

## 2017 State of the Cloud

- ▶ As the use of public cloud becomes a given, IT leaders must navigate the transition and advocate for improved management tools and methods.



By Joe Emison



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# Research Summary

- **Survey Name:** Interop ITX and InformationWeek 2016 State of Cloud Computing Survey
- **Survey Date:** December 2016
- **Region:** North America
- **Respondent base:** 307 technology professionals at organizations that use or plan to use cloud computing. The margin of error for the total respondent base (N=307) is +/- 5.6 percentage points.
- **Methodology:** Interop ITX and InformationWeek surveyed business technology decision-makers at North American companies on cloud computing usage and optimization strategies. The survey was conducted online, and respondents were recruited via an email invitation containing an embedded link to the survey. The email invitation was sent to a select group of UBM's audience. Nearly half of the resulting respondents held IT management titles such as CIO, CTO, VP of IT, IT manager, or IT director. Four in 10 were from large companies with 1,000 or more employees. UBM was responsible for all programming and data analysis. These procedures were carried out in strict accordance with standard market research practices.

# Introduction

As we enter 2017 and cloud adoption continues to grow, we turn our attention to a number of unresolved questions about the future of cloud so that we might better understand what the future holds. These questions are not about whether cloud is here to stay (it is), or whether basically everything will be cloudy in the future (it will be). Instead, these questions are around how systems will transition to the cloud and what the next key innovations in cloud will be.

In this report, we'll begin by examining the transition to cloud. How will we move from on-premises and traditional data centers with virtualization to infrastructure-as-a-service? Will we be using private clouds in the future? Are hybrid clouds an obvious and necessary stepping stone, or are they a useless waste of time and money? How will we manage and orchestrate our clouds? And how will we handle security cost control in an environment that we can't touch and feel and that allows bills to run rampant?

We'll also address what's coming next: Is "serverless" computing the next iteration of cloud and what exactly does serverless mean? How can one tell when it is the right time to be trying out new advancements in cloud technologies?

# Cloud Today

## ► The death of "virtualization=cloud"

2016 seemed to mark the last point in time when IT professionals could describe a collection of virtual machines (most likely using VMware or Citrix Xen) as "doing cloud." We've seen a steady decline in our cloud surveys over the past four years, as the use of "virtualization or private cloud" has dropped nearly 25%, from 52% in 2012 to 40% in 2016, while infrastructure-as-a-service (IaaS), the public alternative, nearly doubled, increasing from 30% to 57%. This is especially meaningful given that many of the respondents to our surveys are working in fairly traditional IT environments.

### Services in Use

Which cloud computing technologies and services are in use by your organization today?

	2016	2014
Software as a service (applications delivered via cloud)	70%	64%
Infrastructure as a service (storage or virtual servers delivered via cloud)	57%	49%
Platform as a service (web platform delivered via cloud)	44%	39%
Virtualization or private cloud technology used internally	40%	47%
Cloud management or orchestration software	17%	N/A
Other	2%	6%

Note: Multiple responses allowed

Data: UBM State of Cloud Computing Survey of 170 users of cloud computing at organizations with 50 or more employees, August 2014

Data: UBM State of Cloud Computing Survey of 307 technology professionals at organizations that utilize or plan to use cloud computing, October 2016

Figure 1

The future decline of virtualization and private cloud was also apparent in our respondent's future plans. They estimated another 12-point drop between current and future usage, with only 28% expecting to use virtualization and private cloud for new projects in the next 12 months.

## Top Benefits of Cloud Computing

What are the top three benefits your organization hopes to realize by using cloud computing? Please rank the list below.

	2016
Greater scalability	1
Higher performance	2
Better and/or faster access to technology resources	3
Cost savings	4
Faster time to market	5
Improved business continuity	6
Increased IT staff efficiency	7
Improved employee productivity	8
Shift of cost allocation from capex to opex	9
Expanded geographic reach	10

Note: Score is a weighted calculation. Items ranked first are valued higher than the following ranks, the score is based on the sum of all weighted rank counts.

Data: UBM State of Cloud Computing Survey of 307 technology professionals at organizations that utilize or plan to use cloud computing, October 2016

A general trend toward obtaining more IT services from the cloud is also evident in the results. Two years ago, only 20% of respondents predicted that they would get half or more of IT services from the cloud. That number has almost doubled, increasing to 39% of all respondents in our survey this year. On the flip side, the percentage of respondents intending to get very few (10% or less) IT services via cloud has dropped by more than 65%, from 32% to 11%. (See Figure 8, p. 16.)

Where are those services coming from? Our survey results show substantial growth in usage of Amazon Web Services (AWS), which increased from 39% to 52% in the past two years, as well as

Figure 2



Google's Cloud, which jumped from 23% to 38%. In contrast, use of Microsoft Azure dropped 10 percentage points, from 48% to 38%. (See Figure 17, p. 26.)

This move away from virtualization and "private cloud" toward public cloud is driven primarily by three criteria, according to our respondents: scalability, performance, and better/faster access to resources. (See Figure 2, previous page.) These are three aspects of public cloud that have substantial business benefits. They are also very hard to achieve in traditional IT environments where servers must be procured and capitalized, and bureaucratic processes must be followed to put equipment into use.

We all know that software is eating the world, making organizations rely more upon their own abilities to develop and deploy software. And the more that deploying software is intimately tied to organizational success, the more that success is directly related to being able to deploy hardware resources to run software quickly in a highly dynamic way. That is why AWS has grown so rapidly into a \$10 billion per year company.

## Cloud Concerns

### ▶ The future of hybrid cloud

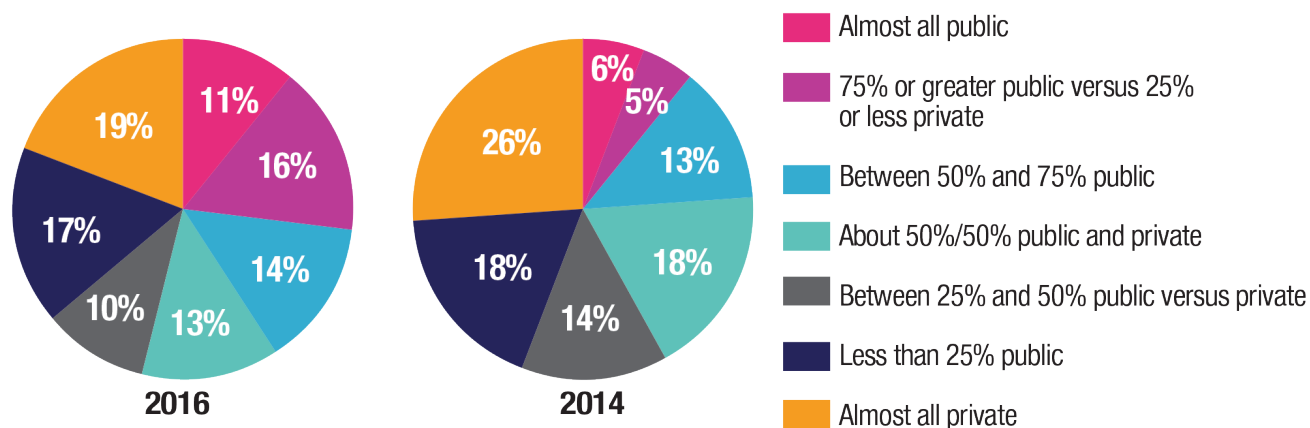
One of the biggest stories of 2016 was hybrid cloud, which theoretically enables applications to run partly in a "private cloud" (which presumably includes more traditional virtualized environments without full cloud capabilities) and partly on a public cloud. Even Amazon announced a partnership with VMware to enable VMware administrators to launch privately-run

VMs in AWS. However, while hybrid cloud seems like a good idea in theory, real practitioner experience (including my own) provides strong cautionary tales against going halfway to the public cloud.

To understand the problems with hybrid cloud, it is first worth understanding that even true private cloud adoption is in decline. In addition to lower predictions on future usage, the number of respondents who were testing private cloud dropped from 30% to 6% (see Figure 11, p. 20), and the percentage of respondents running half or more workloads in the private cloud declined from 76% to 59% (see Figure 3 at right). As Chuck Hollis,

## Public Versus Private Workloads

Approximately what is the ratio of total cloud-based workloads running on public versus private infrastructure?



Base: 160 respondents who have implemented a private cloud or support a hybrid cloud infrastructure in 2016, and 112 respondents using, piloting, or developing a hybrid cloud in 2014

Data: UBM Hybrid Cloud Survey of 383 business technology professionals, May 2014

Data: UBM State of Cloud Computing Survey of 307 technology professionals at organizations that utilize or plan to use cloud computing, October 2016

Figure 3



Oracle's senior vice president of converged infrastructure systems, lamented in a post on his personal blog, "Perhaps there is no deeper disappointment in life than when a cherished concept fails to produce the desired results. Such is the case with the industry's notion of private clouds."

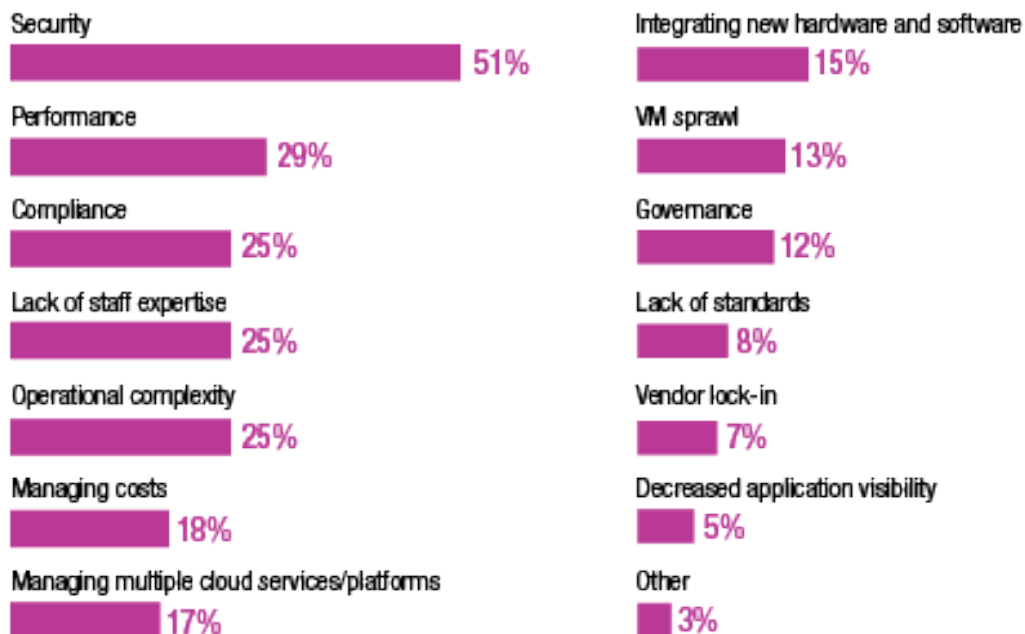
However, many organizations still have large numbers of virtual machines in their own data centers or co-location facilities, leaving them to ask, "What can I do to bring the benefits of the public cloud to my organization?" and "Must I go cold-turkey to public cloud?" This is where the allure of "hybrid" comes in — could it serve as a nice, simple stepping stone, without having to deploy everything in the public cloud all at once?

There are two ways that organizations typically think about hybrid clouds. First is the ability to launch virtual machines on either private hardware or public IaaS from the same, internal management console that they've been using for years. Second is the ability to run specific applications with some components in a private cloud, and others in a public cloud (the example often given here is cloud-bursting, when additional machines are spun up on a public cloud for performance reasons during peak times like Black Friday).

Unfortunately, neither of these use cases seem to work well in practice. With respect to easily launching VMs, our survey showed a decline in past years in the number of respondents who claimed they could deploy on either the private or public cloud — from 30% to 26%. In addition, fewer respondents were thinking about or developing the capability to deploy specific workloads in either public or private clouds (from 55% to 46%). I believe this is because the ability to use traditional virtualization tools to launch VMs in the public cloud doesn't provide the ability to take advantage of the full benefits of the public cloud, while giving you all the downsides of the public cloud (e.g., less reliable machines, more limited configuration sets, etc.).

## Private or Hybrid Cloud Challenges

What are the biggest challenges your organization has encountered in utilizing private/hybrid cloud?



Note: Maximum of three responses allowed

Base: 160 respondents who have implemented a private cloud or support a hybrid cloud infrastructure

Data: UBM State of Cloud Computing Survey of 307 technology professionals at organizations that utilize or plan to use cloud computing, October 2016

And perhaps the most painful lessons learned in hybrid cloud are around those organizations who have tried to build applications that run partially in a private cloud and partially in a public cloud. Those who have attempted this for a significant application have learned there are many assumptions they've made about network reliability that simply aren't true. Latency and dropped connections between the two clouds cause countless errors that are extremely hard to debug and fix. And that doesn't even address the security issues, which our respondents rated as the most significant challenge in private and hybrid cloud adoption by far.

Figure 4

So, while the siren's call for hybrid cloud may be sweet, if you focus on the reasons why organizations need cloud (scalability, performance, and better/faster access to resources), you can see that forcing the additional complexity of running applications in disparate environments with different characteristics and features is unnecessarily costly. Our respondents identified the two most significant challenges in performance of cloud-based applications as the design of the application and their own Internet bandwidth. (See Figure 20, p. 29.) Fully embracing the public cloud solves these issues, but attempting to bolt a private cloud onto the public cloud does not.

## ► Cloud management

One of the most unsettled questions in cloud has been how to accomplish cloud management, an area in which agreed-upon best practices are hard to come by. We've seen many different solutions emerge to tackle cloud management, including RightScale, Chef, and Puppet, platform-as-a-service (PaaS), Docker, Cloud Foundry, and Kubernetes (and that's not even mentioning SaltStack or HashiCorp).

The only thing we can say definitively is that, unlike Amazon's dominance on the public cloud side, there has been no such clear winner with respect to cloud management. Even Amazon has struggled in this space, launching many different services including Elastic Beanstalk, CloudFormation, OpsWorks, and Simple Workflow Service. None of these has found as much success as its Relational Database Service (RDS), which handles management tasks for relational database servers wonderfully but does not extend to managing the rest of the servers needed for the application.

In our survey, a plurality of respondents said they were using their own custom code to automate and orchestrate workloads. More respondents reported they do not automate or

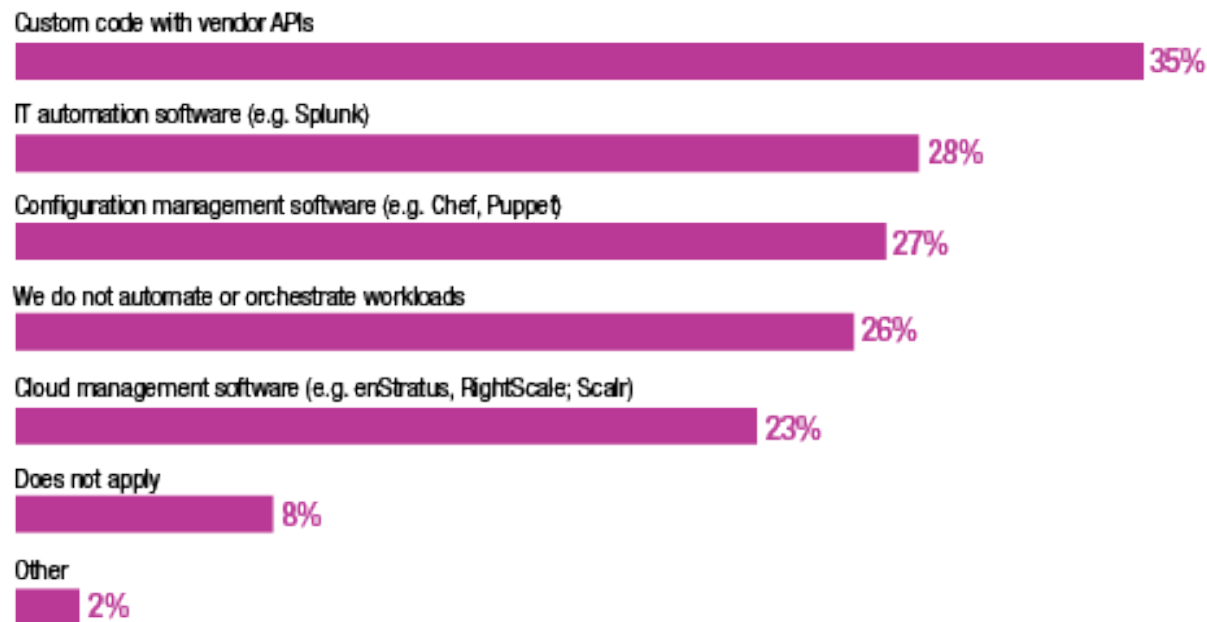
orchestrate workloads than those who use true "cloud management" software, so many users are not realizing some of the main benefits of the cloud. And the lack of effective cloud management hampering the effectiveness of cloud deployments is only going to get worse —

85% of respondents reported using more than one cloud provider, a number that is likely to increase.

In addition to custom code — including using PowerShell (our respondents' most common selection for configuration management) — survey respondents also cited using several technologies that have been around for a while, like Puppet, Chef, Ansible, and Salt. (See Figure 14, p. 23.) However, the rise of Docker and containers is also evident.

## Automation of Workloads

How are you automating and orchestrating workloads in your cloud environment?



Note: Multiple responses allowed

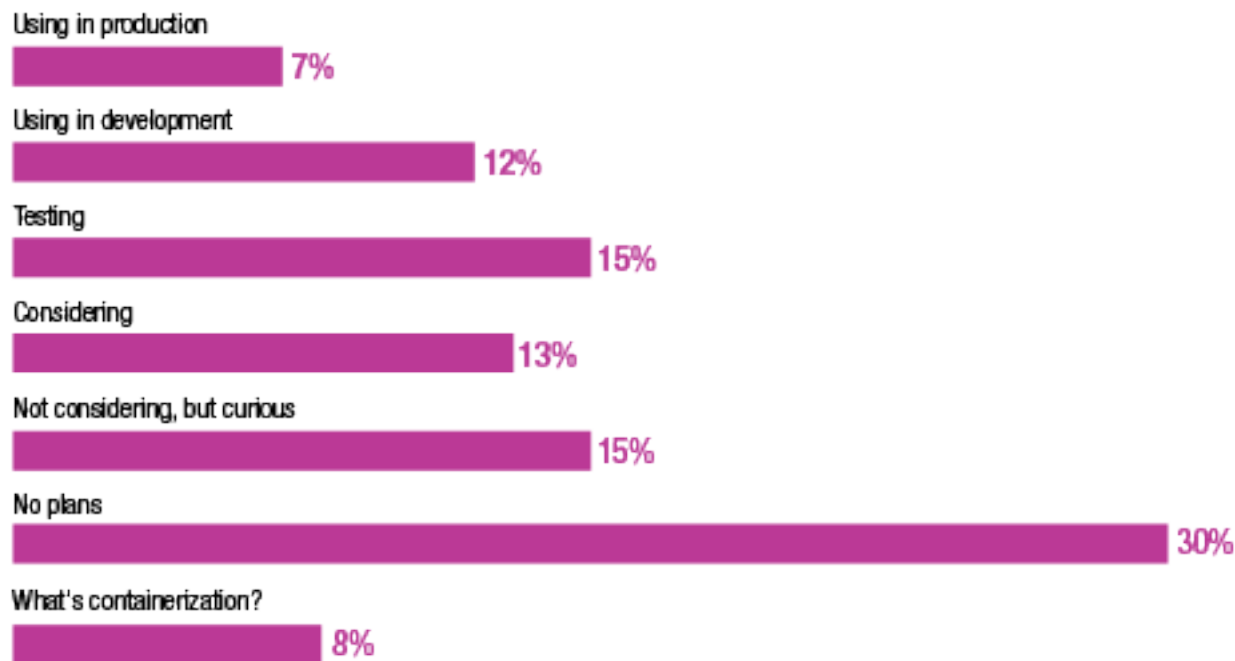
Base: 243 respondents who are actively using cloud computing (cloud services, private cloud or hybrid cloud)

Data: UBM State of Cloud Computing Survey of 307 technology professionals at organizations that utilize or plan to use cloud computing, October 2016

Figure 5

## Containerization Systems in Cloud Environment

Do plans for containerization systems such as Docker factor into your cloud environment?



Base: 160 respondents who have implemented a private cloud or support a hybrid cloud infrastructure  
 Data: UBM State of Cloud Computing Survey of 307 technology professionals at organizations that utilize or plan to use cloud computing, October 2016

The lack of effective cloud management is one of the reasons that interest in Docker and containers is quickly growing. Although only 7% of our respondents said they were actually using containers in production, almost half were at least considering deploying them. Interest may be dampened by many cautionary tales of organizations that attempted implementing Docker in production but found that the undocumented and surprise pains from trying to use the container software exceeded whatever benefits the organizations were expecting from it.

Figure 6

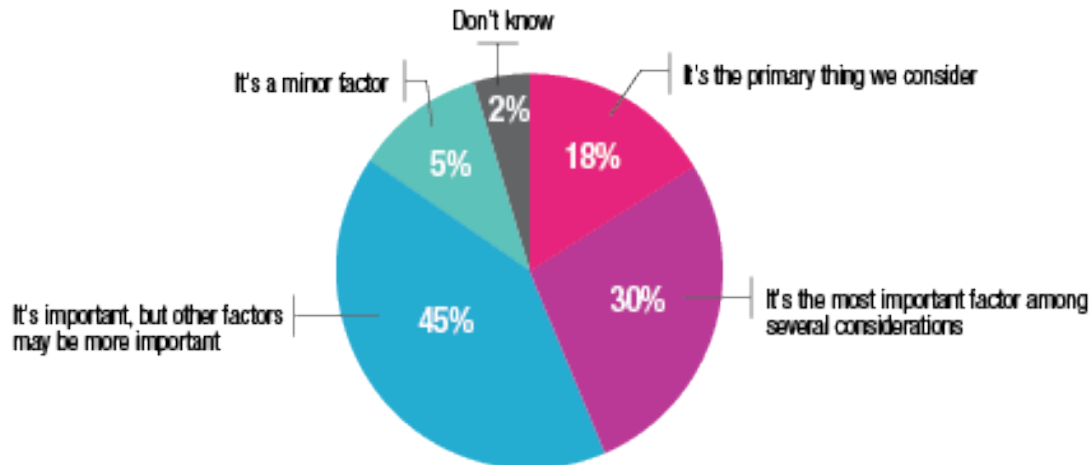
These struggles with Docker (and its management system, Swarm) have led to increased interest in Kubernetes and Cloud Foundry. The only certainty here is that the development of container technology is actively in flux, and it's almost guaranteed that whatever tool one selects today for cloud management, even if it is used successfully, will be obsolete in the near future.

## ▷ Security & cost control

While cost was often an initial point of discussion around cloud adoption, in 2016, most respondents' concerns about the cloud had to do with security. These concerns increasingly have less to do with overall worries that public cloud is insecure and more to do with technology- and application-specific concerns. Cloud providers like AWS subject themselves to far more stringent security audits and controls than most on-premises data centers, so the biggest risks lay

### Cost Considerations

How heavily does cost factor into a decision to go ahead with a cloud project at your organization?



Base: 172 respondents who are receiving services or applications from a cloud provider  
Data: UBM State of Cloud Computing Survey of 307 technology professionals at organizations that utilize or plan to use cloud computing, October 2016

Figure 7



with poorly-designed applications and poor controls around access to systems and information that are controlled by organizations themselves. (See Figure 15, p. 24.)

Nevertheless, the cost of cloud remains a constant topic of conversation, even if it is only one of many considerations for a majority of our respondents. Perhaps the biggest challenge with public cloud costs is that, because they are billed per use and (usually) not capped, the easiest way to monitor costs is to look at monthly statements in arrears. That was by far the predominant way that our respondents said they monitor cloud costs. (See Figure 23, p. 32.) However, given the business benefits of the public cloud, combined with the substantial reduction in capital expenditure that is needed, most businesses have been quite happy to accept the monthly billing variability.

## Cloud Tomorrow

### ▸ Serverless computing

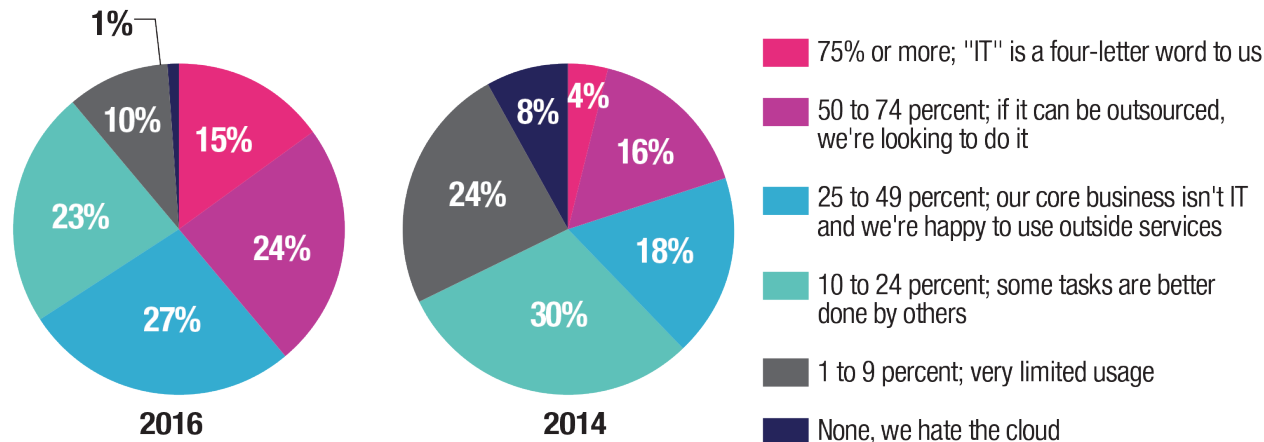
The rise of so-called "serverless" computing is one of the most significant recent topics in cloud. Two distinct trends have ushered in the serverless movement: functions-as-a-service (FaaS) and "serviceful architectures."

AWS's Lambda service, which allows developers to publish code to Amazon so that Amazon completely manages all of the servers that run the code, is the best-known FaaS platform. The promise of FaaS is that applications no longer need any operations support in order to keep servers up or scale them — users need only devote operations effort to the up-front deployment of services. The downside to FaaS is that it requires all applications to be re-architected as a series of functions that can run on the FaaS platform, and there is an incredible amount of complexity (especially within AWS) required to build and deploy applications as FaaS. Google,

Figure 8

## Future Look at IT Services Delivered From Cloud

Looking ahead 24 months, what percentage of your IT services do you predict will be delivered from the cloud?



Note: Multiple responses allowed

Data: UBM State of Cloud Computing Survey of 170 users of cloud computing at organizations with 50 or more employees, August 2014

Data: UBM State of Cloud Computing Survey of 307 technology professionals at organizations that utilize or plan to use cloud computing, October 2016

Microsoft, and smaller vendors like Auth0 all have their own FaaS platforms, and an increasing number of authors are publishing books on FaaS (usually under the "serverless" label) to provide guidance to early adopters of the platform.

In addition to FaaS, developers are taking advantage of an increasing number of cloud-based "serviceful architectures" to reduce development time and simplify deploying code.

Twilio is perhaps the largest and first example of one of these third-party services, allowing developers to easily make voice- and text-based applications without having to deal with things like telephony cards and hooking into telephone or cellular systems. On Twilio's heels, companies like Algolia (for search), Cloudinary (for image manipulation), and Auth0 (for authentication) have followed, along with a host of other services that allow developers to focus only on critical and differentiating client-interaction code.

## ► When is early adoption too early?

Today's enterprises have realized that if they don't start adopting new technology earlier, they will likely be crushed by upstarts who do. The typical enterprise IT adoption cycle is far too slow; but there are far too many new technologies and vendors to try them all. So what is the right strategy to avoid missing out on critically important new services?

One strategy is to follow adoption. This doesn't mean following the tech press, because that can simply be a measure of great PR. For example, the adulation of Docker has not been followed with massive adoption of Docker across the industry. In contrast, Cloud Foundry has arguably found more success than Docker in production, but lags in terms of popularity. If you focus on identifying the technologies that are actually in production use for impressive applications — especially technology used by multiple applications across multiple organizations for at least a year — you'll be well on your way to identifying the right new technologies.

In summary, the state of the cloud today — especially the public cloud — is ever-present and growing. It is a given that public cloud adoption will continue to increase across the board, and that Amazon will continue to be the default choice of many for the near future. What is less clear is which tools we will use as we migrate from a VM-centric world to one that is easier and more automated to manage than VMs. Whether that will be Docker, Cloud Foundry, or other management tools, or whether it will be serverless architectures remains to be seen. But software will continue eating the world, and organizations that can leverage the cloud will continue to beat those that cannot.

# Appendix

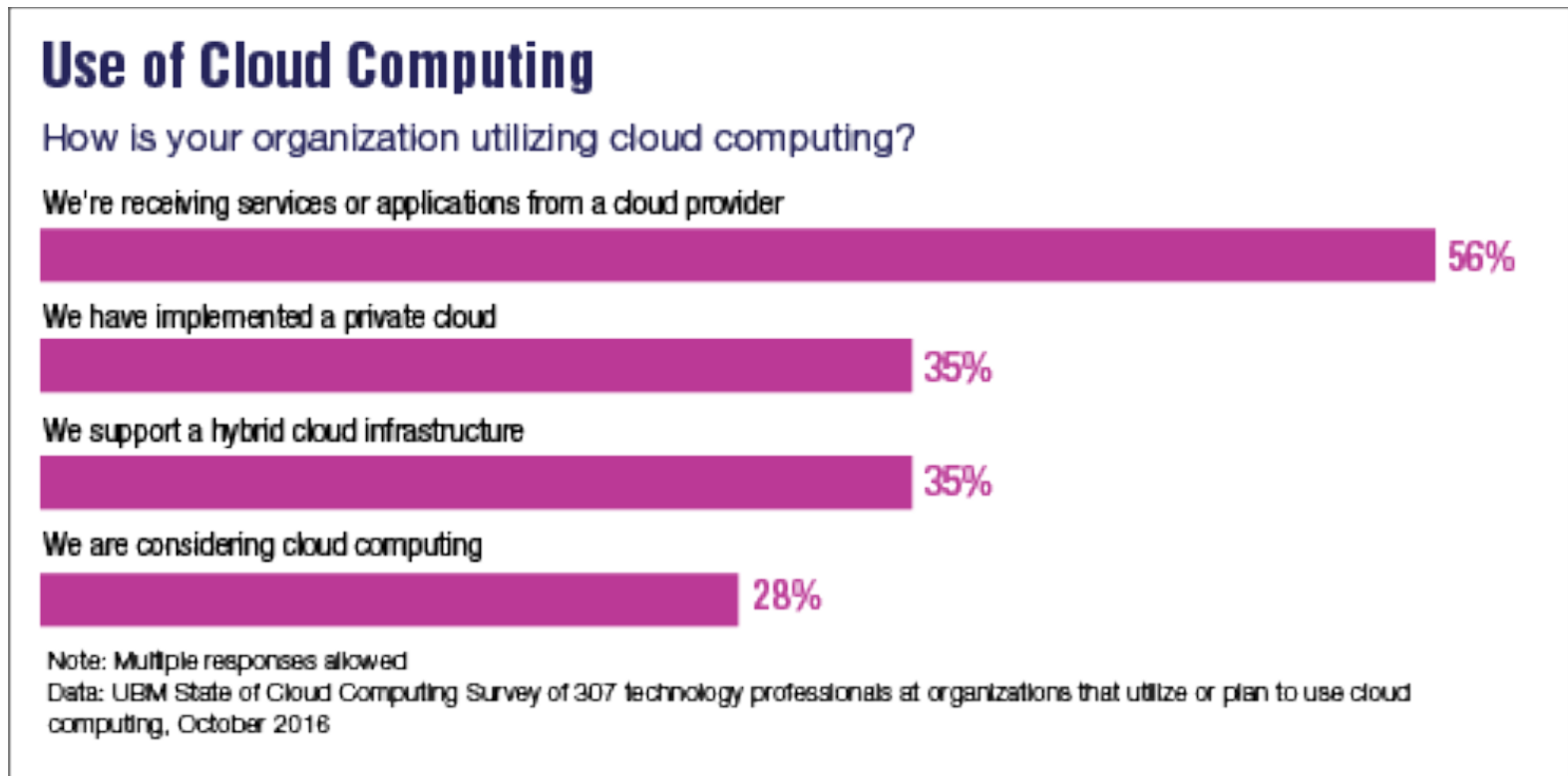
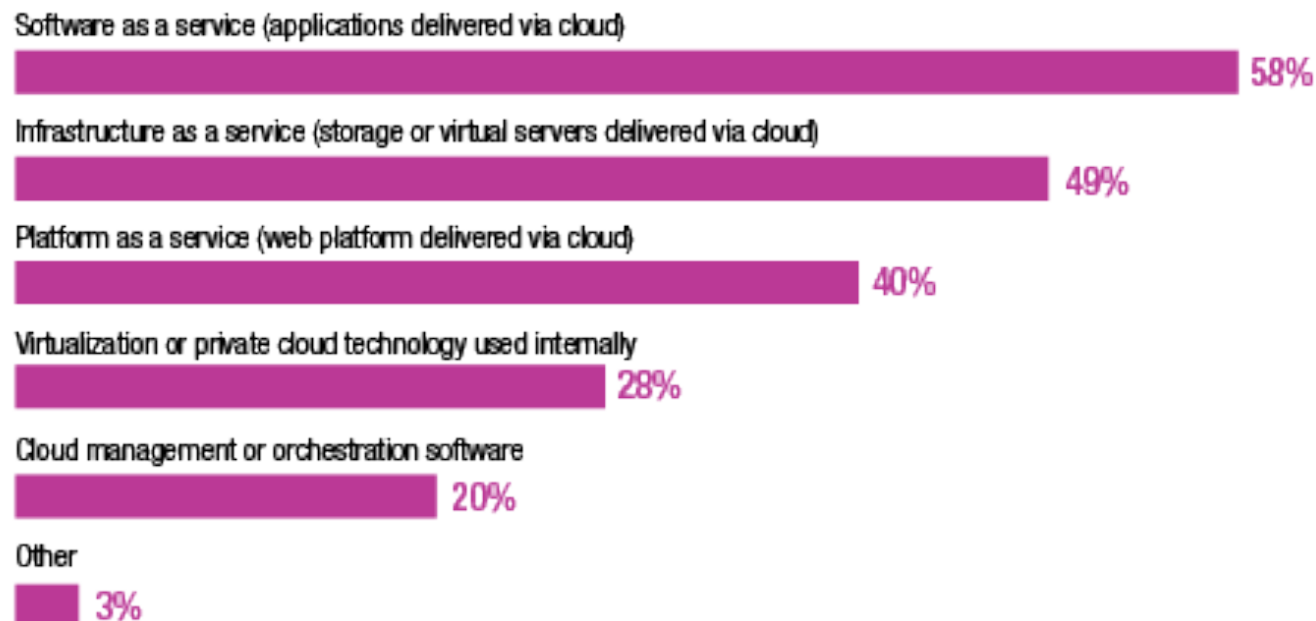


Figure 9

## Future Look at Cloud Computing Services in Use

Which cloud computing technologies and services is your organization most likely to begin using in the next 12 months?



Note: Multiple responses allowed

Data: UBM State of Cloud Computing Survey of 307 technology professionals at organizations that utilize or plan to use cloud computing, October 2016

Figure 10

## Private Cloud Adoption

Which best describes your state of private cloud adoption?

Have a private cloud in production for some of our apps



Have a private cloud in production for most or all of our apps



Considered and decided against it



Built a test version and found it wasn't worth pursuing



Currently testing parts of a private cloud



Piloting a private cloud project



Not using



Base: 160 respondents who have implemented a private cloud or support a hybrid cloud infrastructure in 2016

Data: UBM Private Cloud Survey of 242 business technology professionals at organizations with 50 or more employees, January 2014

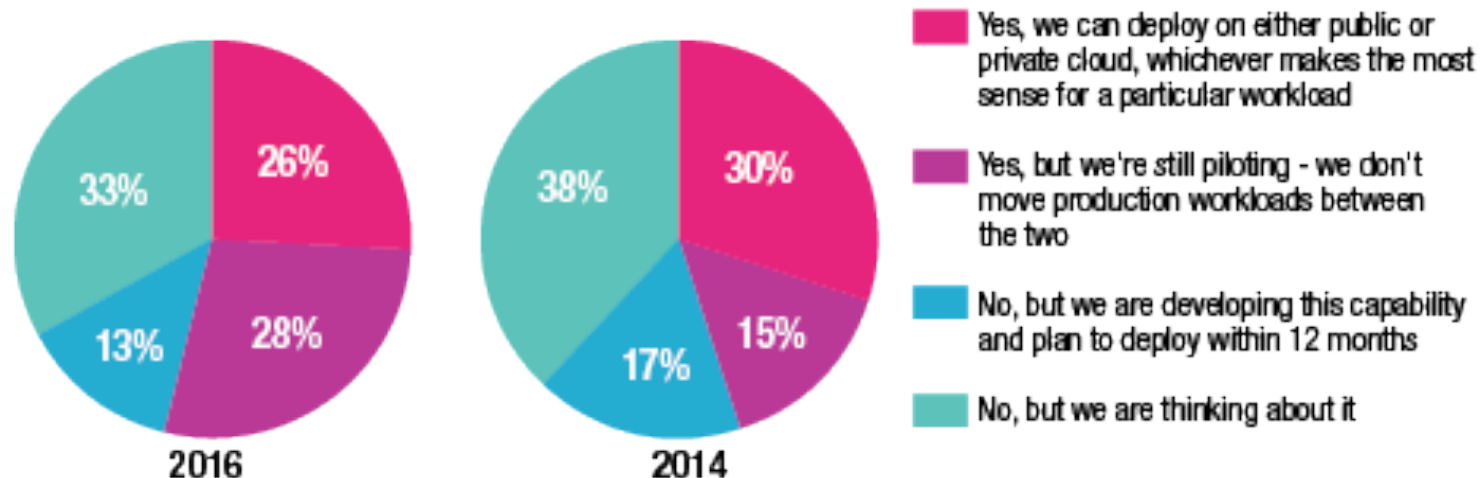
Data: UBM State of Cloud Computing Survey of 307 technology professionals at organizations that utilize or plan to use cloud computing, October 2016

Figure 11



## Moving from Private to Public Cloud

Can you provision and/or move applications and data from your private cloud to one or more public cloud services like AWS, Azure, etc.?



Base: 160 respondents in 2016 and 179 respondents in 2014 who have implemented a private cloud or support a hybrid cloud infrastructure

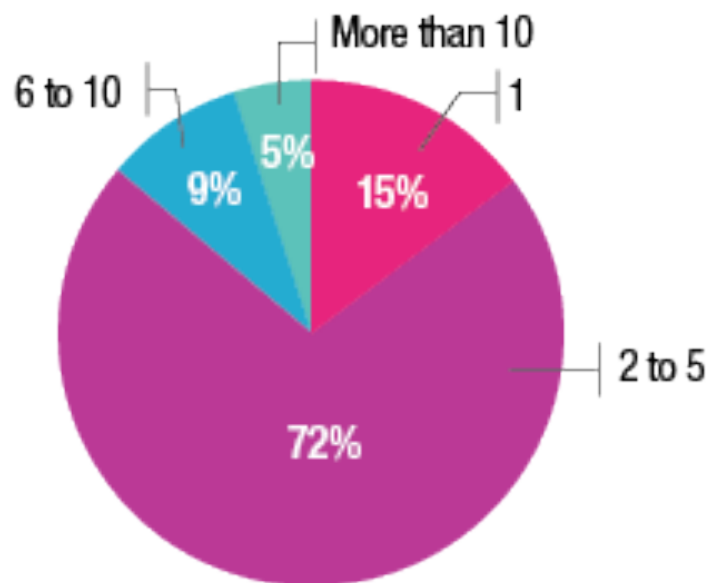
Data: UBM Hybrid Cloud Survey of 383 business technology professionals, May 2014

Data: UBM State of Cloud Computing Survey of 307 technology professionals at organizations that utilize or plan to use cloud computing, October 2016

Figure 12

## Number of Cloud Providers in Use

Regardless of the number of different platforms and options, how many actual cloud providers do you use (e.g., Salesforce, Amazon, Google, Microsoft, IBM etc.)?



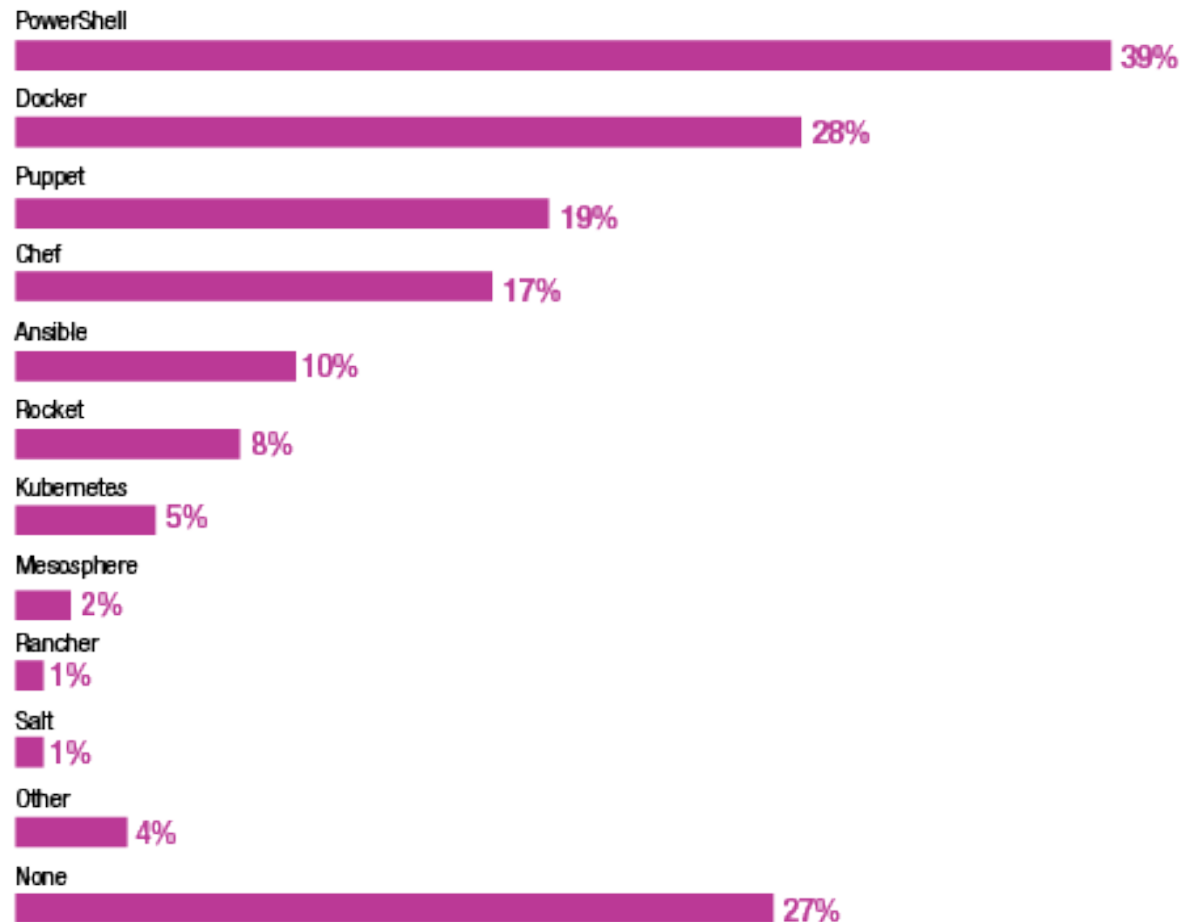
Base: 172 respondents who are receiving services or applications from a cloud provider

Data: UBM State of Cloud Computing Survey of 307 technology professionals at organizations that utilize or plan to use cloud computing, October 2016

Figure 13

## Configuration Management Tools in Use or Planned

Which of the following configuration management tools are you using, or plan to use in the next 12 months?

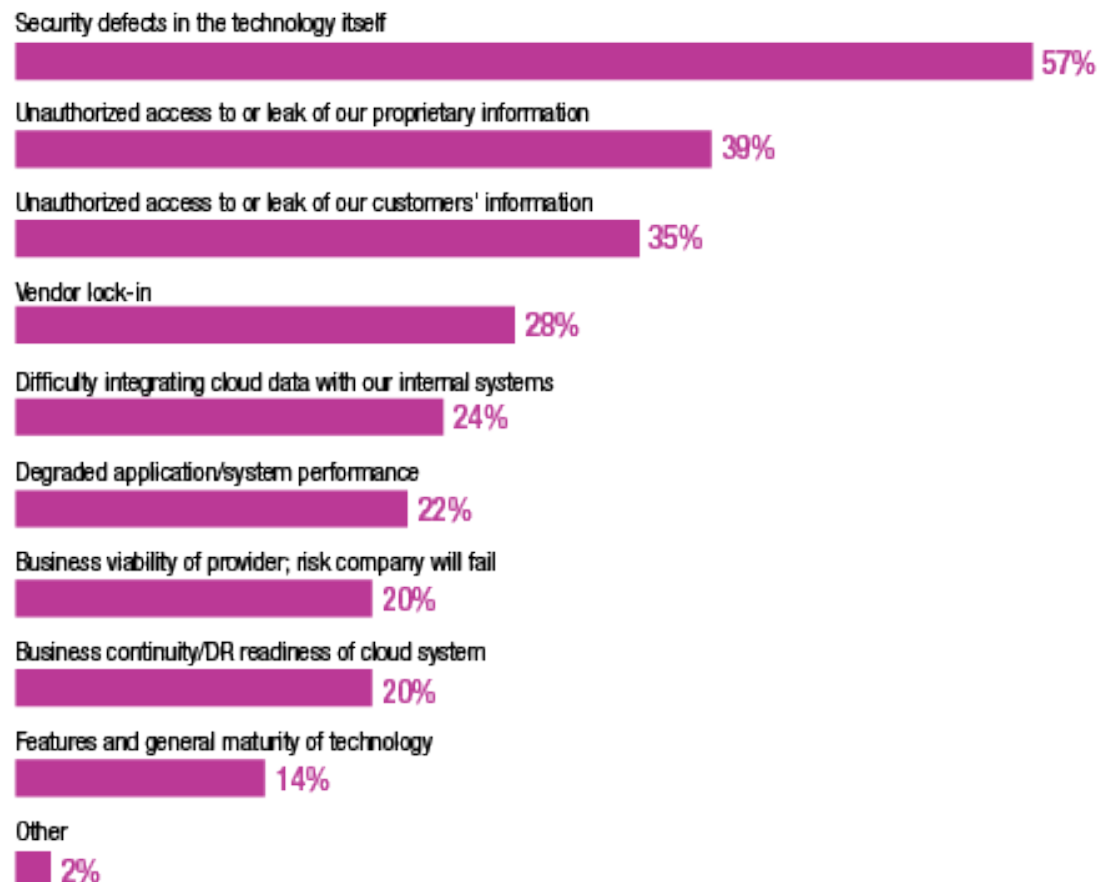


Base: 160 respondents who have implemented a private cloud or support a hybrid cloud infrastructure  
 Data: UBM State of Cloud Computing Survey of 307 technology professionals at organizations that utilize or plan to use cloud computing, October 2016

Figure 14

## Cloud Computing Risks

When thinking about risks related to cloud computing, what are your top three concerns?



Note: Maximum of three responses allowed

Data: UBM State of Cloud Computing Survey of 307 technology professionals at organizations that utilize or plan to use cloud computing, October 2016

Figure 15

## Benefits of Cloud Computing

For each of the following categories, please indicate the degree to which your organization has experienced actual benefit by using cloud computing.

	Benefited greatly	Benefited somewhat	Benefited minimally	No benefit	Does not apply
Greater scalability	40%	38%	15%	5%	2%
Better/faster access to technology resources	38%	38%	16%	6%	2%
Improved performance	32%	41%	14%	10%	3%
Expanded geographic reach	27%	24%	22%	13%	14%
Cost savings	25%	34%	26%	12%	3%
Improved business continuity	23%	39%	23%	9%	6%
Improved employee productivity	18%	39%	24%	14%	5%
Shift of cost allocation from capex to opex	17%	35%	23%	15%	10%
Increased IT staff efficiency	16%	36%	32%	12%	4%

Base: 243 respondents who are actively using cloud computing (cloud services, private cloud or hybrid cloud)

Data: UBM State of Cloud Computing Survey of 307 technology professionals at organizations that utilize or plan to use cloud computing, October 2016

Figure 16

## Public Cloud Services in Use

What public cloud services are you using?

	2016	2014
AmazonAWS	52%	39%
Google (Cloud, App Engine)	38%	23%
Microsoft Azure	38%	48%
Salesforce	30%	N/A
VMware vCloud Air	16%	7%
Oracle Cloud	14%	N/A
Rackspace	13%	15%
IBM (Softlayer, Bluemix)	9%	5%
SAP	9%	N/A
Other OpenStack service	6%	N/A
CenturyLink (Sawis, Tier 3)	5%	2%
DigitalOcean	4%	N/A
Terremark (Verizon)	3%	6%
Virtustream (EMC)	2%	N/A
Other	16%	N/A

Note: Multiple responses allowed

Base: 172 respondents who are receiving services or applications from a cloud provider in 2016, and 112 respondents using, piloting, or developing a hybrid cloud in 2014

Data: UBM Hybrid Cloud Survey of 383 business technology professionals, May 2014

Data: UBM State of Cloud Computing Survey of 307 technology professionals at organizations that utilize or plan to use cloud computing, October 2016

Figure 17



## Integration of Cloud and SaaS Applications

How do you integrate your different cloud and SaaS applications (i.e., IaaS, PaaS, SaaS and private cloud)?

Custom coding direct to our internal system using each vendors API



Don't integrate; users have separate accounts for each provider



Leverage a cloud-based integration platform (e.g. Dell Boomi or open source WS02)



Leverage a traditional VAN for data integration



Leverage an internal integration platform (e.g. Informatica)



Don't know



Other



Note: Multiple responses allowed

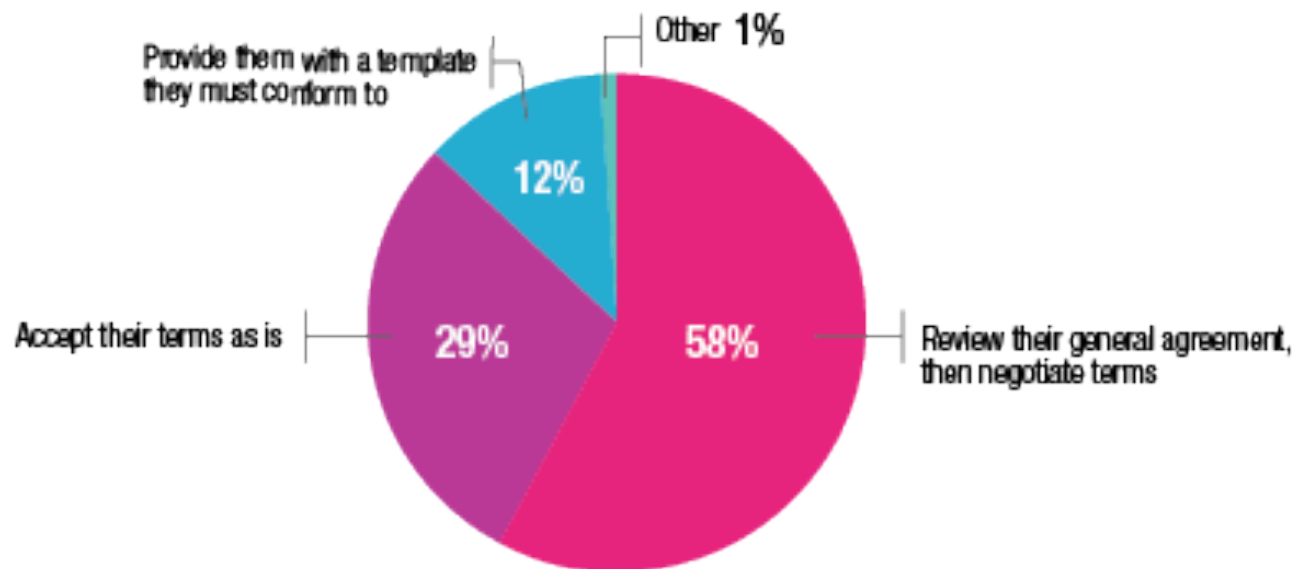
Base: 172 respondents who are receiving services or applications from a cloud provider

Data: UBM State of Cloud Computing Survey of 307 technology professionals at organizations that utilize or plan to use cloud computing, October 2016

Figure 18

## SLA Agreements

How do you create your SLA agreements with cloud providers?



Base: 172 respondents who are receiving services or applications from a cloud provider

Data: UBM State of Cloud Computing Survey of 307 technology professionals at organizations that utilize or plan to use cloud computing, October 2016

Figure 19

## Challenges for Cloud-based Applications

What are the biggest challenges for performance of cloud-based applications?

Actual application/system design of provider's application



Our own Internet bandwidth/connectivity



Cloud vendors' Internet connectivity



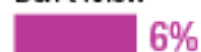
Scalability of provider application



Storage limitations



Don't know



Other



Note: Maximum of three responses allowed

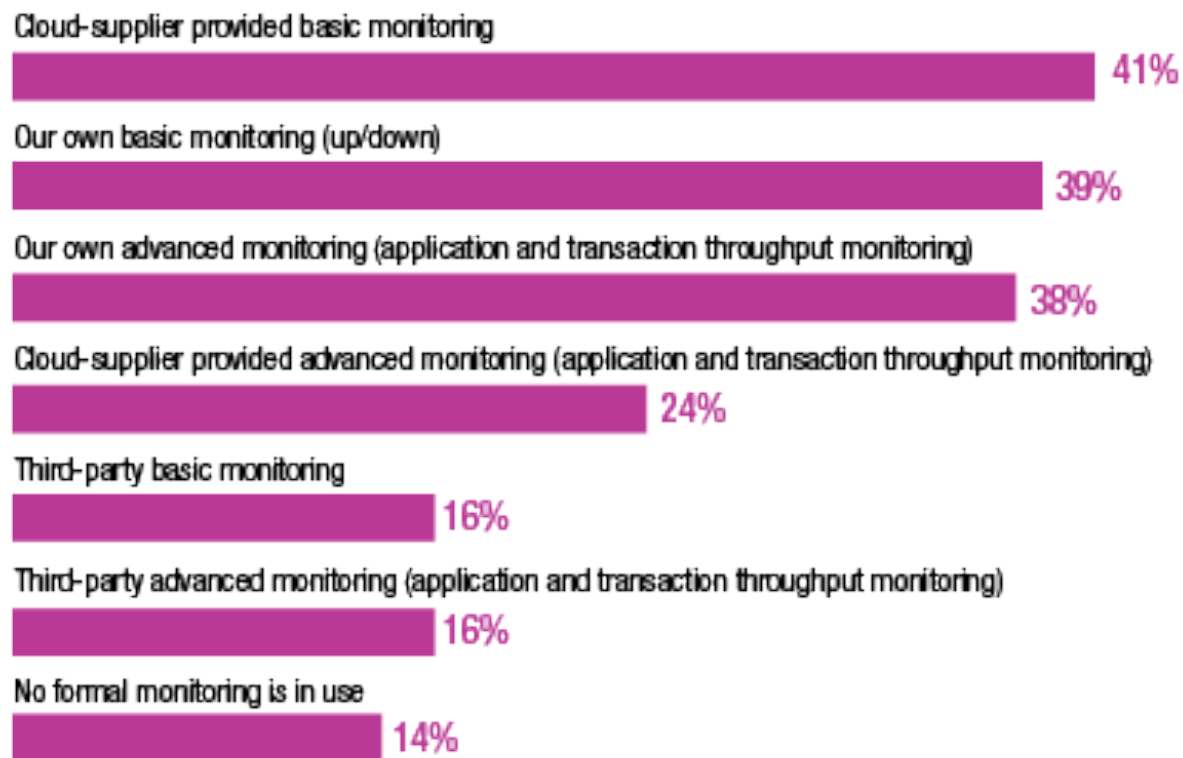
Base: 172 respondents who are receiving services or applications from a cloud provider

Data: UBM State of Cloud Computing Survey of 307 technology professionals at organizations that utilize or plan to use cloud computing, October 2016

Figure 20

## Monitoring Cloud-based Applications

What do you use to actively monitor performance of your cloud-based applications?



Note: Multiple responses allowed

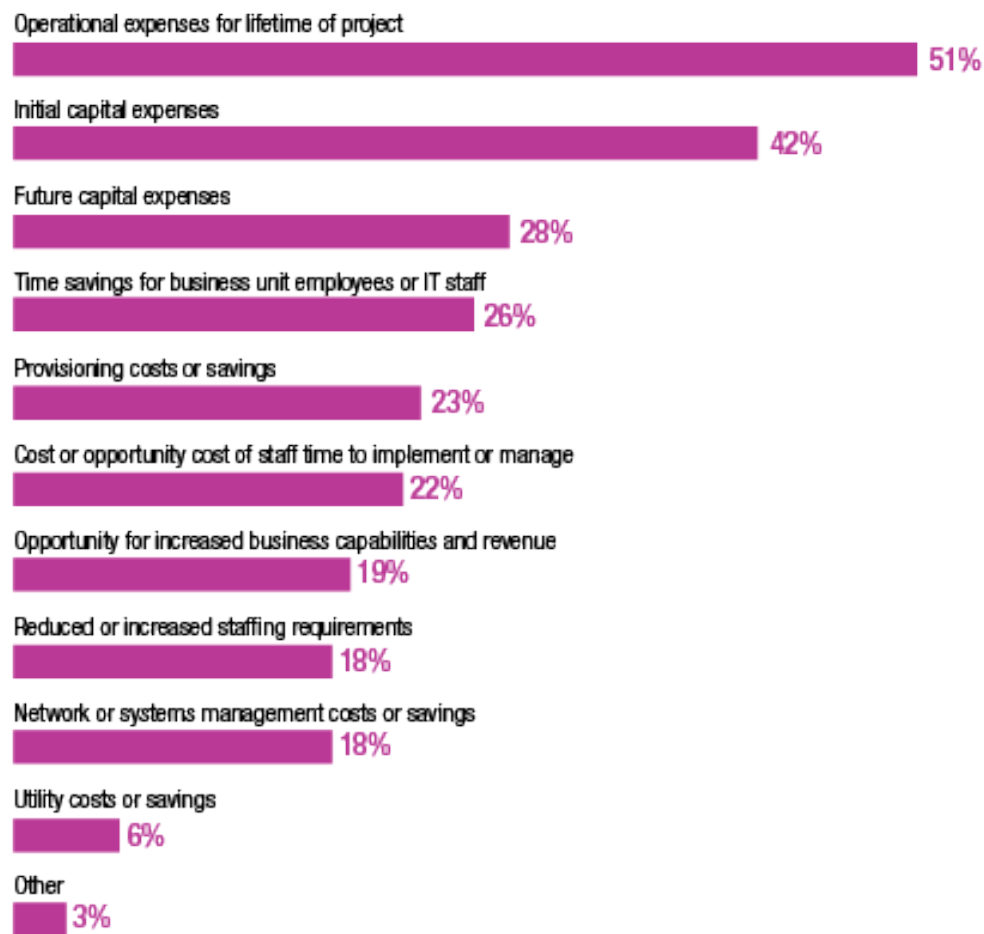
Base: 172 respondents who are receiving services or applications from a cloud provider

Data: UBM State of Cloud Computing Survey of 307 technology professionals at organizations that utilize or plan to use cloud computing, October 2016

Figure 21

## Financial Factors

Which financial factors have the greatest impact on decisions regarding cloud services at your organization?



Note: Maximum of three responses allowed

Base: 172 respondents who are receiving services or applications from a cloud provider

Data: UBM State of Cloud Computing Survey of 307 technology professionals at organizations that utilize or plan to use cloud computing, October 2016

Figure 22

## Monitoring Cloud Services Costs

What strategies does your organization use or plan to use to monitor or estimate costs of cloud services?

Tracking monthly billing or usage reports



In-house NOC monitoring



Real-time tracking (as opposed to monthly billing)



Spending limit set with provider



SMS or other types of alerts



Third-party software (e.g. Cloudability, Cloud Health, Cloudyn)



Other



None



Note: Multiple responses allowed

Base: 172 respondents who are receiving services or applications from a cloud provider

Data: UBM State of Cloud Computing Survey of 307 technology professionals at organizations that utilize or plan to use cloud computing, October 2016

Figure 23



## Cloud Deployment

For each of the following categories, please indicate whether your organization has deployed them using private cloud, public cloud, hybrid cloud, or not at all.

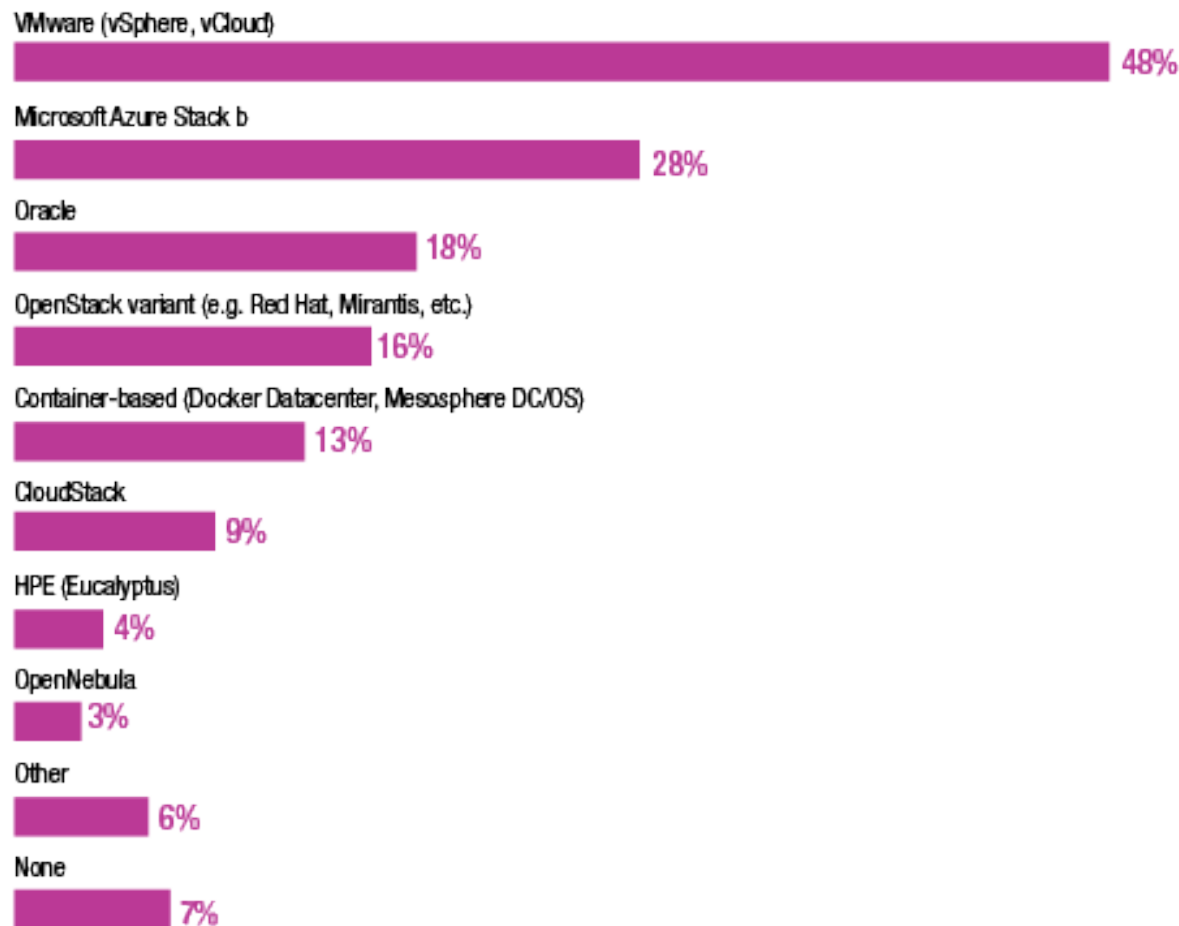
	Deployed in private cloud	Deployed in public cloud	Deployed in hybrid cloud	Not deployed
Web server	32%	40%	15%	14%
Email server	31%	41%	15%	13%
Security services (content filtering, etc.)	31%	19%	15%	36%
Authentication and authorization	30%	17%	19%	33%
Middleware/app logic	29%	26%	13%	32%
Database for N-tier applications	29%	20%	14%	37%
Network services (DNS, ADC, etc.)	29%	23%	12%	36%
Other DBs for mission critical apps	28%	16%	15%	41%
Business intelligence/analytics	25%	22%	13%	41%
Application development and test	25%	22%	17%	37%
CRM	22%	30%	12%	36%
HR/recruiting/training	22%	25%	14%	39%
Collaboration/SharePoint	21%	32%	17%	31%
Project/time management	20%	27%	11%	42%
Big data (Hadoop, etc.)	19%	14%	9%	58%
ERP	19%	18%	11%	52%
CMS/EIM	14%	15%	14%	58%
VDI	14%	12%	13%	61%

Base: 243 respondents who are actively using cloud computing (cloud services, private cloud or hybrid cloud)  
Data: UBM State of Cloud Computing Survey of 307 technology professionals at organizations that utilize or plan to use cloud computing, October 2016

Figure 24

## Private Cloud Platform

What cloud platform are you using for your private cloud?



Note: Multiple responses allowed

Base: 160 respondents who have implemented a private cloud or support a hybrid cloud infrastructure

Data: UBM State of Cloud Computing Survey of 307 technology professionals at organizations that utilize or plan to use cloud computing, October 2016

Figure 25

## Success of Cloud Initiative

How successful is your cloud initiative in meeting the following IT goals?

	1 Completely unsuccessful	2	3	4	5 Extremely successful
Better scalability	5%	4%	23%	36%	32%
More efficient use of hardware	5%	6%	25%	35%	28%
Better overall reliability	4%	7%	28%	37%	25%
Faster delivery of applications to the business	5%	8%	29%	34%	24%
Better disaster recovery	5%	9%	29%	35%	22%
More efficient use of IT staff time	4%	13%	29%	33%	21%
Better peak application performance	4%	11%	32%	32%	21%
Standardized OS builds	3%	12%	35%	31%	19%
Better average application performance	4%	8%	31%	40%	17%
Allowing self-service for end users	7%	15%	36%	26%	16%

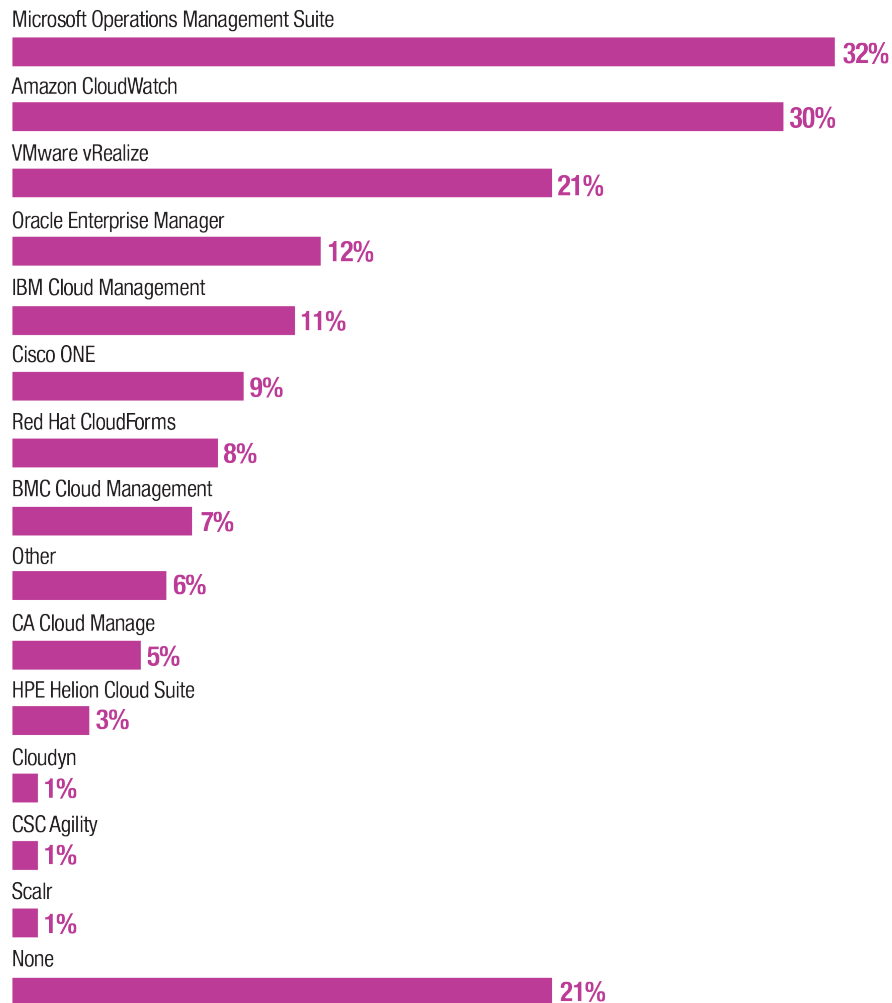
Base: 243 respondents who are actively using cloud computing (cloud services, private cloud or hybrid cloud)

Data: UBM State of Cloud Computing Survey of 307 technology professionals at organizations that utilize or plan to use cloud computing, October 2016

Figure 26

## Cloud Management Software in Use or Planned

Which cloud management software are you using, or plan to use in the next 12 months?



Note: Multiple responses allowed

Base: 160 respondents who have implemented a private cloud or support a hybrid cloud infrastructure

Data: UBM State of Cloud Computing Survey of 307 technology professionals at organizations that utilize or plan to use cloud computing, October 2016

Figure 27

## Job Title

Which of the following best describes your job title?

Director/manager, IT or infrastructure



IT/IS staff



CIO/CTO, Chief compliance officer or CSO



CEO/president/owner/partner/other senior corp. exec.



IT operations



Vice president, IT or infrastructure



Security staff



Corporate VP or Line-of-business management



Consultant



Director/manager, network systems



COO/operations management or CFO/financial management



Other

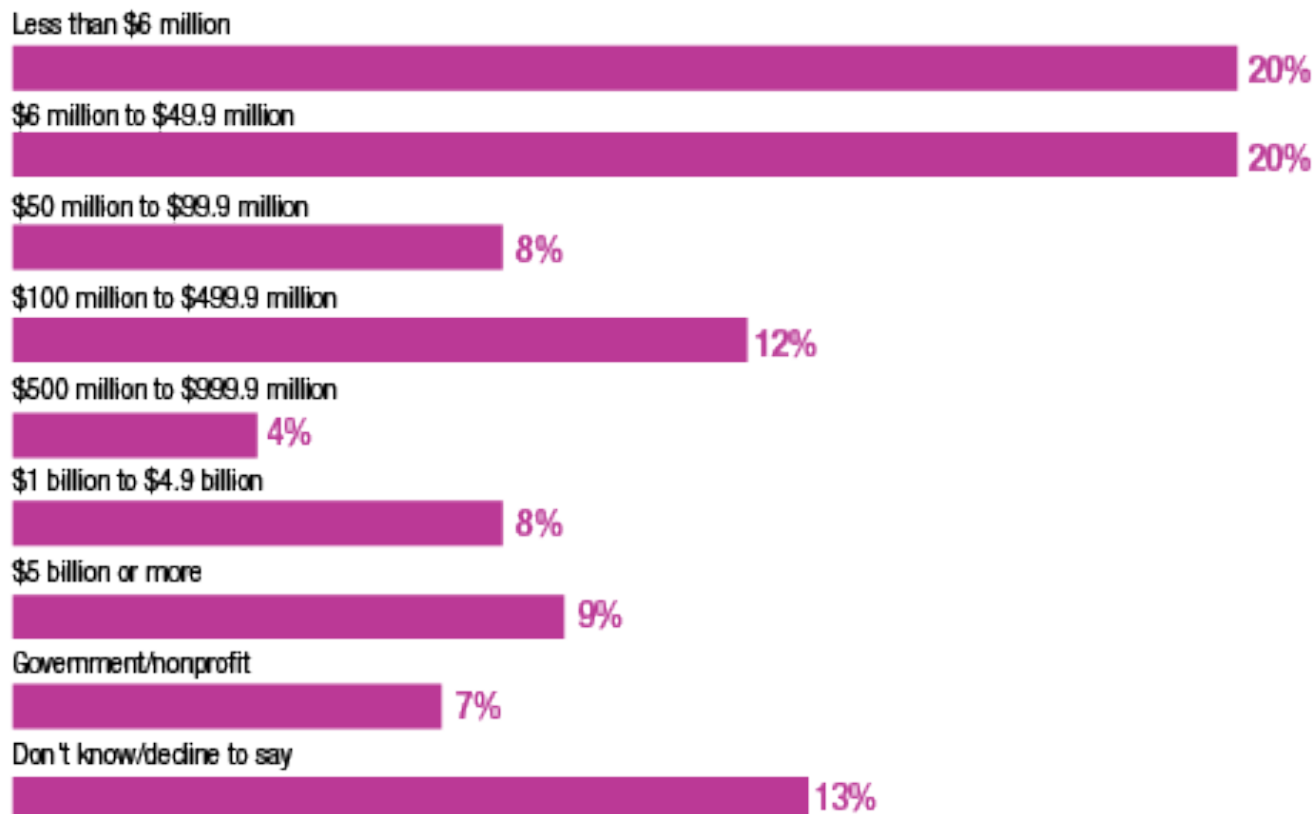


Data: UBM State of Cloud Computing Survey of 307 technology professionals at organizations that utilize or plan to use cloud computing, October 2016

Figure 28

## Company Revenue

Which of the following dollar ranges includes the annual revenue of your entire organization?



Data: UBM State of Cloud Computing Survey of 307 technology professionals at organizations that utilize or plan to use cloud computing, October 2016

Figure 29

## Industry

What is your organization's primary industry? (If you're a subsidiary, name your parent company's primary industry.)

Consulting and business services	13%
Financial services/banking/securities and investments	11%
IT vendors	11%
Education	10%
Healthcare/medical	7%
Government (Federal, State or Local including Military)	7%
Manufacturing/Industrial, non-computer	6%
Non-profit	4%
Telecommunications/ISPs	4%
Distributor	3%
Construction/engineering	3%
Insurance/HMOs	3%
Media/entertainment	3%
Electronics	2%
Logistics/transportation	2%
Retail/e-commerce	2%
Other	9%

Data: UBM State of Cloud Computing Survey of 307 technology professionals at organizations that utilize or plan to use cloud computing, October 2016

Figure 30