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 In a hybrid IT world, a siloed approach to IT management is obsolete.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

31%	10,001+
15%	5,001-10,000
21%	2,001-5,000
12%	1,001-2,000
14%	101-1000
7%	1-100
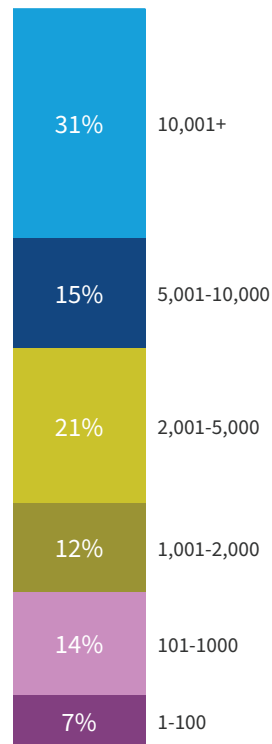
N=753
Source: Flexera 2022 State of the Cloud Report

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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*.

Respondents by industry

22%	20%	17%	10%
Tech services	Financial services	Software and hardware	Healthcare

5%	5%	4%	4%
Retail and e-commerce	Consumer products and services	Education/ Government	Transportation and logistics

4%	3%	3%	3%
Industrial products	Business services	Telecom	Other
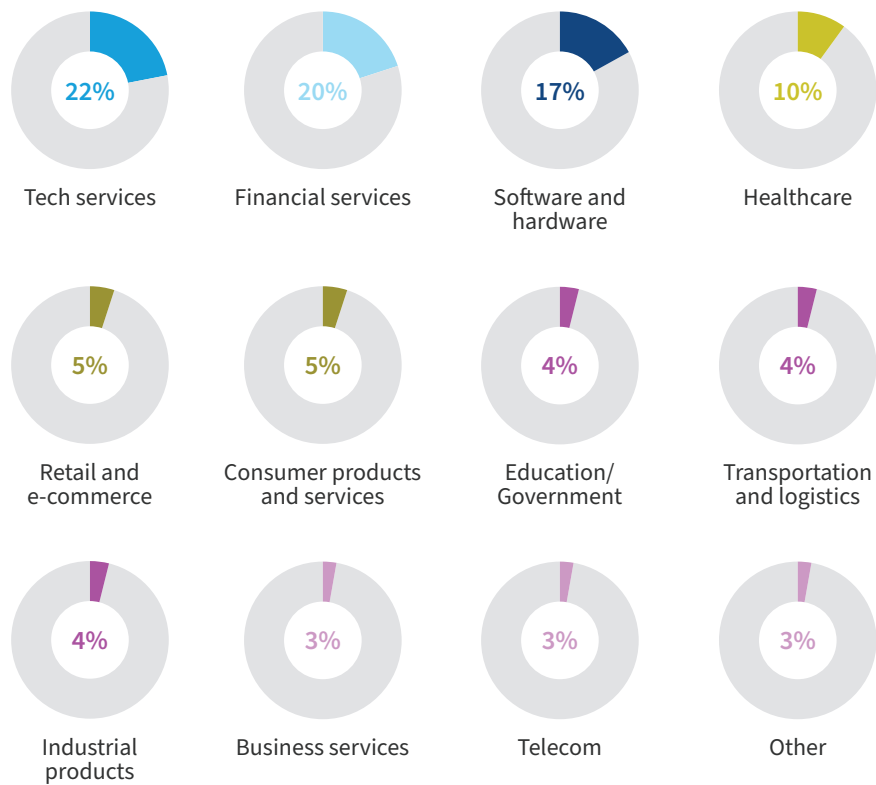
N=753
Source: Flexera 2022 State of the Cloud Report

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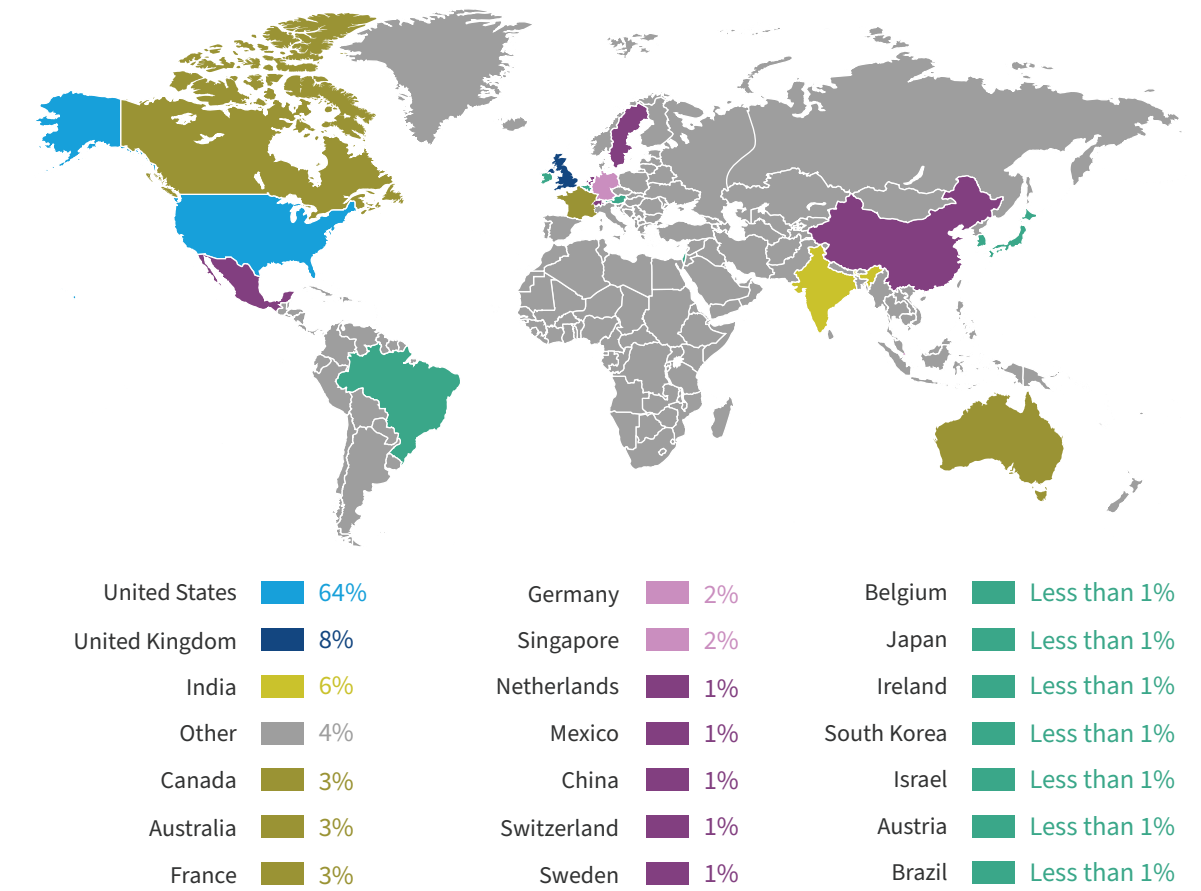
N=753
Source: Flexera 2022 State of the Cloud Report

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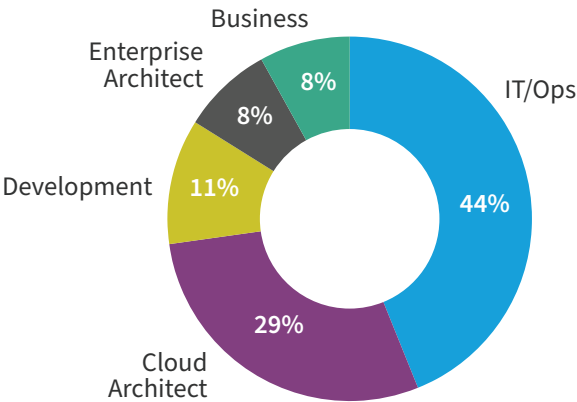
N=753
Source: Flexera 2022 State of the Cloud Report

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FIGURE 5
Most respondents are directors/managers.

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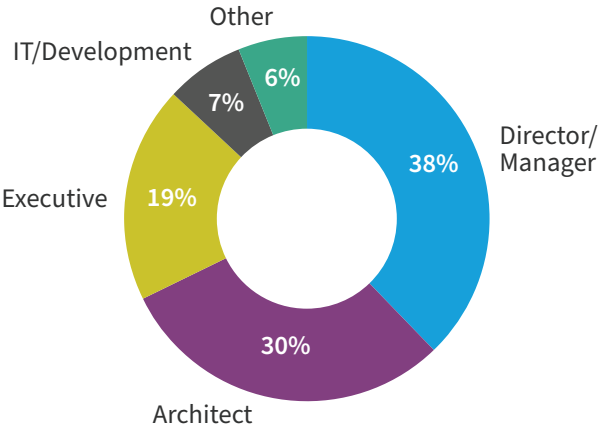
N=753
Source: Flexera 2022 State of the Cloud Report

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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

Central cloud team (CCOE or similar)	Business unit central IT/Dev team	Other central IT/Dev team	Other
60%	22%	16%	2%

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.

What's your company's usage level of public cloud?

63% Heavy

23% Moderate

14% Light
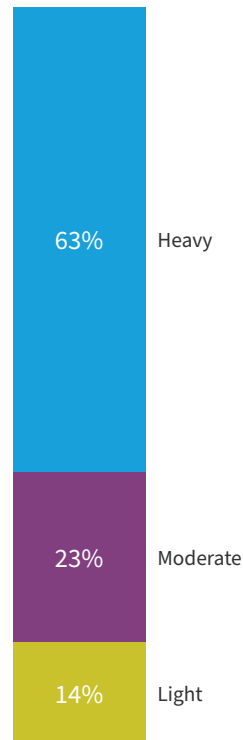
N=753
Source: Flexera 2022 State of the Cloud Report

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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.

Cloud involvement within organization

Category	Percentage
Involved in decisions on SaaS	78%
Involved in decisions on public cloud	77%
Involved in managing use and/or costs of SaaS	69%
Involved in decisions on private cloud	67%
Involved in managing use and/or costs of public cloud	66%
User of public cloud IaaS/PaaS	66%
User of SaaS	65%
Involved in managing use and/or costs of private cloud	57%
User of private cloud IaaS/PaaS	55%
Managing public cloud for our customers (MSP, SI)	33%

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

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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

Single private — 2%
Single public — 9%
89% Multi-cloud

7% — Multiple public
2% — Multiple private
80% Hybrid cloud
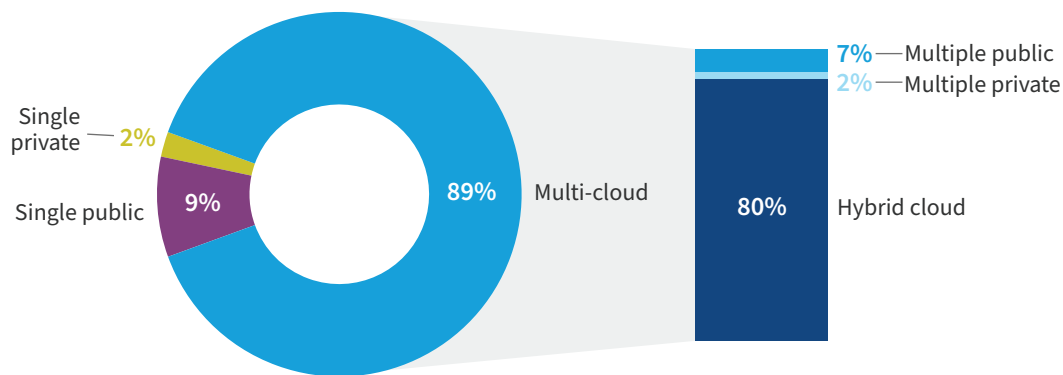
N=753
Source: Flexera 2022 State of the Cloud Report

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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.

Hybrid cloud strategies for all organizations

Category	Percentage
Multiple public and multiple private	48%
Multiple public and one private	31%
One public and multiple private	12%
One public and one private	9%
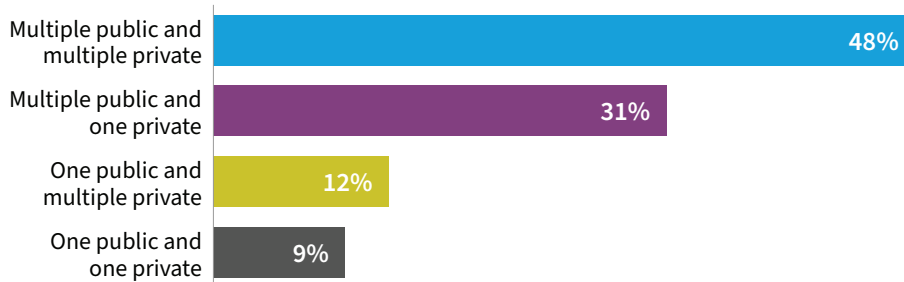
N=602
Source: Flexera 2022 State of the Cloud Report

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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.

Use of multi-cloud architectures by all organizations

Architecture	Percentage
Apps siloed on different clouds	45%
DR/Failover between clouds	44%
Data integration between clouds	41%
Workload mobility between clouds	36%
Individual apps span public and private cloud	32%
Workload bursting (cloud-bursting)	27%
Intelligent workload placement	25%
Cloud brokering	20%
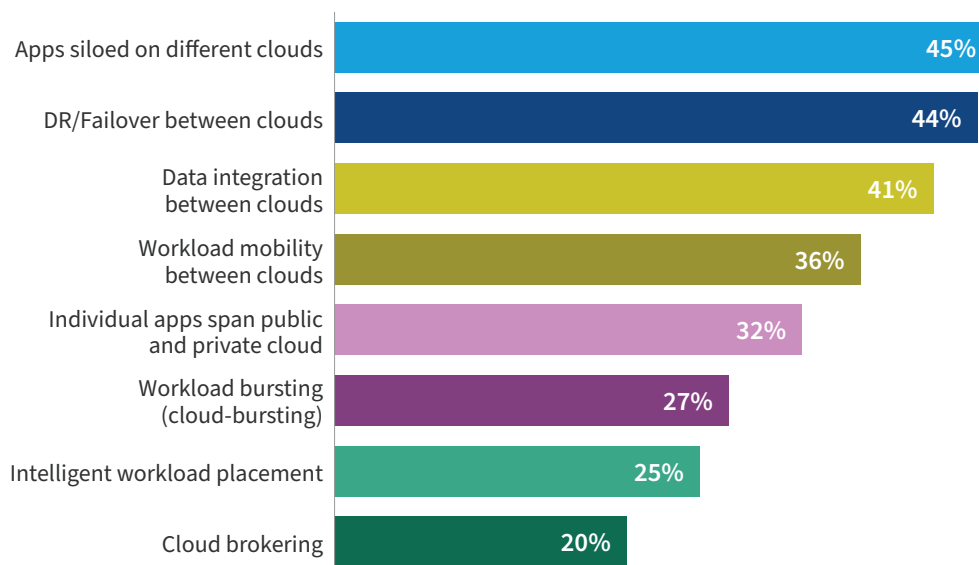
N=753
Source: Flexera 2022 State of the Cloud Report

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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.

Use of multi-cloud tools by all organizations

Tool	Percentage
Multi-cloud security tools	32%
Multi-cloud cost management tools	31%
Multi-cloud governance tools	25%
Multi-cloud management tools	25%

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

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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

Tool	Percentage
Multi-cloud security tools	41%
Multi-cloud cost management tools	37%
Multi-cloud governance tools	34%
Multi-cloud management tools	33%
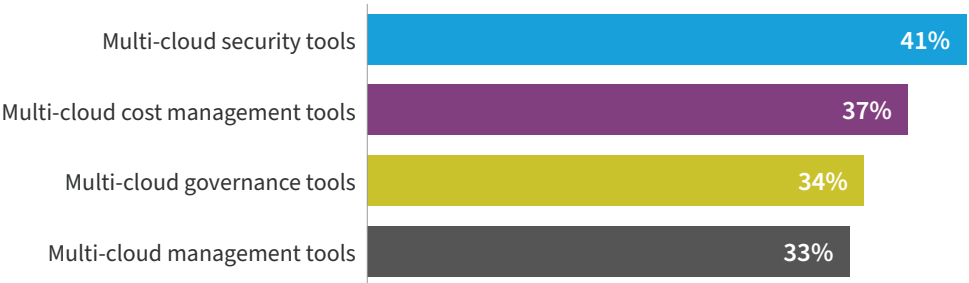
N=232
Source: Flexera 2022 State of the Cloud Report

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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.

Types of clouds used

Public cloud only   16%   80% Hybrid   4%   Private cloud only

Public 96%   Private 84%
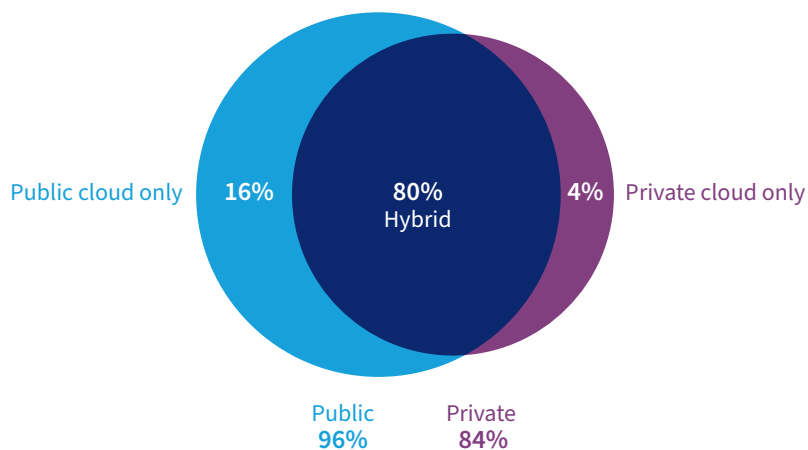
N=753
Source: Flexera 2022 State of the Cloud Report

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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.

Annual public cloud spend for all organizations
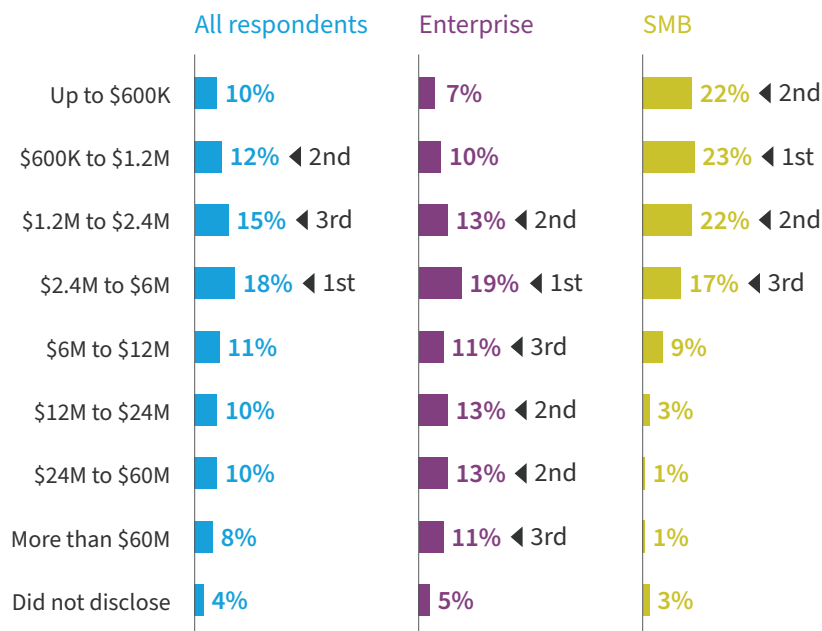
	All respondents	Enterprise	SMB
Up to $600K	10%	7%	22% ◀ 2nd
$600K to $1.2M	12% ◀ 2nd	10%	23% ◀ 1st
$1.2M to $2.4M	15% ◀ 3rd	13% ◀ 2nd	22% ◀ 2nd
$2.4M to $6M	18% ◀ 1st	19% ◀ 1st	17% ◀ 3rd
$6M to $12M	11%	11% ◀ 3rd	9%
$12M to $24M	10%	13% ◀ 2nd	3%
$24M to $60M	10%	13% ◀ 2nd	1%
More than $60M	8%	11% ◀ 3rd	1%
Did not disclose	4%	5%	3%

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

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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

Additional workloads in public cloud in twelve months — 6%

Workloads in public cloud today — 50%
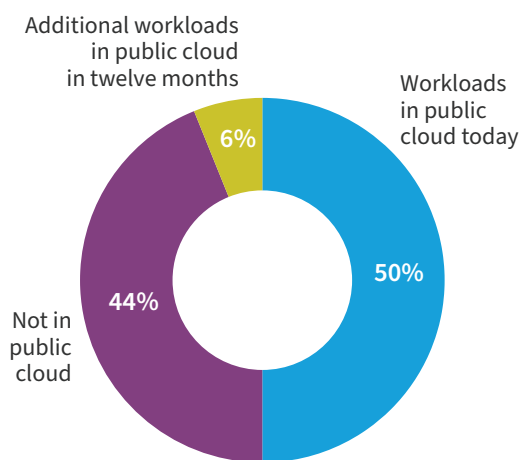
Not in public cloud — 44%

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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

Additional data in public cloud in twelve months — 7%

Data in public cloud today — 48%

Not in public cloud — 45%
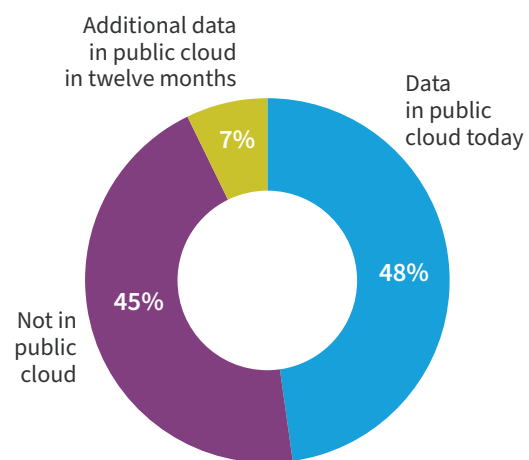
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Nearly half of enterprise workloads and data is in a public cloud

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

Additional workloads in public cloud in twelve months — 6%

Workloads in public cloud today — 49%
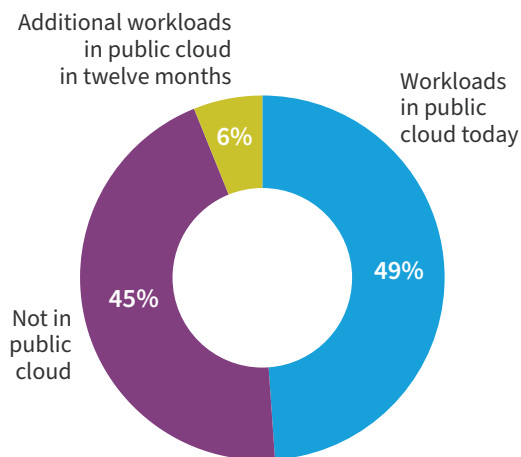
Not in public cloud — 45%

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FIGURE 19

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

Enterprise data in public cloud

Additional data in public cloud in twelve months — 7%

Not in public cloud — 47%

Data in public cloud today — 46%
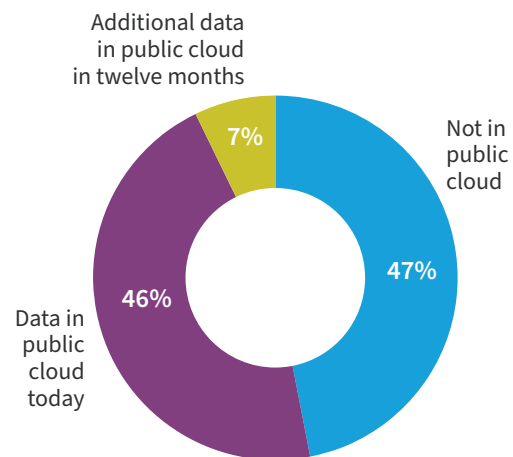
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Nearly two-thirds of SMB workloads will be in the cloud

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

Additional workloads in public cloud in twelve months — 6%
Workloads in public cloud today — 57%
Not in public cloud — 37%
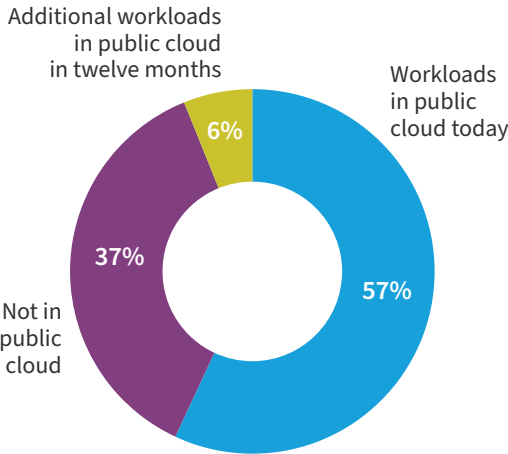
N=156
Source: Flexera 2022 State of the Cloud Report

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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

Additional data in public cloud in twelve months — 6%
Data in public cloud today — 56%
Not in public cloud — 38%
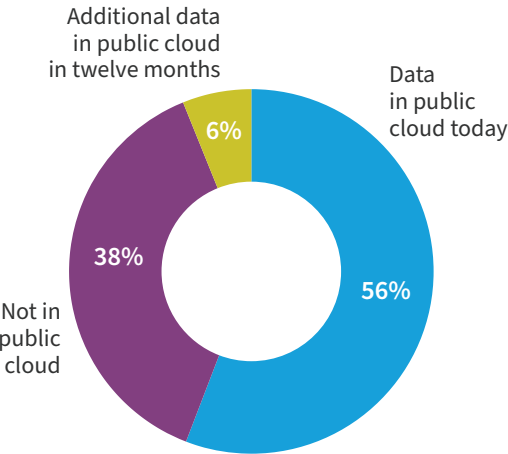
N=156
Source: Flexera 2022 State of the Cloud Report

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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.

Predicted cloud usage compared to actual usage and spend

	Significantly lower than planned	Somewhat lower than planned	About the same as planned	Somewhat higher than planned	Significantly higher than planned
Total	1% / 2%		31%	45%	21%
SMB	0%	4%	36%	40%	20%
Enterprise	1% / 2%		29%	47%	21%

- Significantly lower than planned
- Somewhat lower than planned
- About the same as planned
- Somewhat higher than planned
- Significantly higher than planned
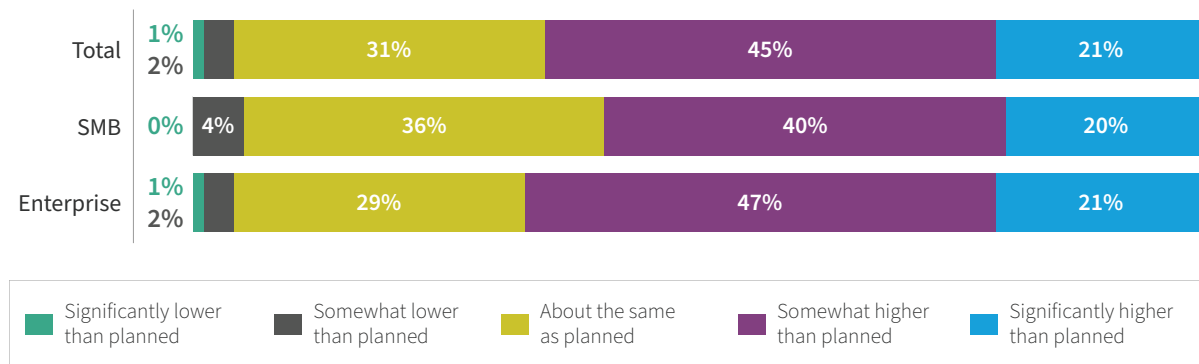
All respondents N=753, SMB N=156, Enterprise N=597
Source: Flexera 2022 State of the Cloud Report

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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.

Data in the cloud

	Consumer data (PII/PHI, etc.)	Corporate financial data	Order/ Sales data	IoT/Edge data	Non-sensitive data for analytics	Other non-sensitive data
All data stays on-premises	15%	19%	7%	7%	5%	3%
Most data stays on-premises	23%	25%	17%	11%	10%	10%
Mix of on-premises and in cloud/SaaS	31%	26%	29%	25%	22%	24%
Most data will move to cloud/SaaS	15%	15%	24%	22%	25%	24%
All data will move to cloud/SaaS	13%	11%	19%	21%	34%	31%
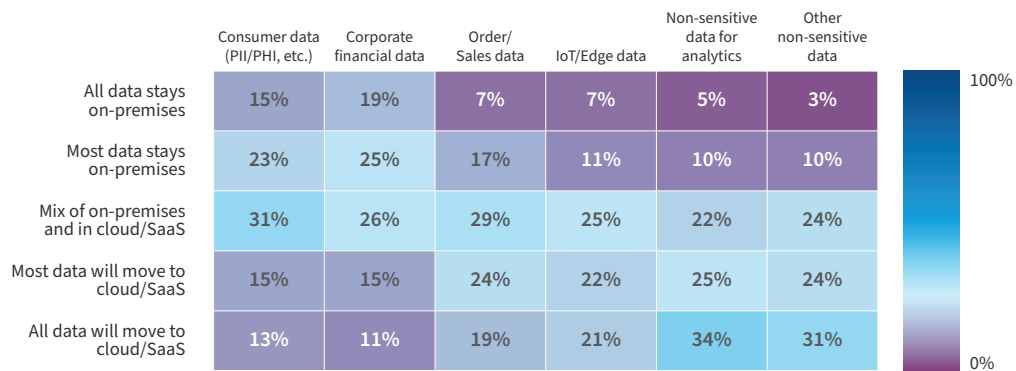
N=753
Source: Flexera 2022 State of the Cloud Report

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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.

Cloud migration challenges

	All respondents	Enterprise	SMB
Understanding app dependencies	53% ◀ 1st	52% ◀ 1st	57% ◀ 1st
Assessing technical feasibility	48% ◀ 2nd	49% ◀ 2nd	44% ◀ 2nd
Assessing on-premises vs. cloud costs	41% ◀ 3rd	42% ◀ 3rd	38% ◀ 3rd
Rightsizing/selecting best instance	41% ◀ 3rd	42% ◀ 3rd	36%
Knowing the implications of BYOL	37%	39%	29%
Selecting the right cloud provider	34%	32%	38% ◀ 3rd
Prioritizing apps to migrate	34%	33%	38% ◀ 3rd
Migrating the app and data	34%	35%	29%
Optimizing costs post-migration	33%	35%	25%
Managing the app post-migration	23%	24%	19%

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

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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.

Top cloud initiatives for 2022 across all organizations

Initiative	Percentage
Optimizing existing use of cloud (cost savings)	59%
Migrating more workloads to cloud	57%
Move from on-premises software to SaaS	42%
Progressing on a cloud-first strategy	40%
Better financial reporting on cloud costs	38%
Automated policies for governance	36%
Expand use of containers	35%
Manage software licenses in the cloud	33%
Expanding public clouds we use	33%
Expand use of public cloud IaaS/PaaS services	31%
Continuous Integration and Deployment (CI/CD)	29%
Enabling IT to broker cloud services	15%
Expand use of cloud MSPs	12%
Expand use of cloud marketplaces	7%

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

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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

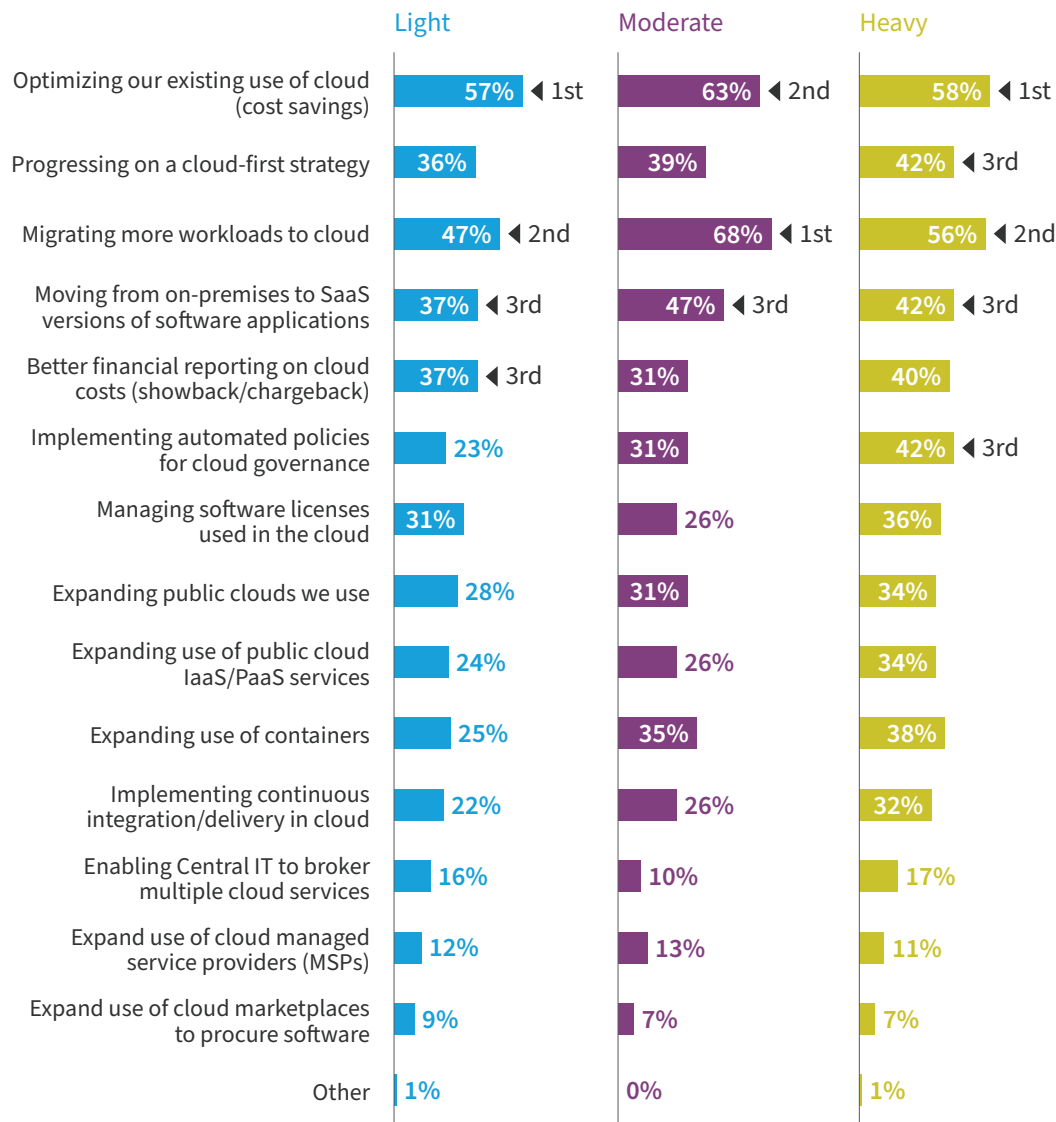|	Light	Moderate	Heavy
Optimizing our existing use of cloud (cost savings)	57% ◄ 1st	63% ◄ 2nd	58% ◄ 1st
Progressing on a cloud-first strategy	36%	39%	42% ◄ 3rd
Migrating more workloads to cloud	47% ◄ 2nd	68% ◄ 1st	56% ◄ 2nd
Moving from on-premises to SaaS versions of software applications	37% ◄ 3rd	47% ◄ 3rd	42% ◄ 3rd
Better financial reporting on cloud costs (showback/chargeback)	37% ◄ 3rd	31%	40%
Implementing automated policies for cloud governance	23%	31%	42% ◄ 3rd
Managing software licenses used in the cloud	31%	26%	36%
Expanding public clouds we use	28%	31%	34%
Expanding use of public cloud IaaS/PaaS services	24%	26%	34%
Expanding use of containers	25%	35%	38%
Implementing continuous integration/delivery in cloud	22%	26%	32%
Enabling Central IT to broker multiple cloud services	16%	10%	17%
Expand use of cloud managed service providers (MSPs)	12%	13%	11%
Expand use of cloud marketplaces to procure software	9%	7%	7%
Other	1%	0%	1%

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

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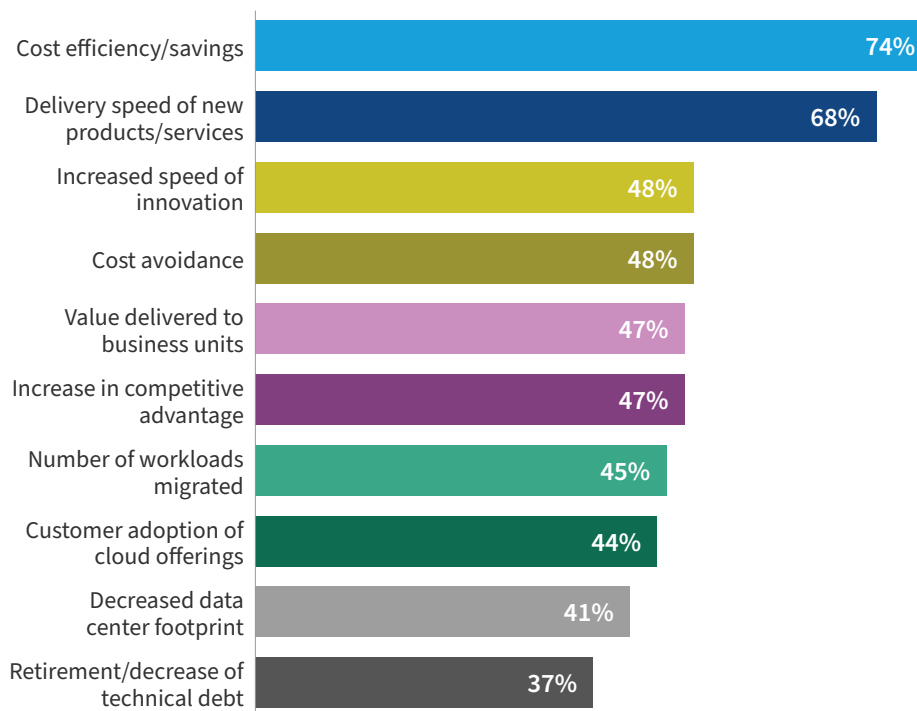## Organizations measure cloud progress by savings, agility and value

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

Metric	Percentage
Cost efficiency/savings	74%
Delivery speed of new products/services	68%
Increased speed of innovation	48%
Cost avoidance	48%
Value delivered to business units	47%
Increase in competitive advantage	47%
Number of workloads migrated	45%
Customer adoption of cloud offerings	44%
Decreased data center footprint	41%
Retirement/decrease of technical debt	37%

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

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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.
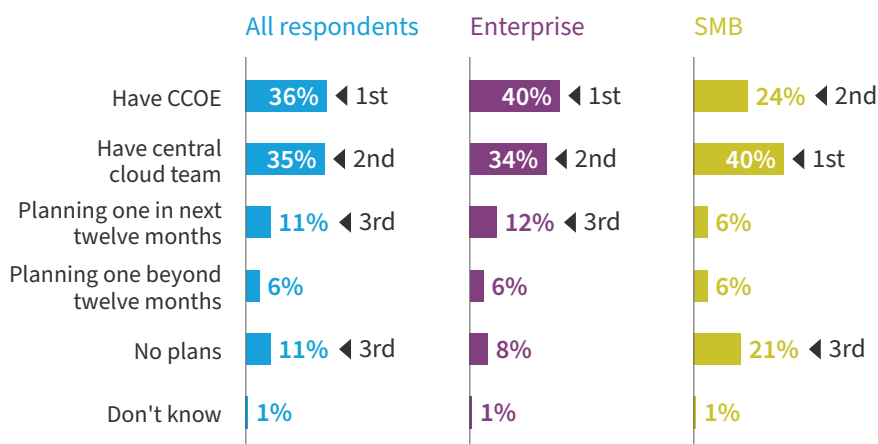
The majority of organizations (71 percent) have a central cloud team or CCOE. Enterprises, due to their larger size and more extensive application portfolios, have a greater need for centralization than do SMBs. Spend, governance and security within larger organizations are much more complex; teams overseeing 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	Enterprise	SMB
Have CCOE	36% ◀ 1st	40% ◀ 1st	24% ◀ 2nd
Have central cloud team	35% ◀ 2nd	34% ◀ 2nd	40% ◀ 1st
Planning one in next twelve months	11% ◀ 3rd	12% ◀ 3rd	6%
Planning one beyond twelve months	6%	6%	6%
No plans	11% ◀ 3rd	8%	21% ◀ 3rd
Don't know	1%	1%	1%

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

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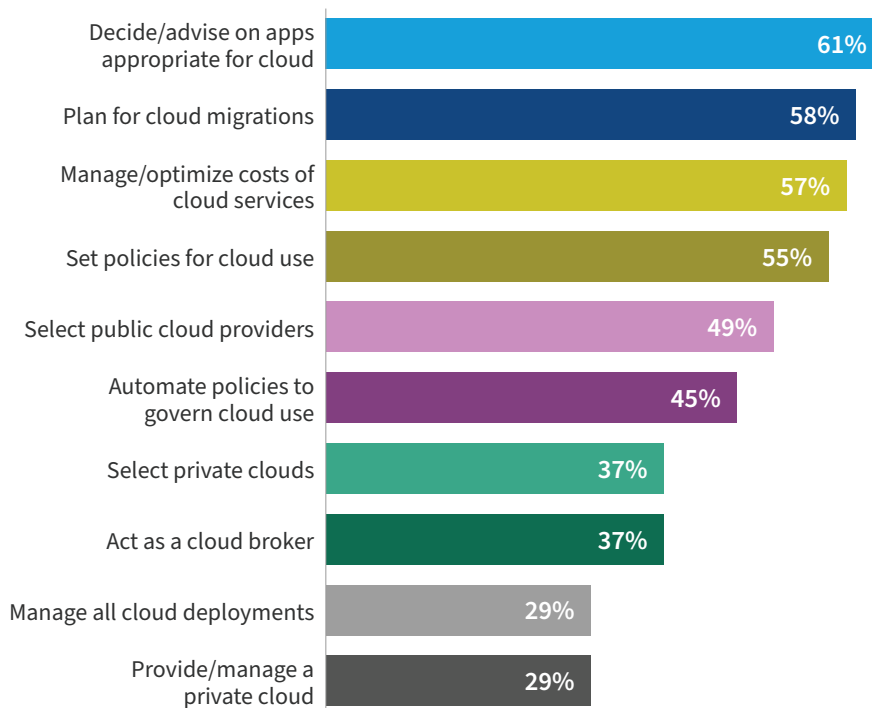## Central teams optimize cloud costs and govern use

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.

Central IT responsibilities in organizations

Responsibility	Percentage
Decide/advise on apps appropriate for cloud	61%
Plan for cloud migrations	58%
Manage/optimize costs of cloud services	57%
Set policies for cloud use	55%
Select public cloud providers	49%
Automate policies to govern cloud use	45%
Select private clouds	37%
Act as a cloud broker	37%
Manage all cloud deployments	29%
Provide/manage a private cloud	29%

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

FLEXERA

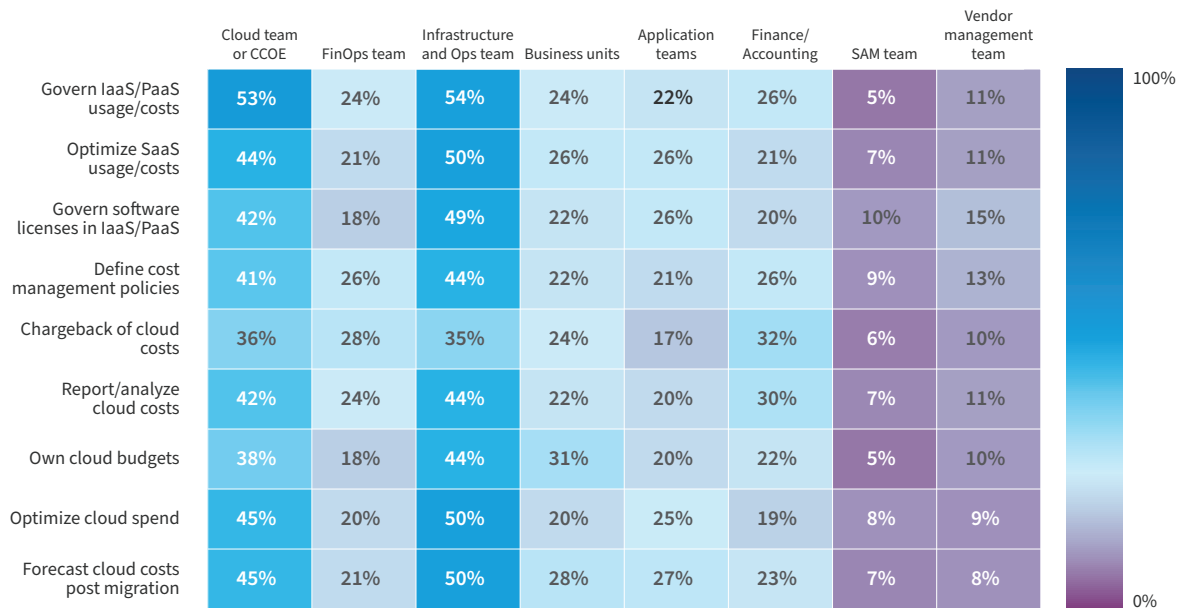## Software asset management and vendor management can lend expertise

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

	Cloud team or CCOE	FinOps team	Infrastructure and Ops team	Business units	Application teams	Finance/ Accounting	SAM team	Vendor management team
Govern IaaS/PaaS usage/costs	53%	24%	54%	24%	22%	26%	5%	11%
Optimize SaaS usage/costs	44%	21%	50%	26%	26%	21%	7%	11%
Govern software licenses in IaaS/PaaS	42%	18%	49%	22%	26%	20%	10%	15%
Define cost management policies	41%	26%	44%	22%	21%	26%	9%	13%
Chargeback of cloud costs	36%	28%	35%	24%	17%	32%	6%	10%
Report/analyze cloud costs	42%	24%	44%	22%	20%	30%	7%	11%
Own cloud budgets	38%	18%	44%	31%	20%	22%	5%	10%
Optimize cloud spend	45%	20%	50%	20%	25%	19%	8%	9%
Forecast cloud costs post migration	45%	21%	50%	28%	27%	23%	7%	8%

N=753
Source: Flexera 2022 State of the Cloud Report
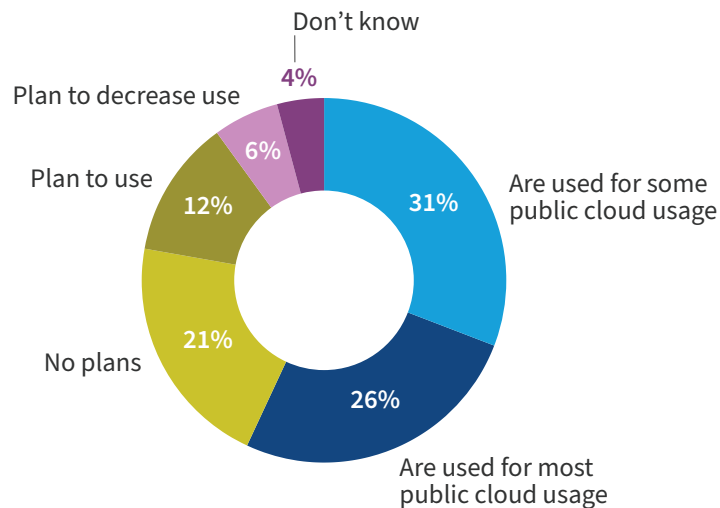
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Managed service providers (MSPs) assist with cloud work

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

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

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

MSP usage by enterprises vs. SMBs

Category	Enterprise	SMB
Use MSP	57%	55%
No plans	21%	21%
Plan to use	13%	11%
Plan to use less	5%	8%
Don't know	4%	5%
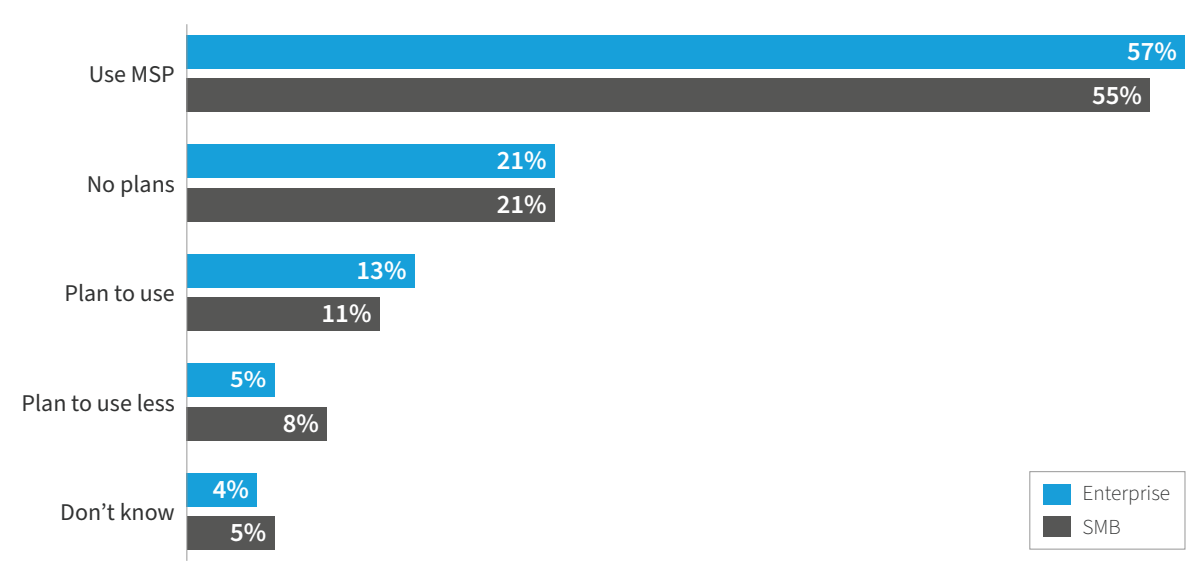
Enterprise N=597, SMB N=156
Source: Flexera 2022 State of the Cloud Report
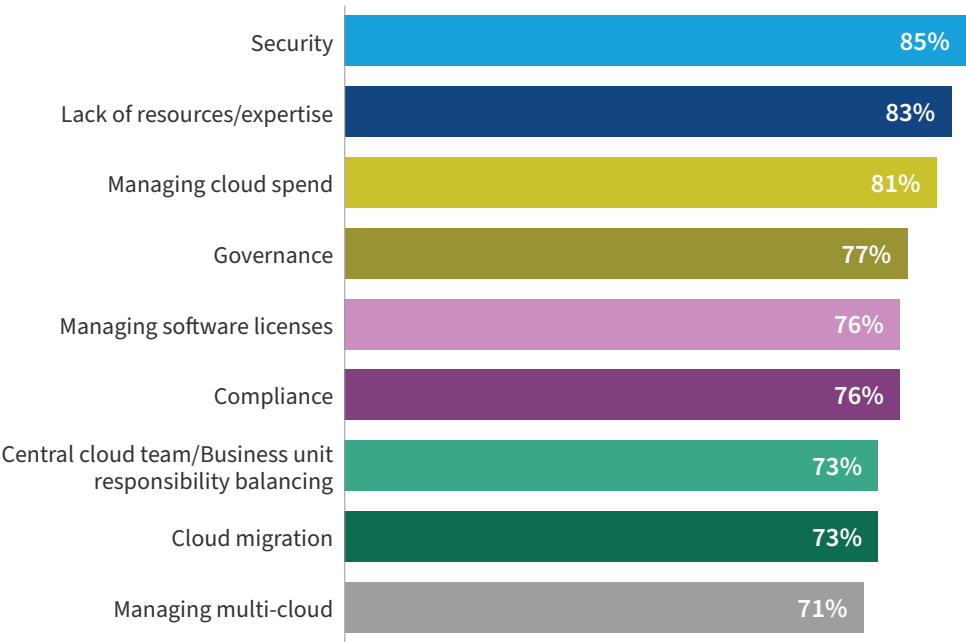
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Top challenges are security, expertise and spend

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.

Top cloud challenges for all organizations

Challenge	%
Security	85%
Lack of resources/expertise	83%
Managing cloud spend	81%
Governance	77%
Managing software licenses	76%
Compliance	76%
Central cloud team/Business unit responsibility balancing	73%
Cloud migration	73%
Managing multi-cloud	71%

N=753
Source: Flexera 2022 State of the Cloud Report
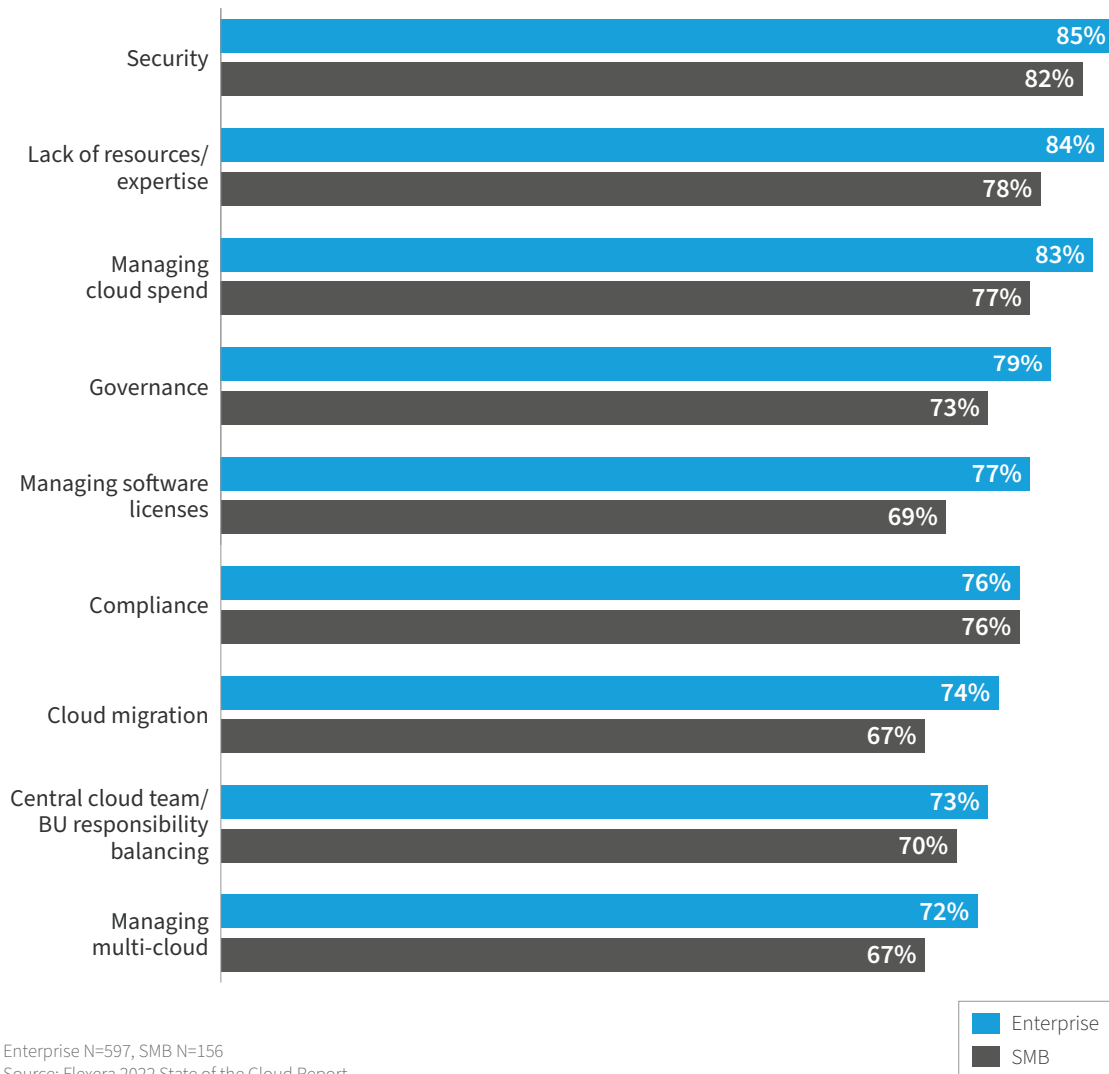
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Enterprises and SMBs see security as top challenge

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

Challenge	Enterprise	SMB
Security	85%	82%
Lack of resources/expertise	84%	78%
Managing cloud spend	83%	77%
Governance	79%	73%
Managing software licenses	77%	69%
Compliance	76%	76%
Cloud migration	74%	67%
Central cloud team/BU responsibility balancing	73%	70%
Managing multi-cloud	72%	67%

Legend: ■ Enterprise ■ SMB

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

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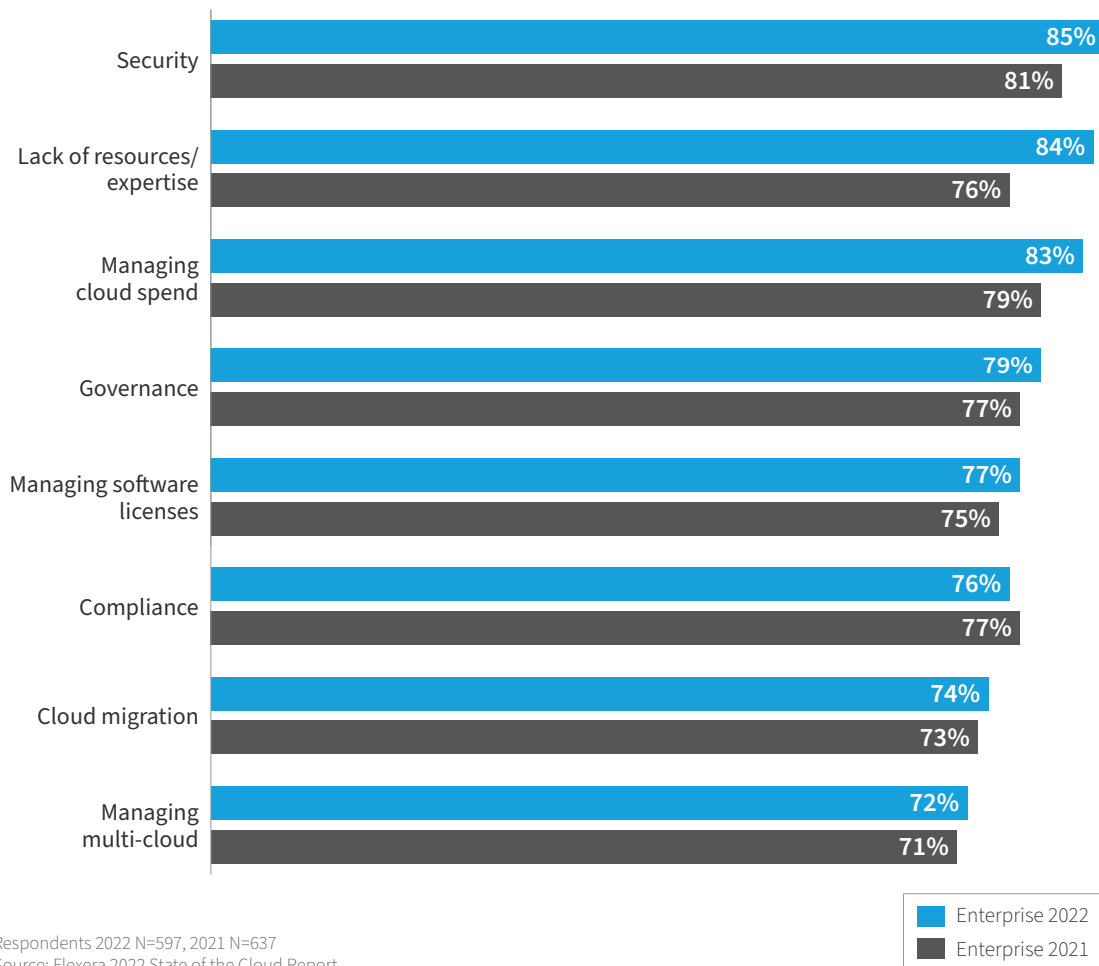
YoY enterprise challenges continue

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

Challenge	Enterprise 2022	Enterprise 2021
Security	85%	81%
Lack of resources/expertise	84%	76%
Managing cloud spend	83%	79%
Governance	79%	77%
Managing software licenses	77%	75%
Compliance	76%	77%
Cloud migration	74%	73%
Managing multi-cloud	72%	71%

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

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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.

Cloud challenges by cloud usage level

	Light	Moderate	Heavy
Lack of resources/expertise	84% ◀ 1st	83% ◀ 2nd	82% ◀ 3rd
Security	83% ◀ 2nd	90% ◀ 1st	84% ◀ 1st
Managing BYOL	70%	79% ◀ 3rd	76%
Managing cloud spend	74%	79% ◀ 3rd	83% ◀ 2nd
Cloud migration	71%	83% ◀ 2nd	71%
Governance	79% ◀ 3rd	79% ◀ 3rd	77%
Managing multi-cloud	64%	75%	71%
Compliance	74%	77%	76%
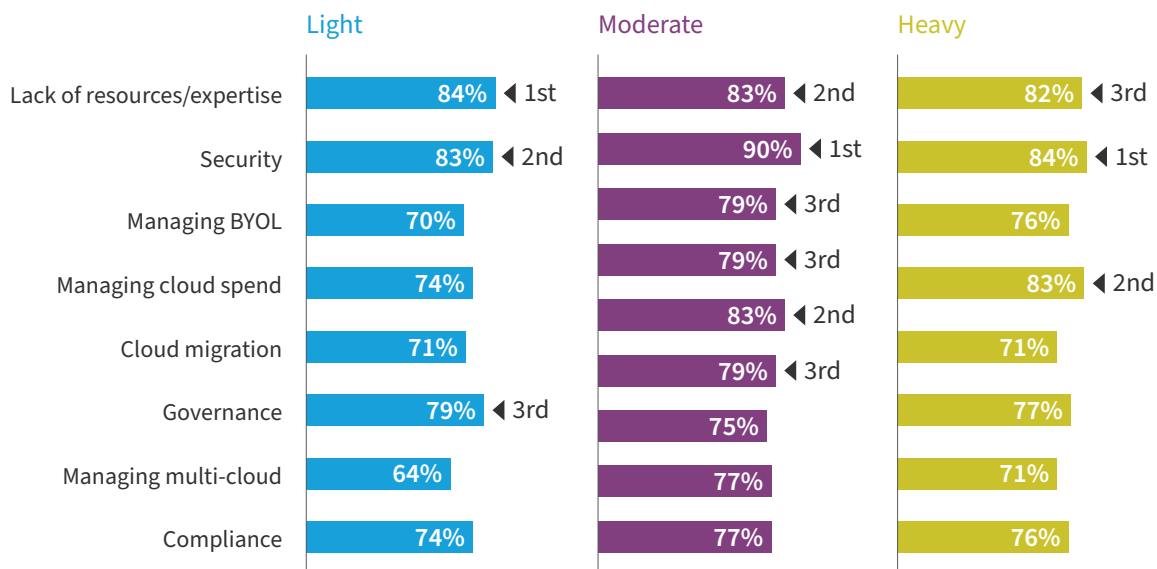
N=753
Source: Flexera 2022 State of the Cloud Report

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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.

Organizational spend on public cloud
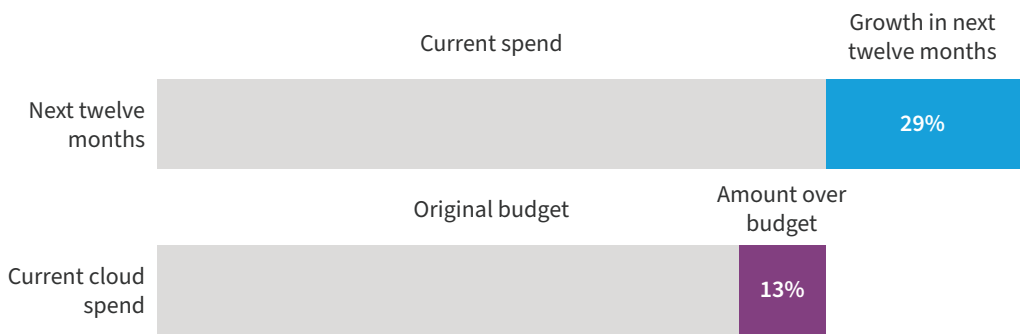
N=753
Source: Flexera 2022 State of the Cloud Report

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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

Self-estimated wasted spend **32%**

68% Efficient spend
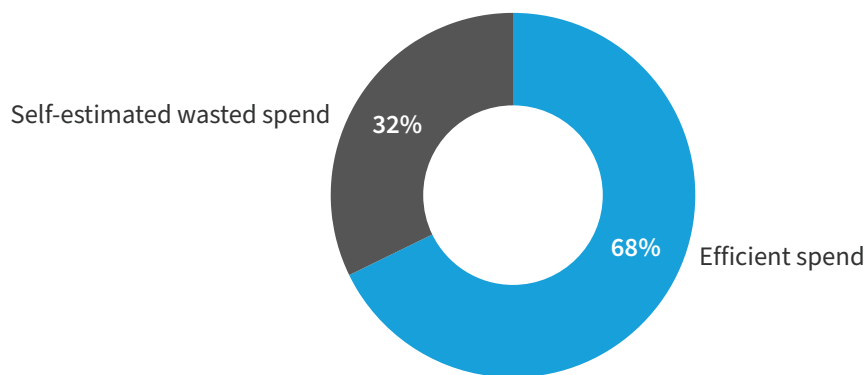
N=753
Source: Flexera 2022 State of the Cloud Report

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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.

Discount types used, by cloud provider

AWS

Discount type	Percentage
AWS Reserved Instances	36%
AWS EDP (Enterprise Discount Program)	32%
AWS Savings Plans	31%
AWS Spot Instances	28%
Ad hoc negotiated discounts	19%

AZURE

Discount type	Percentage
Azure EA (Enterprise Agreement) discount	37%
Azure Reserved Instances	32%
Azure Hybrid Benefit	26%
Azure Low-priority VMs	20%

GOOGLE

Discount type	Percentage
Google Committed Use Discounts	26%
Ad hoc negotiated discounts	10%
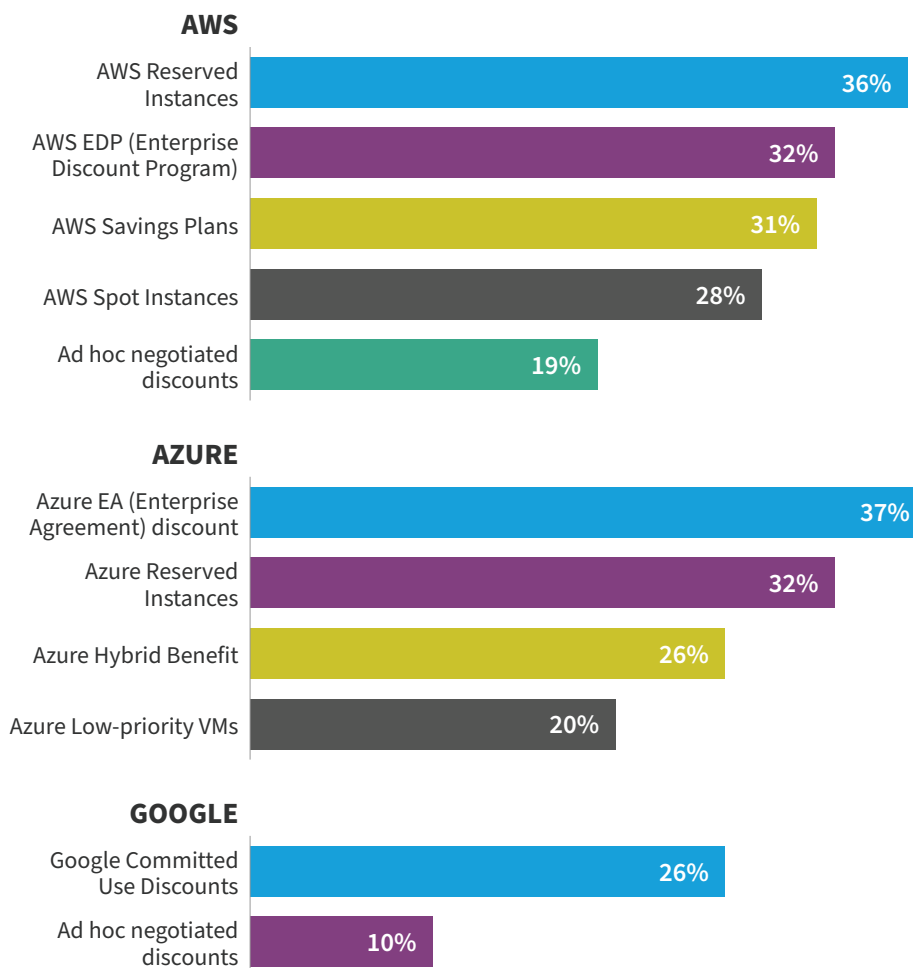
N=753
Source: Flexera 2022 State of the Cloud Report

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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.

Types of policies used to optimize cloud costs

Policy	Automated policies	Manual policies
Rightsize instances	42%	44%
Allowed instance sizes/types	32%	48%
Shut down workloads after hours	45%	35%
Eliminate inactive storage	33%	46%
Specify expiration dates	36%	42%
Underutilized discounts	33%	44%
Use lowest cost regions	29%	47%
Required tags	33%	43%
Use lowest cost cloud	22%	52%
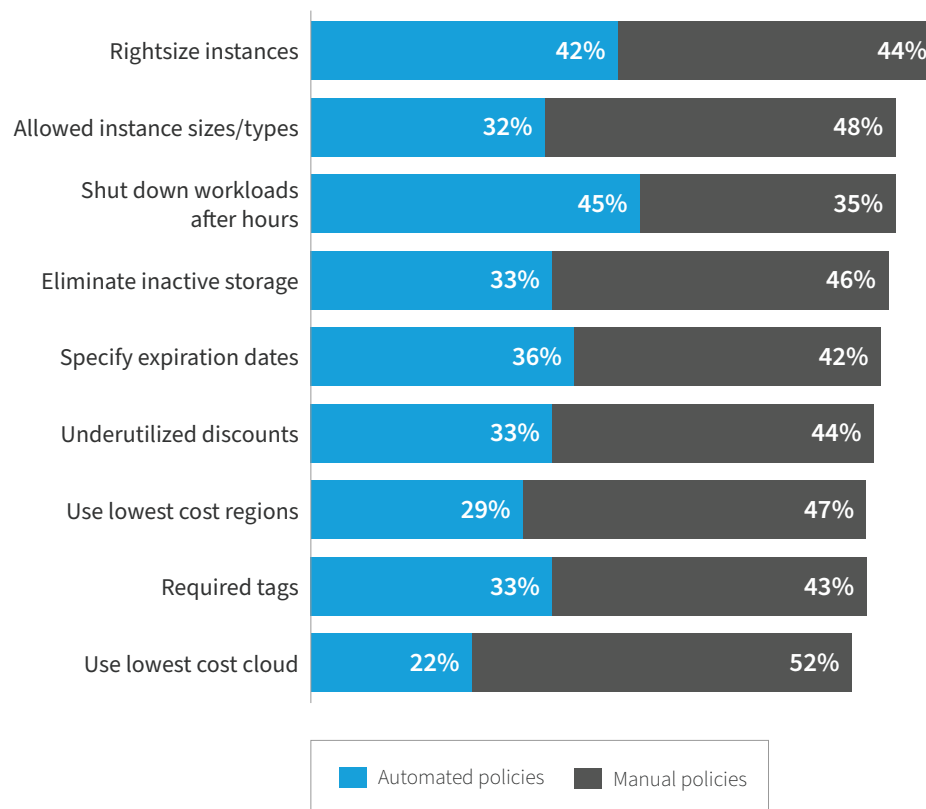
N=753
Source: Flexera 2022 State of the Cloud Report

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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.

Processes used for cloud cost analysis

Process	Percentage
Maximize resource utilization	64%
Unused/idle resource deletion/removal	50%
Provider discounts (reserved instances, etc.)	41%
Unit economics model	39%
None of the above	6%
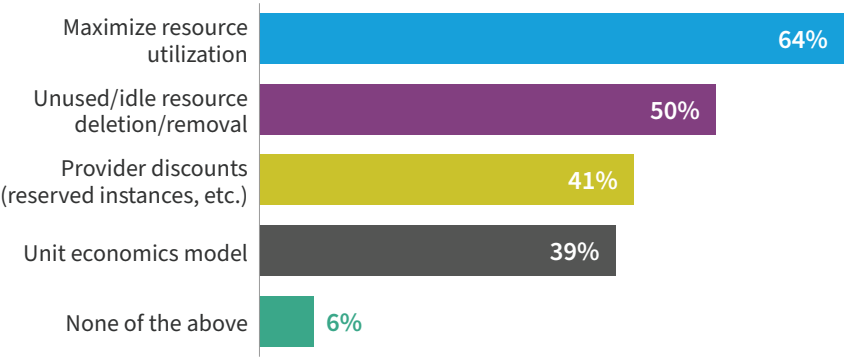
N=753
Source: Flexera 2022 State of the Cloud Report

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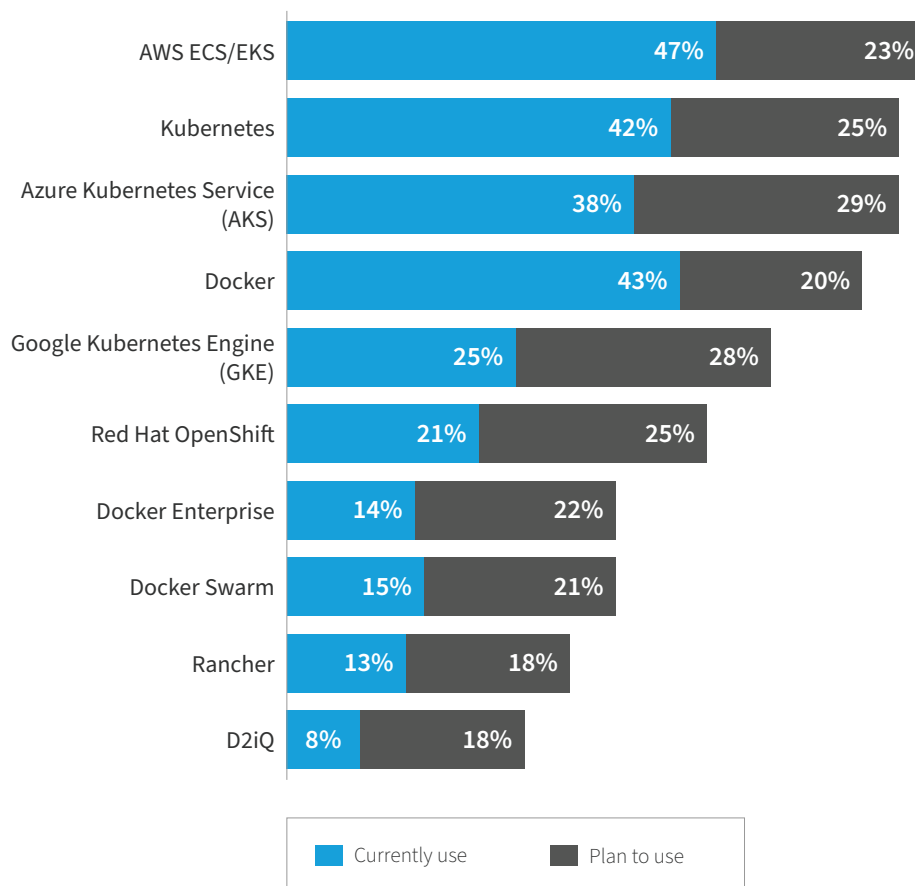
N=753
Source: Flexera 2022 State of the Cloud Report

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*.

Enterprise use of container tools

Tool	Currently use	Plan to use
AWS ECS/EKS	48%	24%
Azure Kubernetes Service (AKS)	42%	29%
Kubernetes	44%	24%
Docker	44%	20%
Google Kubernetes Engine (GKE)	25%	29%
Red Hat OpenShift	24%	24%
Docker Enterprise	15%	22%
Docker Swarm	14%	20%
Rancher	13%	18%
D2iQ	8%	17%

■ Currently use ■ Plan to use
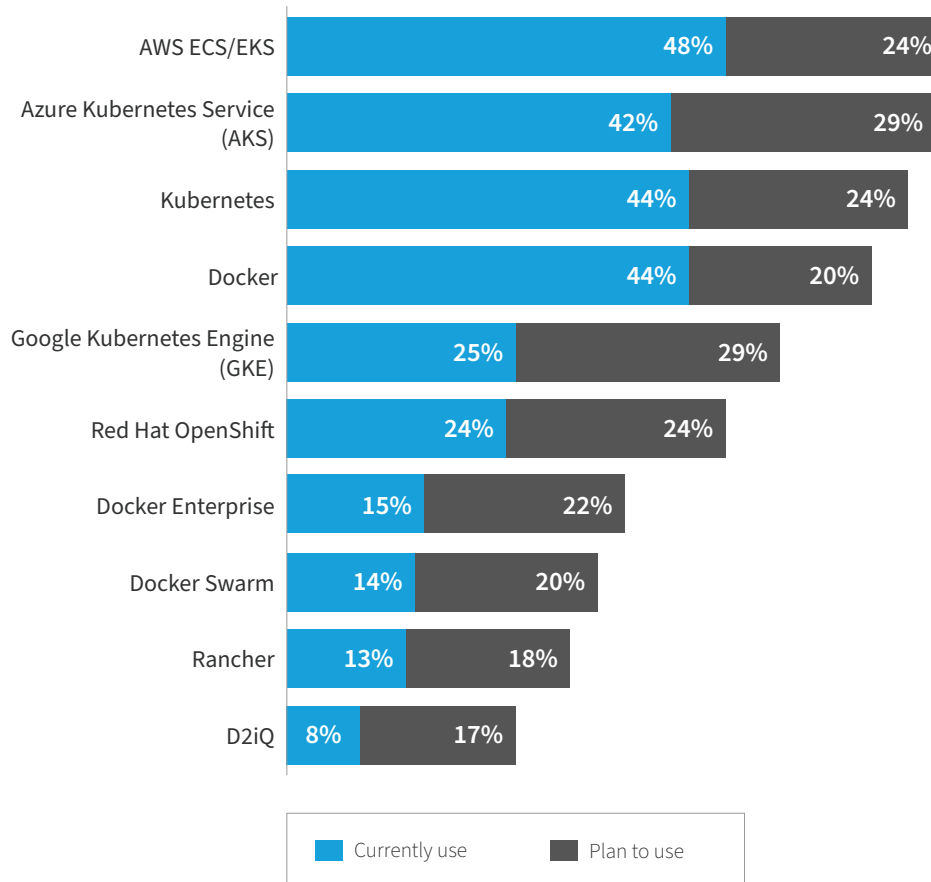
N=597
Source: Flexera 2022 State of the Cloud Report

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FIGURE 44

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

SMB use of container tools

Tool	Currently use	Plan to use
Kubernetes	35%	28%
AWS ECS/EKS	43%	19%
Docker	38%	19%
Azure Kubernetes Service (AKS)	22%	29%
Google Kubernetes Engine (GKE)	26%	21%
Docker Swarm	18%	24%
Red Hat OpenShift	12%	29%
Docker Enterprise	13%	24%
Rancher	16%	19%
D2iQ	8%	21%
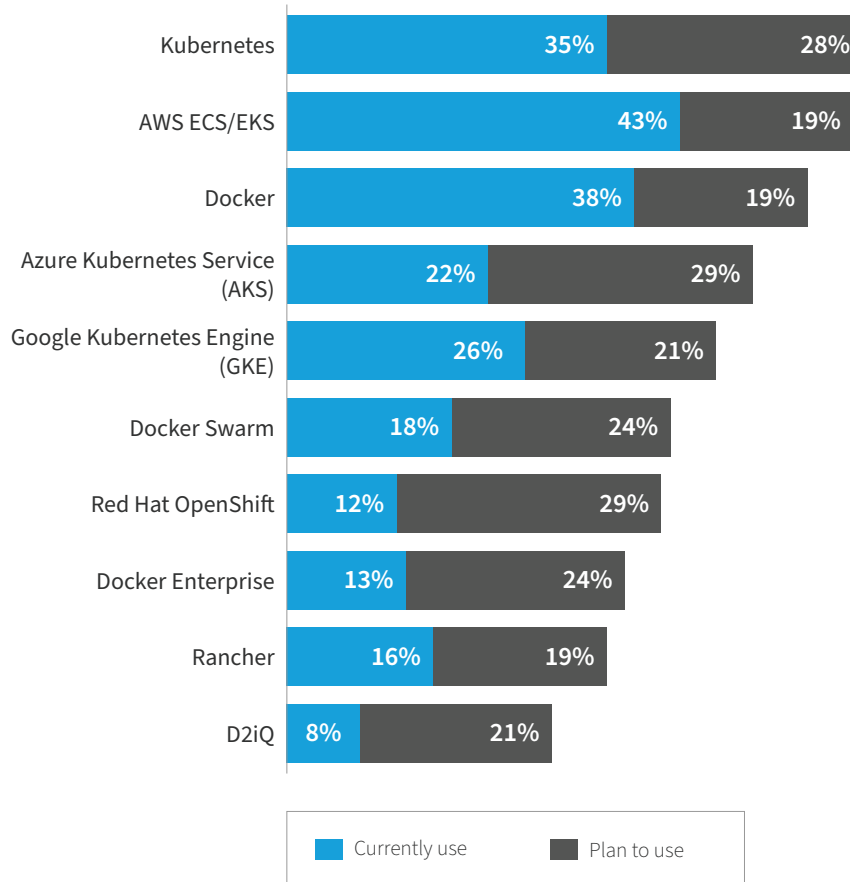
N=156
Source: Flexera 2022 State of the Cloud Report

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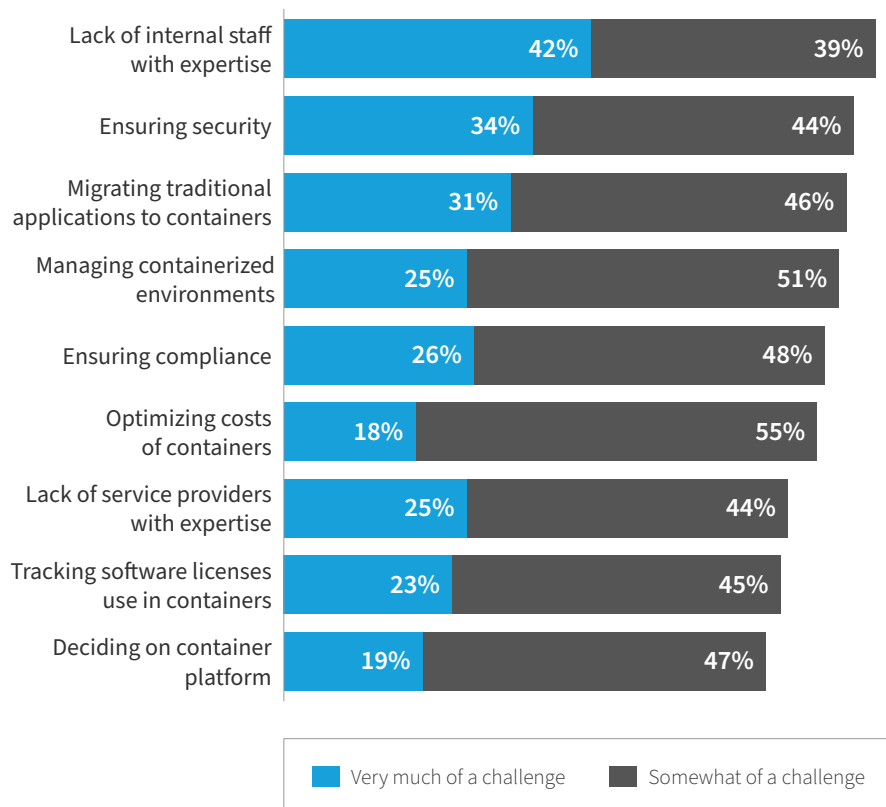
N=753
Source: Flexera 2022 State of the Cloud Report

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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.

Current and planned configuration tools for all organizations

Currently use · Plan to use

AWS CloudFormation templates: 50% / 20%
Azure Resource Manager templates: 48% / 22%
AWS Systems Manager: 27% / 29%
Google Cloud Deployment Manager templates: 29% / 24%
Terraform: 30% / 20%
AWS OpsWorks: 23% / 25%
Ansible: 27% / 18%
Chef: 20% / 19%
Puppet: 20% / 17%
Salt/SaltStack: 5% / 9%
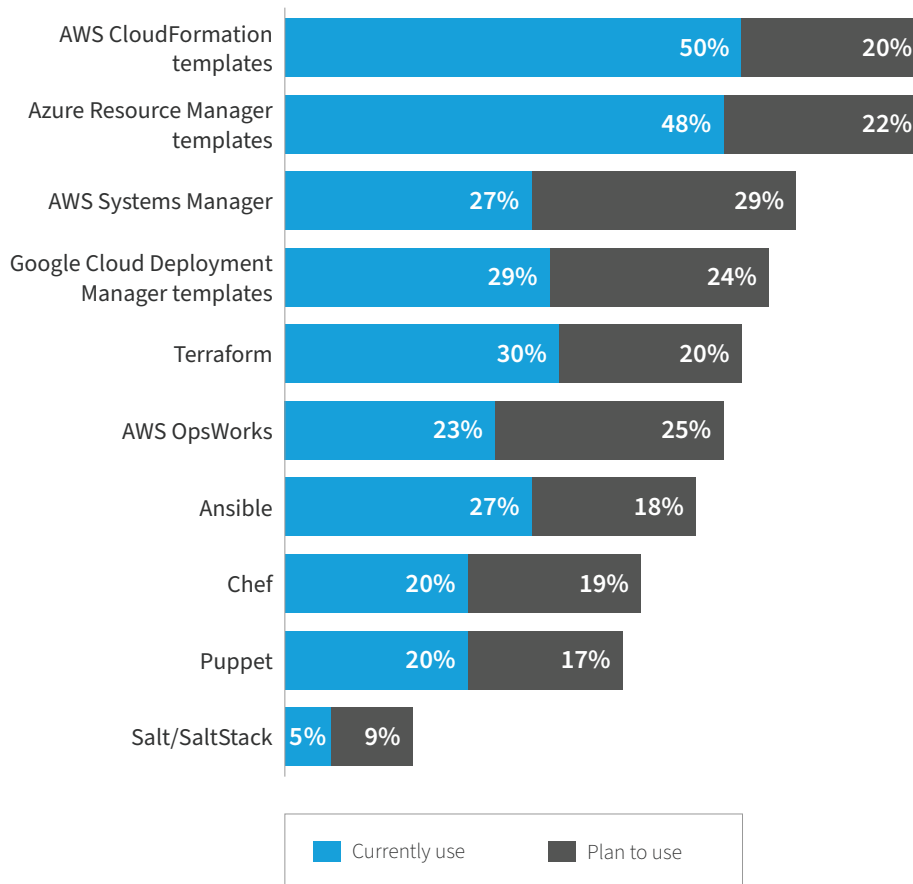
N=753
Source: Flexera 2022 State of the Cloud Report

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*.

Enterprise cloud configuration tool usage

Tool	Currently use	Plan to use
Azure Resource Manager templates	52%	20%
AWS CloudFormation templates	51%	20%
Google Cloud Deployment Manager templates	27%	31%
AWS Systems Manager	28%	29%
Terraform	31%	19%
AWS OpsWorks	24%	25%
Ansible	29%	17%
Chef	21%	18%
Puppet	21%	17%
Salt/SaltStack	15 %	23%

Legend: Currently use, Plan to use
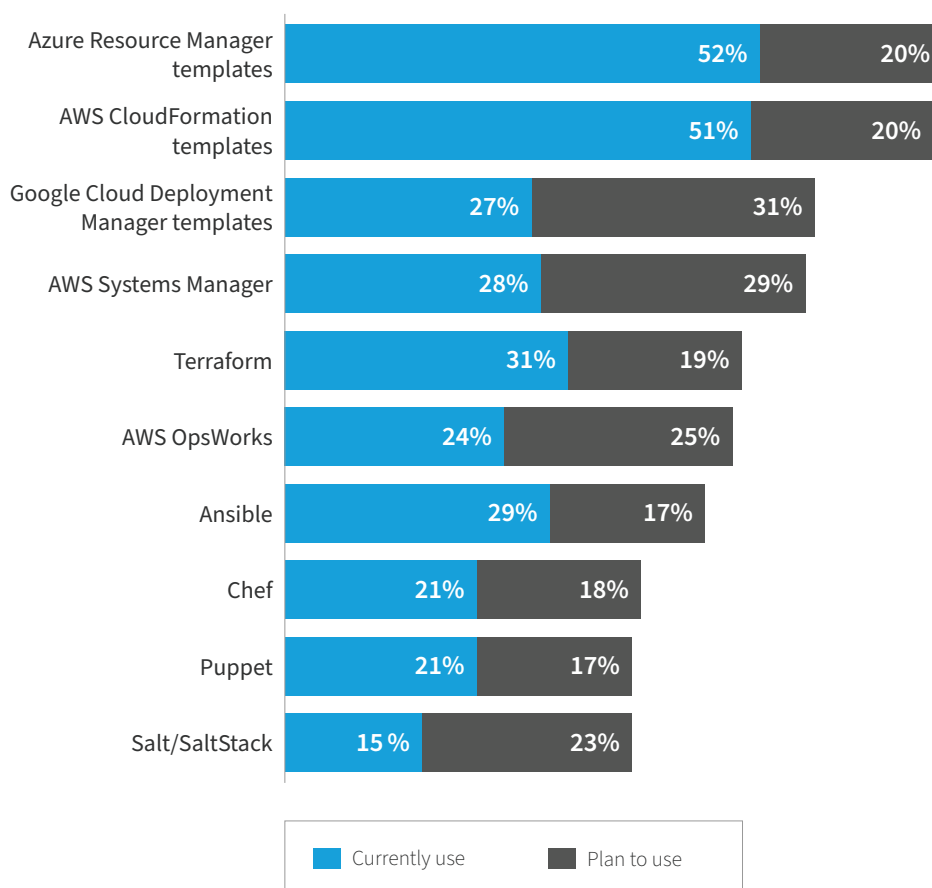
N=597
Source: Flexera 2022 State of the Cloud Report

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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
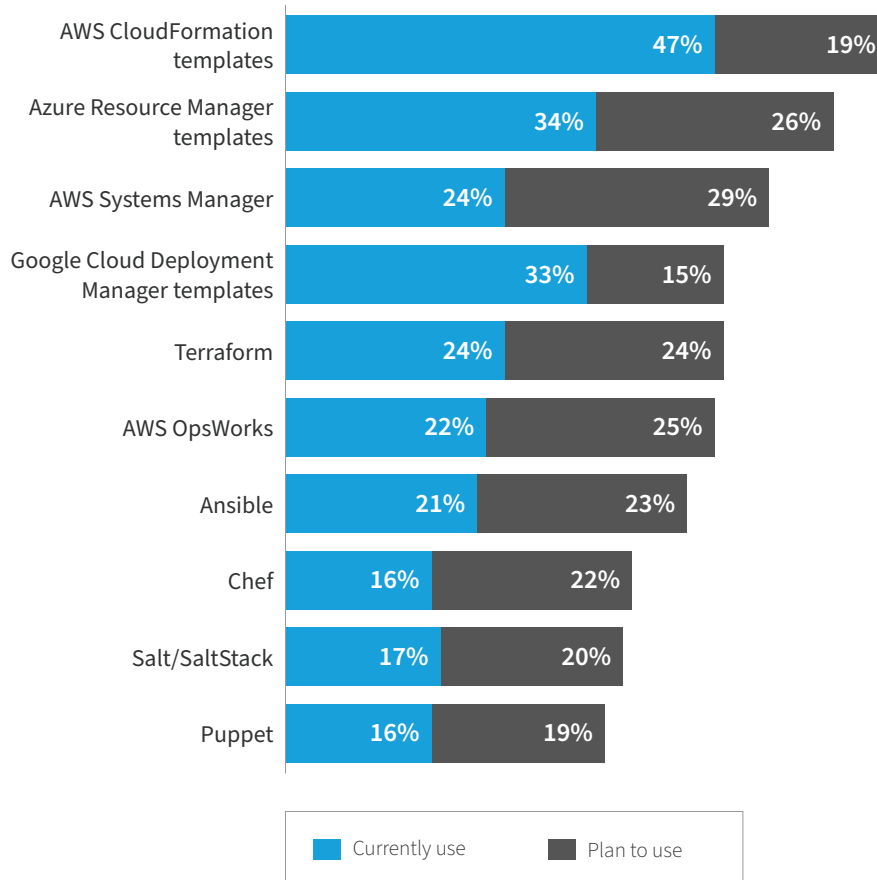
	Currently use	Plan to use
AWS CloudFormation templates	47%	19%
Azure Resource Manager templates	34%	26%
AWS Systems Manager	24%	29%
Google Cloud Deployment Manager templates	33%	15%
Terraform	24%	24%
AWS OpsWorks	22%	25%
Ansible	21%	23%
Chef	16%	22%
Salt/SaltStack	17%	20%
Puppet	16%	19%

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.

Public cloud provider adoption rates for all organizations
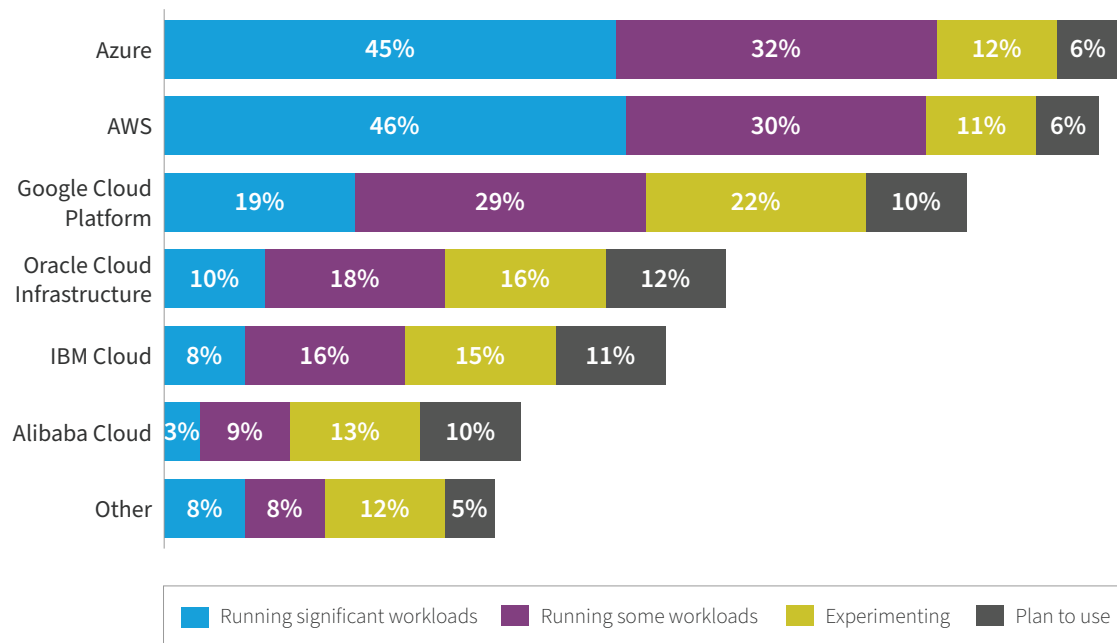
N=753
Source: Flexera 2022 State of the Cloud Report

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FLEXERA

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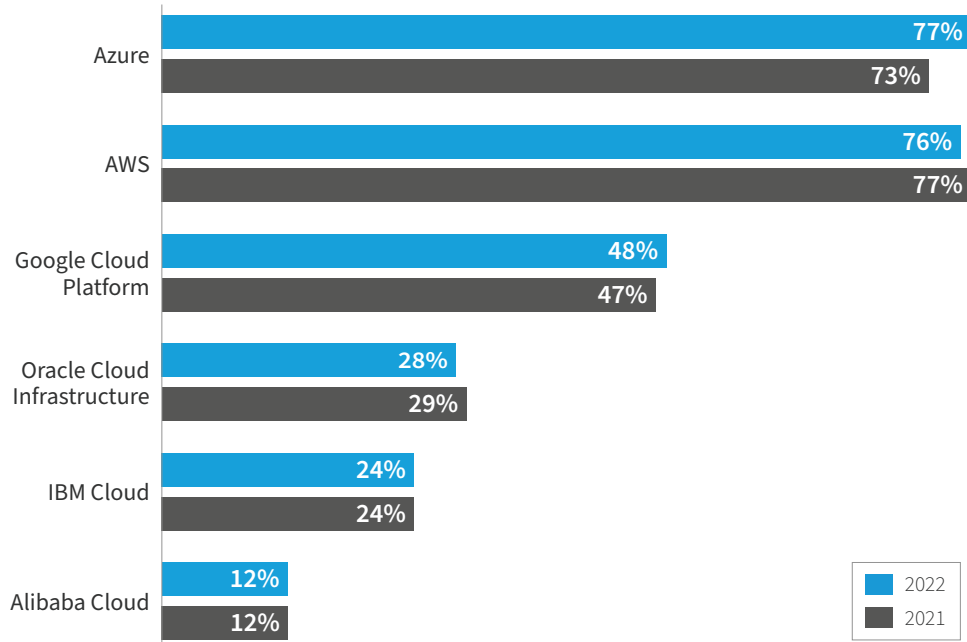
Respondents 2022 N=753, 2021 N=750
Source: Flexera 2022 State of the Cloud Report

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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.

Enterprise public cloud adoption rates
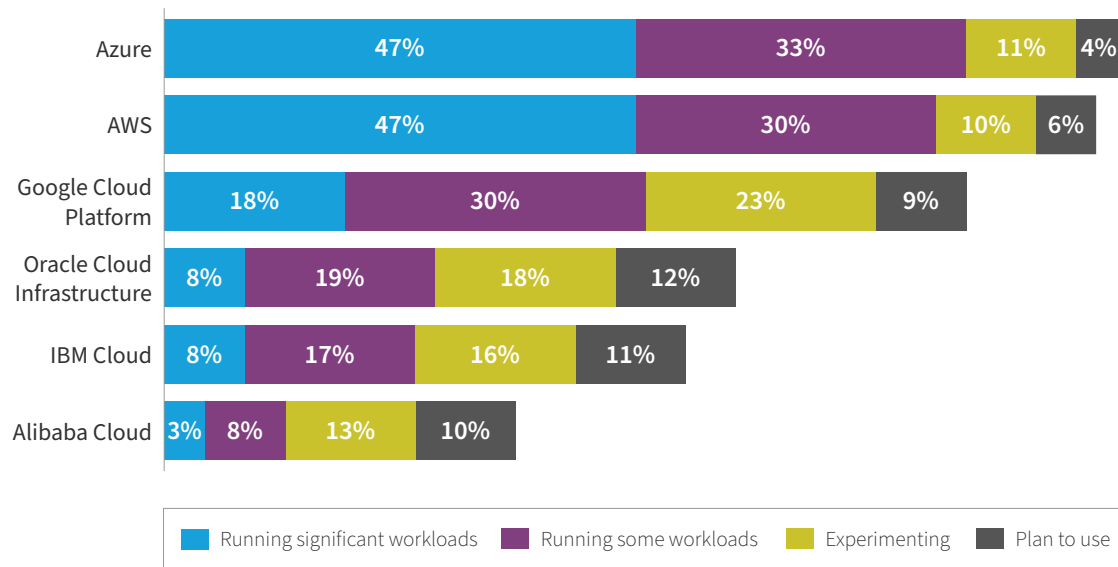
N=597
Source: Flexera 2022 State of the Cloud Report

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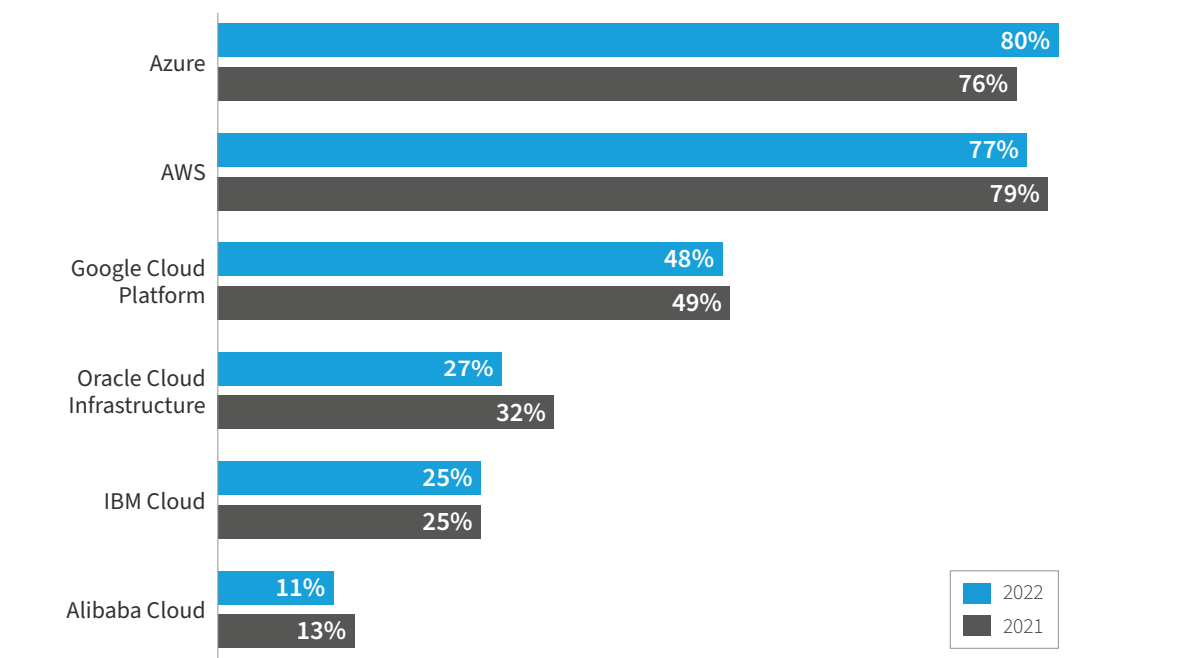
Respondents 2022 N=597, 2021 N=637
Source: Flexera 2022 State of the Cloud Report

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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.

SMB public cloud adoption rates

AWS — Running significant workloads 41%, Running some workloads 28%, Experimenting 13%, Plan to use 7%
Azure — 31%, 28%, 13%, 12%
Google Cloud Platform — 21%, 22%, 19%, 12%
IBM Cloud — 11%, 13%, 15%, 10%
Oracle Cloud Infrastructure — 15%, 13%, 8%, 12%
Alibaba Cloud — 4%, 13%, 15%, 10%

Legend: Running significant workloads ■ Running some workloads ■ Experimenting ■ Plan to use
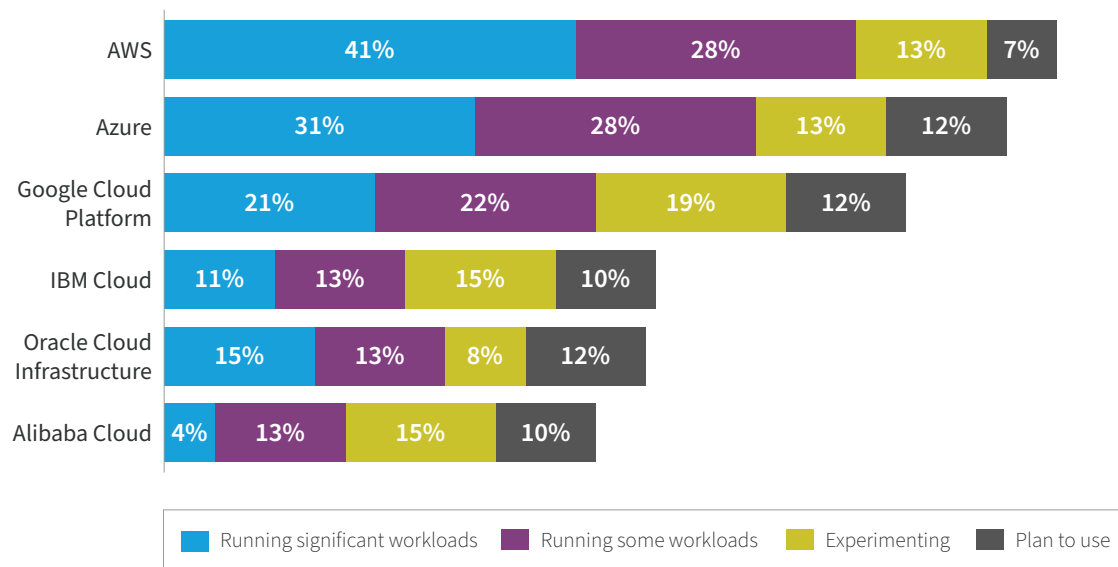
N=156
Source: Flexera 2022 State of the Cloud Report

FLEXERA

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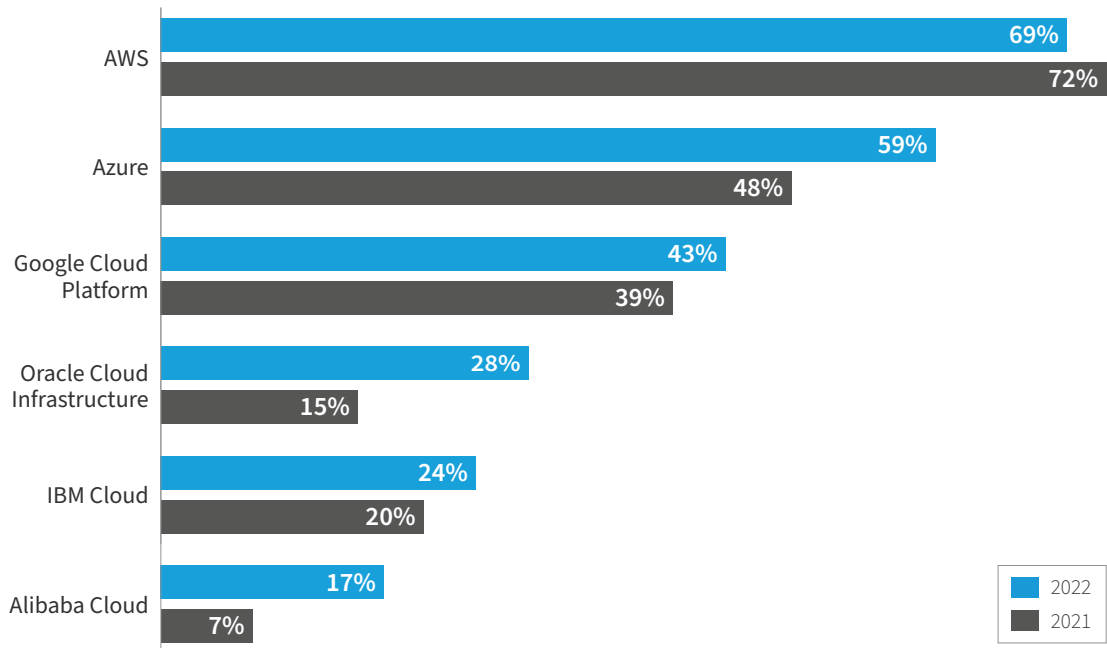
Respondents 2022 N=156, 2021 N=113
Source: Flexera 2022 State of the Cloud Report

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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.

Clouds used by cloud usage level
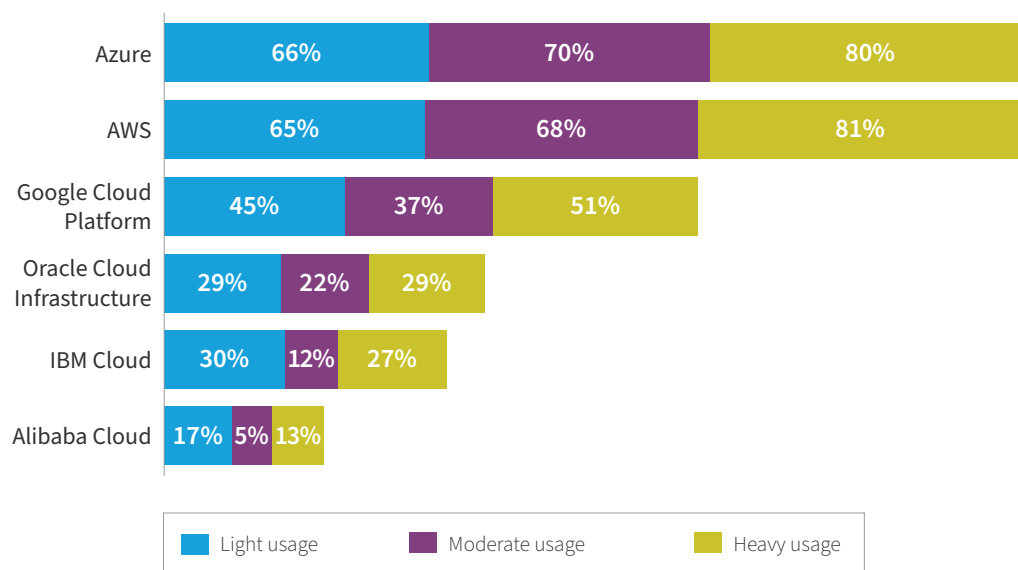
N=753
Source: Flexera 2022 State of the Cloud Report

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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

	AWS	Azure	Google Cloud Platform
Up to $600K	18% ◀ 1st	18% ◀ 1st	22% ◀ 1st
$600K to $1.2M	16% ◀ 2nd	18% ◀ 1st	12% ◀ 2nd
$1.2M to $2.4M	14% ◀ 3rd	14% ◀ 2nd	10% ◀ 3rd
$2.4M to $6M	12%	14% ◀ 2nd	10% ◀ 3rd
$6M to $12M	8%	9% ◀ 3rd	6%
$12M to $24M	9%	7%	5%
$24M to $60M	5%	4%	1%
More than $60M	4%	4%	1%
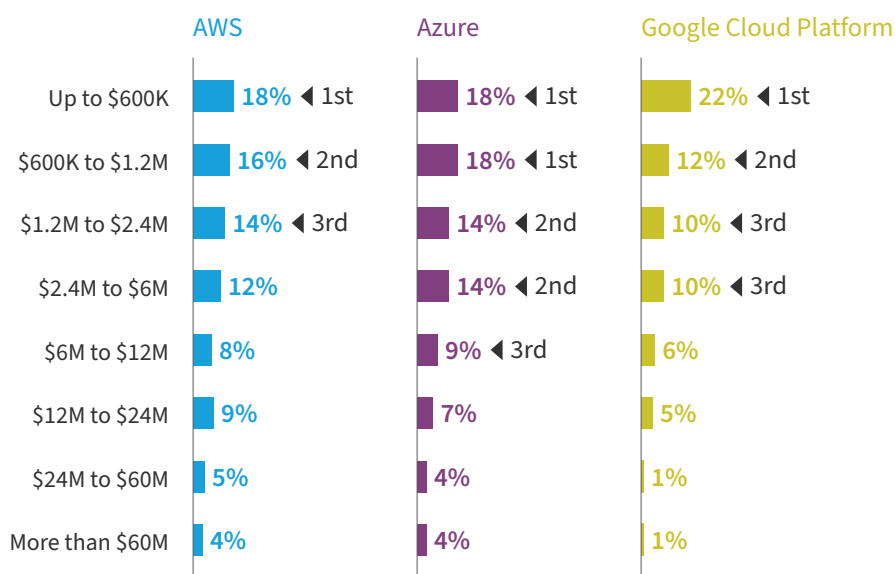
N=597
Source: Flexera 2022 State of the Cloud Report

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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

Cloud provider	1 to 50	51 to 100	101 to 500	501 to 1,000	More than 1,000
AWS	31%	25%	21%	13%	10%
Microsoft Azure	29%	26%	25%	11%	9%
Google Cloud Platform	51%	22%	16%	8%	3%
IBM Cloud	68%	15%	11%	5%	1%
OracleClound Infrastructure	67%	15%	12%	5%	1%
Alibaba Cloud	77%	13%	7%	1%	2%
OpenStack	72%	13%	11%	1%	3%
AWS Outposts	67%	17%	10%	5%	1%
Google Anthos	70%	13%	10%	6%	1%
Microsoft Azure Stack	59%	20%	13%	5%	3%
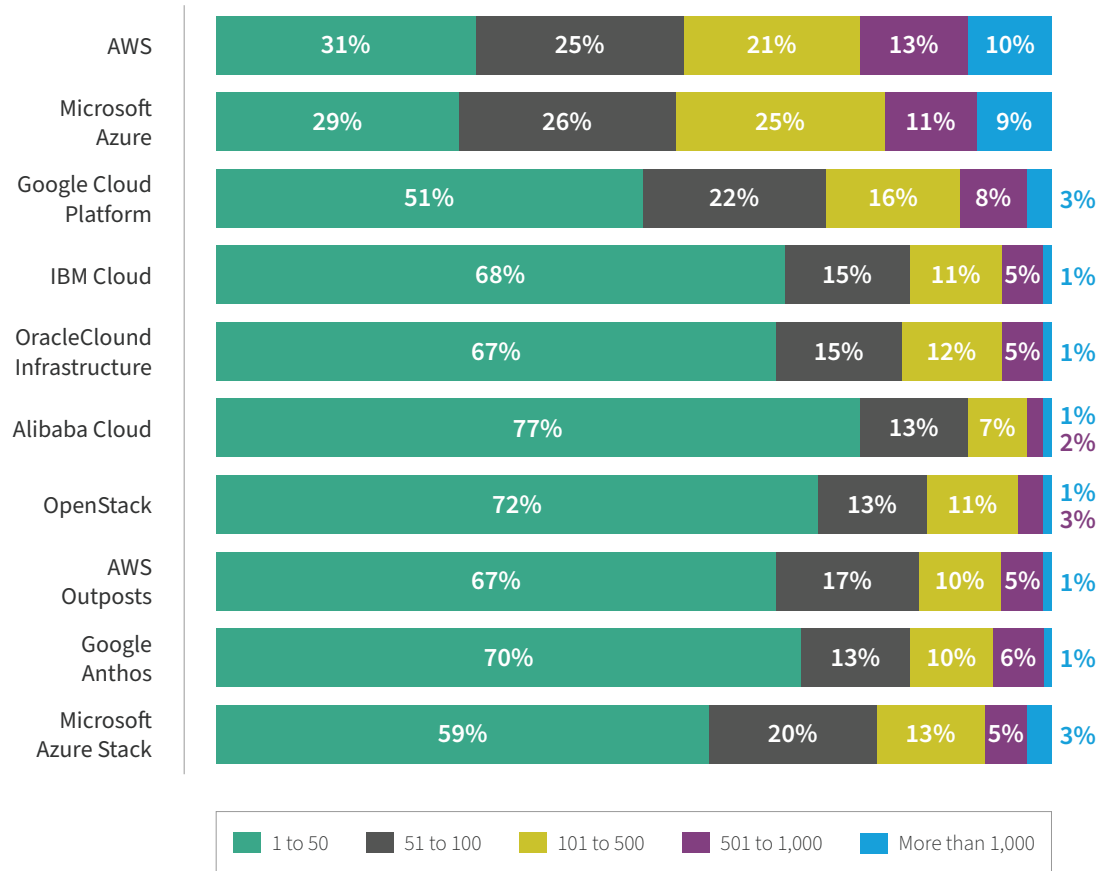
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Use of public cloud PaaS services is increasing

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.

Public cloud services used

	Currently use	Experimenting	Plan to use
Data warehouse	55% ◀ 1st	21%	13%
DBaaS (relational)	49% ◀ 2nd	20%	13%
Container-as-a-Service	44% ◀ 3rd	25% ◀ 2nd	15%
DBaaS (NoSQL)	38%	22%	14%
Hadoop	26%	22%	16%
Serverless (Function-as-a-Service)	36%	28% ◀ 1st	16%
Caching	39%	22%	15%
Batch processing	37%	22%	17%
Search	43%	16%	16%
Stream processing	31%	23%	17%
Machine Learning/ Artificial Intelligence (AI)	37%	28% ◀ 1st	18%
Mobile services	41%	21%	15%
Push notifications	41%	20%	17%
Queuing	33%	20%	18%
DRaaS (Disaster Recovery-as-a-service)	29%	25% ◀ 2nd	22% ◀ 1st
Edge services	29%	23%	19% ◀ 3rd
IoT	28%	24% ◀ 3rd	20% ◀ 2nd

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

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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.

Public cloud services that enterprises use

	Currently use	Experimenting	Plan to use
Data warehouse	58% ◀ 1st	20%	11%
DBaaS (relational)	50% ◀ 2nd	20%	12%
Container-as-a-Service	46% ◀ 3rd	27% ◀ 2nd	14%
DBaaS (NoSQL)	40%	22%	15%
Hadoop	29%	22%	15%
Serverless (Function-as-a-Service)	36%	29% ◀ 1st	18%
Caching	40%	22%	15%
Batch processing	39%	20%	19% ◀ 3rd
Search	43%	17%	16%
Stream processing	31%	23%	17%
Machine Learning/ Artificial Intelligence (AI)	40%	29% ◀ 1st	17%
Mobile services	42%	20%	15%
Push notifications	43%	20%	17%
Queuing	35%	20%	18%
DRaaS (Disaster Recovery-as-a-service)	29%	25% ◀ 3rd	23% ◀ 1st
Edge services	30%	24%	19% ◀ 3rd
IoT	29%	25% ◀ 3rd	20% ◀ 2nd

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

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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.

PaaS services used based on cloud usage level for all organizations

	Light	Moderate	Heavy
Data warehouse	38% ◀ 1st	54% ◀ 1st	60% ◀ 1st
DBaaS (Relational)	29%	44% ◀ 2nd	57% ◀ 2nd
Container-as-a-Service	30% ◀ 3rd	33%	51% ◀ 3rd
Search	30% ◀ 3rd	35% ◀ 3rd	49%
Push notifications	27%	34%	47%
Mobile services	33% ◀ 2nd	35% ◀ 3rd	44%
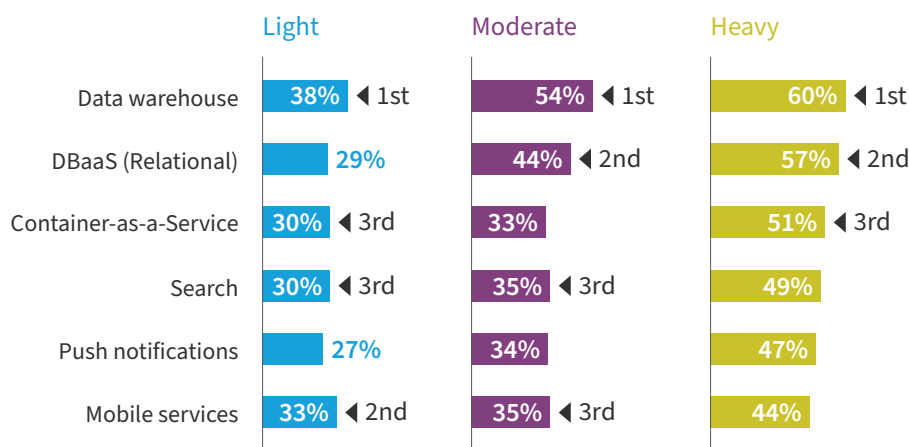
N=753
Source: Flexera 2022 State of the Cloud Report

FLEXERA

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.

Private cloud technologies used for all organizations

	Currently running workloads	Experimenting	Plan to use
Microsoft Azure Stack	37% ◀ 1st	21% ◀ 3rd	13% ◀ 3rd
VMware vSphere/vCenter	31% ◀ 2nd	23% ◀ 1st	13% ◀ 3rd
AWS Outposts	30% ◀ 3rd	22% ◀ 2nd	10%
Microsoft System Center	28%	23% ◀ 1st	13% ◀ 3rd
VMware vCloud Director	19%	22% ◀ 2nd	14% ◀ 2nd
Google Anthos	17%	22% ◀ 2nd	14% ◀ 2nd
OpenStack	15%	19%	15% ◀ 1st
Bare-metal cloud	13%	16%	11%
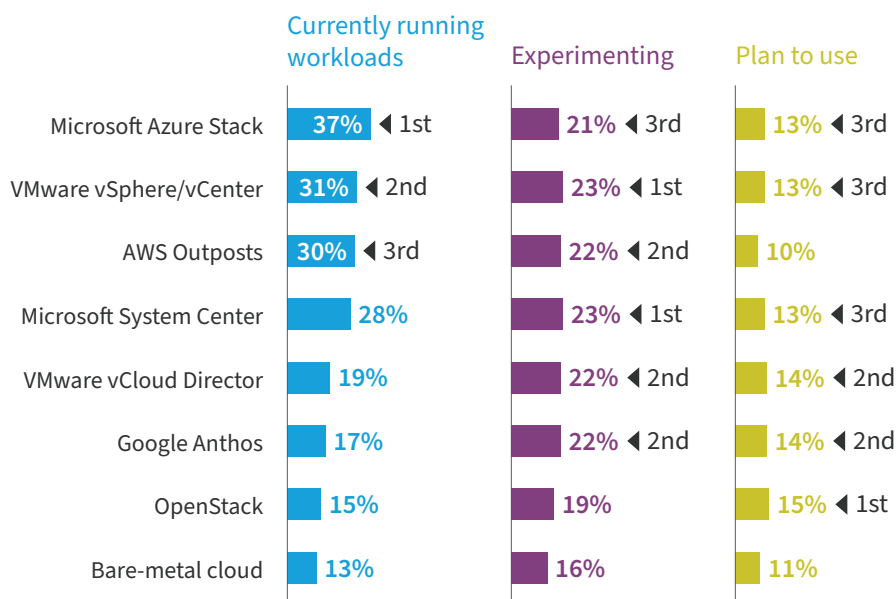
N=753
Source: Flexera 2022 State of the Cloud Report

FLEXERA

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.

Private cloud adoption for enterprises

	Currently use	Experimenting	Plan to use
Microsoft Azure Stack	38% ◀ 1st	21% ◀ 3rd	13% ◀ 3rd
VMware vSphere/vCenter	35% ◀ 2nd	22% ◀ 2nd	13% ◀ 3rd
AWS Outposts	31% ◀ 3rd	23% ◀ 1st	10%
Microsoft System Center	29%	23% ◀ 1st	13% ◀ 3rd
VMware vCloud Director	22%	21% ◀ 3rd	14% ◀ 2nd
OpenStack	16%	20%	15% ◀ 1st
Google Anthos	16%	23% ◀ 1st	14% ◀ 2nd
Bare-metal cloud	14%	16%	11%
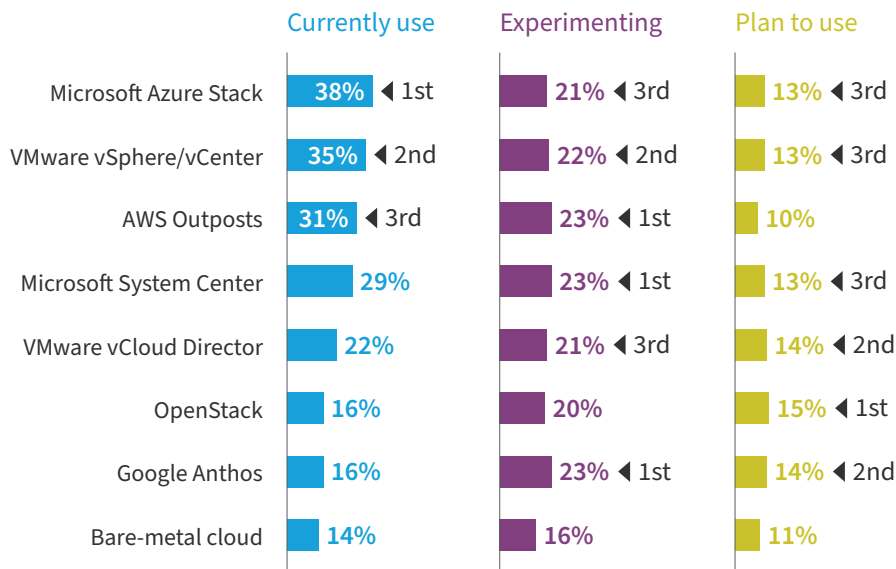
N=597
Source: Flexera 2022 State of the Cloud Report

FLEXERA

FIGURE 63

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

Private cloud adoption for SMBs
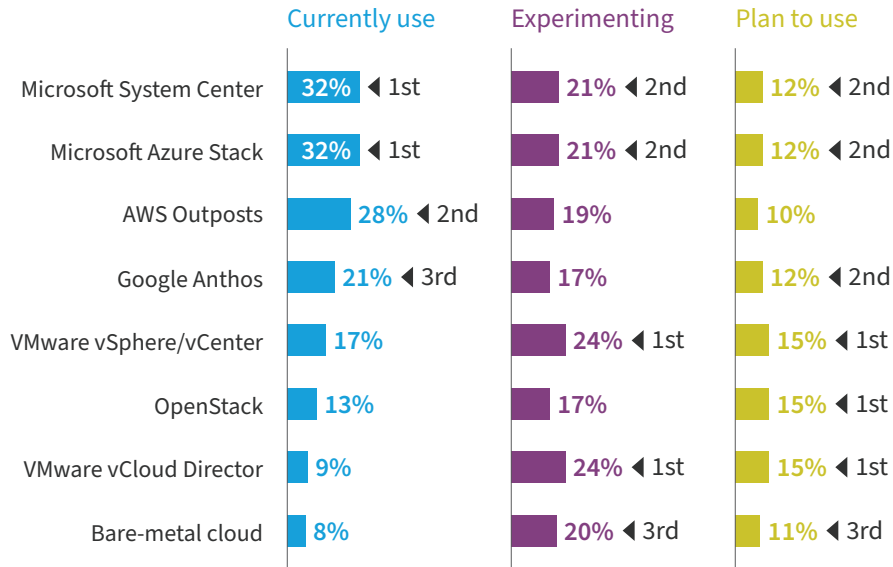
	Currently use	Experimenting	Plan to use
Microsoft System Center	32% ◄ 1st	21% ◄ 2nd	12% ◄ 2nd
Microsoft Azure Stack	32% ◄ 1st	21% ◄ 2nd	12% ◄ 2nd
AWS Outposts	28% ◄ 2nd	19%	10%
Google Anthos	21% ◄ 3rd	17%	12% ◄ 2nd
VMware vSphere/vCenter	17%	24% ◄ 1st	15% ◄ 1st
OpenStack	13%	17%	15% ◄ 1st
VMware vCloud Director	9%	24% ◄ 1st	15% ◄ 1st
Bare-metal cloud	8%	20% ◄ 3rd	11% ◄ 3rd

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

FLEXEra

State of the
Cloud Report:
European
spotlight

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.

European respondents by organization size

36%	10,001+
19%	5,001-10,000
18%	2,001-5,000
10%	1,001-2,000
15%	101-1000
2%	1-100
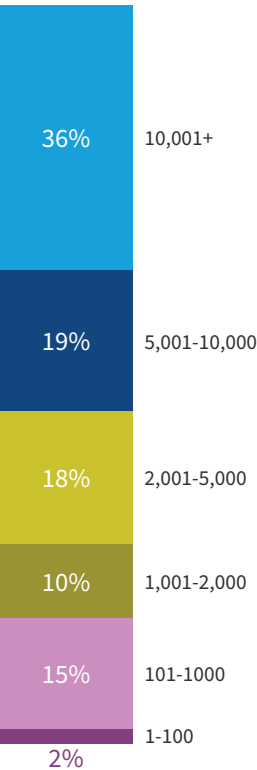
N=140
Source: Flexera 2022 State of the Cloud Report

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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.

European respondents by industry

26%	**18%**	**9%**	**8%**
Financial services	Tech services	Transportation and logistics	Software and hardware
7%	**7%**	**6%**	**5%**
Industrial products	Retail and eCommerce	Consumer products and services	Telecom
5%	**4%**	**3%**	**2%**
Other	Healthcare	Business services	Education/ Government
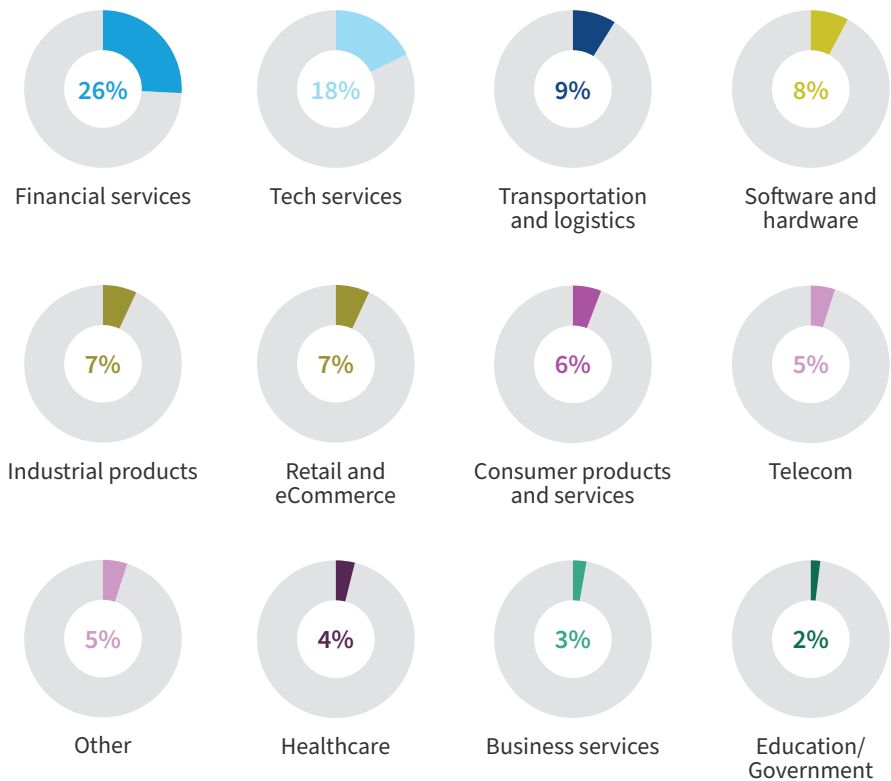
N=140
Source: Flexera 2022 State of the Cloud Report

FLEXERA

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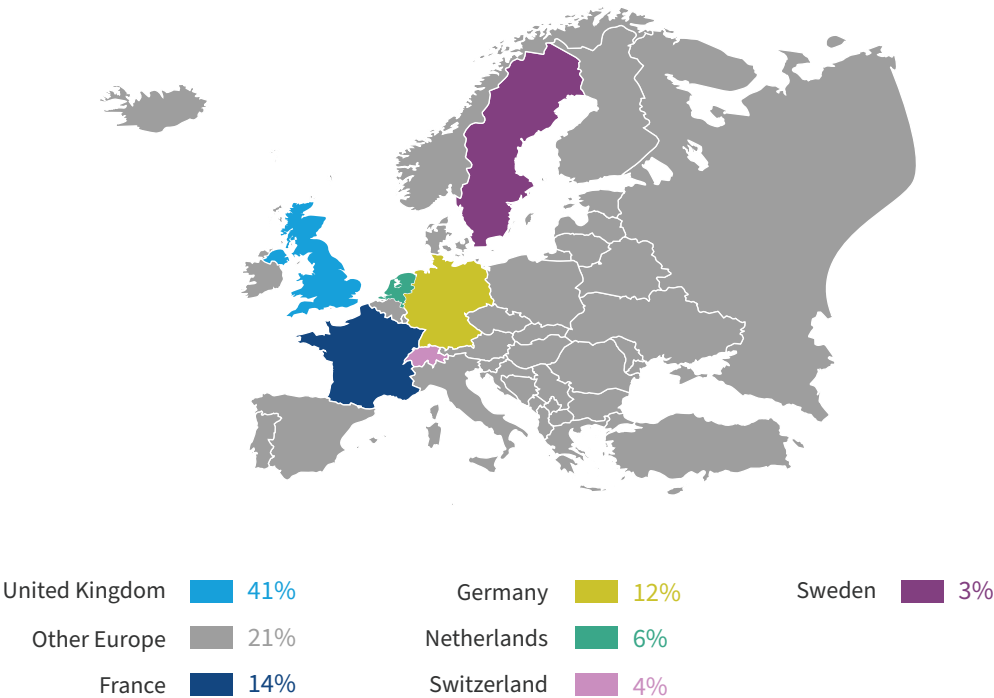
N=140
Source: Flexera 2022 State of the Cloud Report

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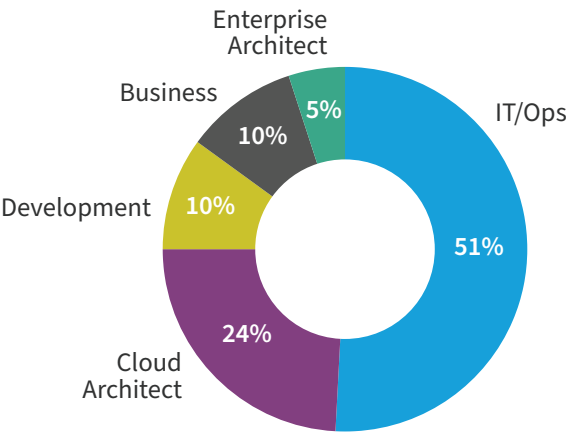
N=140
Source: Flexera 2022 State of the Cloud Report

FIGURE 68

Most European respondents are directors/managers.

European respondents by level
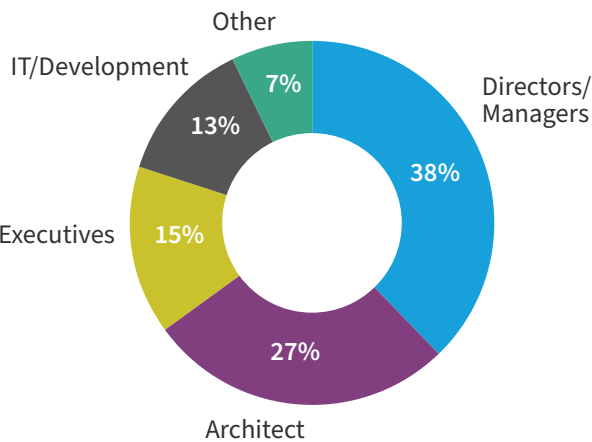
N=140
Source: Flexera 2022 State of the Cloud Report

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.

European respondents by where in the organization they work

- Other — 4%
- Business unit IT/ Dev team — 22%
- Central cloud team (CCOE or similar) — 49%
- Other central IT/ Dev team — 25%
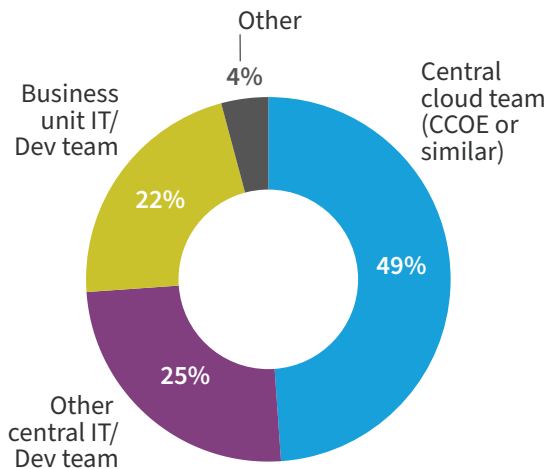
N=140
Source: Flexera 2022 State of the Cloud Report

FLEXEra

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.

European respondents by cloud usage level

- 58% Heavy
- 28% Moderate
- 14% Light
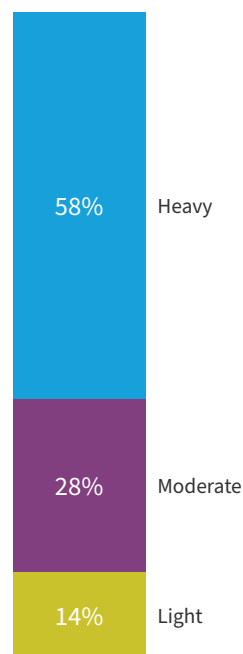
N=140
Source: Flexera 2022 State of the Cloud Report

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

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

Comparison of cloud usage level between Europe and the Americas

Europe

Heavy cloud users	Moderate cloud users	Light cloud users
58%	28%	14%

Americas

Heavy cloud users	Moderate cloud users	Light cloud users
63%	23%	14%
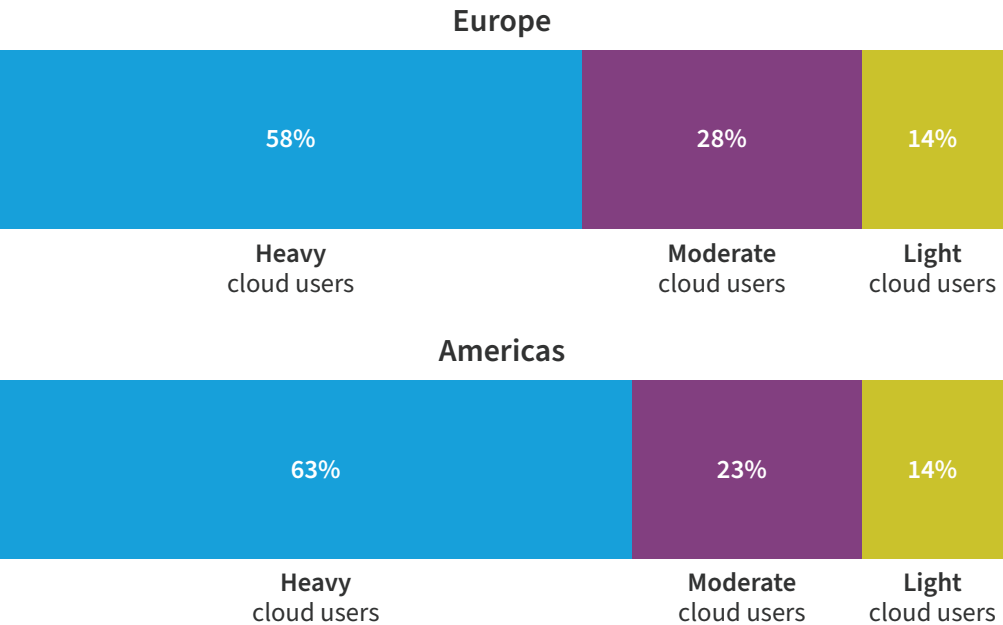
Europe N=140, Americas N=516
Source: Flexera 2022 State of the Cloud Report

FLEXEra

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.

Acceleration of cloud plans in Europe due to COVID-19

Europe

22%	43%	31%	4%
			0%

Americas

19%	45%	32%	2%
			1%

- Significantly higher than planned
- Somewhat higher than planned
- About the same as planned
- Somewhat lower than planned
- Significantly lower than planned
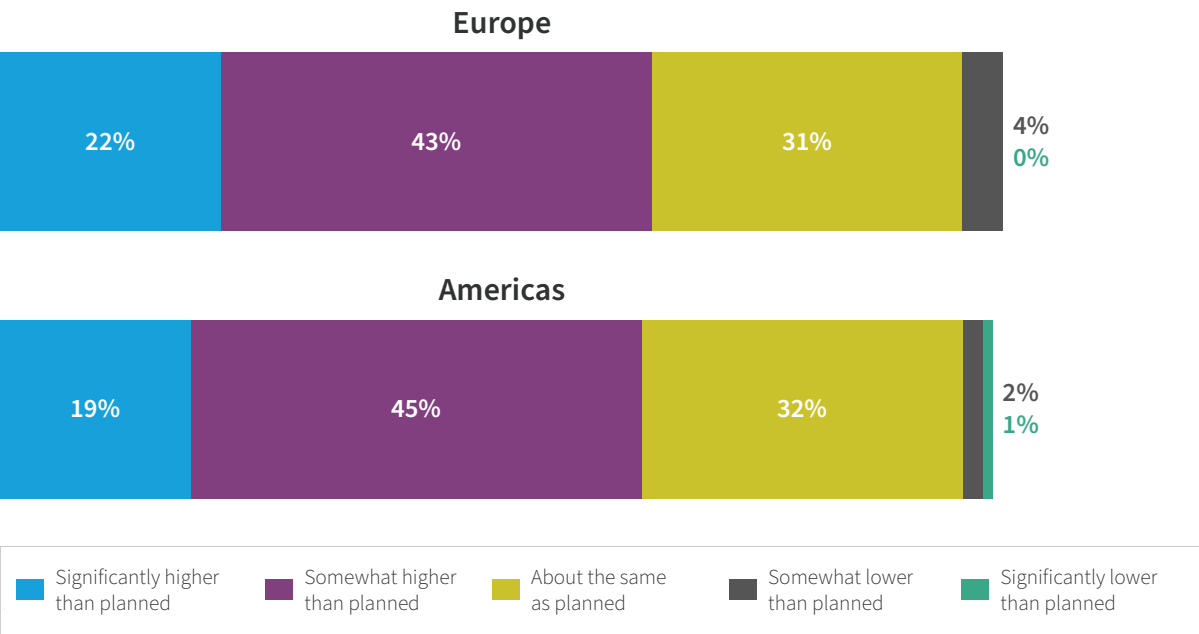
Europe N=140, Americas N=516
Source: Flexera 2022 State of the Cloud Report

FLEXERA

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.

Adoption of central cloud team/CCOE for European organizations

Have cloud center of excellence (CCOE)	34%
Have central cloud team	29%
No plans	16%
Planning one in next twelve months	12%
Planning one beyond twelve months	8%
Don't know	1%
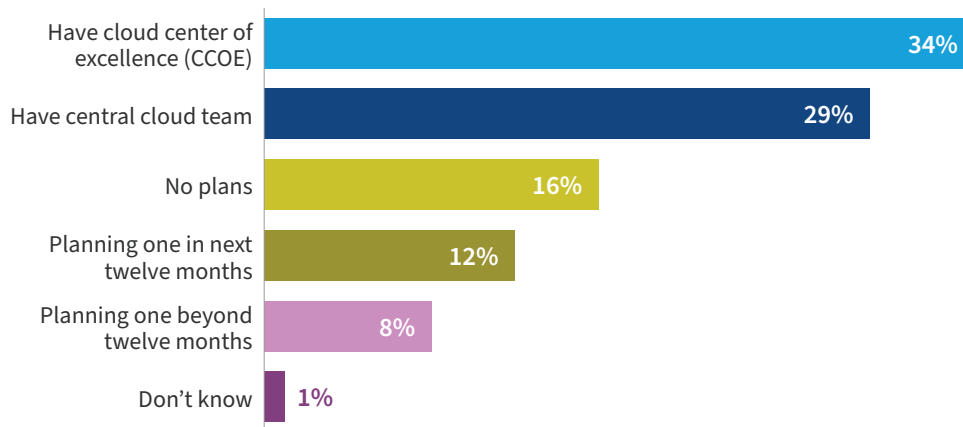
N=140
Source: Flexera 2022 State of the Cloud Report

FLEXEra

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

Challenge	Percentage
Assessing technical feasibility	51%
Understanding app dependencies	49%
Assessing on-premises vs. cloud costs	44%
Rightsizing/selecting best instance	42%
Migrating the app and data	36%
Optimizing costs post-migration	34%
Knowing the implications of BYOL	32%
Prioritizing apps to migrate	32%
Selecting the right cloud provider	29%
Managing the app post-migration	25%
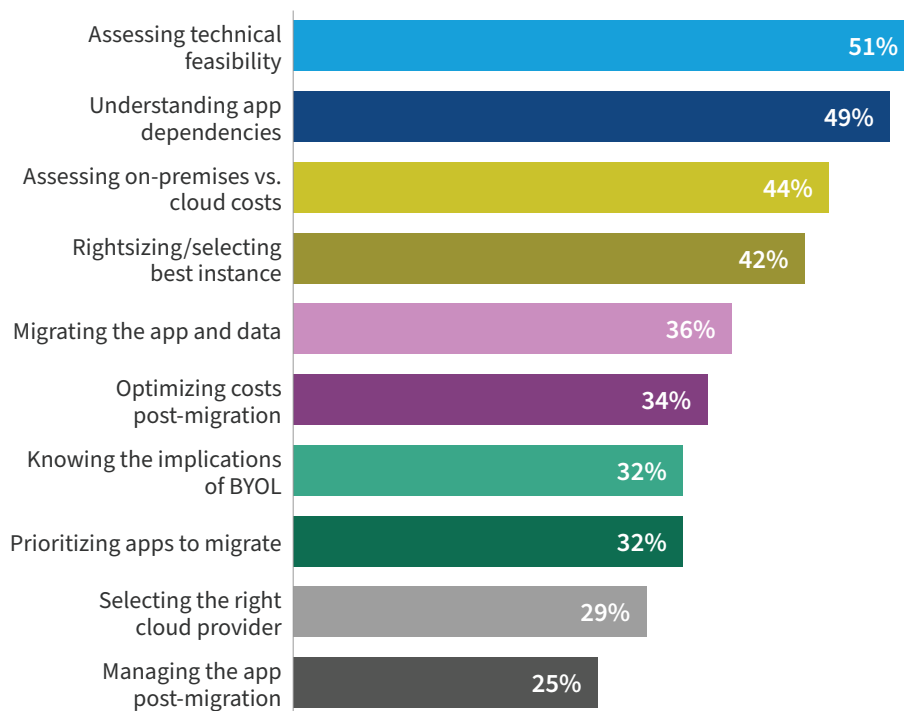
N=140
Source: Flexera 2022 State of the Cloud Report

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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

Initiative	Percentage
Migrating more workloads to cloud	69%
Optimizing existing use of cloud (cost savings)	68%
Progressing on a cloud-first strategy	47%
Move from on-prem software to SaaS	44%
Expand use of containers	41%
Better financial reporting on cloud costs	37%
Automated policies for governance	37%
Manage software licenses in the cloud	37%
Implement CI/CD in the cloud	33%
Expand use of public cloud IaaS/PaaS services	32%
Expanding public clouds we use	31%
Enabling IT to broker cloud services	12%
Expand use of cloud MSPs	12%
Expand use of cloud marketplaces	6%

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

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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.

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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.

More than 50,000 customers subscribe to our technology value optimization solutions, delivered by 1,300+ passionate team members worldwide. To learn more, visit **flexera.com**

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