FLEXERA™ 2022

State of the Cloud Report

The post-pandemic world comes into focus and FinOps practices gain momentum

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Executive summary

To compete in today's game, organizations must have the cloud play a role in their strategy. The cloud helps enterprises scale, be more agile, increase revenue and achieve business goals. Cloud adoption was already expanding for several years—and has been accelerated by the pandemic—but as a post-pandemic world begins to take shape, new trends in cloud usage are coming into focus.

The eleventh annual *Flexera 2022 State of the Cloud Report* (previously known as the *RightScale State of the Cloud Report*) explores the thinking of 753 respondents from a survey conducted in late 2021. It highlights year-over-year (YoY) changes to help identify trends. The respondents—global cloud decision-makers and users—revealed their experiences and insights about the public, private and multi-cloud market.

Modern enterprises are focused on optimizing hybrid IT, rightsizing cloud environments, leveraging consumption intelligence to plan cloud migrations and looking for the best data to optimize spend through negotiation readiness. In a hybrid IT world, a siloed approach to IT management is obsolete.

Today's top challenges for organizations of all sizes are security, managing cloud spend and a lack of resources or expertise. Understanding current cloud computing trends can help guide your organization's digital business decision-making processes, vendor and technology selection, cost forecasting and investment strategies to support upcoming stages of your cloud journey.

The highlights

The *Flexera 2022 State of the Cloud Report* survey captured insights into the growing reliance on Microsoft Azure, the move toward the use of native tooling and the massive uptake of cloud among small to midsized businesses. Among the most interesting highlights:

The need for FinOps grows

Cloud costs continue to grow, and the amount of waste remains high. Numerous roles, including IT/Ops, cloud centers of excellence and FinOps teams, are seeking to keep costs down.

Microsoft Azure usage surpasses that of AWS

In several instances in the 2022 survey, Microsoft Azure usage met or exceeded that of Amazon Web Services (AWS).

Native tooling gains traction

Third-party tools that assist in areas such as orchestration and container management seem to be losing ground to native tooling from the cloud providers themselves.

Growth of SMB cloud usage

Cloud spend by SMBs reflects a massive uptake, with 53 percent of SMBs spending more than $1.2 million—up from 38 percent reported last year.

Terminology used throughout the report:

Large enterprises are public- or private-sector organizations with 10,000 or more employees

Enterprises are public- or private-sector organizations with 1,000 or more employees

SMBs are small to midsized businesses with fewer than 1,000 employees

Organizations refers to the combination of enterprises and SMBs participating in the survey

Methodology

A total of 753 technical and business professionals from around the world and across a broad cross-section of organizations participated in the *Flexera 2022 State of the Cloud Report* survey to provide insights into their adoption of cloud infrastructure and services. Participants in the survey are sourced from a respondent pool that is independent from Flexera customers and prospects. The independent panel is rigorously maintained and comprised of vetted respondents with detailed profiles.

Most respondents are cloud decision-makers and users from organizations ranging from 100 employees to more than 10,000 employees. Their answers provide a comprehensive perspective on the state of the cloud today.

Respondent demographics

Organizations of all sizes are using the cloud to help manage IT workloads. However, this survey skews toward larger organizations. As figure 1 shows, 79 percent of participating organizations are enterprises that employ at least 1,000 people, and 31 percent employ more than 10,000 people.

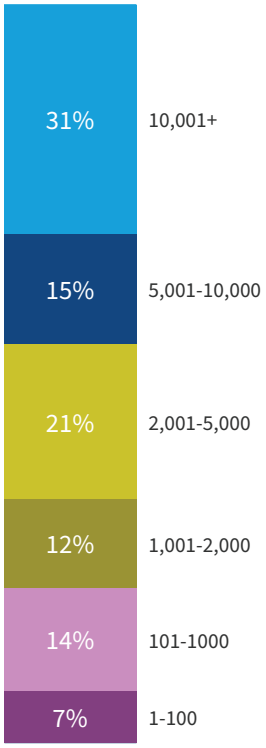
Portions of this report compare data based upon geography:

- The Americas region is comprised of respondents from countries including the United States, Canada, Mexico and Brazil
- Europe includes respondents from a broad set of countries
- The Asia-Pacific region is comprised of respondents from China, Australia, India, Japan, Singapore and South Korea

FIGURE 1

The majority of respondents are from enterprises that employ at least 1,000 people.

Respondents by organization size

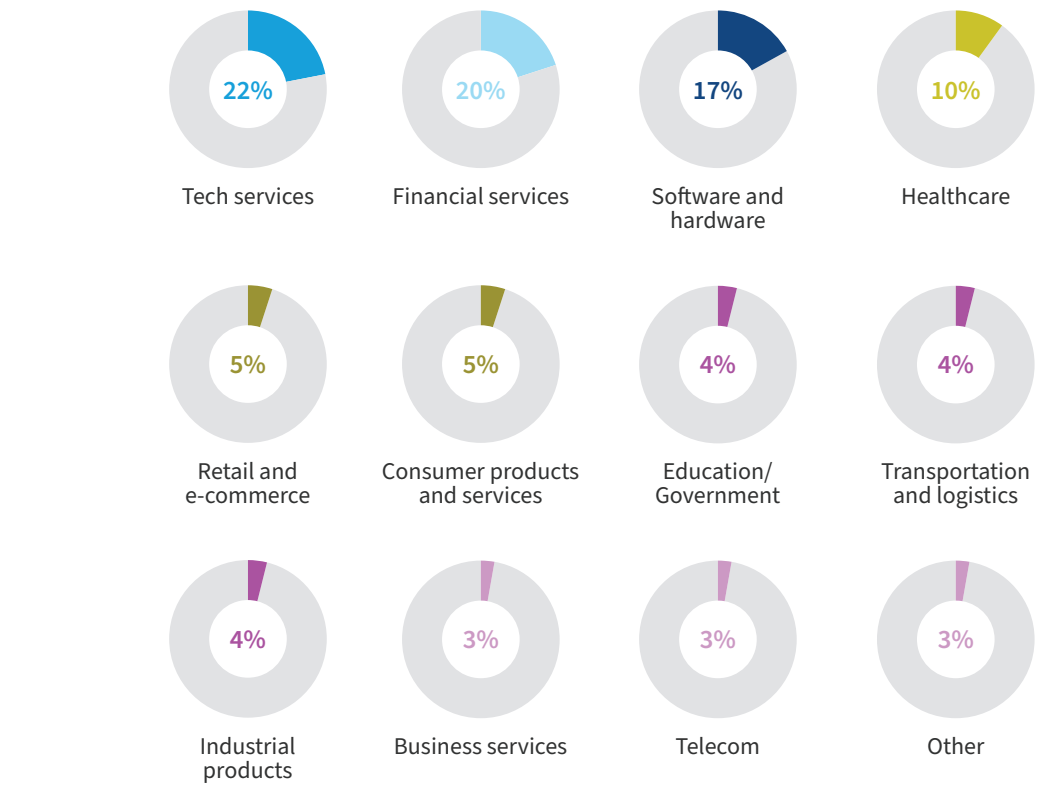


N=753
Source: Flexera 2022 State of the Cloud Report

Businesses in virtually every industry around the world leverage cloud computing. As figure 2 indicates, the report covers a broad range of industries. As in previous years, the largest groups of respondents come from *tech* and *financial services*, followed closely by *software and hardware*. This year we see larger representation from *consumer products and services* and *transportation and logistics*. The *other* category includes industries that represent less than three percent of respondents.

FIGURE 2

Tech services and *financial services* lead respondents' industries, followed closely by *software and hardware*.

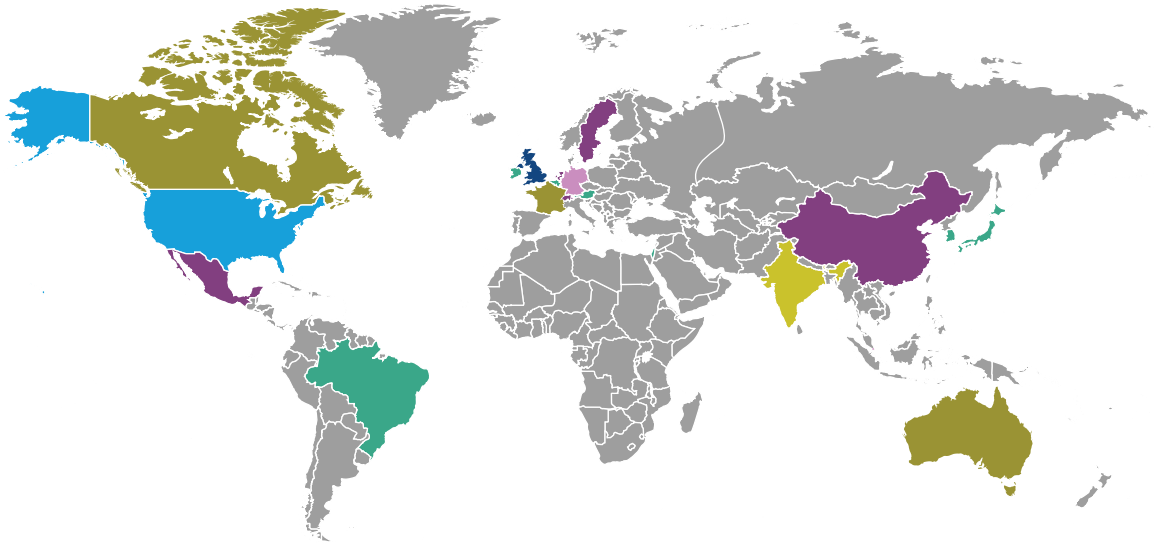


N=753
Source: Flexera 2022 State of the Cloud Report

Figure 3 shows the locations of participating organizations' headquarters or main offices around the world.

FIGURE 3
The majority of respondents are from the United States.

Respondents by geography



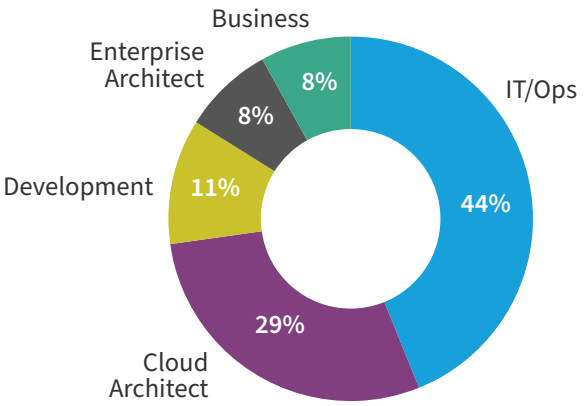
United States	64%	Germany	2%	Belgium	Less than 1%
United Kingdom	8%	Singapore	2%	Japan	Less than 1%
India	6%	Netherlands	1%	Ireland	Less than 1%
Other	4%	Mexico	1%	South Korea	Less than 1%
Canada	3%	China	1%	Israel	Less than 1%
Australia	3%	Switzerland	1%	Austria	Less than 1%
France	3%	Sweden	1%	Brazil	Less than 1%

N=753
Source: Flexera 2022 State of the Cloud Report

Figures 4, 5 and 6 indicate the breakdown of respondents by business role, level and where they work within an organization, respectively. Most respondents are in IT/Ops; 73 percent are close to the cloud, either as IT/Operations (44 percent) or Cloud Architects (29 percent). And 60 percent of respondents work within a central cloud team or cloud center of excellence (CCOE) or similar.

FIGURE 4
Most respondents are in IT/Ops.

Respondents by role



N=753
Source: Flexera 2022 State of the Cloud Report

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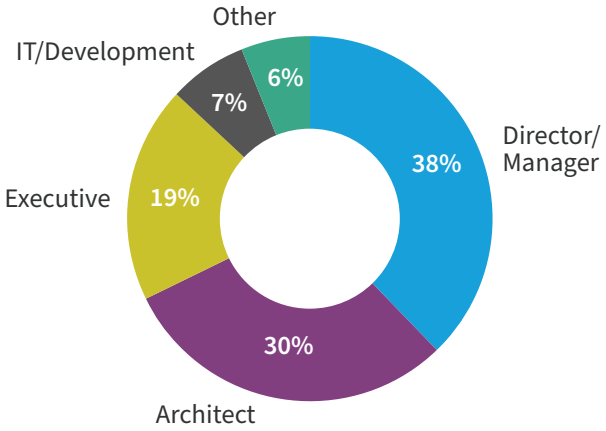
FIGURE 5
Most respondents are directors/managers.

Respondents by level



N=753
Source: Flexera 2022 State of the Cloud Report

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FIGURE 6
The majority of respondents work in a central cloud team (CCOE or similar).

Respondents by where in the organization they work

N=753
Source: Flexera 2022 State of the Cloud Report

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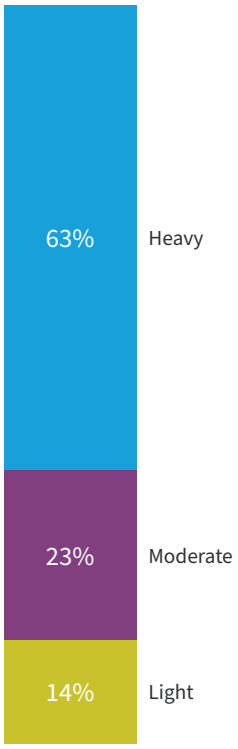
Cloud adoption continues to become more mainstream, as figure 7 shows. *Heavy users* (currently running more than 25 percent of workloads in the cloud) are up to 63 percent, an increase from 59 percent in 2021 and 53 percent in 2020. Similarly, respondents who reported *light usage* decreased from 19 percent to 14 percent, implying more organizations are advancing through their cloud journeys. The findings make sense with the growing cloud adoption and need to remain competitive in our ever-evolving digital world.

FIGURE 7

More and more organizations are advancing through their cloud journeys.

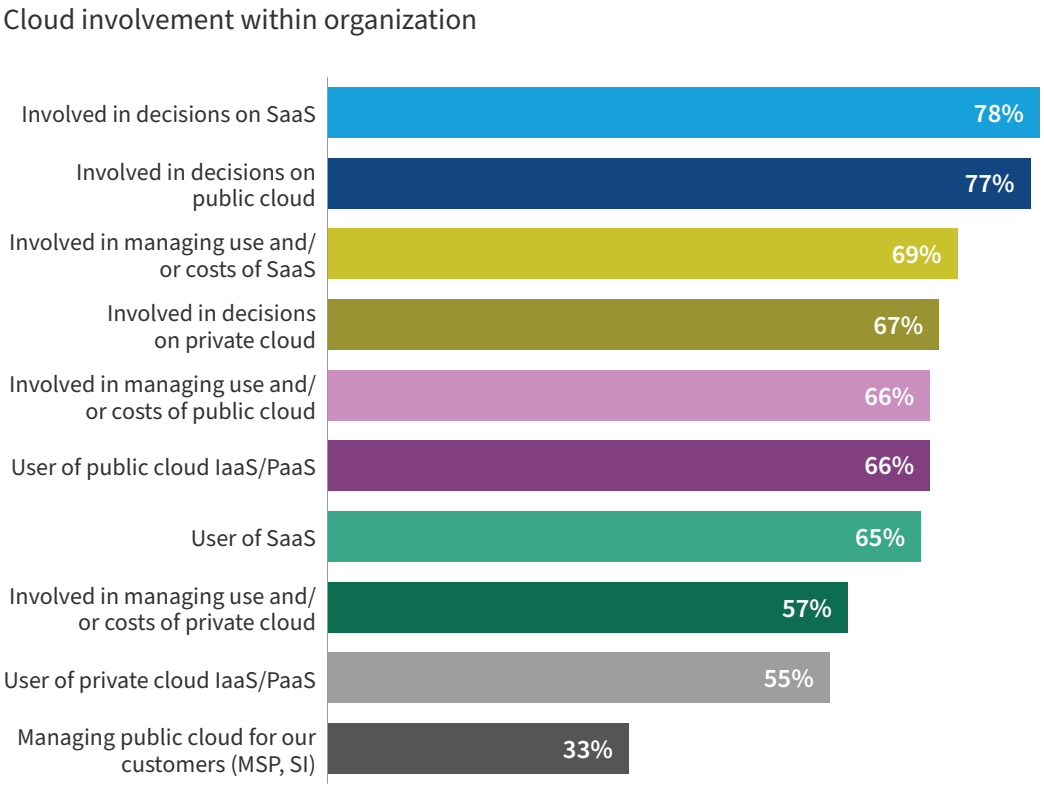


N=753

Source: Flexera 2022 State of the Cloud Report

Respondents have significant influence on both SaaS and IaaS/PaaS. As figure 8 indicates, 78 percent are *involved in decisions on SaaS*, compared to 77 percent *involved in decisions on public cloud*. Similarly, respondents are actively involved in the ongoing usage and cost management for both SaaS (69 percent) and public cloud IaaS and PaaS (66 percent). Interestingly, more and more users are swimming in the FinOps side of the pool, even if they may not know it—or call it FinOps yet.

FIGURE 8
Respondents have significant influence on both SaaS and IaaS/PaaS.



N=753
Source: Flexera 2022 State of the Cloud Report

Organizations embrace multi-cloud

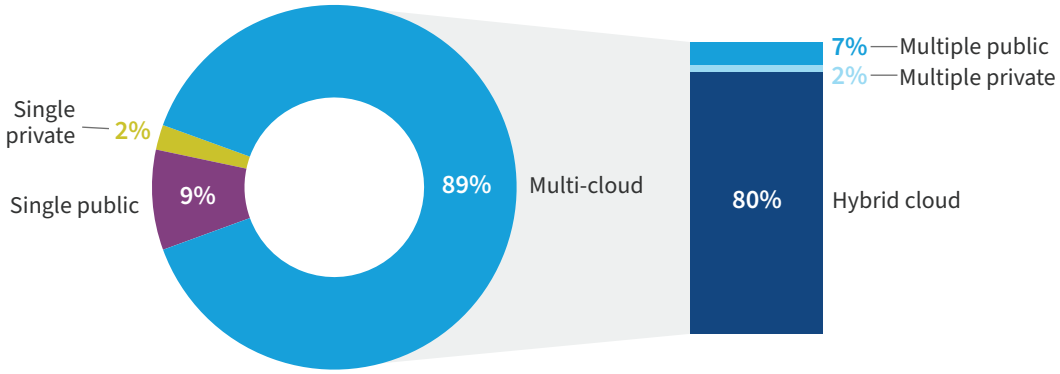
Organizations embrace multi-cloud

Nearly all organizations have employed multi-cloud. As figure 9 indicates, 89 percent of respondents report having a multi-cloud strategy, a slight decrease from 92 percent in 2021. However, *single public* increased from eight to nine percent, and *multiple private* made an appearance at two percent.

It seems multi-cloud is still the de facto standard, but the ways in which organizations arrive at multi-cloud vary depending on their needs and the mix of providers chosen. Most are taking a hybrid approach, combining the use of both public and private clouds.

FIGURE 9
Multi-cloud remains the de facto standard.

Cloud strategy for all organizations



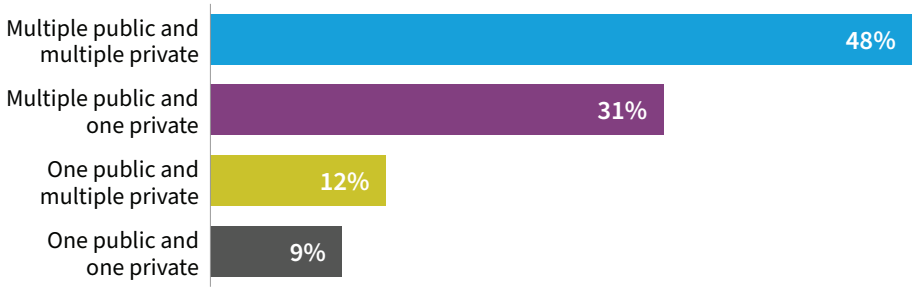
N=753
Source: Flexera 2022 State of the Cloud Report

Organizations take a hybrid approach

As figure 10 shows, 79 percent of respondents said they're incorporating multiple public clouds, and 60 percent report using more than one private cloud—an increase from last year. The most common combination is a mix of various public and private clouds.

FIGURE 10

Most respondents use multiple public and private clouds.



N=602

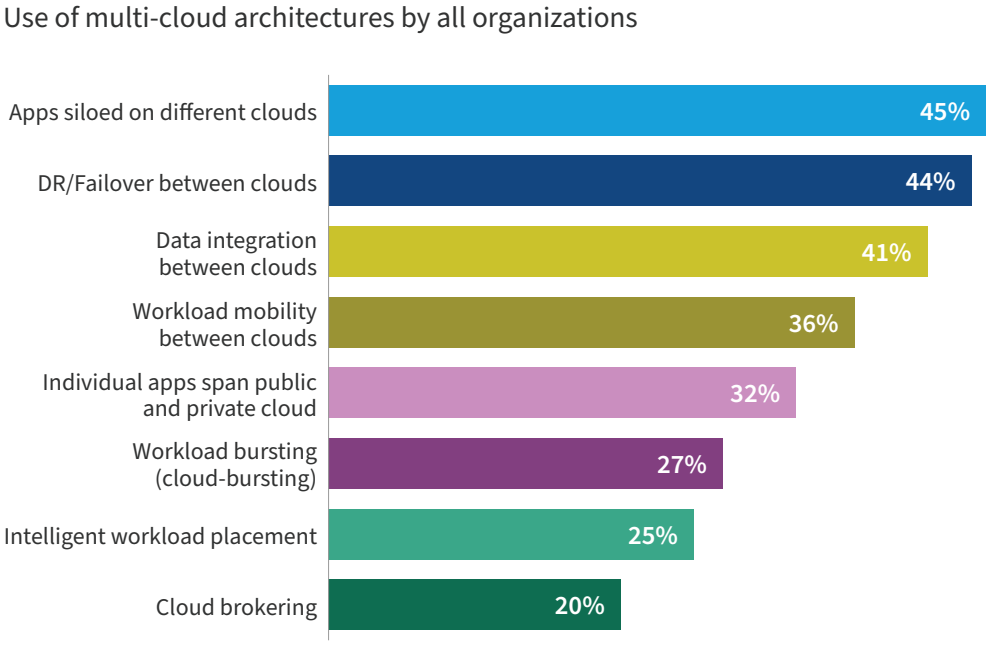
Source: Flexera 2022 State of the Cloud Report

Applications are often siloed on different clouds

While organizations are using multiple clouds, this doesn't necessarily mean individual applications are spanning clouds. As figure 11 shows, *apps siloed on different clouds* is the most common multi-cloud implementation, with 45 percent of respondents calling it the most popular architecture for the third year running. *DR/Failover* saw a ten-percentage-point gain YoY and is now at 44 percent. Major cloud outages can have a downstream impact on other integrated platforms (which may themselves rely on the affected cloud), rendering a move to a new cloud provider ineffective in restoring services.

FIGURE 11

Apps siloed on different clouds remains the most common implementation, but *DR/Failover* between clouds saw a significant increase YoY.



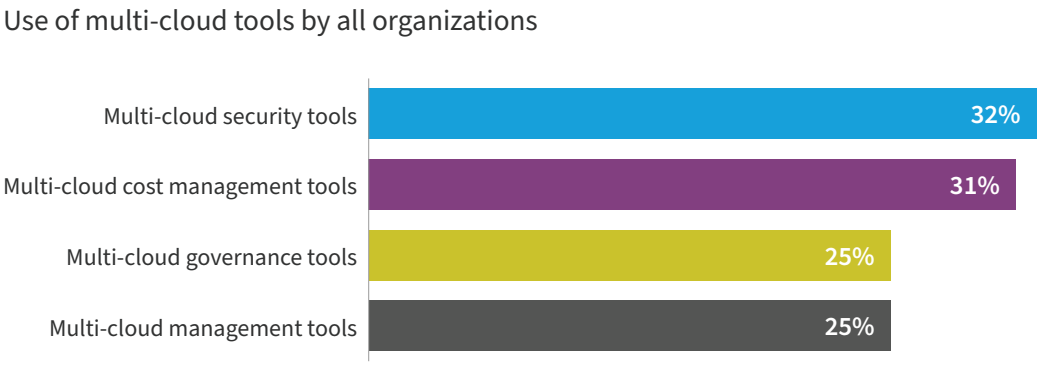
N=753
Source: Flexera 2022 State of the Cloud Report

Multi-cloud management tools used for security and cost

Multi-cloud architectures are more complex and more challenging to manage—and multi-cloud tooling is essential for managing cloud resources cost-effectively and ensuring strong governance and security. For the first time, *multi-cloud security* tools took the number one spot (figure 12), while the use of multi-cloud tools otherwise decreased across the board YoY.

FIGURE 12

Multi-cloud security tools becomes the front-runner for the first time.



N=753
Source: Flexera 2022 State of the Cloud Report

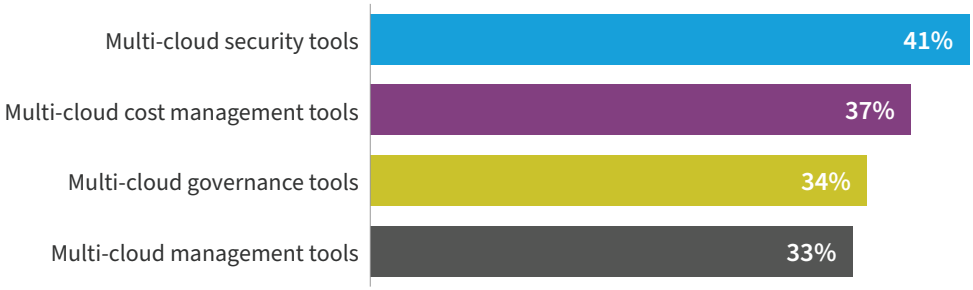
Multi-cloud cost management tools used for enterprises

It's no surprise that for large enterprises with more than 10,000 employees, *multi-cloud security tools* also took the number one spot, as figure 13 indicates.

FIGURE 13

For enterprises with more than 10,000 employees, multi-cloud security tools takes the lead.

Use of multi-cloud tools by large enterprises with more than 10,000 employees



N=232
Source: Flexera 2022 State of the Cloud Report

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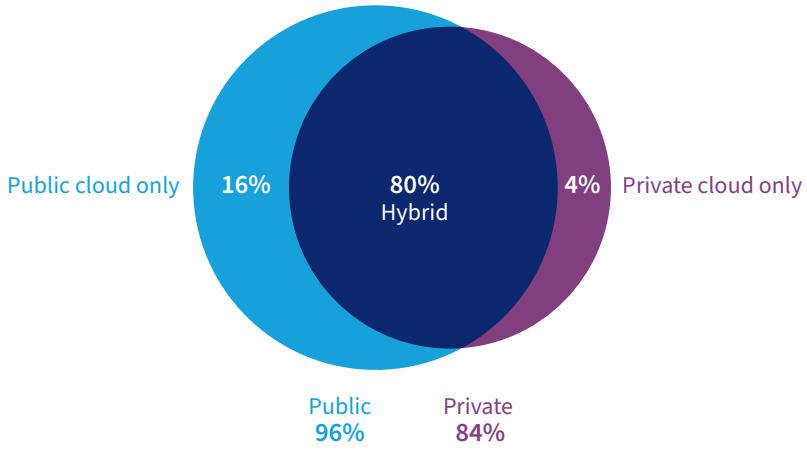
All organizations are using at least one cloud

As figure 14 indicates, all respondents are using at least one public or private cloud. Ninety-six percent of respondents utilize at least one public cloud, while 84 percent have at least one private cloud. Eighty percent of respondents are using hybrid cloud.

FIGURE 14
All respondents use at least one public or private cloud.



N=753
Source: Flexera 2022 State of the Cloud Report

Public cloud adoption continues to accelerate

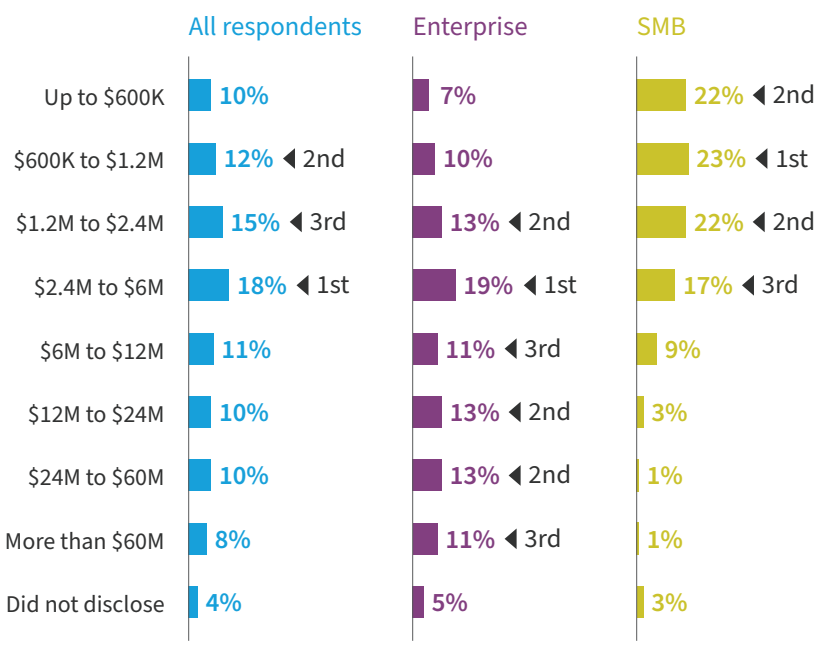
Public cloud adoption continues to accelerate

The increasing use of public cloud is driving up cloud spend for organizations of all sizes, and public cloud spend is now a significant line item in IT budgets, as depicted in figure 15.

In fact, eight percent of all respondents spend more than $60 million, and more than half spend over $2.4 million on public cloud each year. Public cloud spend is even more significant among larger organizations. Thirty-seven percent of enterprises said their annual spend exceeded $12 million and 80 percent reported that cloud spend exceeds $1.2 million per year. These figures are similar to 2021, when 36 percent of enterprises reported an annual spend of more than $12 million and 83 percent reported yearly spend of more than $1.2 million.

SMBs run fewer and smaller workloads, so it stands to reason their cloud bills would also be lower. Twenty-two percent of SMBs are spending less than $600,000 annually, compared with only seven percent of enterprises. However, 53 percent of SMBs spend more than $1.2 million—up from 38 percent reported last year. Enterprise spending remains high, as 37 percent of organizations with more than 1,000 employees spend more than $12 million a year.

FIGURE 15
Public cloud spend is now a significant line item in all IT budgets.



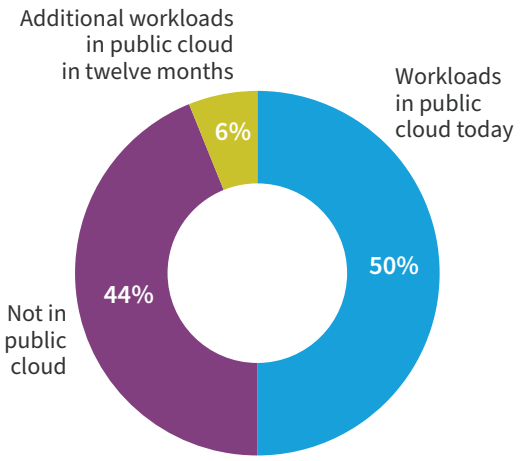
All respondents N=753, Enterprise N=597, SMB N=156
Source: Flexera 2022 State of the Cloud Report

Half of workloads and data from all respondents is in a public cloud

Figure 16 shows that respondents are running 50 percent of their workloads in public cloud, and they expect to increase that number to 56 percent in the next twelve months. Forty-eight percent of organizations' data is in a public cloud today, and respondents expect to add another seven percent over the next twelve months, as illustrated in figure 17.

FIGURE 16
Respondents run half of their workloads in cloud—and are expecting to increase that amount over the next year.

Workloads in public cloud for all organizations



N=753
Source: Flexera 2022 State of the Cloud Report

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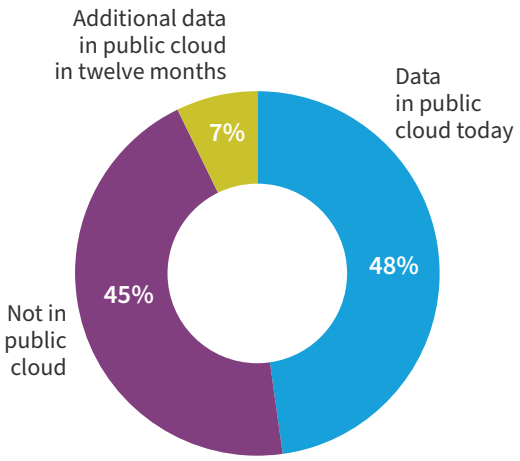
FIGURE 17
Within the next year, more than half of respondents' data will be in the public cloud.

Data in public cloud for all organizations



N=753
Source: Flexera 2022 State of the Cloud Report

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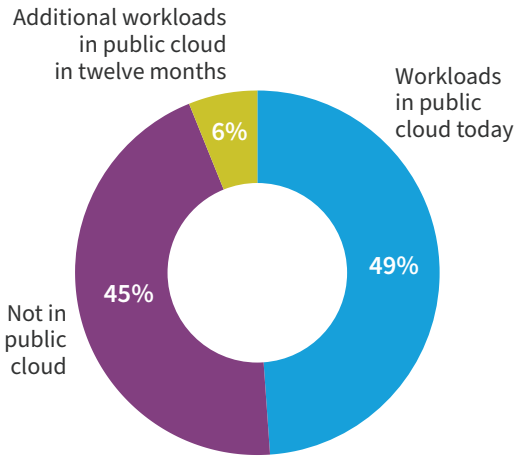
Nearly half of enterprise workloads and data is in a public cloud

As figures 18 and 19 indicate, enterprises are running 49 percent of workloads and storing 46 percent of data in a public cloud. Enterprise respondents plan to increase workloads and data in public cloud over the next twelve months by six percent and seven percent, respectively.

FIGURE 18
Enterprises run nearly half of their workloads in a public cloud.

Enterprise workloads in public cloud



N=597
Source: Flexera 2022 State of the Cloud Report

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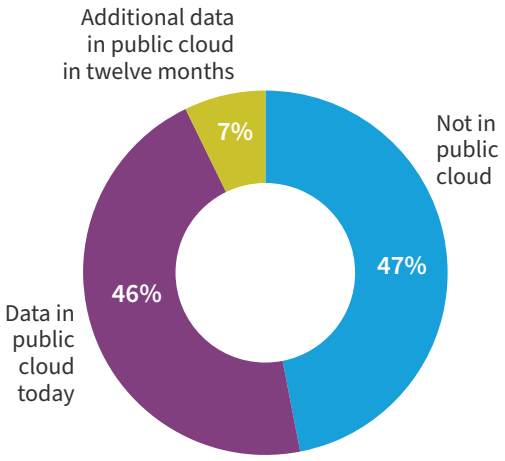
FIGURE 19
Enterprises store nearly half of their data in a public cloud.

Enterprise data in public cloud



N=597
Source: Flexera 2022 State of the Cloud Report

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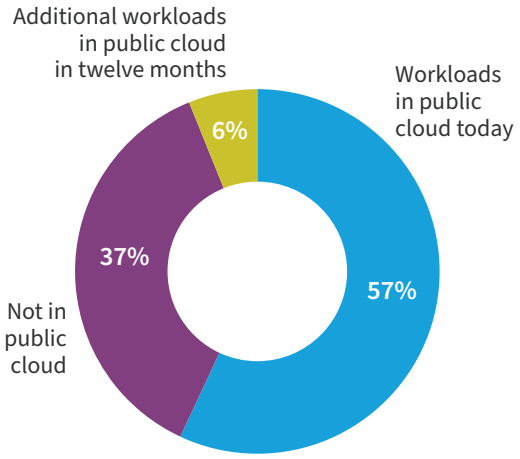
Nearly two-thirds of SMB workloads will be in the cloud

SMBs are moving quickly to the public cloud. As figures 20 and 21 show, 63 percent of SMB workloads and 62 percent of data will reside in a public cloud within the next twelve months.

FIGURE 20

Nearly two-thirds of SMB workloads will be in the cloud within the next twelve months.

SMB workloads in public cloud



N=156
Source: Flexera 2022 State of the Cloud Report

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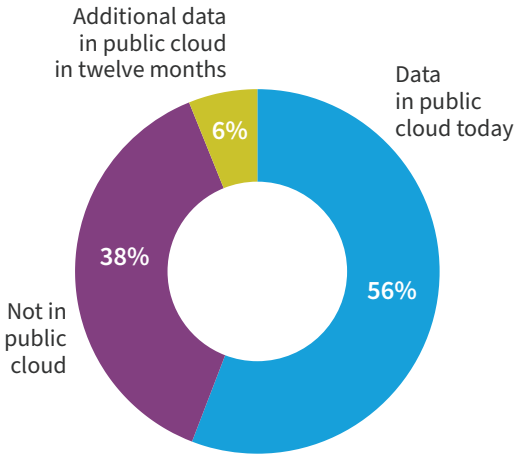
FIGURE 21

Sixty-two percent of SMB data will reside in a public cloud within the next twelve months.

SMB data in public cloud



N=156
Source: Flexera 2022 State of the Cloud Report

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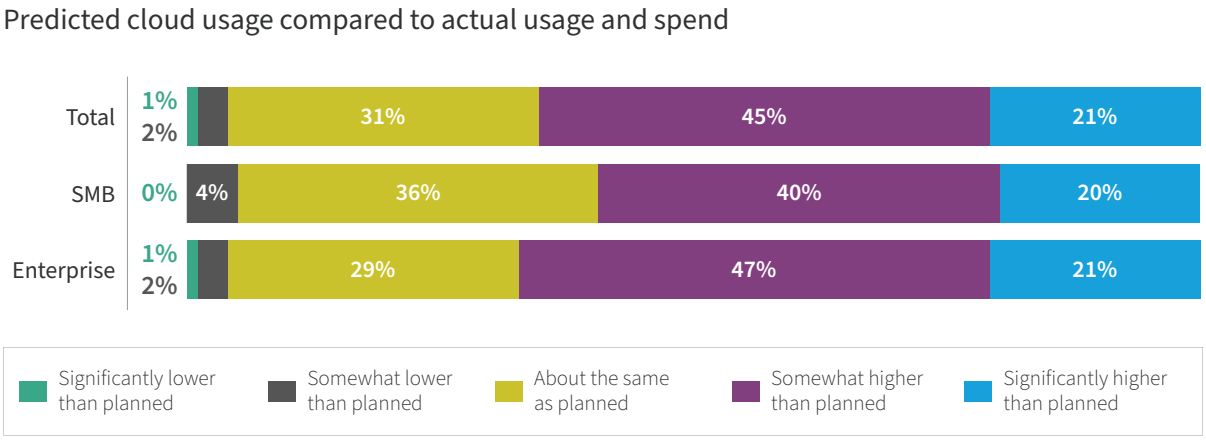
COVID-19 increased cloud usage, though not as much as predicted

The emergence of COVID-19 prompted Flexera to add a question to last year's *2021 State of the Cloud Report* survey to understand how the pandemic might affect cloud plans. For the *Flexera 2022 State of the Cloud Report* survey, we asked respondents to rate their predictions. Cloud plans and adoption have clearly shifted as a result of the pandemic, though not as much as respondents had anticipated.

Sixty-six percent of respondents said cloud usage is higher than initially planned this year, though 90 percent had predicted higher usage last year, as shown in figure 22. Twenty-one percent of respondents said cloud usage was significantly higher than planned this year, though 29 percent had thought that would be the case last year.

FIGURE 22

Actual cloud usage was somewhat higher than planned from the previous year, though not as significant as previously anticipated.



All respondents N=753, SMB N=156, Enterprise N=597
Source: Flexera 2022 State of the Cloud Report

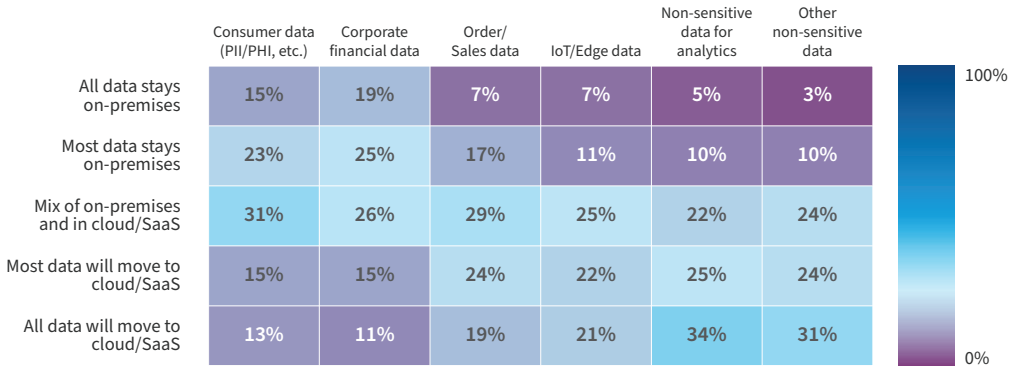
Organizations are more open to moving sensitive data to public cloud

In the past, some organizations hesitated to put certain types of data in public clouds. This year's survey found many respondents are reconsidering.

As figure 23 shows, more than half of respondents said they'll consider moving at least some of their sensitive *consumer data* or *corporate financial data* to the cloud, which reflects increasing confidence in the security tools and processes of cloud providers to implement adequate protection.

FIGURE 23

More than half of respondents are planning to move at least some sensitive data to the cloud.



N=753

Source: Flexera 2022 State of the Cloud Report

Dependency mapping is a top cloud migration challenge

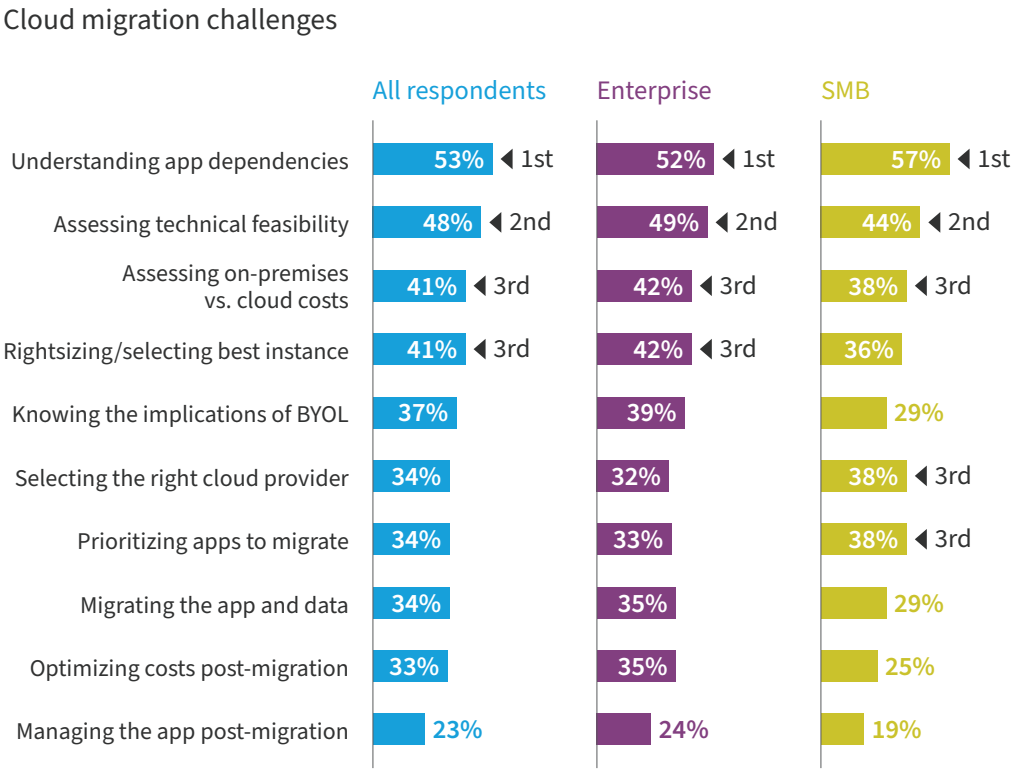
Mapping all the relationships across apps, hardware and networking devices for each IT-delivered service is notoriously difficult to do, especially in a rapidly evolving environment, as illustrated in figure 24. The data findings for this year's report are similar to the *Flexera 2021 State of the Cloud Report*, indicating organizations still need to address these challenges in order to make informed decisions as to which apps to optimize and migrate.

It's therefore no surprise that 53 percent of respondents reported *understanding app dependencies* as the top cloud migration challenge. Other critical challenges for all respondents include *assessing the technical feasibility* (of migrating on-premises apps), *assessing on-premises versus cloud costs* and *rightsizing/selecting the best instance*.

For SMBs, *knowing the implications of bring your own license (BYOL)* was reported to be a more significant challenge, likely due to SMBs being more likely to use more open-source software and less licensed software.

FIGURE 24

Understanding app dependencies and *assessing technical feasibility* are top challenges for all organizations.



All respondents N=753, Enterprise N=597, SMB N=156
Source: Flexera 2022 State of the Cloud Report

Understanding cloud initiatives and metrics

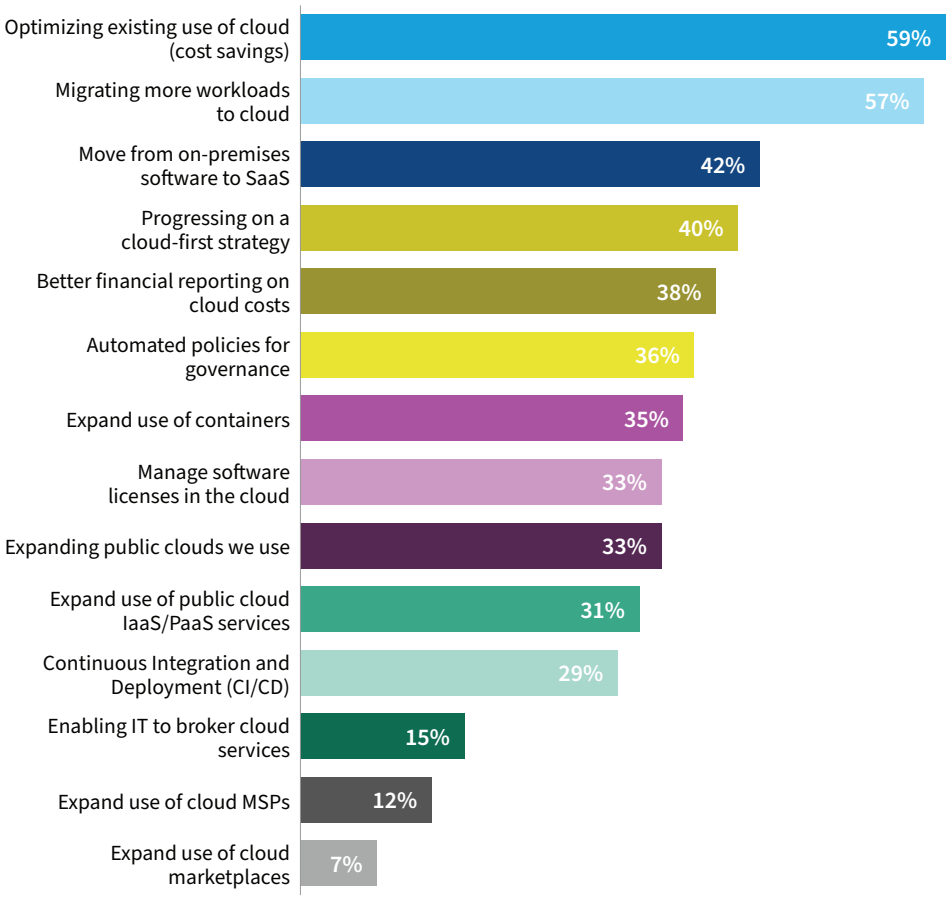
Understanding cloud initiatives and metrics

Optimizing usage is the top cloud initiative for the sixth year running

The discipline of FinOps continues to gain traction in large enterprises. For the sixth year in a row, *optimizing the existing use of cloud (cost savings)* is the top initiative, followed by *migrating more workloads to the cloud*, as shown in figure 25. Optimizing usage is a cost-control measure. Migrating workloads can save money and drive agility. As organizations move more workloads to the cloud, they can retire the technical debt associated with maintaining and operating traditional data centers. Moving to SaaS solutions eliminates the resources required to manage equivalent on-premises software packages.

FIGURE 25

Cost-control measures and moving to SaaS solutions are top of mind.



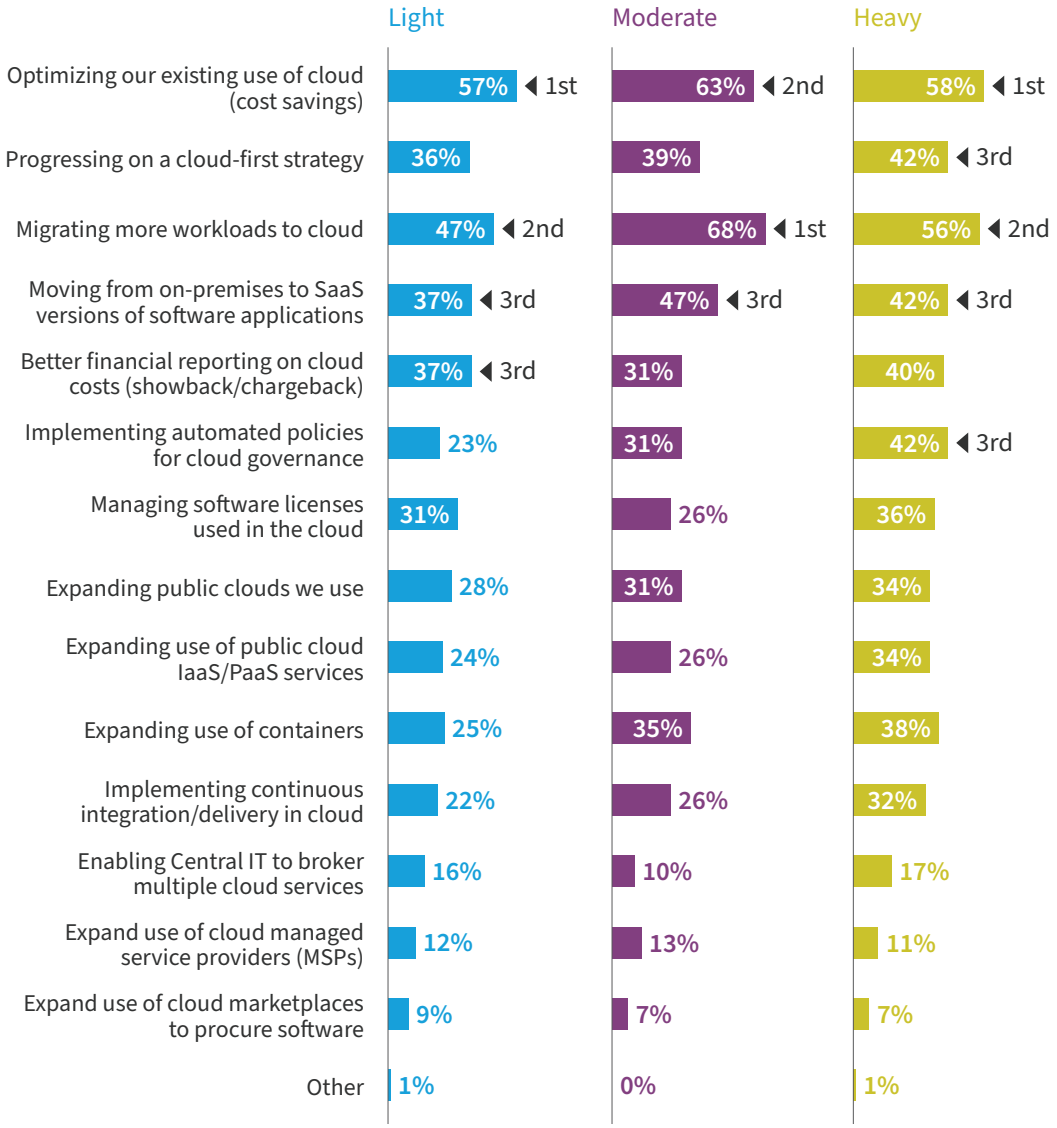
N=753

Source: Flexera 2022 State of the Cloud Report

Figure 26 divides respondents by cloud usage based on light, moderate and heavy utilization of cloud. Each ranks *optimizing existing use of cloud* and *migrating more workloads* to cloud as one of the top two initiatives. *Moving from on-premises to SaaS* appeared in the top five for each category for the first time. As organizations expand their usage of cloud, they look beyond experimentation and greenfield applications, focusing on SaaS options for existing on-premises software.

FIGURE 26
Regardless of cloud usage level, *optimizing existing use of cloud* and *migrating more workloads to cloud* remain top initiatives.

Top cloud initiatives for 2022 by cloud usage for all organizations



N=753
Source: Flexera 2022 State of the Cloud Report

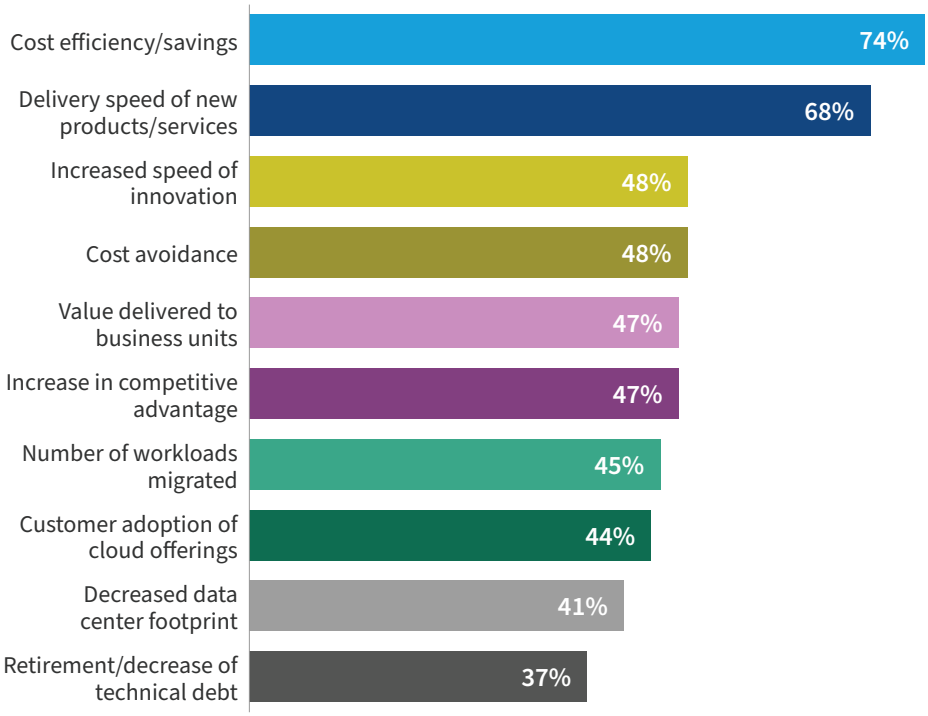
Organizations measure cloud progress by savings, agility and value

To achieve cost benefits, organizations must optimize as they migrate by rightsizing and using automation to continually monitor and optimize spend. Figure 27 lists the ranking of metrics that organizations are using to measure cloud progress. The top two are *cost efficiency/savings* and *delivery speed of new product/services*. *Cost avoidance* ties for third with *increased speed of innovation*, which moved up from fifth in 2021. Cost remains top of mind—as does the ability to deliver to customers quickly—but organizations are beginning to realize and prioritize the innovation and competitive advantages of the cloud.

FIGURE 27

Increased speed of innovation and *increase in competitive advantage* rise in importance compared to last year.

Top metrics for assessing progress against cloud goals for all organizations



N=753
Source: Flexera 2022 State of the Cloud Report

Organizations are taking a centralized approach to cloud

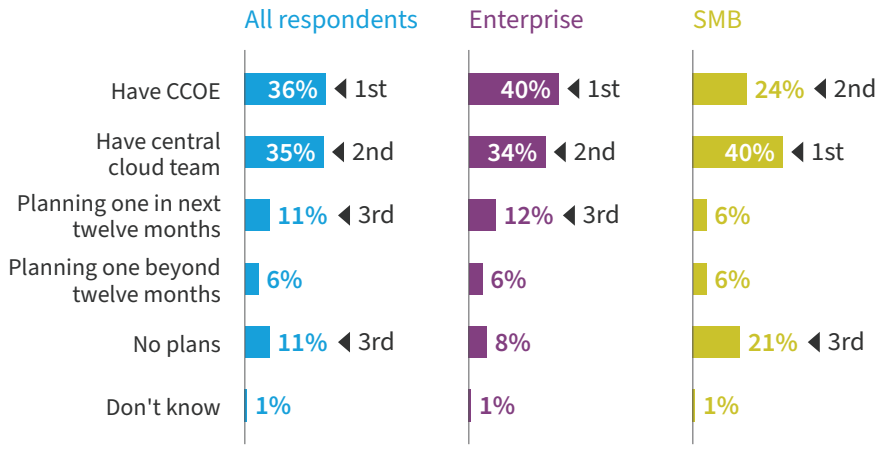
Organizations are taking a centralized approach to cloud

As organizations adopt cloud-first strategies, many are creating a central cloud team or a cloud center of excellence (CCOE) tasked with providing centralized controls, tools and best practices. The purpose of these teams is to accelerate cloud adoption by centralizing expertise while reducing costs and risk. Figure 28 depicts respondents' plans for adopting a central cloud team or CCOE.

The majority of organizations (71 percent) have a central cloud team or CCOE. Enterprises, due to their larger size and more extensive application portfolios, have a greater need for centralization than do SMBs. Spend, governance and security within larger organizations are much more complex; teams overseeing those areas must coordinate across multiple business units and functional areas. Seventy-four percent of enterprises already have a central cloud team or CCOE compared with 64 percent of SMBs. Only eight percent of enterprises and 21 percent of SMBs have no plans for a central cloud team.

FIGURE 28
The majority of organizations have a central cloud team or similar.

Adoption of central cloud team or similar across organizations



All respondents N=753, Enterprise N=597, SMB N=156
Source: Flexera 2022 State of the Cloud Report

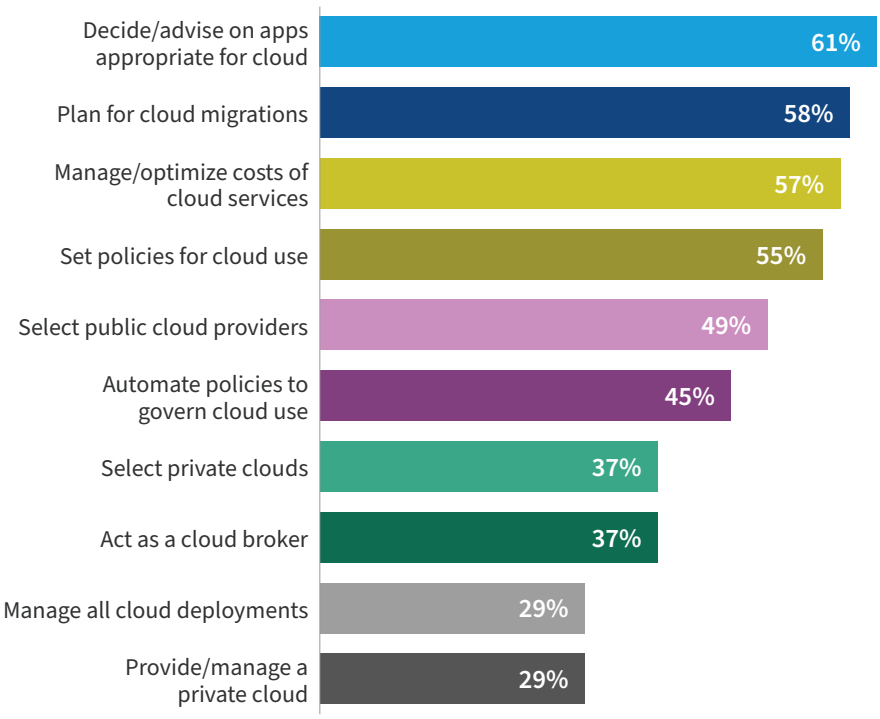
Flexera

Central teams optimize cloud costs and govern use

Figure 29 shows the continued role central IT teams play in providing guardrails for cloud use and controlling shadow IT, and it has remained consistent YoY. These cloud teams shoulder most of the responsibility for cloud cost optimization, migration planning and governance. They also serve in an advisory capacity to help stakeholders make informed decisions and ensure the apps selected comply with the governance framework and security policies.

FIGURE 29

The top priority for organizations is to decide/advise on apps appropriate for the cloud.



N=753

Source: Flexera 2022 State of the Cloud Report

Software asset management and vendor management can lend expertise

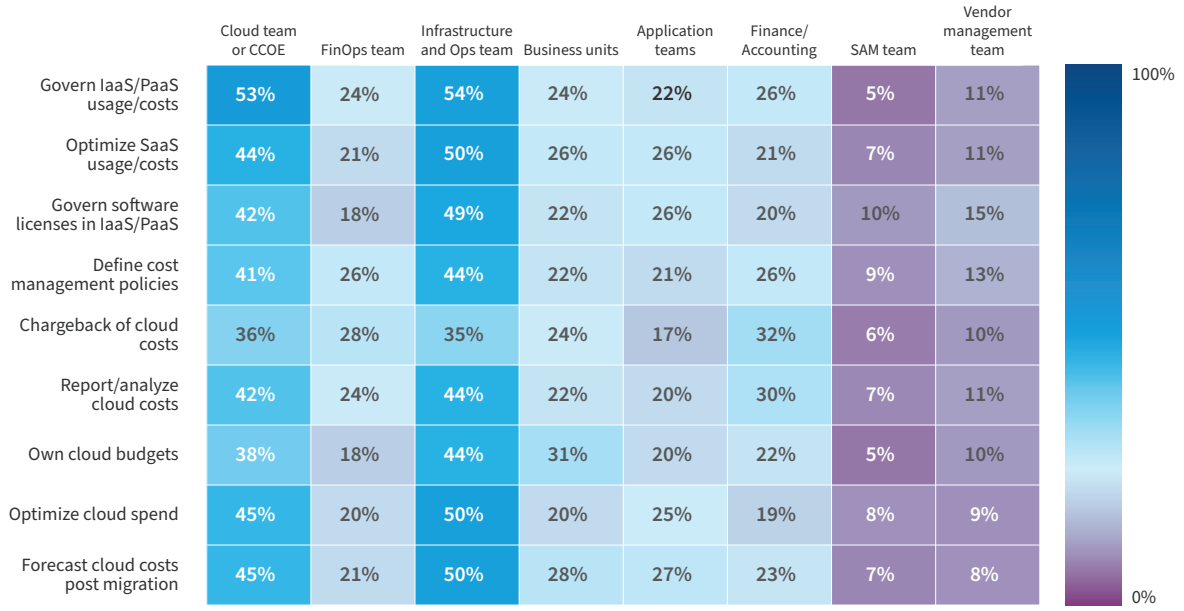
As figure 30 indicates, the cloud team and the infrastructure and operations team are actively involved in enterprise cloud cost management. Their top responsibilities include *governing IaaS and PaaS usage and costs, forecasting cloud costs post migration* and *optimizing cloud spend*.

These are responsibilities that software asset management (SAM) and vendor management teams have traditionally handled for on-premises software. Organizations could benefit significantly from increased involvement by SAM, vendor management and FinOps teams in cloud cost management. This year, 17 percent of SAM and vendor management teams optimized cloud spend, up from seven percent last year.

FIGURE 30

SAM, vendor management and FinOps teams can lend expertise in cloud cost management.

Cloud cost management responsibilities by IT team for all organizations



N=753

Source: Flexera 2022 State of the Cloud Report

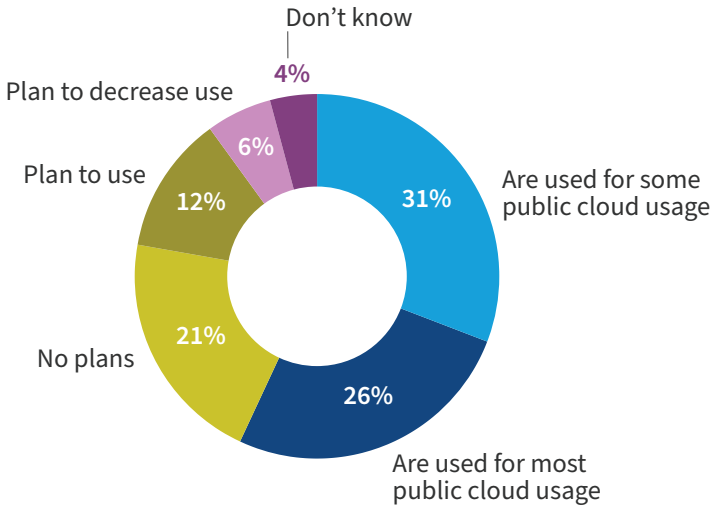
Managed service providers (MSPs) assist with cloud work

Fifty-seven percent of all organizations are outsourcing at least some public cloud work, including 26 percent that engage cloud MSPs for most of their public cloud use, as depicted in figure 31.

FIGURE 31

More than half of respondents engage cloud MSPs.

Leveraging MSPs to manage public cloud resources for all organizations

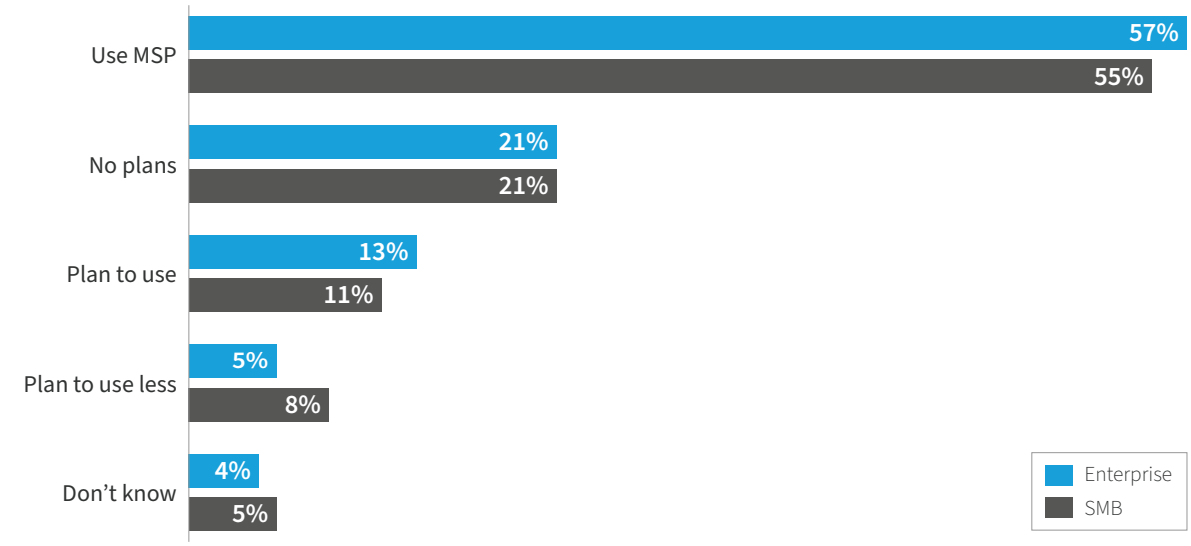


N=753

Source: Flexera 2022 State of the Cloud Report

Figure 32 indicates that enterprises are slightly more likely than SMBs to use MSPs.

FIGURE 32
SMBs are less likely to use MSPs than enterprise organizations.



Enterprise N=597, SMB N=156
Source: Flexera 2022 State of the Cloud Report

Top challenges are security, expertise and spend

Top challenges are security, expertise and spend

When it comes to the top cloud challenges, it's a close race for respondents. As figure 33 illustrates, the top three are *security, lack of resources/expertise* and *managing cloud spend*. Security was the number one challenge facing respondents in ten of the eleven *State of the Cloud* reports.

FIGURE 33
Security remains consistent as a top challenge for respondents.

N=753
Source: Flexera 2022 State of the Cloud Report

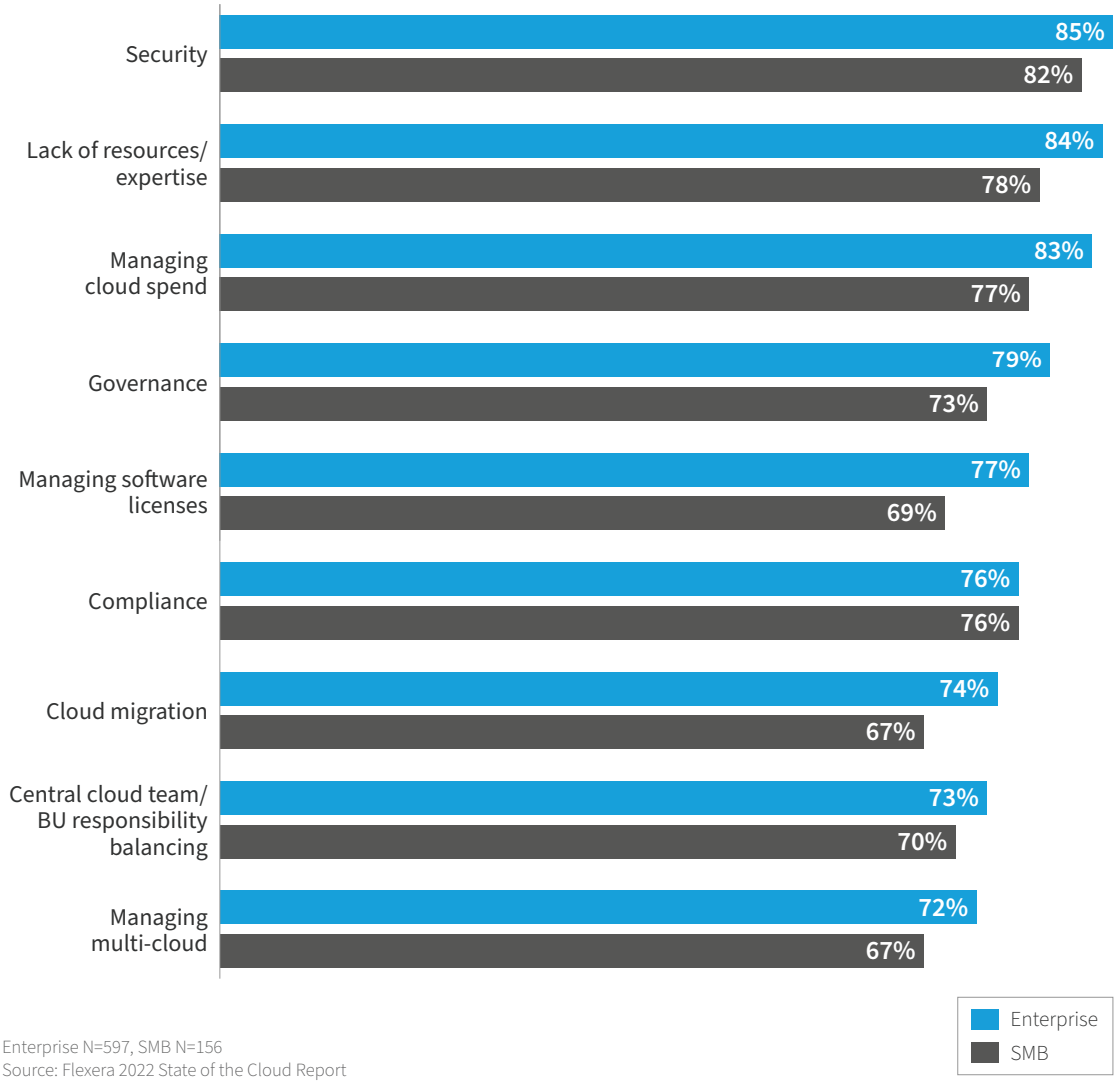
Enterprises and SMBs see security as top challenge

Security is the top challenge for both enterprises and SMBs, but this year *lack of resources/expertise* climbed from fourth place (at 76 and 72 percent respectively) to second (at 84 and 78 percent respectively). Figure 34 compares the top challenges for both enterprises and SMBs.

FIGURE 34

Security is a top challenge for both SMBs and enterprises, but *lack of resources/expertise* is climbing the ranks.

Comparison of top cloud challenges for enterprises and SMBs



Enterprise N=597, SMB N=156
Source: Flexera 2022 State of the Cloud Report

Flexera

YoY enterprise challenges continue

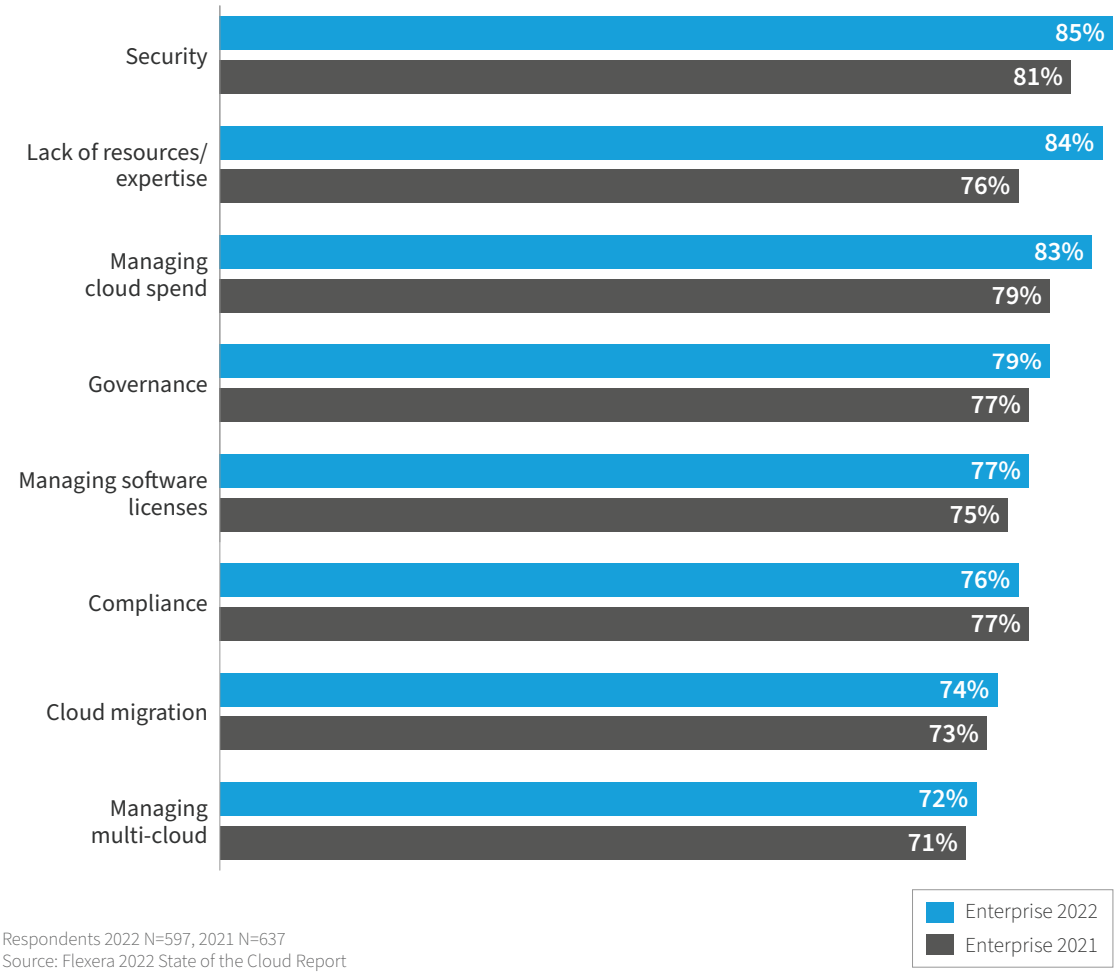
Enterprises are gaining experience with cloud, but challenges remain (figure 35). For the tenth time in eleven years, respondents ranked *security* as the top challenge, rising from 81 percent to 85 percent YoY.

As mentioned, *lack of resources/expertise* also made a large jump and is now the second highest cloud challenge as more and more organizations expand their cloud footprint and the demand for skilled staff grows.

FIGURE 35

Lack of resources/expertise as a top challenge indicates the demand for skilled staff is growing.

YoY comparison of top challenges for enterprises



Respondents 2022 N=597, 2021 N=637
Source: Flexera 2022 State of the Cloud Report

Flexera

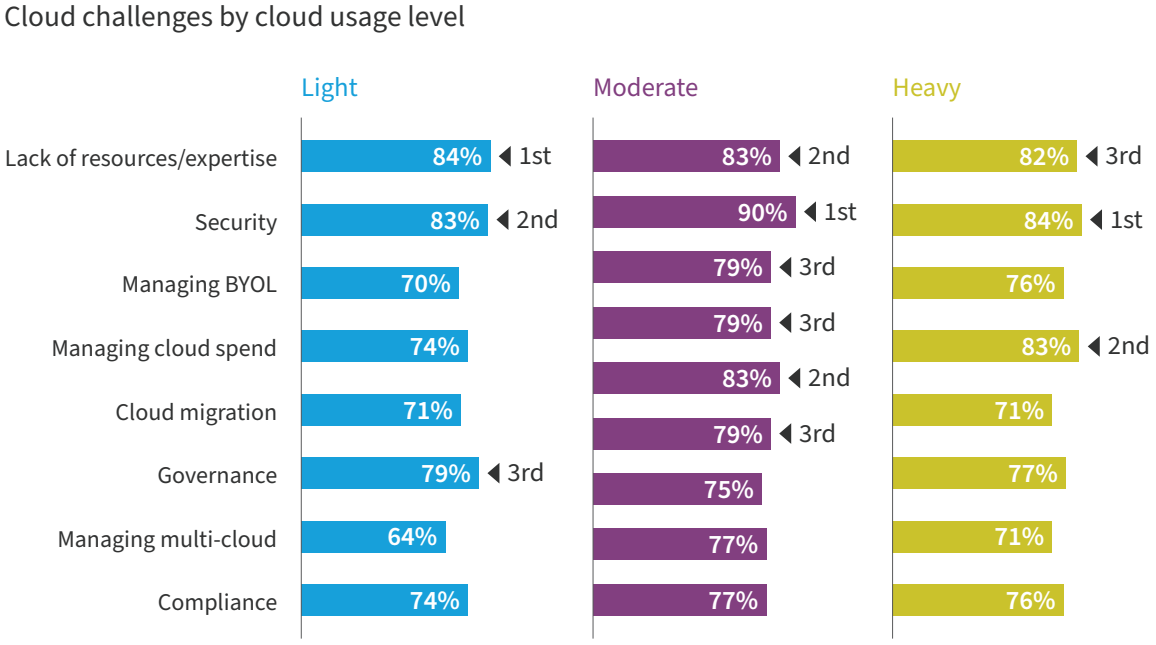
Cost, governance and security remain challenges regardless of cloud usage

As figure 36 shows, *security* is the top challenge for more advanced users heavily relying on cloud, and *lack of resource/expertise* is the top challenge for beginners who experience a lighter use of the cloud.

Regardless of cloud usage level, challenges such as *managing bring your own license (BYOL)*, *managing cloud spend, cloud migration* and *governance* are also significant obstacles. As cloud estates expand, they need better governance controls to maintain visibility. With this expansion, more workloads with compliance mandates are entering the cloud.

FIGURE 36

Regardless of cloud usage level, *security, lack of resources/expertise* and *managing cloud spend* are top challenges.



N=753
Source: Flexera 2022 State of the Cloud Report

Organizations struggle to control growing cloud spend

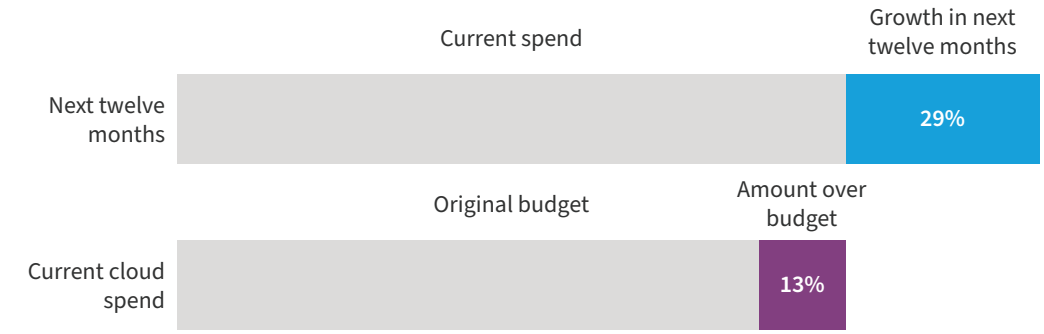
Organizations struggle to control growing cloud spend

It's easy to see why FinOps is evolving and being adopted as a cultural practice and financial management discipline. Organizations continue to increase their cloud spend, although the rate of growth is slowing. This could be an indication that some organizations have already deployed high-priority applications to the cloud and will continue to expand their cloud footprint but at a less accelerated rate.

As figure 37 indicates, respondents reported their public cloud spend was over budget by an average of 13 percent, down from 24 percent YoY. Moreover, respondents expect their cloud spend to further increase by 29 percent in the next twelve months. This trend indicates it's more critical than ever to get a handle on forecasting and cost optimization.

FIGURE 37

The growth rate may be slowing, but organizations continue to increase cloud spend.



N=753
Source: Flexera 2022 State of the Cloud Report

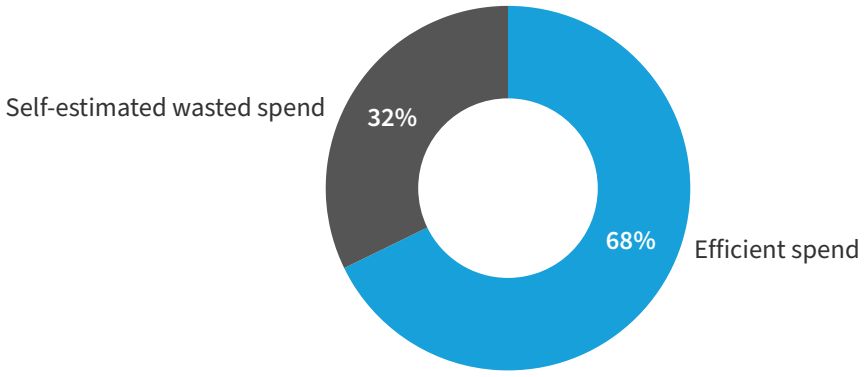
Organizations continue to waste significant cloud spend

Wasted cloud spend is a major issue and becomes more critical as cloud costs continue to rise. Respondents self-estimated that their organizations waste 32 percent of cloud spend (figure 38), up from 30 percent last year. However, spend is likely less efficient and likely even higher on average, as many organizations tend to underestimate their amount of waste.

FIGURE 38

Respondents indicated their organizations have increased cloud spend waste.

Respondent self-estimates of wasted cloud spend for all organizations



N=753
Source: Flexera 2022 State of the Cloud Report

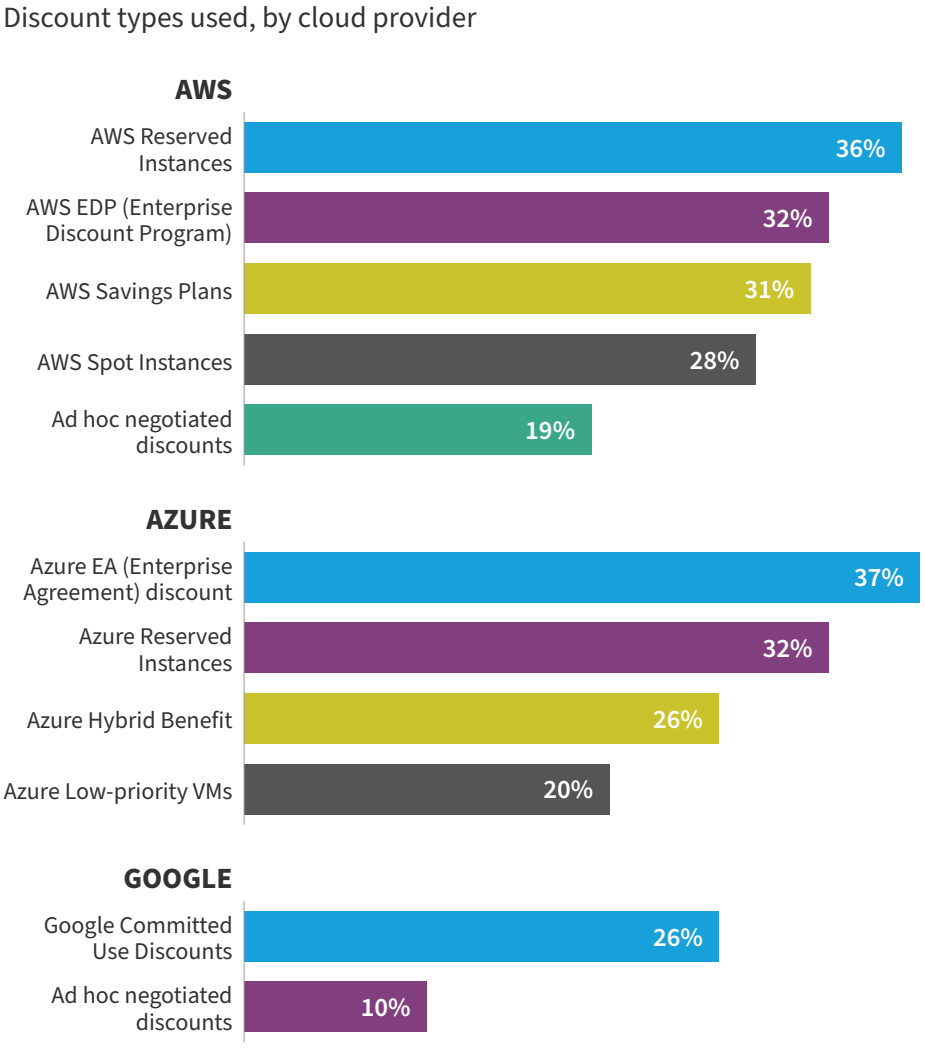
Finding savings opportunities with cloud provider discounts

Cloud provider pricing structures are complex and difficult to decipher, but provider discounts could identify opportunities to reduce costs. According to figure 39, some organizations aren't taking advantage of all the available discounts. It's worth noting that YoY the number of respondents indicating they're leveraging these discounts has dropped.

For example, 36 percent of AWS users use *reserved instances* and 31 percent use *savings plans* (down from 52 percent and 44 percent last year, respectively). Similarly, only 32 percent of Azure users utilize *reserved instances*.

FIGURE 39

Organizations can leverage public cloud discount options for additional cost savings.



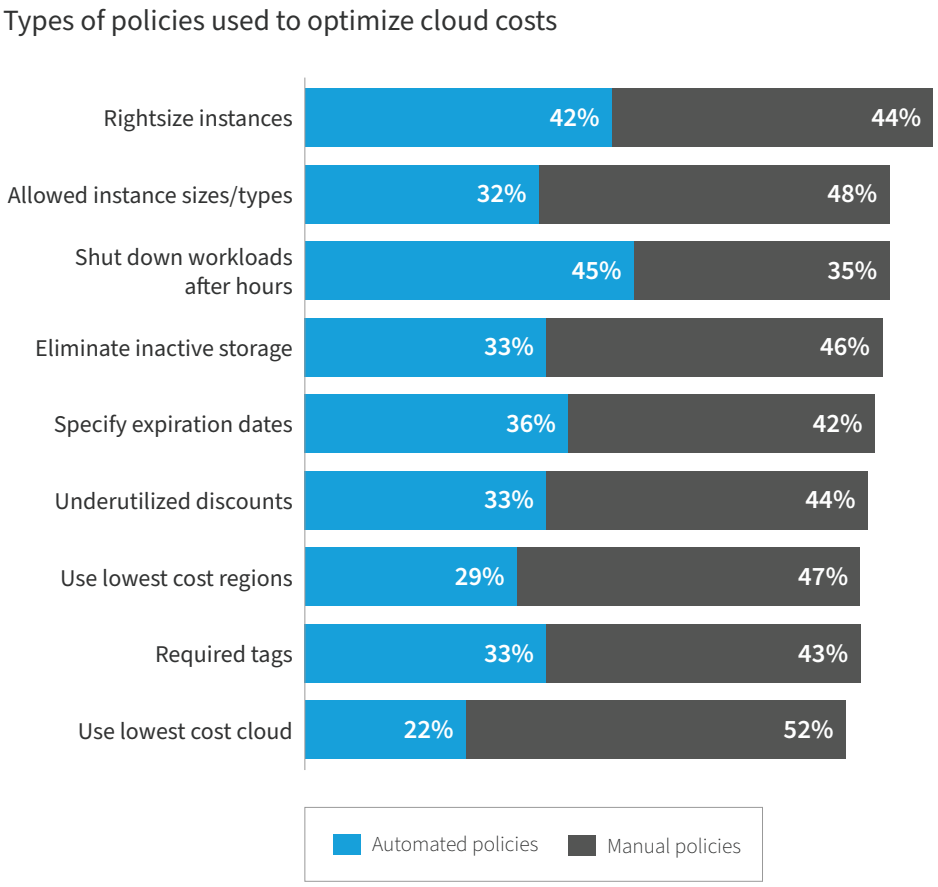
N=753

Source: Flexera 2022 State of the Cloud Report

Organizations continue to use automation to optimize costs

Figure 40 indicates that policies are being implemented by organizations to optimize costs. Over 40 percent of respondents are using automated policies to shut down workloads after hours and to rightsize underutilized instances. These processes have evolved over the years from manual operations to their current level of automation. Only 33 percent are using automated policies to implement *required tags*, and another 43 percent perform this labor-intensive process manually. Automated cloud cost optimization policies can save time while ensuring organizations monitor their environments consistently to eliminate waste.

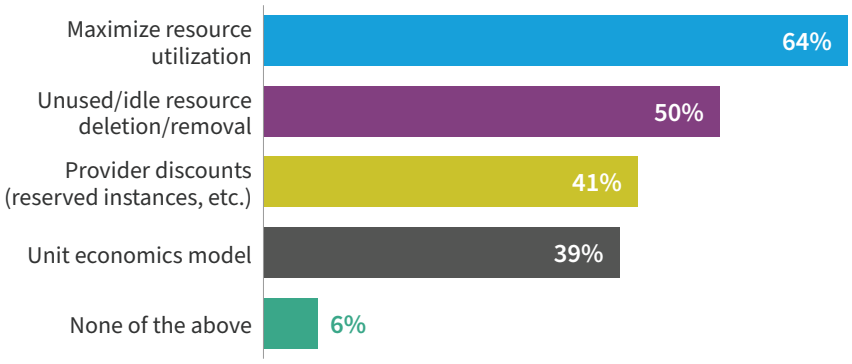
FIGURE 40
Automated cloud cost optimization policies can save time and reduce wasted spend.



N=753
Source: Flexera 2022 State of the Cloud Report

Organizations use a combination of processes to analyze and reduce their cloud costs. As figure 41 shows, only six percent of respondents did not use any of the specified processes, while 39 percent utilized the *unit economics model*, which is a key component of the emerging FinOps discipline and the preferred way to perform cost analysis.

FIGURE 41
Nearly 40 percent of respondents leverage the unit economics model.



N=753
Source: Flexera 2022 State of the Cloud Report

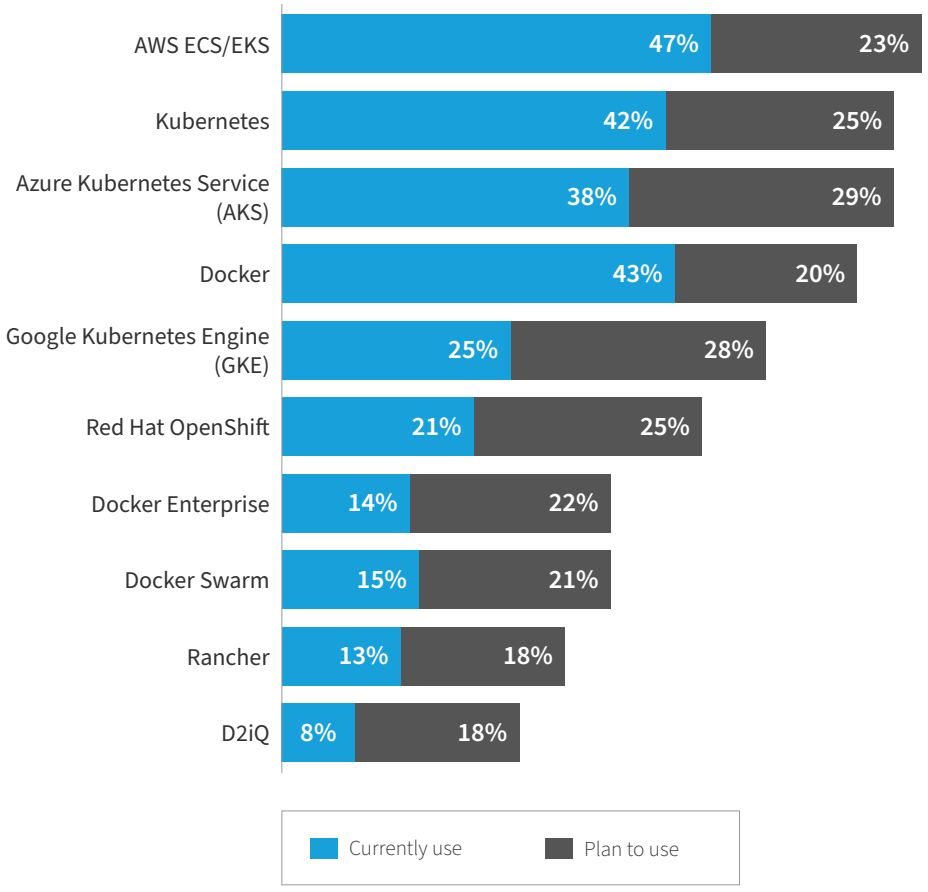
Container use becomes increasingly mainstream

Container use becomes increasingly mainstream

The use of *Docker* and *Kubernetes* continues to be considerable. As figure 42 indicates, container-as-a-service (CaaS) offerings from the public cloud providers continue to gain traction with customers; this year, *AWS Elastic Container Service (ECS)* and *AWS Elastic Kubernetes Service (EKS)* surpassed *Docker* for the top spot. However, *Docker* and *Kubernetes* remain near the top of the list of container tools, each used by over 40 percent of respondents.

FIGURE 42
AWS ECS/EKS surpassed *Docker* for the top container spot this year.

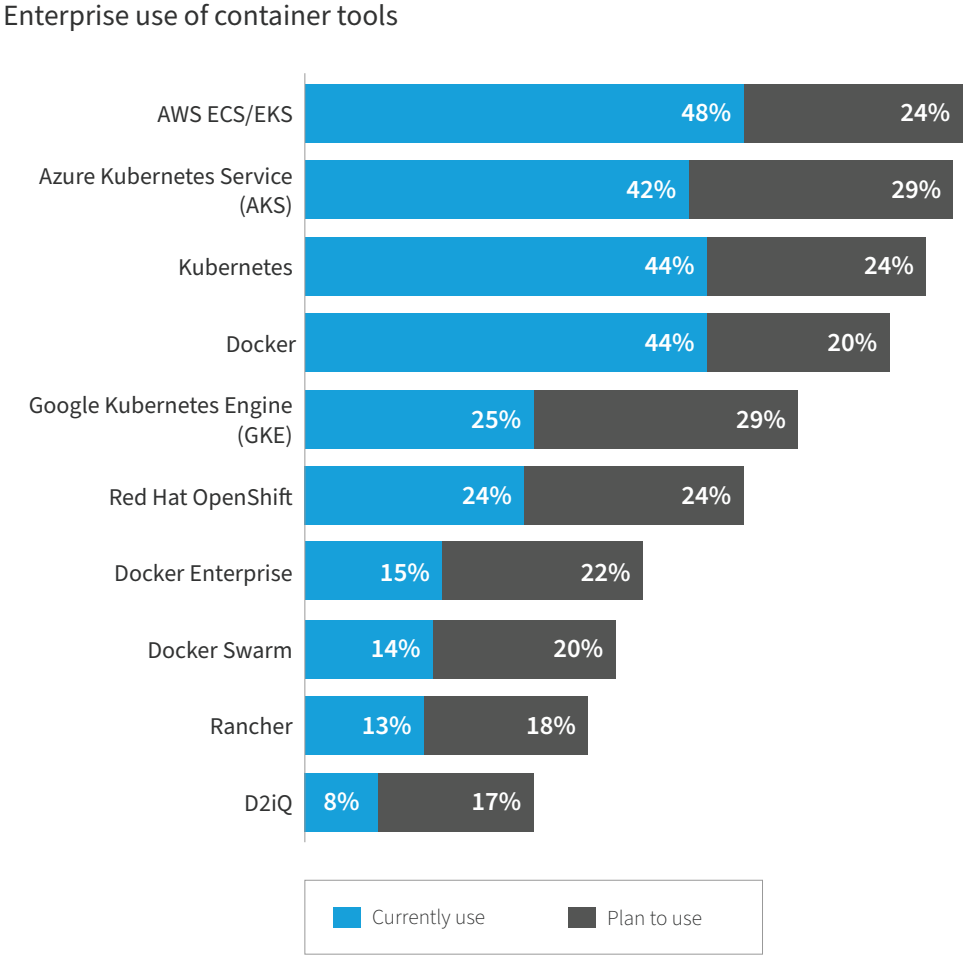
Container tools used by all respondents



N=753
Source: Flexera 2022 State of the Cloud Report

Figures 43 and 44 show that native tools such as *AWS ECS* and *AWS EKS* are the most used container tools for both enterprises (48 percent) and SMBs (43 percent). Along with growing interest in *Azure Kubernetes Service (AKS)* and *Google Kubernetes Engine (GKE)*, organizations are planning to use provider-specific, purpose-built tools.

FIGURE 43
Enterprises prefer to use *AWS ECS/EKS*, followed closely by *Azure Kubernetes Service (AKS)*, *Docker* and *Kubernetes*.

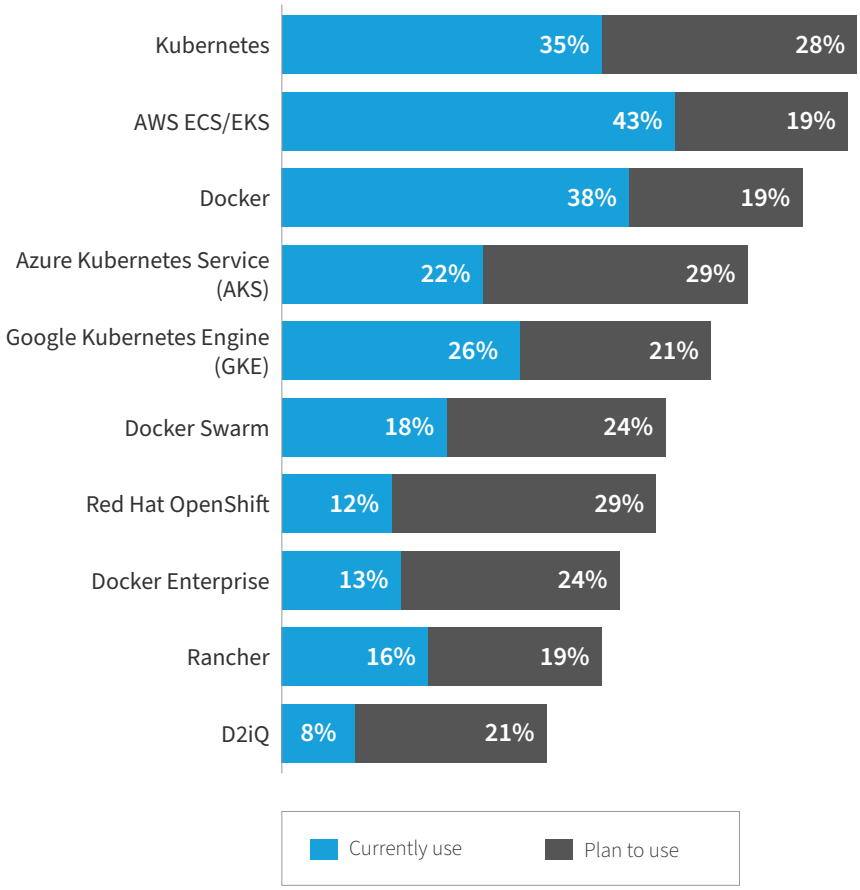


N=597
Source: Flexera 2022 State of the Cloud Report

FIGURE 44

SMBs prefer to use *Kubernetes*, followed closely by *AWS ECS/EKS* and *Docker*.

SMB use of container tools



N=156

Source: Flexera 2022 State of the Cloud Report

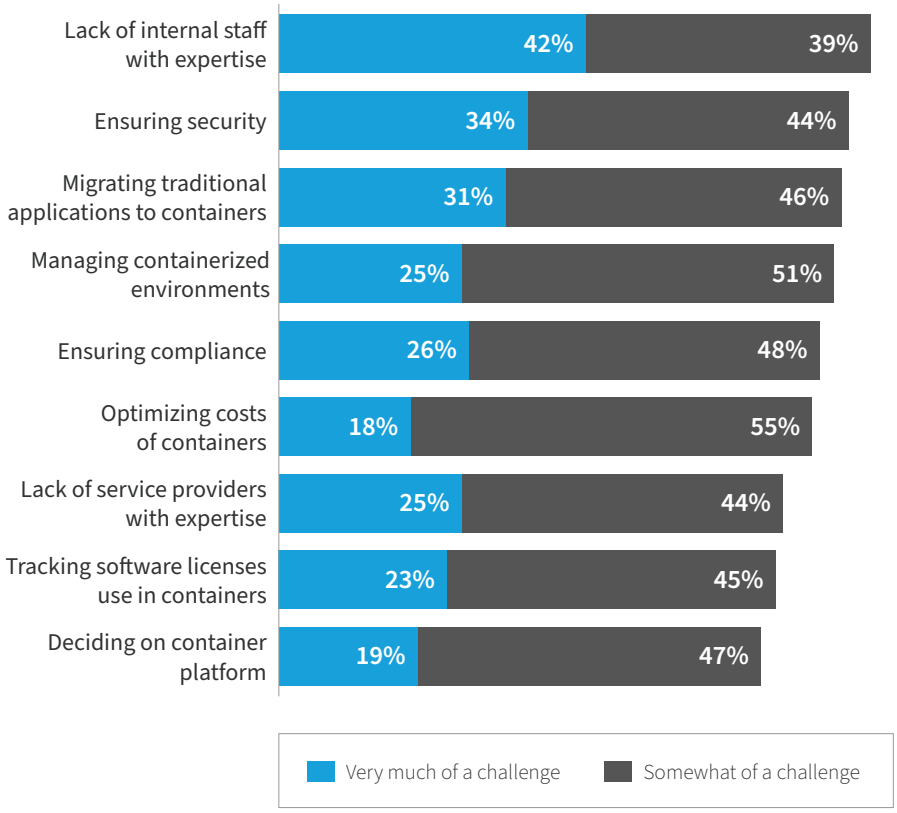
Containers may be mainstream, but lack of expertise is the top challenge

Organizations face challenges using containers. Figure 45 shows that the top container challenges for all organizations are the *lack of internal resources with expertise, ensuring security* and *migrating traditional applications to containers*. Respondents citing *lack of internal resources with expertise* as a significant challenge grew from 30 percent last year to 42 percent this year. The resource challenges can be attributed to the strong uptick in the use of container technology. Migrating traditional applications to containers is more problematic, as traditional apps aren't implemented via microservices, which are more aligned to containerized deployment models.

FIGURE 45

As more organizations begin or expand their use of containers, finding the resources to implement is becoming more difficult.

Top container-related challenges for all organizations



N=753
Source: Flexera 2022 State of the Cloud Report

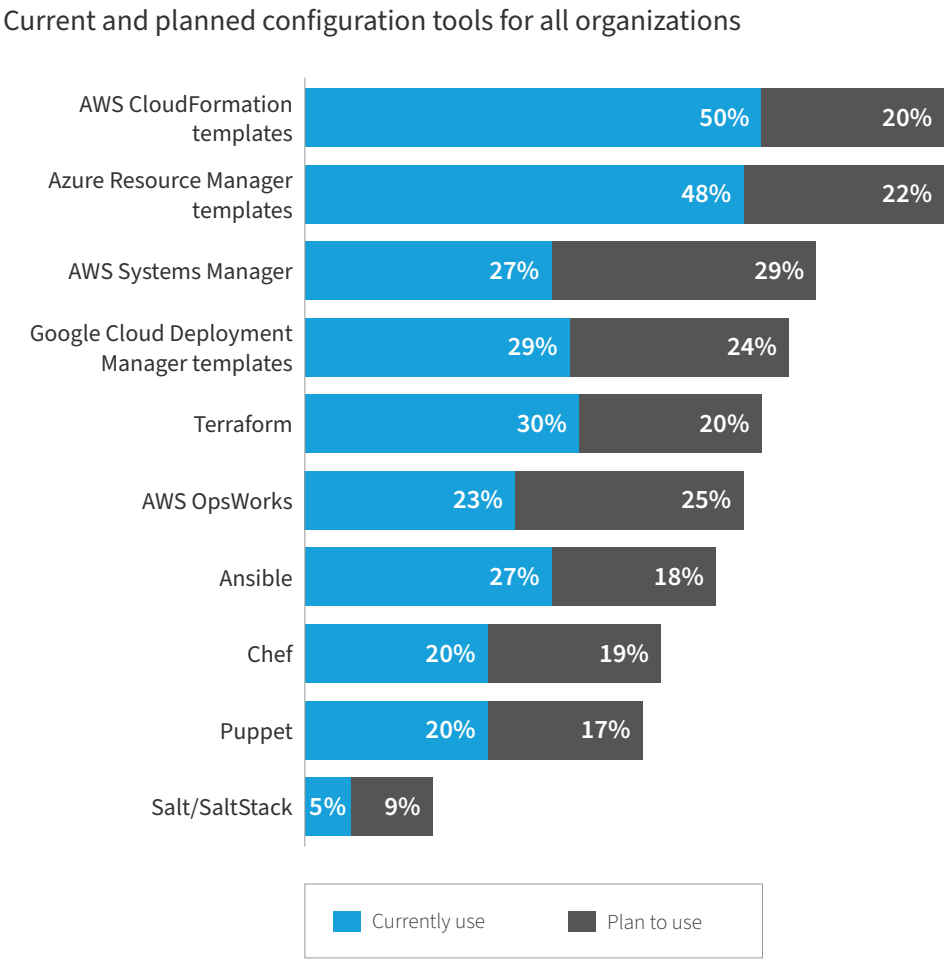
Adoption of cloud configuration tools is shifting

Adoption of cloud configuration tools is shifting

Cloud use often goes hand in hand with adopting DevOps processes. Organizations frequently choose to utilize configuration management tools that allow them to standardize and automate deployment and configuration of servers and applications.

Native cloud tools are most commonly used today, including *AWS CloudFormation templates* (50 percent) and *Azure Resource Manager templates* (48 percent), as shown in figure 46. Third-party tool usage declined from last year: *Terraform* dropped from 36 percent to 30 percent; *Ansible* dropped from 31 percent to 27 percent; *Chef* dropped from 27 percent to 20 percent; *Puppet* dropped from 27 percent to 20 percent; and *Salt/SaltStack* dropped from twelve percent to five percent. This may indicate that the ease and features of provider-specific tools are more enticing to organizations, despite our multi-cloud world. In comparison, it can be cumbersome to implement a third-party tool and cover all provider services.

FIGURE 46
Provider-specific tools are hard for organizations to resist.



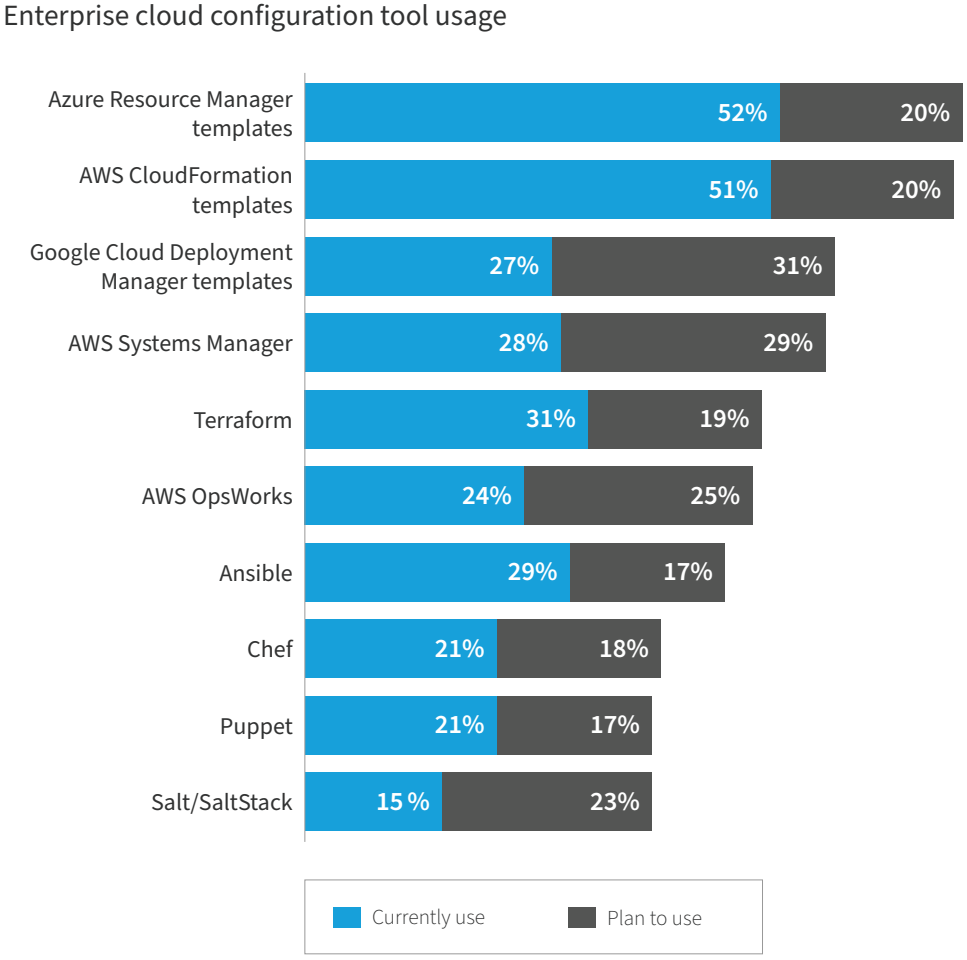
N=753
Source: Flexera 2022 State of the Cloud Report

Figures 47 and 48 show the configuration tools used by enterprises and SMBs, respectively. Overall, respondents indicate they rely most heavily on native cloud provider configuration tools, not third-party tools.

The configuration tools respondents say they'll use in the future vary, based on organization size. *Google Cloud Deployment Manager templates* have the highest percentage (31 percent) of enterprises planning to use them in the future. The highest percentage of SMBs (29 percent) plan to use *AWS Systems Manager*.

FIGURE 47

Most enterprises plan to use *Google Cloud Deployment Manager templates* in the future, followed by *AWS Systems Manager*.

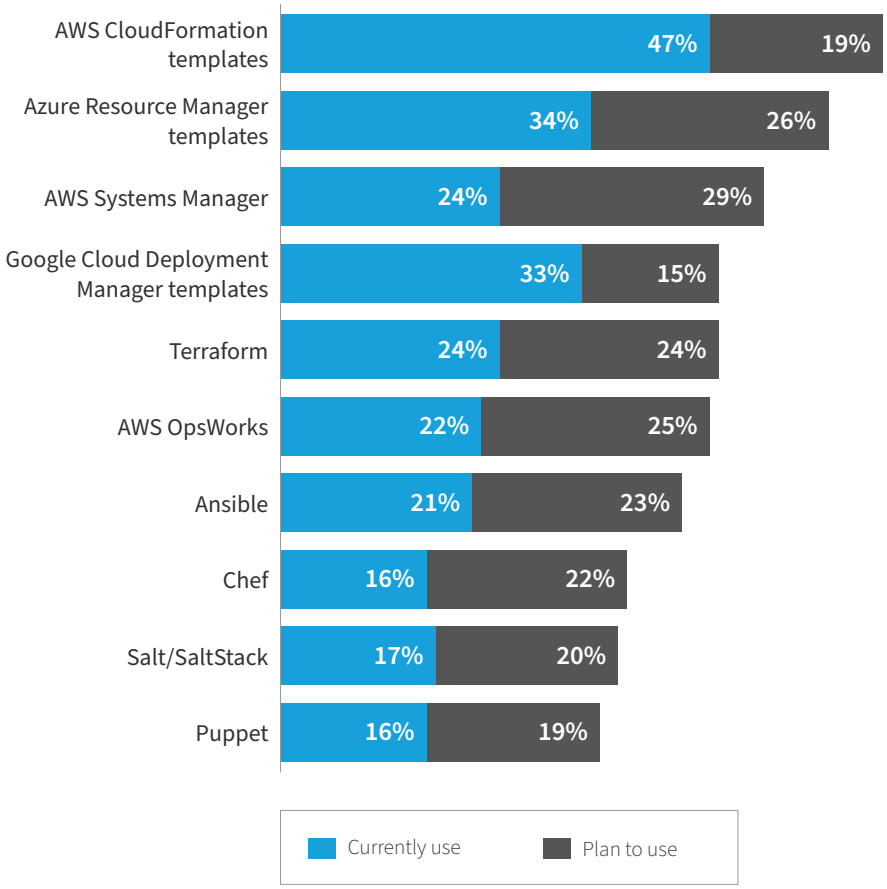


N=597
Source: Flexera 2022 State of the Cloud Report

FIGURE 48

Most SMBs plan to use *AWS Systems Manager* in the future, followed by *Azure Resource Manager templates* and *AWS OpsWorks*.

SMB cloud configuration tool usage



N=156

Source: Flexera 2022 State of the Cloud Report

Public cloud adoption is evolving

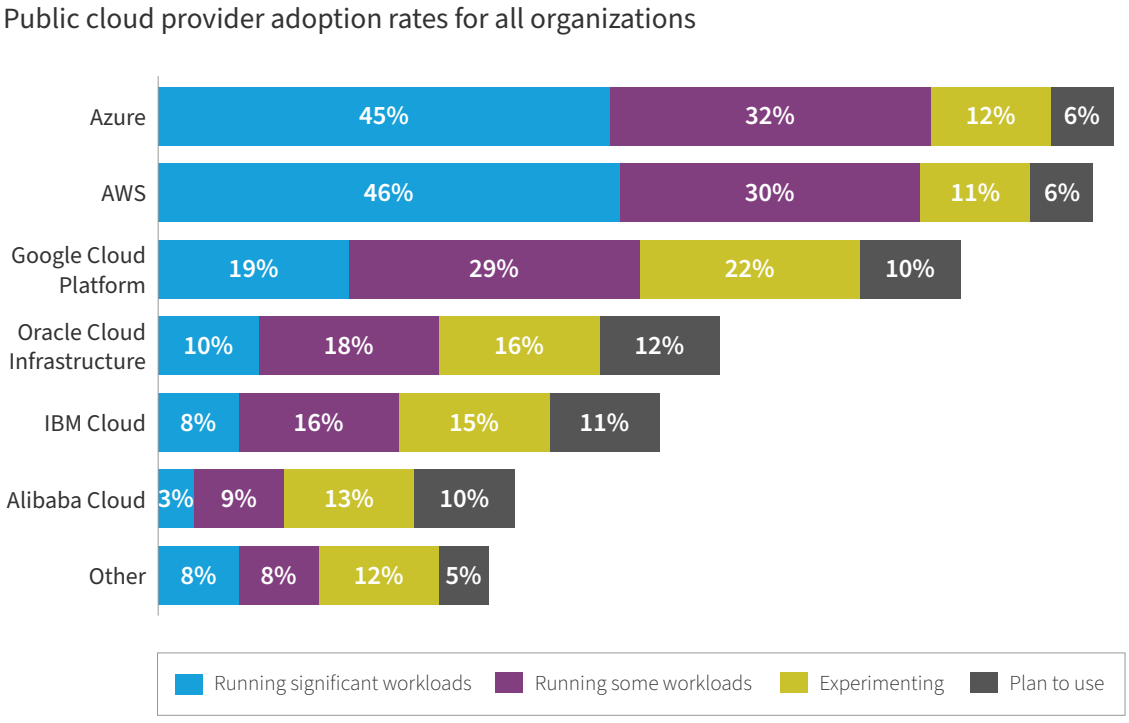
Public cloud adoption is evolving

The *Flexera 2022 State of the Cloud Report* survey probed into the private and public clouds that organizations are using. Figure 49 shows how the major providers stack up for adoption across all respondents this year. Figure 50 compares YoY rankings.

As in previous years, *AWS, Azure* and *Google Cloud Platform* are the top three public cloud providers. But for the first time, *Azure* has closed the gap with *AWS*, while other cloud providers have not shown much growth. For each public cloud provider, respondents specified whether they're running *significant workloads* in that cloud, *running some workloads, experimenting, plan to use it* or had *no plans to use it*. Most respondents are using more than one cloud, so individual percentages sometimes total more than 100 percent.

It's important to note that adoption—meaning an organization is using a cloud provider—is only one factor influencing revenue growth for the provider. The survey also explores other factors, including the number of virtual machines (VMs) running and PaaS cloud services used. This year respondents were also asked about their level of cloud spend per cloud provider.

FIGURE 49
Azure, *AWS* and *Google Cloud Platform* lead the pack of public cloud providers.

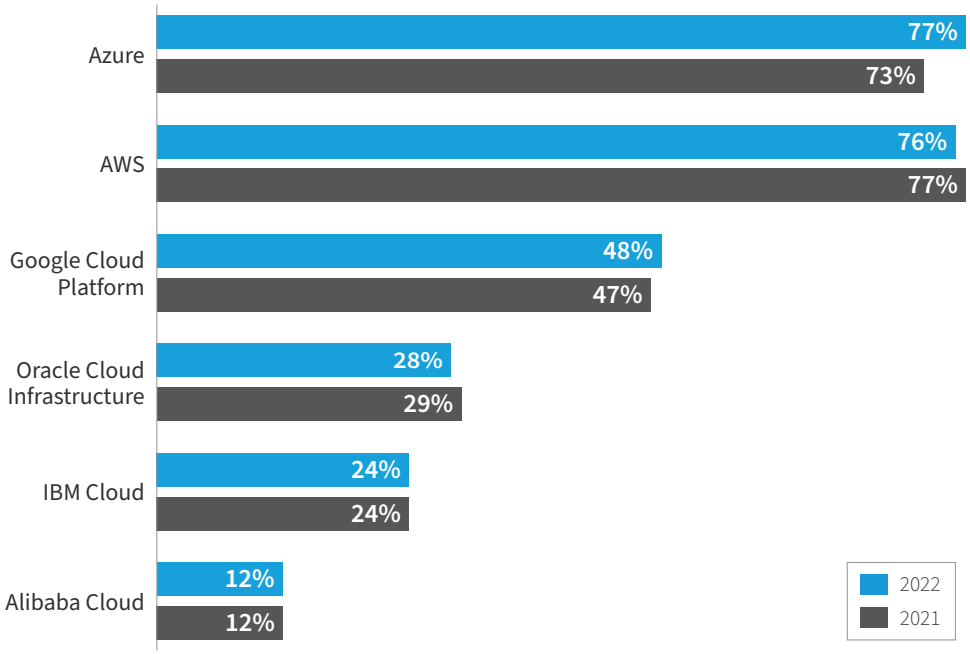


N=753
Source: Flexera 2022 State of the Cloud Report

FIGURE 50

For the first time, *Azure* took a slight lead over *AWS* in YoY public cloud adoption.

YoY public cloud provider adoption rates for all organizations



Respondents 2022 N=753, 2021 N=750
Source: Flexera 2022 State of the Cloud Report

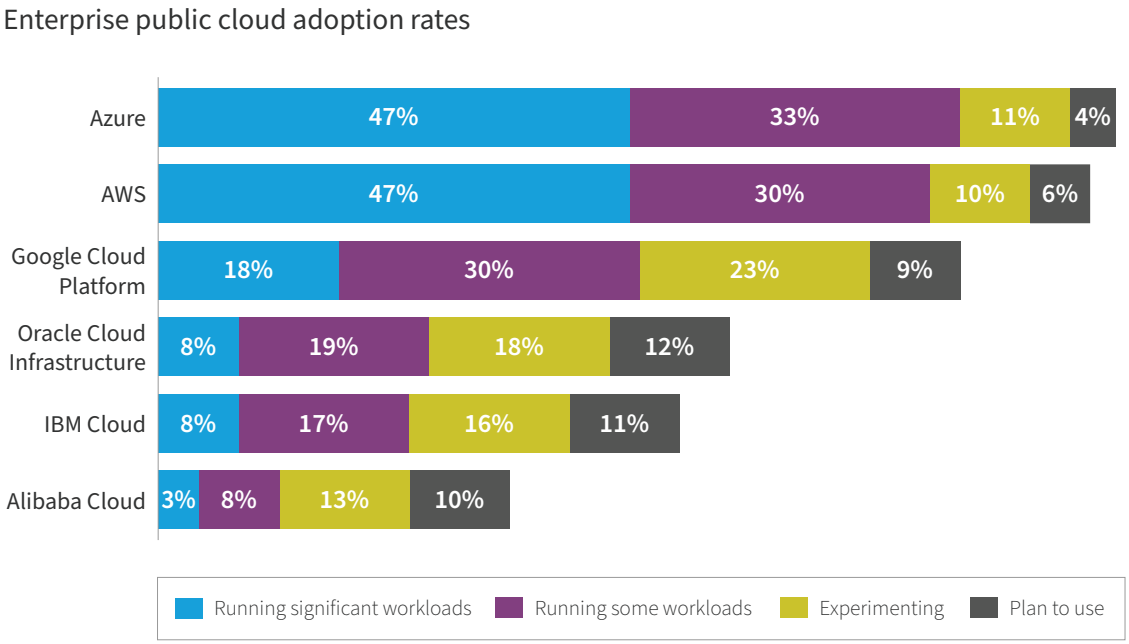
Flexera

Major public cloud provider use is shifting among enterprises

As figure 51 indicates, *Azure* passed *AWS* for breadth of adoption among enterprises. *Google Cloud Platform* has the highest percentage for experimentation (23 percent) and *Oracle Cloud Infrastructure* has the highest percentage of plan to use (twelve percent), which could drive more adoption in future years.

FIGURE 51

Azure surpassed *AWS* for enterprises running some or significant workloads on the platforms.

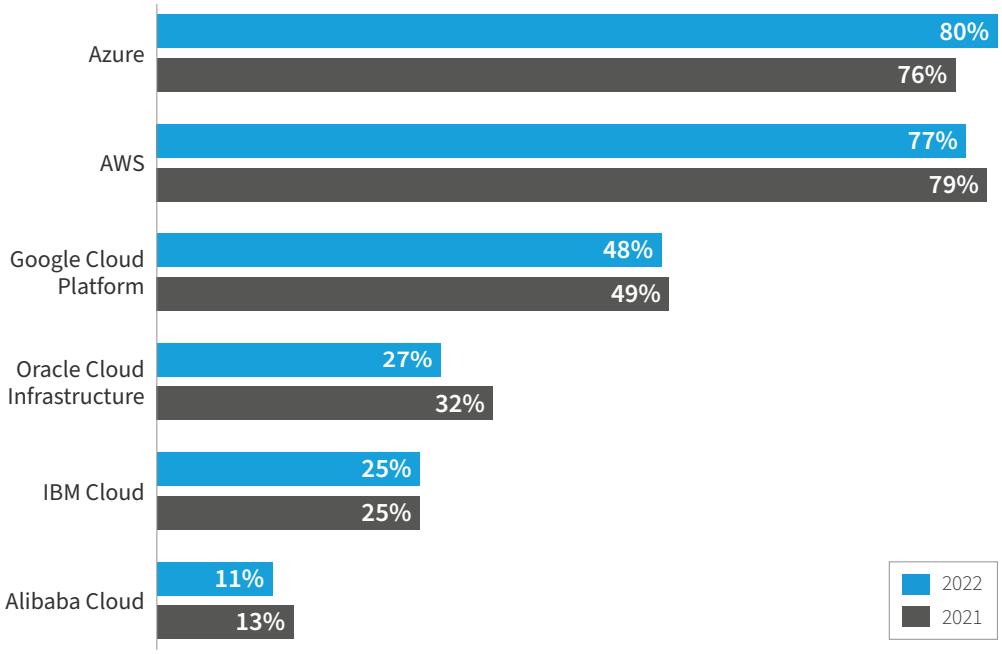


N=597
Source: Flexera 2022 State of the Cloud Report

Figure 52 shows *Azure* adoption rates rose somewhat among enterprises over the previous year, and *Azure* is now at 80 percent. *Oracle Cloud Infrastructure* dropped from 32 percent last year to 27 percent this year, and adoption of other cloud providers stayed stable.

FIGURE 52
Azure rose slightly ahead of *AWS* in enterprise adoption this year.

YoY enterprise public cloud adoption rates



Respondents 2022 N=597, 2021 N=637
Source: Flexera 2022 State of the Cloud Report

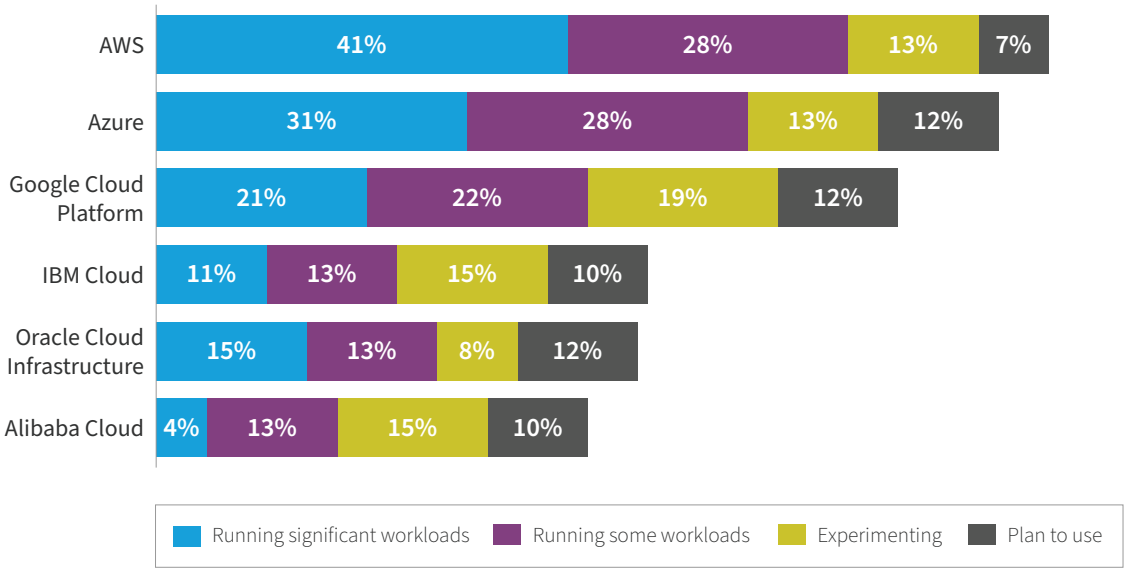
Choice of public cloud provider changing for SMBs

Among SMBs, *AWS* continues to be the frontrunner, although the percentage of respondents who are *running significant workloads* in *AWS* decreased from 53 percent last year to 31 percent this year. As figure 53 indicates, almost a third of SMBs are running workloads in *Google Cloud Platform*; SMB respondents who report *running significant workloads* in *Oracle Cloud Infrastructure* more than doubled from last year (six percent) to this year (15 percent).

SMB respondents with future projects—indicated by the combination of the clouds they're experimenting with and planning to use—demonstrated the most interest in *Google Cloud Platform* (31 percent), followed closely by *Azure, IBM Cloud* and *Alibaba Cloud* (all tied at 25 percent).

FIGURE 53

SMB respondents indicated the most interest in *Google Cloud Platform*, *Azure*, *IBM Cloud* and *Alibaba Cloud* for their future plans.

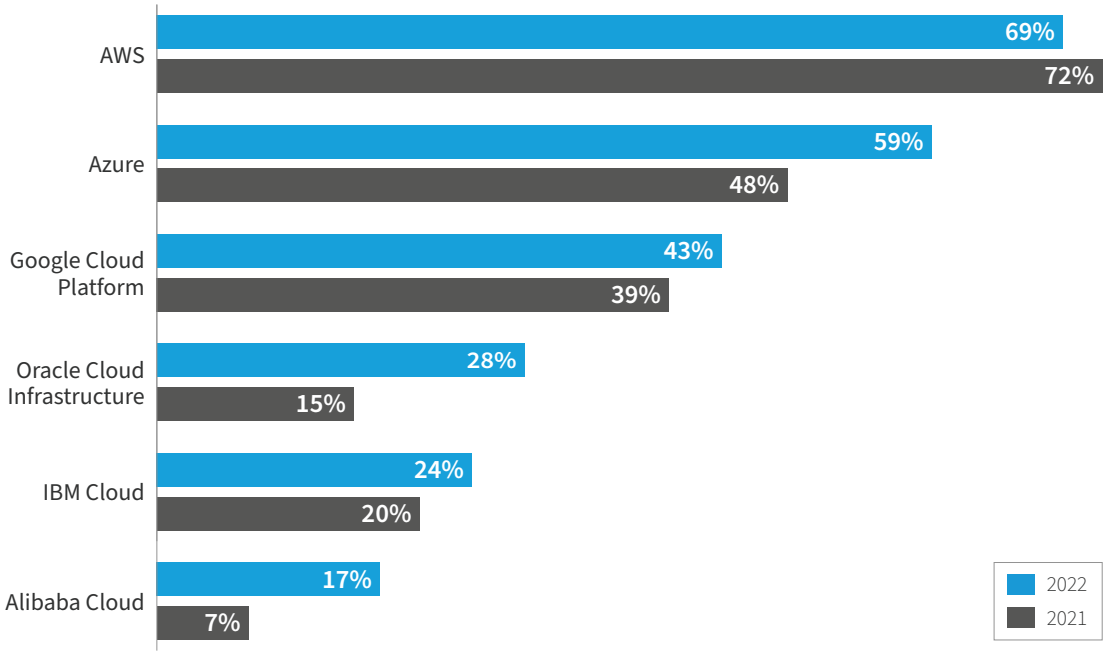


N=156
Source: Flexera 2022 State of the Cloud Report

SMB adoption of *AWS* dropped from 72 percent to 69 percent. *Oracle* jumped 13 percentage points (15 percent in 2021, 28 percent in 2022), as shown in figure 54.

FIGURE 54
SMB adoption of Oracle Cloud Infrastructure nearly doubled YoY.

YoY public cloud adoption rates for SMBs



Respondents 2022 N=156, 2021 N=113
Source: Flexera 2022 State of the Cloud Report

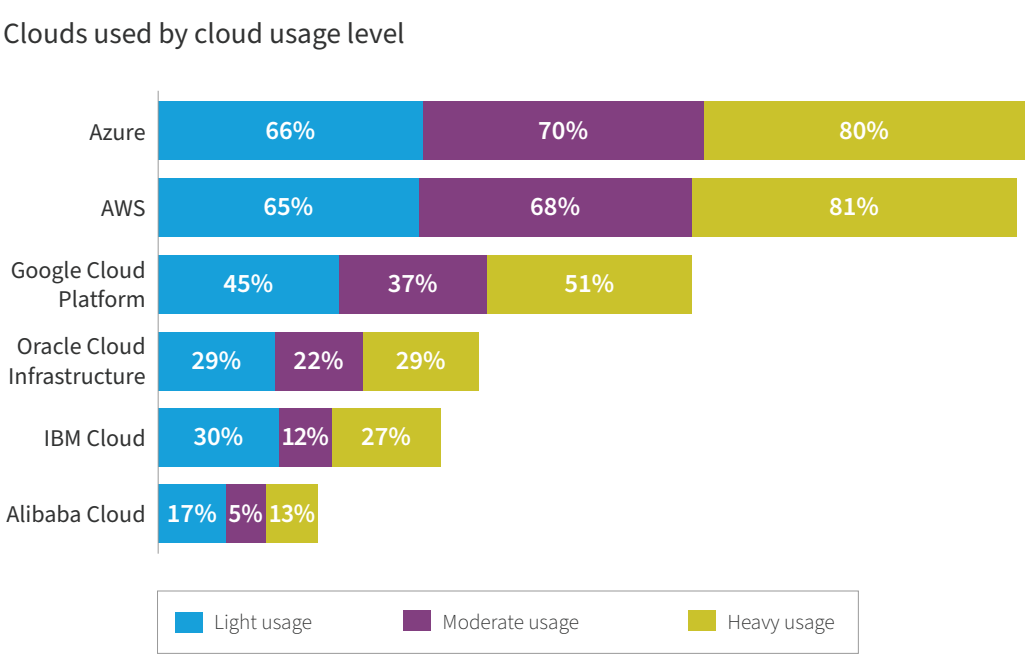
Usage levels affect public cloud provider choice

Usage levels—showing how heavily an organization relies on the cloud—are indicated in figure 55. Public cloud provider adoption is based on the organization's cloud usage level. As organizations mature, they tend to gravitate toward market leaders. Data from this year's survey indicates *Azure* seems to be either closing the gap—or has slightly surpassed—*AWS* with some users.

As the first large-scale cloud provider, *AWS* is used more frequently by organizations that have been using the cloud over a longer period and are heavy cloud users. Across all respondents, 81 percent of *heavy* cloud use organizations use *AWS* compared with 80 percent using *Azure*. Among organizations with *moderate* cloud use *Azure* has a slight lead and enjoys higher adoption for organizations that are *light* users. Although *Google Cloud Platform* remains in third place among all maturity levels, its popularity is significantly higher (51 percent) within organizations with *heavy* use of the cloud.

FIGURE 55

Azure surpassed *AWS* among light and moderate users and is closing the gap with heavy users.



N=753

Source: Flexera 2022 State of the Cloud Report

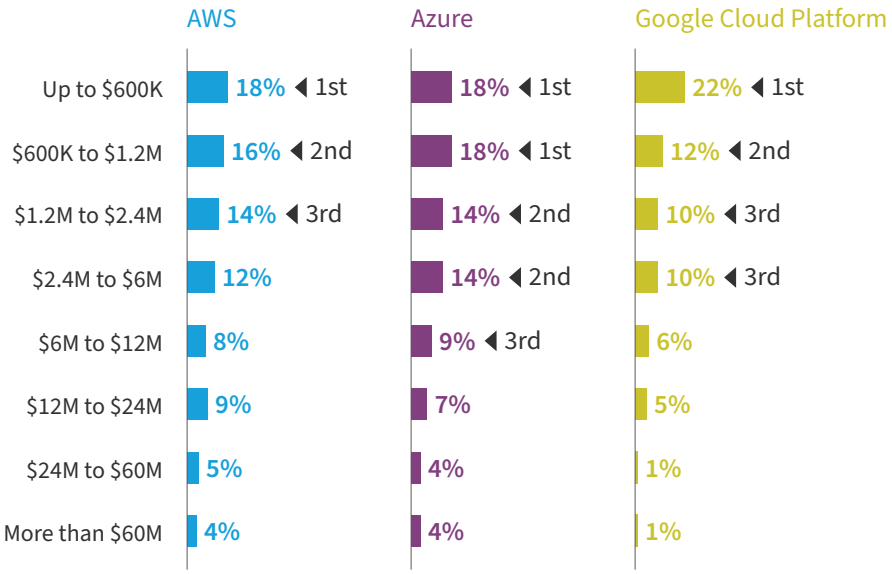
Enterprises are expanding their public cloud footprint

Cloud-first policies and cloud migration are top of mind for senior IT leaders, particularly in enterprise environments. As a result, enterprises are rapidly increasing public cloud spend and workload volumes.

Cloud spend is a good indicator of how much an enterprise is using a public cloud provider. As figure 56 indicates, 18 percent of enterprises spend $12 million or more annually on *AWS*. By comparison, 15 percent spend $12 million or more annually on *Azure*. Seven percent of enterprises reported spending $12 million or more annually on *Google Cloud Platform*.

FIGURE 56
AWS holds a slight lead among enterprises spending over $12 million annually.

Enterprise spend on top three cloud providers

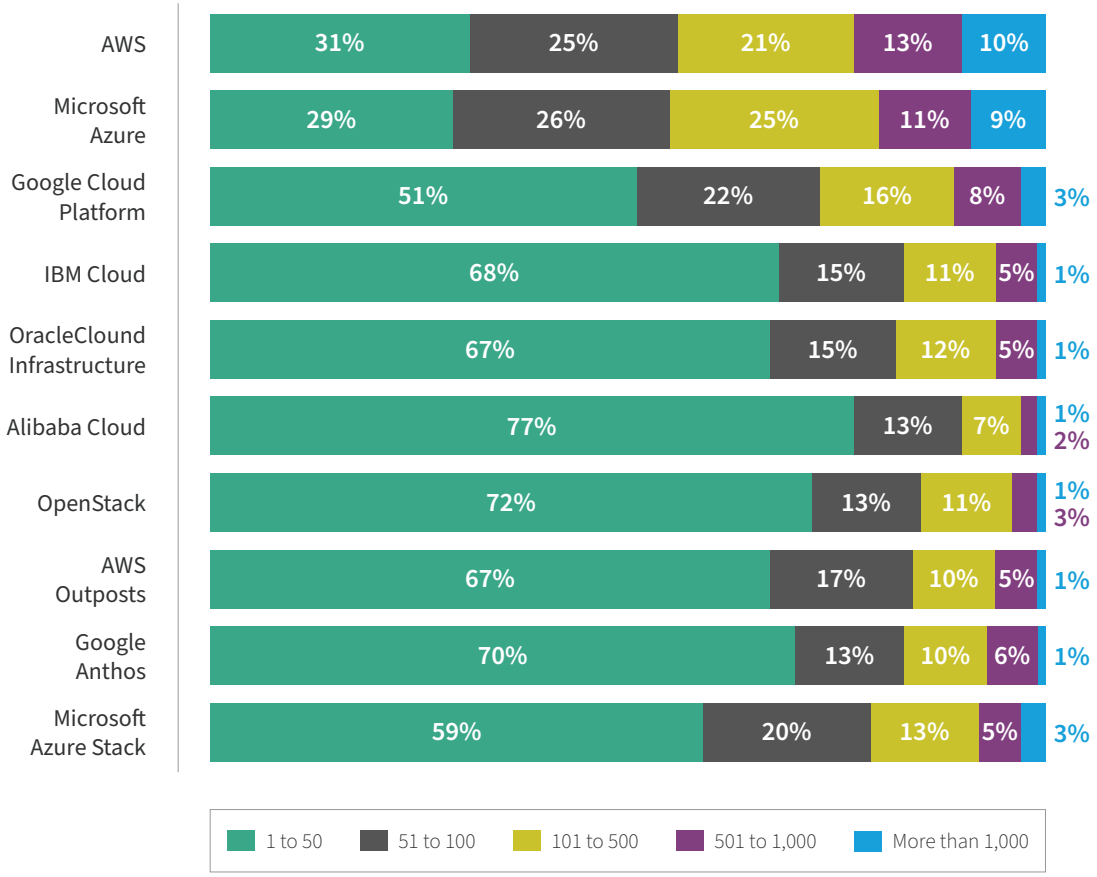


N=597
Source: Flexera 2022 State of the Cloud Report

The number of virtual machines (VMs) or instances running in each cloud provides additional insight into the size of organizations' footprints within them. For example, figure 57 indicates that *Microsoft Azure* is now on par with *AWS* among the larger footprint sizes of 500+ instances. Ten percent of respondents run more than 1,000 VMs in *AWS* compared to nine percent running that many in *Microsoft Azure*.

FIGURE 57
For larger instances (500+), *Microsoft Azure*, *AWS* and *Google Cloud Platform* lead the pack.

Number of VMs in use by cloud provider



N=753
Source: Flexera 2022 State of the Cloud Report

Use of public cloud PaaS services is increasing

Use of public cloud PaaS services is increasing

The number of public cloud users who utilize service beyond basic compute, storage and network services continues to grow.

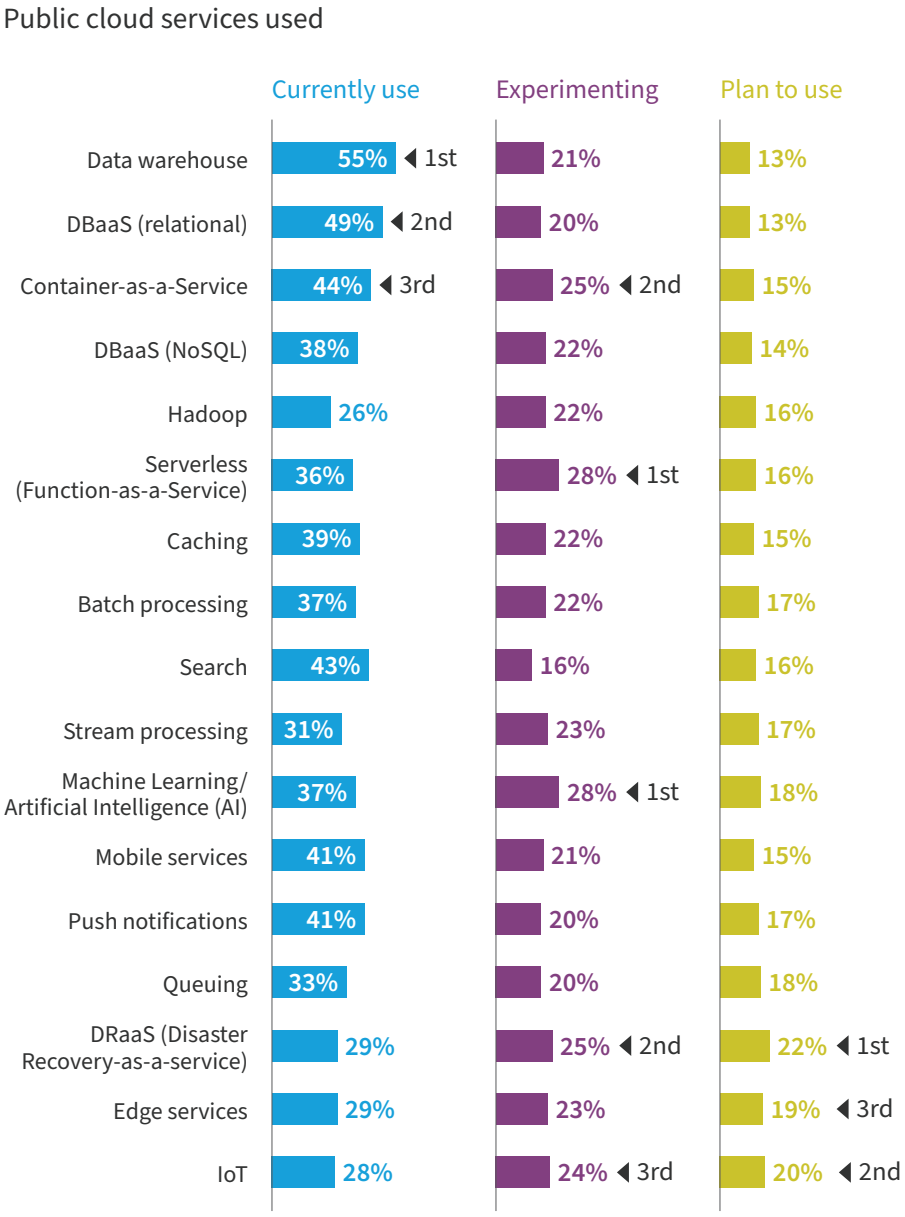
The most heavily used PaaS services have shifted

Organizations are increasingly utilizing PaaS services from cloud providers. Figure 58 ranks the services that organizations are *currently using, experimenting with* or *plan to use*. The top three currently being used are *data warehouse, relational database-as-a-service (DBaaS)* and *container-as-a-service*. Organizations are driving this shift due to their growing interest in using containers to quicken deployment, scale operations and increase the efficiency of workloads running in the cloud.

A look at the respondents *experimenting with* or *planning to use* a PaaS service sheds light on their strategies. Nearly half are *experimenting with* or *plan to use DRaaS* (47 percent) and *Machine Learning/Artificial Intelligence* (46 percent).

FIGURE 58

Data warehouse, relational database-as-a-service (DBaaS) and *container-as-a-service* are the top three public cloud services organizations use.



N=753

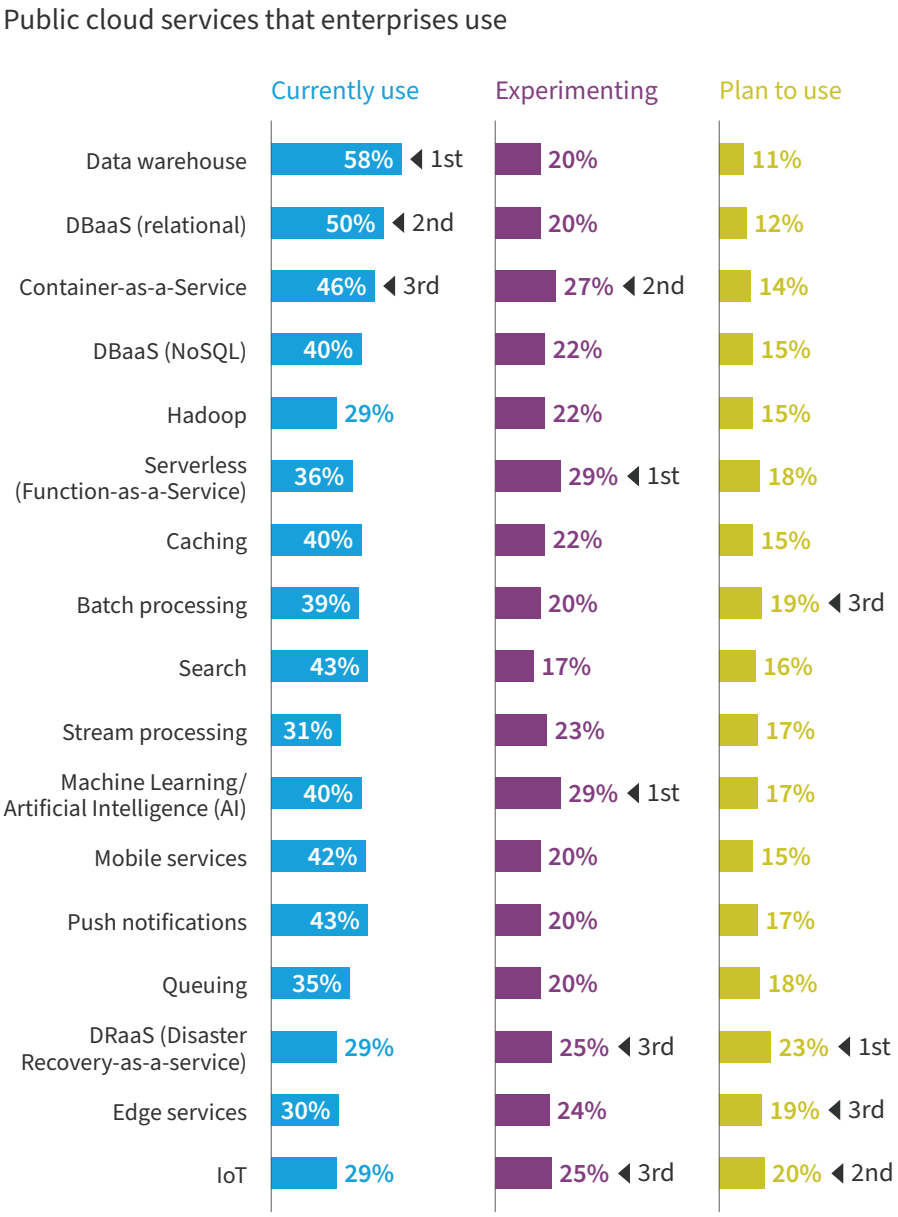
Source: Flexera 2022 State of the Cloud Report

Enterprises use more PaaS services

Enterprises use more PaaS services overall than SMBs. Figure 59 lists the rankings for enterprise respondents. These respondents place *data warehouse, DBaaS (relational)* and *container-as-a-service* in the top three. *Serverless (Function-as-a-Service)* and *Machine Learning/Artificial Intelligence (AI)* have the highest percentages of respondents experimenting with the service.

FIGURE 59

Serverless (Function-as-a-Service) and *Machine Learning/Artificial Intelligence (AI)* have the highest percentages of respondents experimenting.



N=597

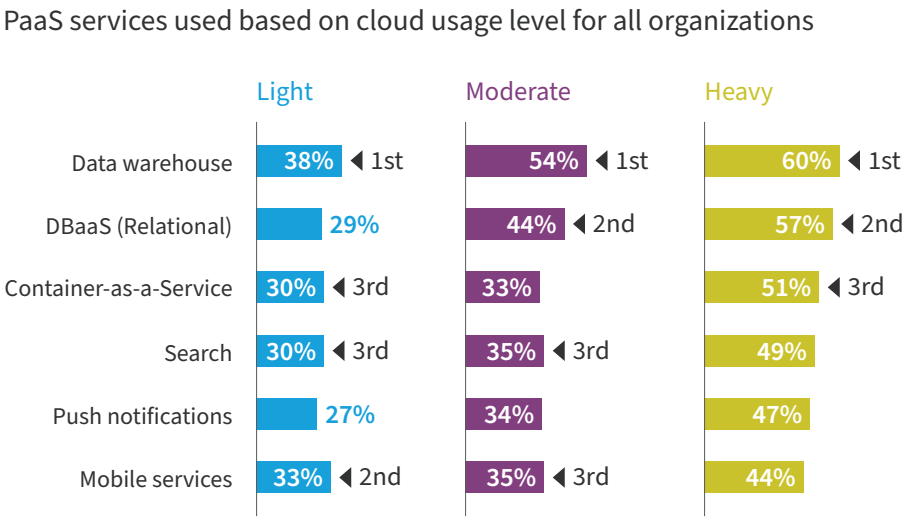
Source: Flexera 2022 State of the Cloud Report

PaaS services use increases with cloud usage level

Organizations increase their use of PaaS services as they increase their overall cloud usage, as figure 60 demonstrates. For example, *Data warehouse, DBaaS (relational)* and *Container-as-a-Service (CaaS)* lead the pack among heavy users. The adoption of these services increases as organizations mature. As organizations rely on cloud more heavily, they come to appreciate the operational burden these services eliminate from internal teams.

FIGURE 60

Data warehouse, DBaaS (relational) and *Container-as-a-Service (CaaS)* dominate the top three spots for PaaS services.



N=753
Source: Flexera 2022 State of the Cloud Report

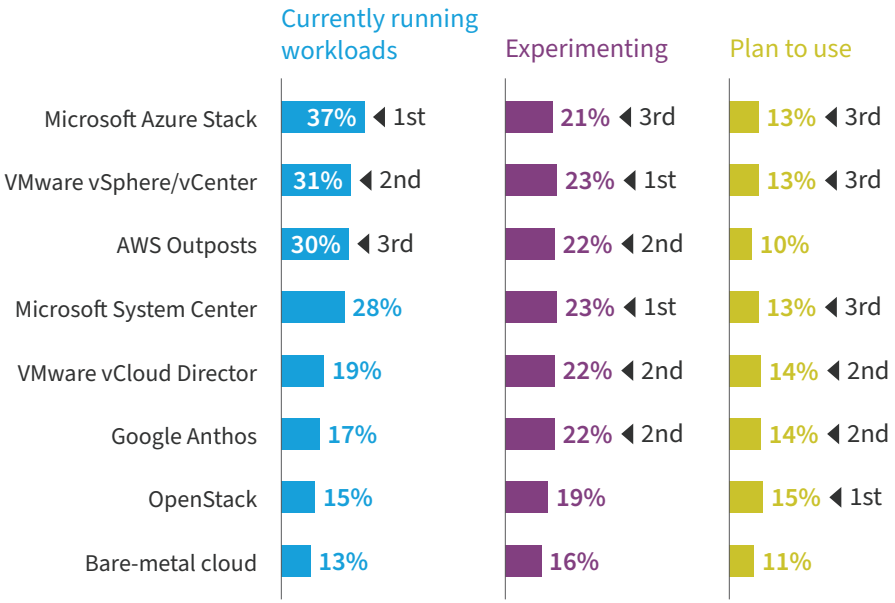
Private cloud plays an important role

Private cloud plays an important role

Most organizations are taking a multi-cloud, hybrid approach, in which private cloud plays an important role. Figure 61 lists the technologies all organizations are currently using, experimenting with or plan to use.

Microsoft Azure Stack increased slightly YoY and replaced *VMware vSphere* for the top spot. It's important to note that respondents could choose more than one response, so there may be overlap with some of these technologies.

FIGURE 61
Microsoft Azure Stack takes the top spot for private cloud adoption.

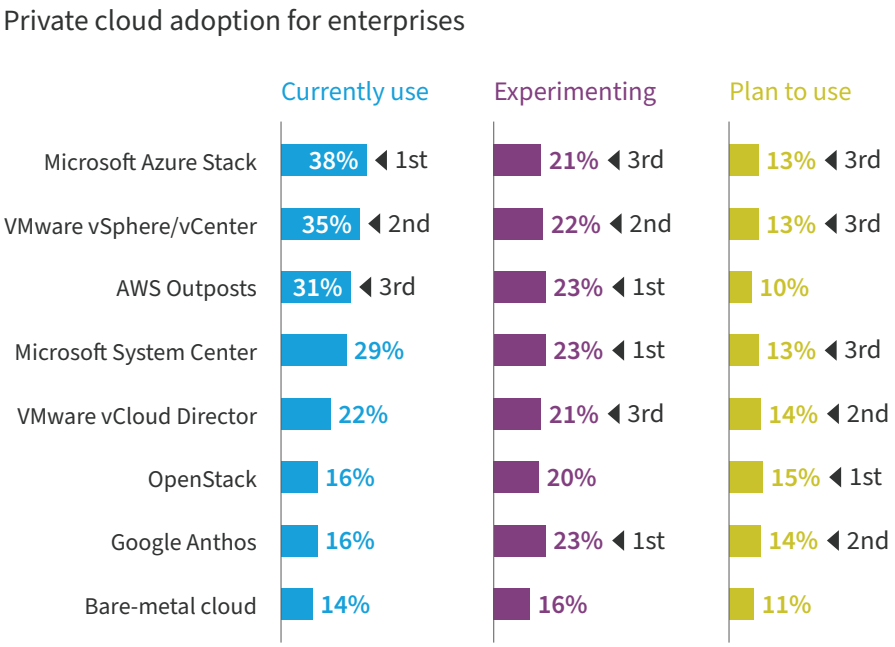


N=753
Source: Flexera 2022 State of the Cloud Report

SMBs use private clouds less than enterprises

Figures 62 and 63 show the ranking of the private cloud technologies usage by enterprise and SMB respondents, respectively. Among enterprises, *Microsoft Azure Stack* took the top spot. The biggest drop this year for enterprises was with *OpenStack*, which fell from 31 percent last year to 16 percent this year. When it comes to SMB preferences, the Microsoft technologies (*System Center* and *Microsoft Azure Stack*) are most popular, with 32 percent currently using each of these solutions.

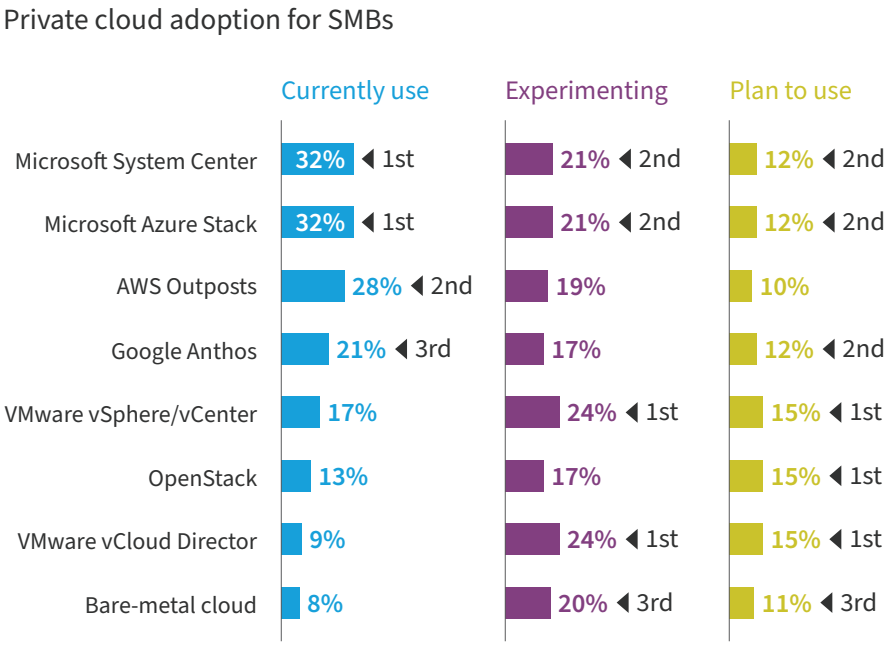
FIGURE 62
Enterprises prefer Microsoft Azure Stack for private cloud adoption.



N=597
Source: Flexera 2022 State of the Cloud Report

FIGURE 63

SMBs prefer *Microsoft* technologies (*System Center* and *Microsoft Azure Stack*) for private cloud adoption.



N=156

Source: Flexera 2022 State of the Cloud Report

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State of the Cloud Report: European spotlight

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State of the Cloud Report: European spotlight

European organizations face similar challenges and cite the same tech priorities as their global counterparts.

The 140 European participants in the *Flexera 2022 State of the Cloud Report* represent about one-fifth of the total survey audience and are executives or high-level managers in IT with significant knowledge of their organizations' overall cloud usage and IT budgets. This European spotlight examines the technology and spend issues respondents face as their organizations develop tech strategies. It includes comparisons between European organizations and their counterparts in other parts of the world.

European spotlight: highlights

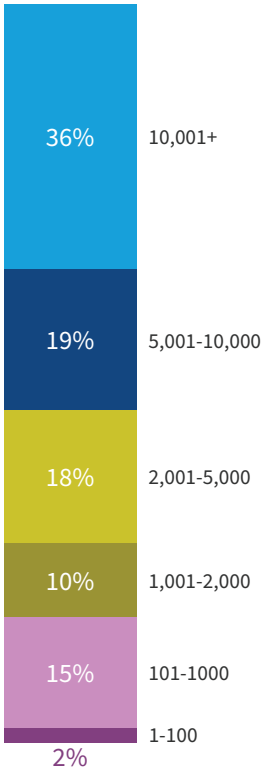
- Cloud usage is now mainstream. More than half (58 percent) of European respondents use cloud heavily, compared to 63 percent globally
- Top cloud initiatives in Europe are migrating more workloads to the cloud (69 percent), optimizing existing use of cloud (68 percent) and progressing on a cloud-first strategy (47 percent)
- The COVID-19 pandemic drove higher than normal cloud usage in Europe. Sixty-five percent of European respondents reported cloud usage that was somewhat or significantly higher than planned
- Similar to last year, assessing technical feasibility is the top cloud migration challenge for European respondents (51 percent). Other top challenges include understanding app dependencies (49 percent), assessing on-premises vs cloud costs (44 percent) and rightsizing/selecting the best instance (42 percent)

European respondent demographics

As figure 64 shows, 55 percent of European participants work in organizations with 5,000 or more employees compared with 46 percent globally. Representation by European organizations with 1,001 to 5,000 employees is 28 percent in Europe, compared to 33 percent globally. This year, we included a 10,000+ category; 36 percent of respondents are from these very large enterprises.

FIGURE 64

Most European respondents work in organizations with 5,000 or more employees.

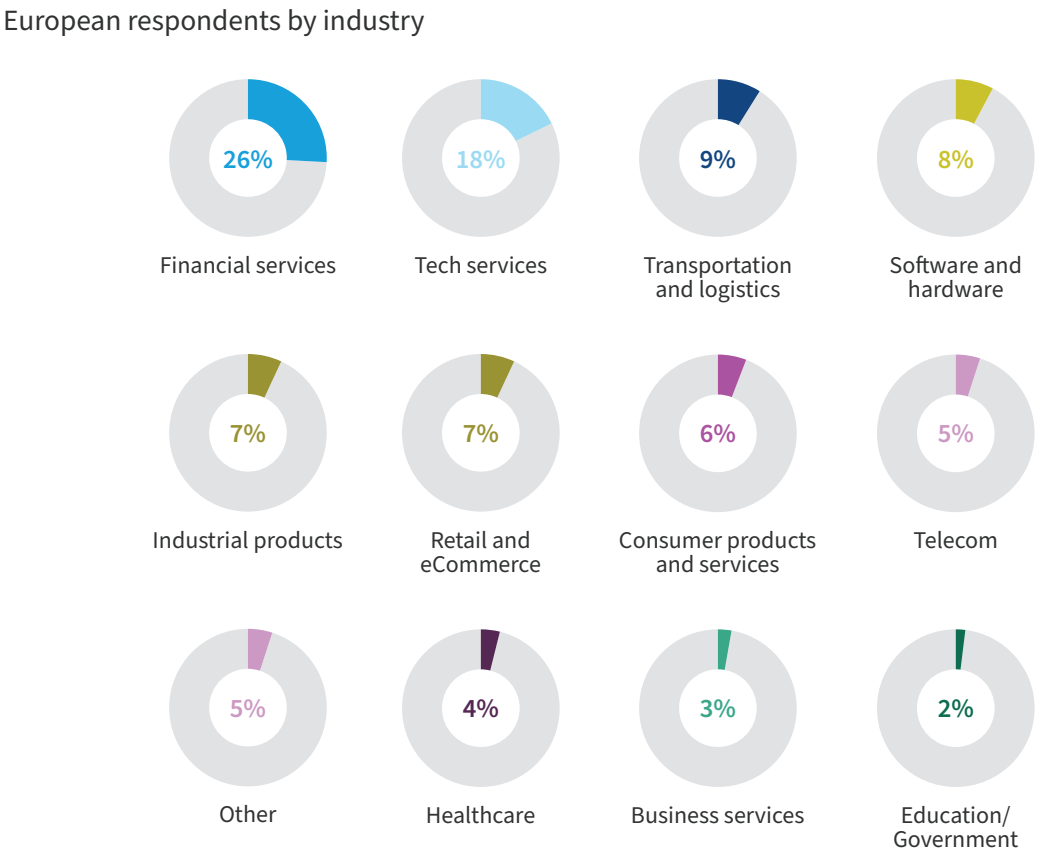


N=140
Source: Flexera 2022 State of the Cloud Report

Figure 65 summarizes European participation by industry. While the survey spans a range of industries, two have double-digit representation: *financial services* and *technology services*. The *other* category represents a variety of industries, with each representing less than two percent of respondents.

FIGURE 65

Financial services and *tech services* lead European respondent industries.



N=140

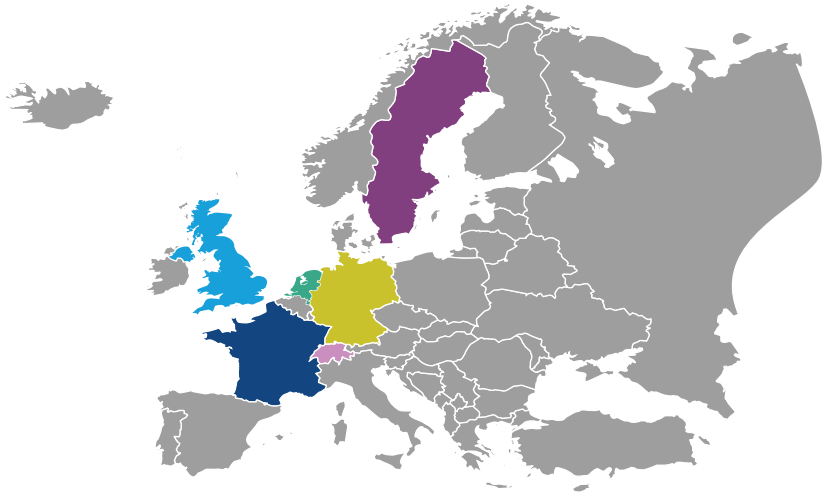
Source: Flexera 2022 State of the Cloud Report

Figure 66 summarizes European respondents by country. Forty-one percent are from the United Kingdom, 14 percent are from France and 12 percent are from Germany.

FIGURE 66

Most European respondents are from the United Kingdom.

European respondents by country



United Kingdom	41%	Germany	12%	Sweden	3%
Other Europe	21%	Netherlands	6%		
France	14%	Switzerland	4%		

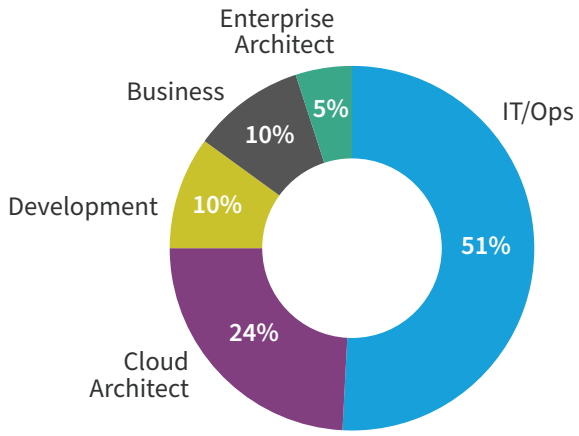
N=140
Source: Flexera 2022 State of the Cloud Report

Flexera

Figure 67 indicates the breakdown of European respondents by role within the organization.
Figure 68 shows the breakdown of European respondents by level within the organization.

FIGURE 67
Most European respondents are in IT/Ops.

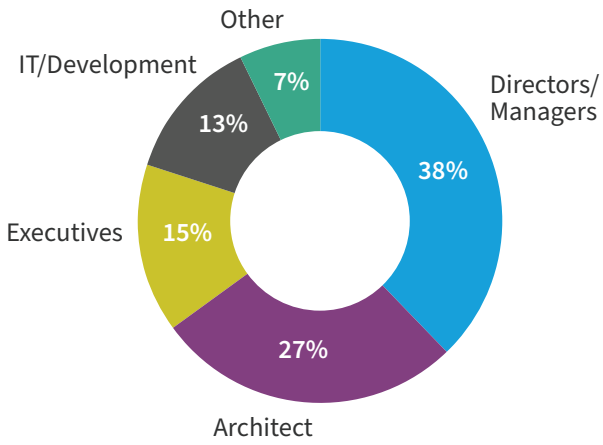
European respondents by role



N=140
Source: Flexera 2022 State of the Cloud Report

FIGURE 68
Most European respondents are directors/managers.

European respondents by level

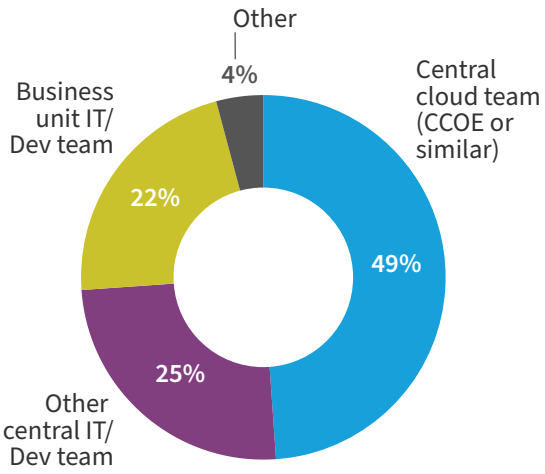


N=140
Source: Flexera 2022 State of the Cloud Report

Figure 69 illustrates the breakdown of European respondents by where in the organization they work.

FIGURE 69

Almost half of European respondents work in a CCOE or similar.



N=140
Source: Flexera 2022 State of the Cloud Report

Cloud has now become mainstream

As figure 70 shows, more than half (58 percent) of European respondents use the cloud heavily, compared to 62 percent globally; 28 percent use it moderately and 14 percent have light usage. This could be a result of more organizations entering the cloud and therefore starting with a lighter load. It could also reflect more respondents realizing that the evolving dynamics of the cloud are more complex than originally anticipated and are still working up to a heavier load.

FIGURE 70

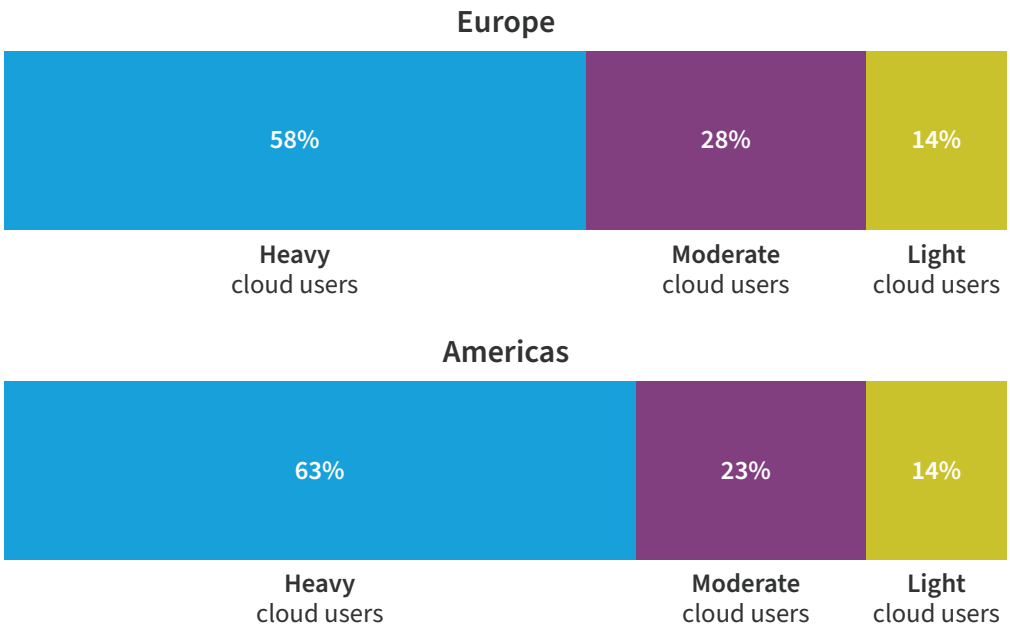
More than half of European respondents reported being heavy cloud users.

N=140
Source: Flexera 2022 State of the Cloud Report

Figure 71 provides a comparison of organizational cloud usage in Europe and in the Americas.

FIGURE 71
European respondents are more moderate cloud users than in the Americas.

Comparison of cloud usage level between Europe and the Americas

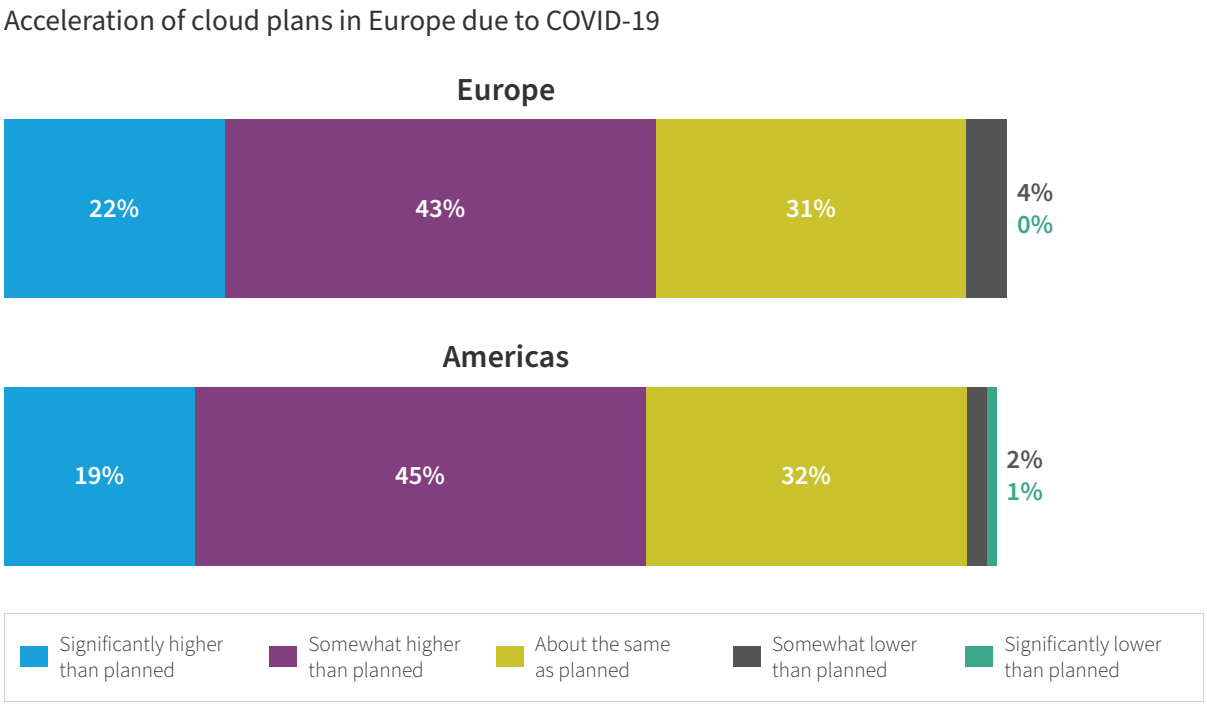


Europe N=140, Americas N=516
Source: Flexera 2022 State of the Cloud Report

European cloud usage accelerated due to COVID-19

In the *2021 State of the Cloud* survey, Flexera asked respondents how much they expected their cloud usage to change over the next twelve months due to the pandemic. This year we asked respondents to rate the accuracy of their predictions. As figure 72 shows, Europe saw higher than normal cloud usage due to COVID-19.

FIGURE 72
Most European respondents indicated their cloud usage was somewhat higher than planned due to the pandemic.



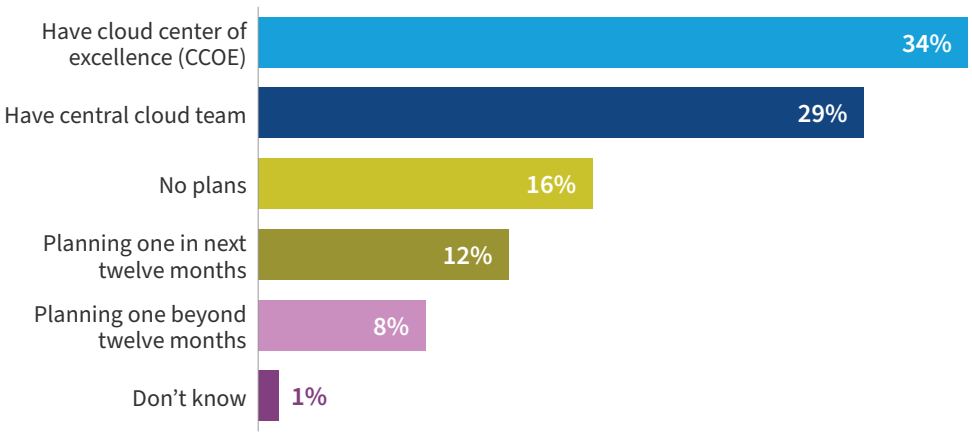
Europe N=140, Americas N=516
Source: Flexera 2022 State of the Cloud Report

Most European respondents have cloud teams or CCOEs

As figure 73 indicates, most European organizations (63 percent) have a *central cloud team* or a *cloud center of excellence* (*CCOE*), although that figure is still lower than their global counterparts (74 percent).

FIGURE 73

Nearly two-thirds of European organizations have a CCOE or central cloud team.



N=140
Source: Flexera 2022 State of the Cloud Report

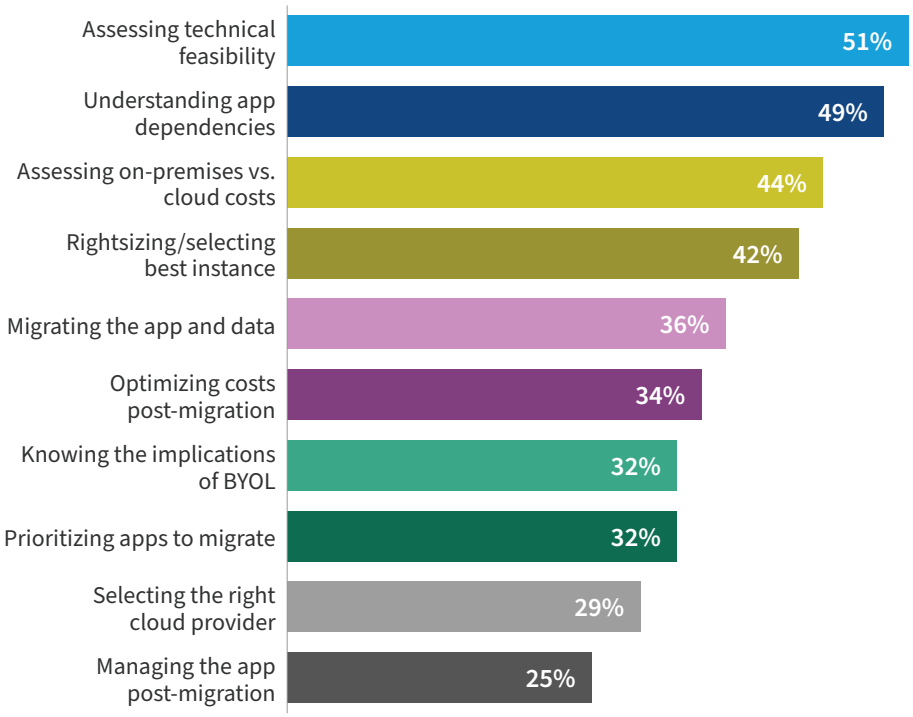
Assessing technical feasibility is a top cloud migration challenge

Fifty-one percent of respondents reported *assessing technical feasibility* as the top cloud migration challenge in Europe, as figure 74 shows. Other critical challenges include *understanding app dependencies, assessing on-premises vs. cloud costs* and *rightsizing/selecting the best instance*.

FIGURE 74

Similar to their global counterparts, European respondents indicated assessing technical feasibility is a top challenge.

Cloud migration challenges for European organizations



N=140
Source: Flexera 2022 State of the Cloud Report

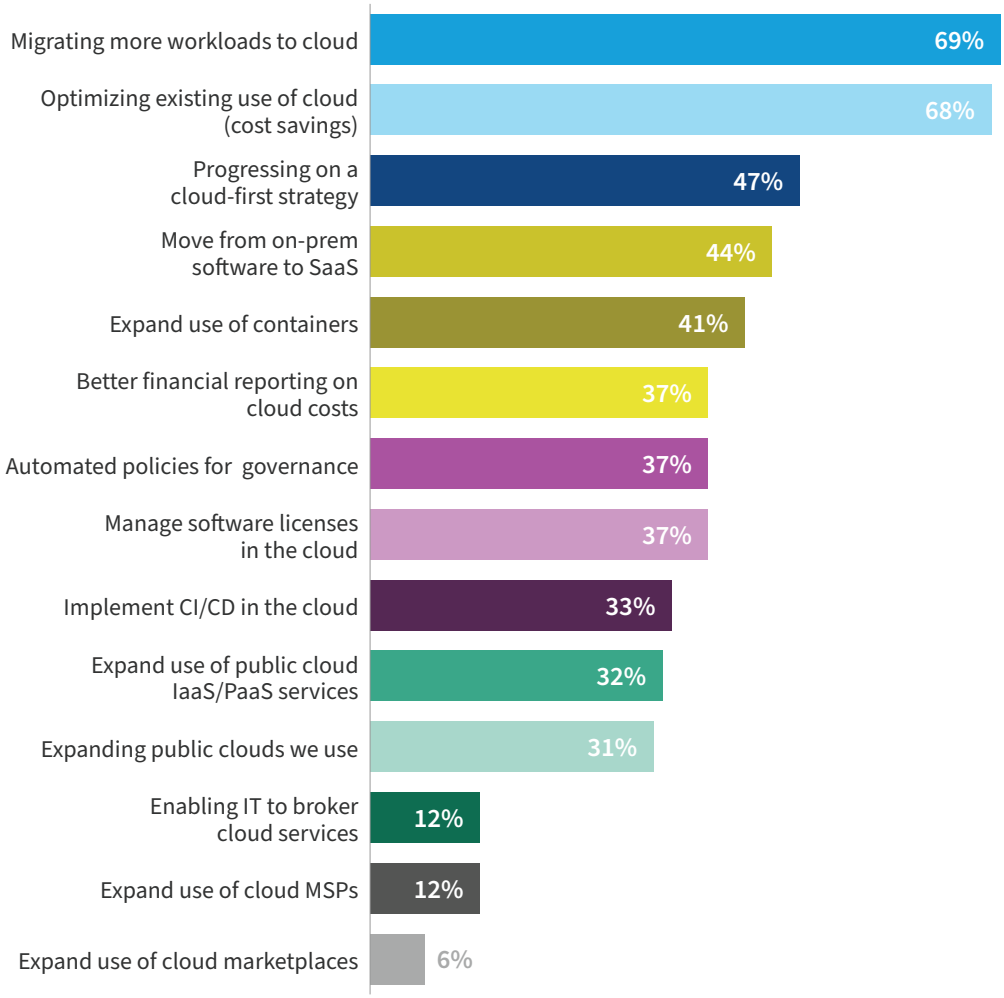
Migrating to the cloud is a top initiative

Migrating more workloads to the cloud is the top European cloud initiative this year (figure 75), followed by *optimizing the existing use of cloud (cost savings)* and *progressing on a cloud-first strategy.*

FIGURE 75

Migrating workloads to the cloud is a top priority for European respondents.

Cloud migration initiatives for European organizations



N=140
Source: Flexera 2022 State of the Cloud Report

Global summary

As the world becomes more digital and continues to define what a post-pandemic "new normal" looks like, the way businesses approach the cloud becomes increasingly important. The *Flexera 2022 State of the Cloud Report* highlights key insights surrounding ways in which organizations are tackling the complexities of the cloud.

The emergence of COVID-19 increased cloud usage, although not as much as predicted. Sixty-six percent of respondents said cloud usage is higher than initially planned this year, although 90 percent had predicted higher usage last year.

Today, organizations are progressively more comfortable with putting sensitive data in the cloud, reflecting increasing confidence in the security of the cloud. More than half of respondents are now considering moving at least some of their sensitive consumer data or corporate financial data to the cloud.

Multi-cloud strategies remain dominant, but the way they take shape varies. Hybrid approaches are adopted by approximately four out of five respondents, with the most common among enterprises a mix of various public and multiple private clouds. Notably, usage of cloud configuration tools is shifting as well. Native cloud tools are most used commonly today, and as the reliance on native tooling grows, the usage of third-party tools declines.

SMBs are experiencing a significant uptake of usage and spend on the cloud. More than half (53 percent) of SMBs now spend more than $1.2 million on cloud annually, up from 38 percent reported last year.

Companies continue to adopt FinOps practices as cloud spend is wasted and optimization remains a priority. For the sixth year in a row, saving on costs by optimizing the existing use of cloud is the top initiative. Wasted spend on cloud is growing, and as the need to maximize every dollar spent grows so does the importance of FinOps.

One thing is for certain: to remain competitive and maximize the available advantages, organizations must make strategic decisions about cloud architecture, usage of public clouds, effective tooling and cloud cost management. And the siloed and disjointed approaches of yesterday will no longer be effective in today's fast-evolving digital world.

Table of figures

About Flexera

Flexera delivers SaaS-based IT management solutions that enable enterprises to accelerate digital transformation and multiply the value of their technology investments. We help organizations ***inform their IT*** with definitive visibility into complex hybrid IT ecosystems, providing unparalleled IT insights that allow them to seize technology opportunities. And we help them ***transform their IT*** with tools that deliver actionable intelligence across an ever-increasing range of dimensions to effectively manage, govern and optimize their hybrid IT estate.

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Contact us for more information or a demo:

+1 800.809.5659 | +44 870.871.1111

sales@flexera.com