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The Right App On The Right Cloud

Untangling Cloud Platform Complexity

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Adoption of both public and private cloud container platforms will increase in the next two years.

A lack of skilled staff is a top challenge for development and delivery across multiple platforms.

Executive Summary

Companies are adopting multiple cloud platforms to support an acceleration of application modernization, building new cloud-native applications and greater infrastructure efficiency. Each enterprise needs to determine the cloud infrastructure that will best meet their business needs. However, in any case, the complexity of a growing cloud portfolio must be addressed in any cloud-based strategy. Cloud complexity stems from using: different infrastructure across private and public cloud platforms; a current state of highly distributed and fragmented data; and inconsistently defined security policies. As a result, users of multiple cloud platforms require specialized knowledge of each platform. To find the right mix, enterprises must match the right app to the right compute type and environment within the bounds of their overall strategy, while also maintaining security, increasing performance, and keeping costs in check.

We found that enterprises are turning to services partners as part of their cloud strategy, especially when it comes to handling migration and addressing skills shortages. They are also seeking cloud tools that simplify multicloud operations and aggressively evaluating multiple container-based development platforms.

In June 2019, IBM commissioned Forrester Consulting to evaluate the key factors that will determine where and how enterprises currently build and run workloads on different cloud platforms, and where those workloads will live in two years. Forrester conducted an online survey with 315 IT, enterprise architecture, and development decision makers to explore this topic.

KEY FINDINGS

- **As expected, public and private cloud containers and VMs are increasingly used in today's cloud environments.** Within the next two years, companies will continue the trend of increasing their use of cloud-based infrastructure and decreasing their use of traditional on-premises bare metal servers and VMs. Companies are adopting new platforms to meet the needs of developers and business teams for security and faster development, as they modernize all types of applications, both customer-facing and back-office systems.
- **A lack of skills is holding enterprises back from innovating across multiple cloud platforms.** The biggest challenge companies face today when moving and modernizing applications is finding people with the right cloud-native development and operations skills. Four of the five top challenges we identified were related to the lack of skills among the workforce. Security and compliance were also cited as major concerns as hybrid environments expand, especially in Europe due to the General Data Protection Regulation (GDPR). Enterprise organizations are actively seeking cloud service partners to fill internal skills gaps.

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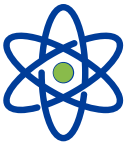
› **Cloud complexity can be reduced by targeting key challenges.** Companies are using more platforms to build and run key workloads that support their app modernization and cloud-native app strategies. To keep expanding without adding complexity, companies must increase infrastructure efficiency, unify security, and establish DevOps tools and practices for how they build, deploy, connect, manage, and optimize apps on all cloud platforms they use. This requires the adoption of cross-cloud management tools, consistent networking, and operations across clouds. Reliable workload portability and governance are the goals of simplification.



58% percent of companies plan to modernize their ERP and finance software while moving to the cloud.

Enterprises Are Aggressively Developing And Modernizing Apps Across Multiple Cloud Platforms

Companies must unify their mix of workloads, modernization approaches, and cloud environments into a coherent strategy that fits their business needs. These needs will vary by company, industry, and cloud strategy. Currently, companies are beginning to modernize apps in multiple ways, with different strategies for different types of apps. Some are moving to the cloud and modernizing; some are modernizing in place and then moving; and some are refactoring apps as a step beyond modernizing them. And even further, some are already modernizing their core business apps, i.e., their ERP systems. With all this ongoing work, enterprise cloud strategies, environments, and implementations are not getting simpler any time soon. In this section, we explore how companies are changing their deployment and cloud strategies to suit the needs of their different applications.

In surveying 315 enterprise architecture and development decision makers, we found that:

› **No one size or type of infrastructure fits all enterprises.** Today, enterprises are relying on a range of infrastructures including on-premises bare metal servers, public and private cloud VMs, and public and private cloud containers to support their vendor-built and custom-built apps. Use of these types of infrastructures is expected to continue growing over the next two years. However, the use of traditional on-premises bare metal servers and virtualized servers will decline over the next two years, while the use of containers and VMs in the cloud will increase the most (see Figure 1). Specialized compute and mainframe platforms are also growing in usage over the next two years, but they are growing more slowly than containers and VMs.

App modernization strategies are varied and complex. Companies are using a multicloud strategy in order to modernize their apps, and doing so requires identifying an environment that best suits the needs of each specific app. The majority of enterprises are planning to modernize thier apps as part of migrating from on-premises to the cloud environment. This is especially true for customer-facing apps

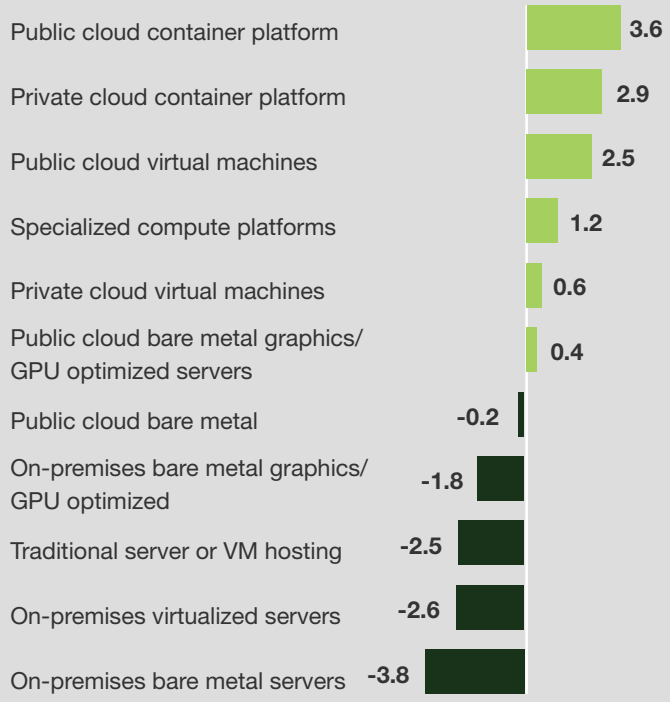
like commerce software (see Figure 2). However, middleware apps (e.g., message-oriented, API-driven), web/mobile apps, and commerce software apps are most likely to be modernized after they've been successfully moved to the cloud. And enterprise leaders indicate that apps for big data and collaboration software are the types most likely to be rewritten, using cloud-native tools and services, or replaced with a software-as-a-service (SaaS) alternative. In particular, the SaaS software market is mature enough for collaboration software, which means it is a less risky choice for replacement. It's also important to note that new machine learning and AI tools and services are mainly being pioneered in public clouds, and thus data scientists are actively seeking to improve their custom-built, insight-generating apps there.

64% of companies are customizing their ERP systems to support business processes.

Figure 1

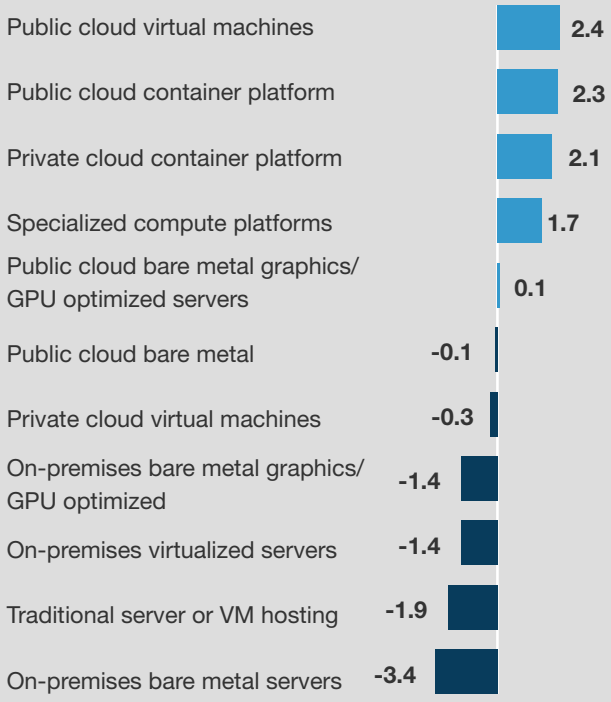
"Using your best estimate, what percentage of your firm's vendor-built/packaged application portfolio runs on the following deployment types?"

% DIFFERENCE FROM TODAY TO IN 2 YEARS



"Using your best estimate, what percentage of your firm's custom/self-built application portfolio runs on the following deployment types?"

% DIFFERENCE FROM TODAY TO IN 2 YEARS



Base: 315 IT, enterprise architecture, and development decision makers in NA and EMEA
Source: A commissioned study conducted by Forrester Consulting on behalf of IBM, June 2019

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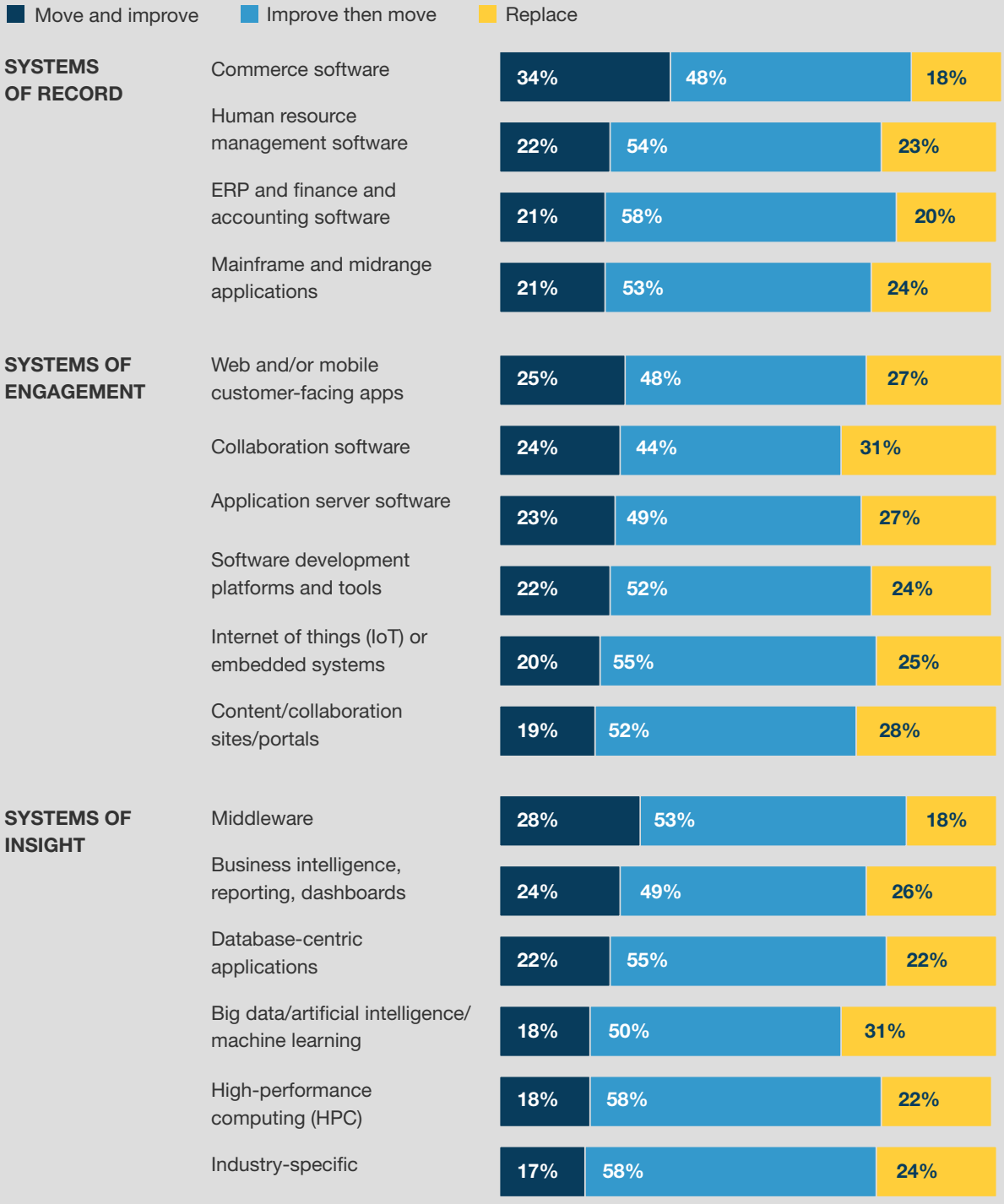
Figure 2

"Which of the following best reflects your organization's primary cloud strategy for each of the application types you develop, manage, support, or oversee?"



Note: Percentages may not total 100 due to rounding.
Base: 315 IT, enterprise architecture, and development decision makers in NA and EMEA
Source: A commissioned study conducted by Forrester Consulting on behalf of IBM, June 2019

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Generally, apps that must be highly available must also easily adapt to changing business needs, and rapidly evolve as technology changes require them to be at least partially rewritten.

Core business applications like ERP systems are being actively modernized along with customer-facing applications. We found that 14% of companies heavily customize their ERP systems and 50% do at least some customization to support their analytics. We found that the majority of enterprises are customizing 11% to 49% of their ERP system to support their business processes. ERP systems are most likely to have modifications or new capabilities built in while they are being migrated from an on-premises environment to the cloud.

81% of firms cited a lack of security tools and processes that are uniform across compute environments as their top strategy challenge when expanding their use of multiple cloud platforms.

The Multicloud Reality Creates New Challenges

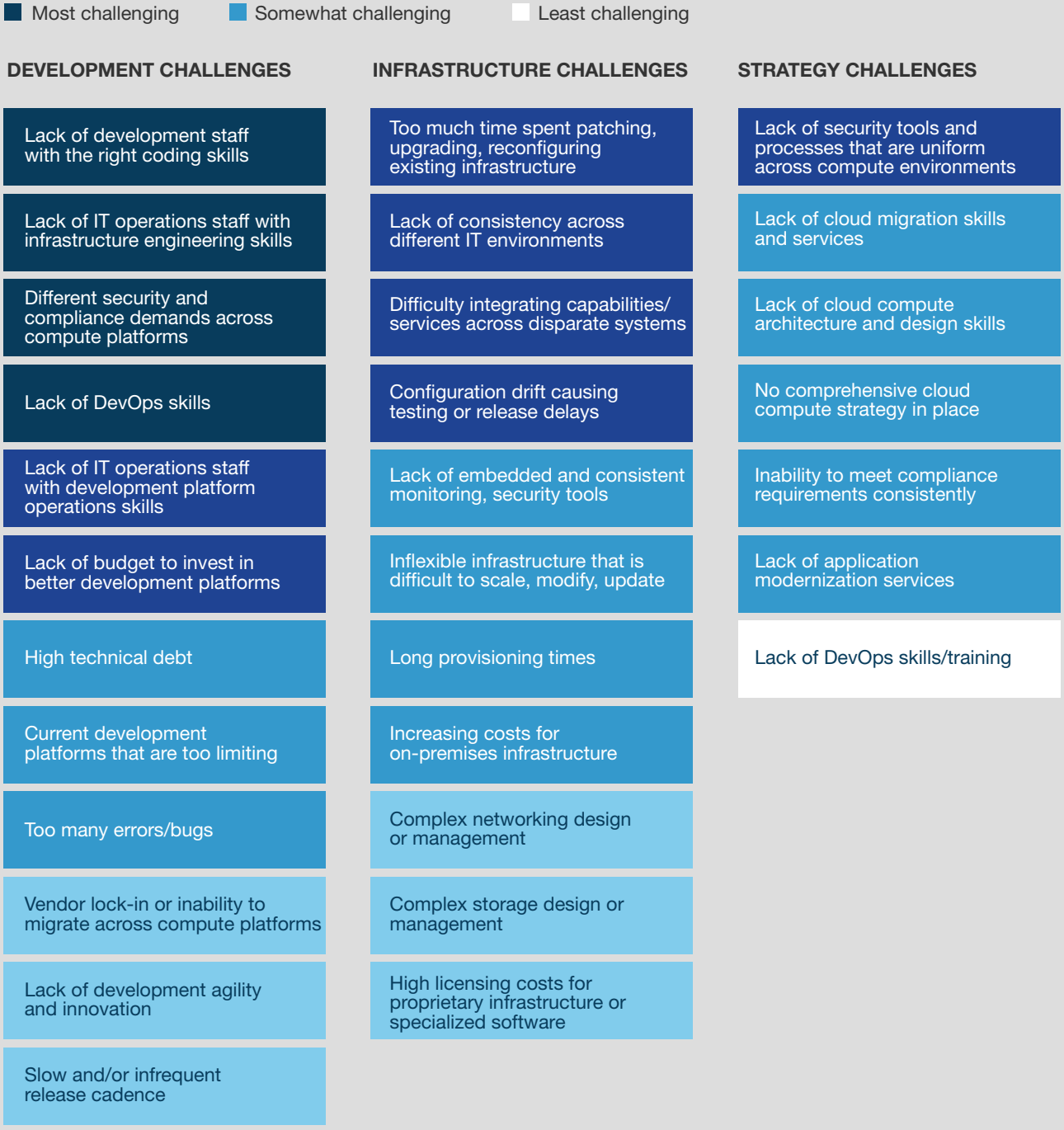
The moving and modernizing of apps, using a broad range of cloud platforms, presents many infrastructure, development, and strategy challenges. Overall, companies told us that software development and delivery challenges were the most difficult to overcome, due to the scarcity of staff with cloud development skills. The figure in the following section demonstrates the varying degree of challenge that companies face across the different categories this study explored. Indeed, we identified a wide range of challenges preventing development, infrastructure, and operations teams from executing their cloud strategy.

The study shows:

- **Finding developers with the right coding and operations skills tops the list of DevOps-related challenges in using cloud platforms.** Companies told us that they are most eager to find services partners to help with meeting different security and compliance demands across compute platforms (50%) and filling skills gaps (see Figure 3). Companies are struggling to find and retain staff with the right skills in infrastructure engineering (48%), development platform operations (47%), coding (46%), and DevOps (45%).
- **Infrastructure teams struggle to support new environments while operating existing ones.** Difficulty integrating capabilities/ services across disparate systems (55%) is the top infrastructure challenge. Companies also face a lack of consistency across different IT environments (51%), spending too much time patching and upgrading their existing infrastructure (49%), and they do not have monitoring tools that are embedded within the infrastructure and provide consistent (48%) results. This is all amplified by an inflexible infrastructure that is difficult to scale, modify, and update (48%).
- **Strategy teams lack security across cloud environments, architectures, and modernization services.** A lack of security tools and processes that are uniform across compute environments (81%) is the top strategy challenge in adopting cloud platforms and technologies. Enterprises also say they need service partners to help with cloud migration (77%), app modernization (74%), and

Figure 3

"Of the development, infrastructure, and strategy challenges you selected, which are the top five challenges your organization faces in software/application development and delivery across multiple compute platforms?"



Base: 315 IT, enterprise architecture, and development decision makers in NA and EMEA
Source: A commissioned study conducted by Forrester Consulting on behalf of IBM, June 2019

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consistently meeting compliance requirements (71%). Not all cloud platforms are created equally, and neither are applications. Many applications have latency challenges, require additional security, or do not scale effectively — these apps require a deeper architectural analysis (and possible a redesign) in order to function well in a cloud platform. Such challenges reinforce the need to thoroughly assess each application's unique demands and constraints.

› **Strategy teams seek architecture and design skills.** Cloud compute architecture and design are crucial as companies match the right app to the right cloud platform. Seventy-four percent of enterprise architecture and development decision makers listed a lack of cloud compute architecture and design skills as a top strategic challenge. Without the ability to design multi-tier architectures that can split data across more than one server, firms must rely on single points of failure that can cause downtime and lock-ins.

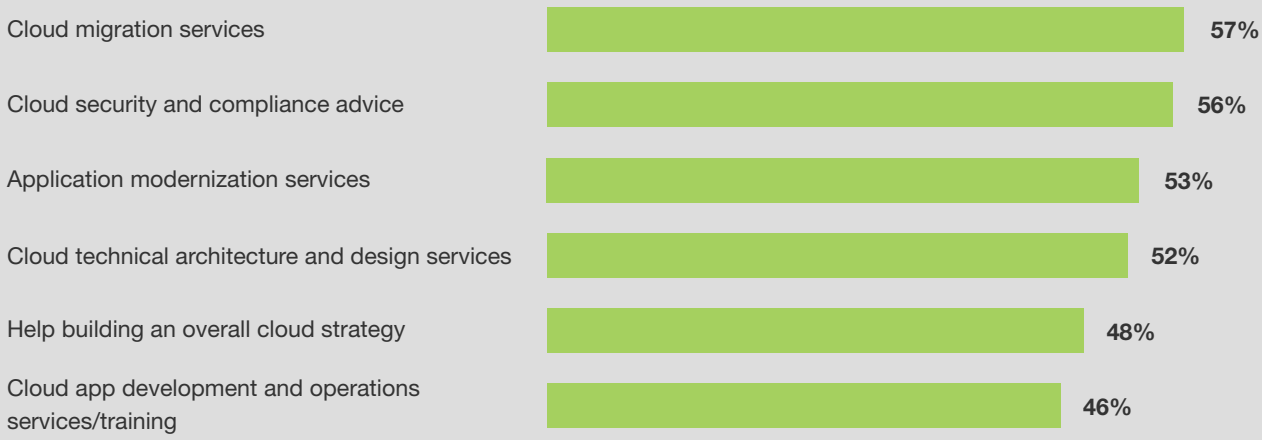
As firms expand their use of multiple cloud platforms, they need cloud migration and security and compliance services the most.

Cut Complexity With New Cloud Services, Tools, And Platforms

Complexity grows in technology environments when companies feel pressured to take advantage of multiple new or changing technologies in order to respond quickly to external/internal competitive drivers. In a rush to test and deploy as much new technology as possible, especially in competitive markets, companies often find themselves running out of resources and the time needed to step back and evaluate how each new platform or tool can best fit their businesses' needs.

Figure 4

"As you expand your use of multiple on-premises and cloud compute platforms, which of the following strategy and consulting services would be of most value to your organization?"



Base: 315 IT, enterprise architecture, and development decision makers in NA and EMEA
Source: A commissioned study conducted by Forrester Consulting on behalf of IBM, June 2019

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In order to chip away at the complexity that seems to plague companies' adoption and integration of cloud environments and tools, companies are turning to services partners for help. Additionally, by extending the capabilities of management tools and providing consistent cross-platform/container-based development environments, service providers promise to improve portability and development speed. In short, companies are trying to turn a collection of disjointed cloud projects into a more consistent cloud strategy. In this final section we assess what is most valuable to companies as they address their cloud strategy challenges.

To address complexity:

- **Turn to services partners to fill skills gaps.** Cloud migration, security, and app modernization involve acquiring new skills for most companies, and fulfilling this need is not something you can easily hire or retrain your way out of (see Figure 4). Respondents told us they are most eager to find services partners to help with cloud migration services (57%), security and compliance (56%), and application modernization (53%). Lower priority areas for enterprises include helping to build an overall cloud strategy (48%) and app development and operations services (46%).
- **Identify where you need new multicloud management tools to deploy, protect, and connect apps on multiple cloud platforms.** Developers and apps buyers need a structured collection of services and capabilities as a foundation for their work. Leaders must choose the right platform for their needs, and not just a collection of services and tools.[1] Backup and disaster recovery tools (51%) are most needed to secure and protect data across multiple cloud platforms. Enterprises also need consistent application support (48%), multicloud network design and management tools (47%), and multicloud performance monitoring and optimization (45%) (see Figure 5).
- **Establish your preferred approach to building and deploying container-based apps.** The future is in containers. We've already mentioned the aggressive move toward public and private cloud containers taking place over the next two years for both vendor-built and custom-built applications. Specifically, 38% of enterprises prefer containers-as-a-service (CaaS) and 32% prefer platform-as-a-service (PaaS) as their approach to cloud development platforms. Lightly curated container platforms give enterprises the tools and support they need to enable a versatile approach to coding. While more than a quarter (26%) prefer to build their own cloud platform to fit their needs.
- **Determine the right cloud migration strategy for your core applications.** Since most applications weren't designed to recover or scale in a cloud environment, redesign can bring a heavy cost. Enterprises need to assess the value and fit for migration, balancing costs and performance of an app or an ecosystem of dependent apps. Doing this rigorous evaluation at scale isn't easy, especially given the number of data points required.[2] But once you've determined how to rebuild or redesign an app, seek cloud development platforms tailored to those unique development needs.

Figure 5

As you expand your use of multiple on-premises and cloud compute platforms, which of the following cloud tools and capabilities would be of most value to your organization?"

51% Backup and disaster recovery tools

48% Consistent application support across multiple cloud platforms

47% Multicloud network design and management

45% Multicloud performance monitoring and optimization

44% Multicloud security visibility and operations

44% Consistent infrastructure management tools

Base: 315 IT, enterprise architecture, and development decision makers in NA and EMEA
Source: A commissioned study conducted by Forrester Consulting on behalf of IBM, June 2019

A Midwest US OpenStack adopter spent over two years trying to fill a position for a cloud architect and has since invested in a remotely managed private cloud service to mitigate the risk of talent gaps. Explore your own staffing realities and update the strategy accordingly.[3]

Key Recommendations

Forrester's in-depth survey of 315 IT, enterprise architecture, and development decision makers about their use of enterprise cloud compute yielded several important recommendations to help you expand your use of cloud platforms without letting complexity slow you down.

Start with addressing your staffing needs. The drought of cloud-savvy skills in the market today is a challenge but also an opportunity. As you build your cloud strategy, explore the skill sets of your current cloud staff, their aptitude for change and innovation, and your ability to attract new talent and fresh perspectives. Turn to experienced service partners to fill skills gaps quickly.

Identify your optimal mix of cloud platforms. A multicloud strategy is not like a Jackson Pollock painting in that you can't put an array of tools, services, and solutions together and call it a strategy. Be deliberate and take your time to closely align each key app modernization effort with the cloud development and infrastructure platform best suited to each. Carefully select, integrate, and train your team, especially on public and private cloud container- and VM-based platforms; since these represent the future for cloud deployments.

Match each app modernization approach to the best cloud platform. Which apps must be refactored or rebuilt on-premises before they can be moved to a public cloud platform? Which apps could benefit from immediate migration, while you secure funding to modernize them? And which net-new apps do you need to build natively on public cloud platforms to delight your customers? Your answers will determine where and how you must deploy your development platforms.

Adopt cross-cloud management tools to create consistent networking and operations across clouds. Complexity kills innovation. And unless you invest in a hybrid-cloud deployment and configuration management tools and skills, your key infrastructure and operations team members will struggle to increase the number of cloud platforms they can effectively support. Look for ways to extend management tooling, rather than adding new management tools for each new cloud platform.

Adopt a container-based development platform today. The future of application architecture is loosely coupled sets of services that will be developed and deployed in containers. While you might not be ready to migrate all of your apps to container platforms today, you must start building the automated DevOps skills and the container platform operations skills you will need to support building and running apps in containers across a range of cloud platforms.

Consolidate your security tools and align them to cloud-native development. Security tools and processes must be uniform across compute environments in order to expand your use of multiple cloud platforms. Assess and consolidate your security tools across all platforms so they fit your cloud-native development strategy.

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Appendix A: Methodology

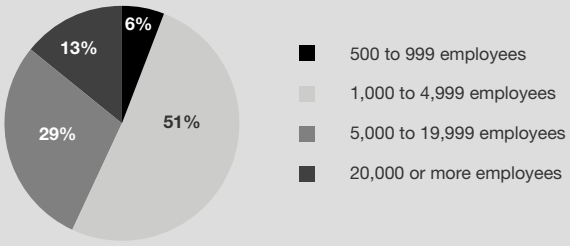
In this study, Forrester conducted an online survey of 315 IT, enterprise architecture, and development decision makers in North America and Europe to evaluate factors that will determine where and how enterprises will build and run key workloads as they expand their use of different cloud compute platforms, both on-premises and off-premises. Survey participants included decision makers in IT and cloud roles. Questions provided to the participants asked about their organizations' current and future cloud compute strategies. The study began in April 2019 and was completed in June 2019.

Appendix B: Demographics/Data

REGION

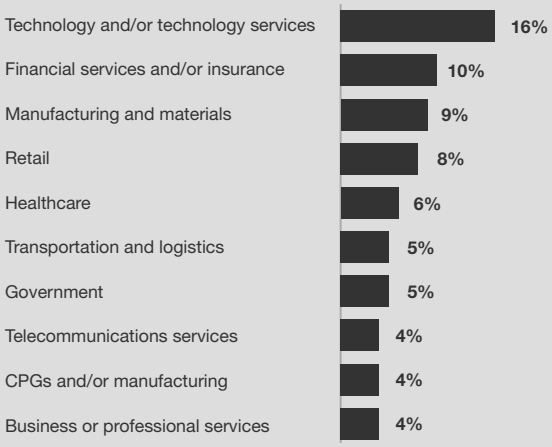
67% US
13% UK
10% GERMANY
10% FRANCE

COMPANY SIZE

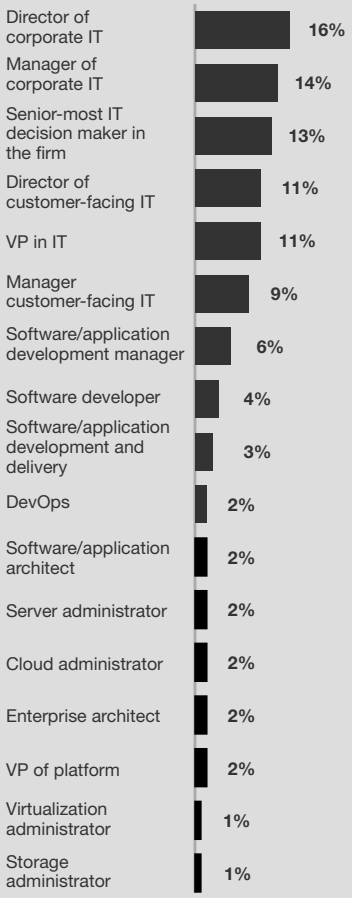


INDUSTRY

(Top 10 shown)



"WHICH OF THE FOLLOWING MOST CLOSELY DESCRIBES YOUR JOB TITLE?"



Base: 315 IT, enterprise architecture, and development decision makers in NA and EMEA
Source: A commissioned study conducted by Forrester Consulting on behalf of IBM, June 2019

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Appendix C : Supplemental Material

RELATED FORRESTER RESEARCH

"Modernize Core Applications With Cloud," Forrester Research, Inc., August 5, 2019.

Appendix C : Endnotes

[1] Source: "Modernize Core Applications With Cloud," Forrester Research, Inc., August 5, 2019.

[2] Source: "The State Of Cloud Migration, Portability, And Interoperability, Q4, 2017," Forrester Research, Inc., January 5, 2018.

[3] Source: "Top 10 Decision Factors That Must Influence Your Cloud Strategy," Forrester Research, Inc., October 17, 2017.

[4] Source: "Top 10 Facts Every Tech Leader Should Know About Hybrid Cloud," Forrester Research, April 25, 2018.