hold the answer. For instance, no-code or low-code development tools integrated within the autonomous database environment could offer a firm with little domain expertise the opportunity to utilize cloud native capabilities while remaining focused on its core business practices instead of IT, data, and analytics.

In 2020's global business landscape, organizations assessed these opportunities with speed and urgency in an effort to drive business agility. As the cloud accelerates and automation proliferates, tools are becoming easier to use, meaning organizations can utilize technology to address workforce skills gaps or to free up human productivity for more innovative and creative work practices. It may not be the pace that many had planned, but the coming of the next-generation cloud gives all organizations the opportunity to become cloud leaders, who can make their businesses thrive.

Five ways to join the cloud leaders

In a year full of uncertainty, at least one thing became crystal clear:
Next-generation cloud adoption is accelerating and rewarding the
companies that are blazing the trail into a hopeful future.
Here are five key steps to joining those firms.

1
Make cloud native central to cloud strategy

Shifting to cloud native is a key milestone on the road to next-generation cloud. It should not take a back seat to other cloud initiatives.

2
Embrace intelligent automation

Exploiting AI and ML is complex and can be expensive, but leading firms are using autonomous capabilities to accelerate their cloud capabilities.

3
Trust in cloud security

Cybersecurity threats are not likely to recede, but executives can be confident in the defenses built continuously by cloud providers. Security capabilities will increase with every generation of the cloud.

4
Align talent and training strategies closely with cloud strategy

Move to cloud native without the necessary expertise, and you'll risk impeding your cloud implementation.

5
Maintain the pace of migration

The merits of maintaining applications, data, and other IT assets in the cloud have become crystal clear in the difficult environment of 2020. Cloud migration must not slacken.

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