RightScale 2017

STATE OF THE CLOUD REPORT

Public Cloud Adoption Grows as Private Cloud Wanes

RIGHT SCALE®

Executive Summary

In January 2017, RightScale surveyed 1,002 technical professionals across a broad cross-section of organizations about their adoption of cloud computing.

The 2017 State of the Cloud Survey identified several key findings:

Hybrid cloud is the preferred enterprise strategy, but private cloud adoption fell.

- Private cloud adoption fell from 77 percent to 72 percent, also bringing hybrid cloud adoption down from 71 percent to 67 percent year-over-year.
- 85 percent of enterprises have a multi-cloud strategy, up from 82 percent in 2016.
- 95 percent of organizations surveyed are running applications or experimenting with infrastructure-as-a-service.

Cloud users running applications in 8 clouds on average.

- Cloud users are already running applications in an average of 1.8 public clouds and 2.3 private clouds.
- They are experimenting with an additional 1.8 public clouds and 2.1 private clouds.

Companies run a majority of workloads in cloud.

- Respondents run 41 percent of workloads in public cloud and 38 percent in private cloud.
- Among enterprises, respondents run 32 percent of workloads in public cloud and 43 percent in private cloud.

Enterprise central IT teams take a stronger cloud role.

- Enterprise central IT has a broader view of its cloud role in 2017 that includes selecting public clouds (65 percent), deciding/advising on which apps move to cloud (63 percent), and selecting private clouds (63 percent).
- In comparison, respondents in business units are less likely to delegate authority to central IT for selecting public clouds (41 percent), deciding/advising on which apps move to cloud (45 percent), and selecting private clouds (38 percent).
- Despite this disconnect, enterprises continue to progress on cloud governance; 70 percent of respondents have now defined the value they want to achieve from cloud, up from 63 percent in 2016, while 53 percent now have a timeline for implementing a cloud strategy, up from 48 percent in 2016.

Cloud challenges decline overall: Expertise, security, and spend tie for #1.

- Lack of resources/expertise, the #1 cloud challenge in 2016, was less of a challenge in 2017 with only 25 percent citing it as a major concern, down from 32 percent in 2016.

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- Concerns about security also fell to 25 percent vs. 29 percent last year.
- Managing cloud spend fell only slightly from 26 to 25 percent to tie for the biggest challenge.
- The most cited challenge among mature cloud users is managing costs (24 percent) while among cloud beginners it is security (32 percent).

Significant wasted cloud spend drives users to focus on costs.

- Cloud users underestimate the amount of wasted cloud spend. Respondents estimate 30 percent waste, while RightScale has measured actual waste between 30 and 45 percent.
- Despite an increased focus on cloud cost management, only a minority of companies are taking critical actions to optimize cloud costs, such as shutting down unused workloads or selecting lower-cost clouds or regions.
- Optimizing cloud costs is the top initiative across all cloud users (53 percent) and especially among mature cloud users (64 percent).

Docker shoots into the lead for DevOps tools.

- Overall DevOps adoption rises from 74 to 78 percent with enterprises reaching 84 percent. 30 percent of enterprises are adopting DevOps company-wide, up from 21 percent in 2016.
- Overall Docker adoption surges to 35 percent, taking the lead over Chef and Puppet at 28 percent each.
- Kubernetes adoption also grew strongly to 14 percent from 7 percent in 2016.
- An even higher percentage of enterprises use Docker (40 percent) with 30 percent more planning to use it.
- Many respondents use Docker through container-as-a-service offerings from cloud providers including AWS ECS (35 percent), Azure Container Service (11 percent), and Google Container Engine (8 percent).
- Use of Puppet and Chef fell this year from 32 percent to 28 percent of respondents for each. Ansible stayed steady, used by 21 percent of respondents vs. 20 percent in 2016.

Azure increases market penetration, reducing the AWS lead.

- Overall Azure adoption grew from 20 to 34 percent of respondents, while AWS stayed flat at 57 percent of respondents.
- Google also grew from 10 to 15 percent to maintain third position.
- Azure also reduced the AWS lead among enterprises; Azure increased adoption significantly from 26 percent to 43 percent while AWS adoption in this group increased slightly from 56 percent to 59 percent.

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Public cloud users still have a larger footprint in AWS.

- AWS holds a significant lead in the number of VMs its users are running: 28 percent of respondents have more than 100 VMs in AWS, while only 13 percent have more than 100 VMs in Azure.
- Among enterprises, 38 percent have 100+ VMs in AWS, and 21 percent have 100+ in Azure.

Private cloud adoption flattens.

- VMware vSphere continues to lead with 42 percent adoption, slightly below last year (44 percent).
- OpenStack (20 percent) and VMware vCloud Suite (19 percent) were also flat in growth, with OpenStack barely eking into the #2 slot.
- Among enterprises, VMware vCloud Suite (28 percent) beats OpenStack (25 percent).
- Azure Pack/Stack was the only private cloud technology to show significant growth, up from 9 percent to 14 percent.

Methodology

In January 2017, RightScale conducted its annual State of the Cloud Survey. The survey questioned technical professionals across a broad cross-section of organizations about their adoption of cloud infrastructure. The 1,002 respondents range from technical executives to managers and practitioners and represent organizations of varying sizes across many industries. Respondents represent companies across the cloud spectrum, including both users (20 percent) and non-users (80 percent) of RightScale solutions. Their answers provide a comprehensive perspective on the state of the cloud today.

Key Survey Stats:

All respondents = 1,002

- **Enterprise respondents (1,000+ employees) = 485**
- **SMB respondents (<1,000 employees) = 517**

Margin of error = 3.07 percent.

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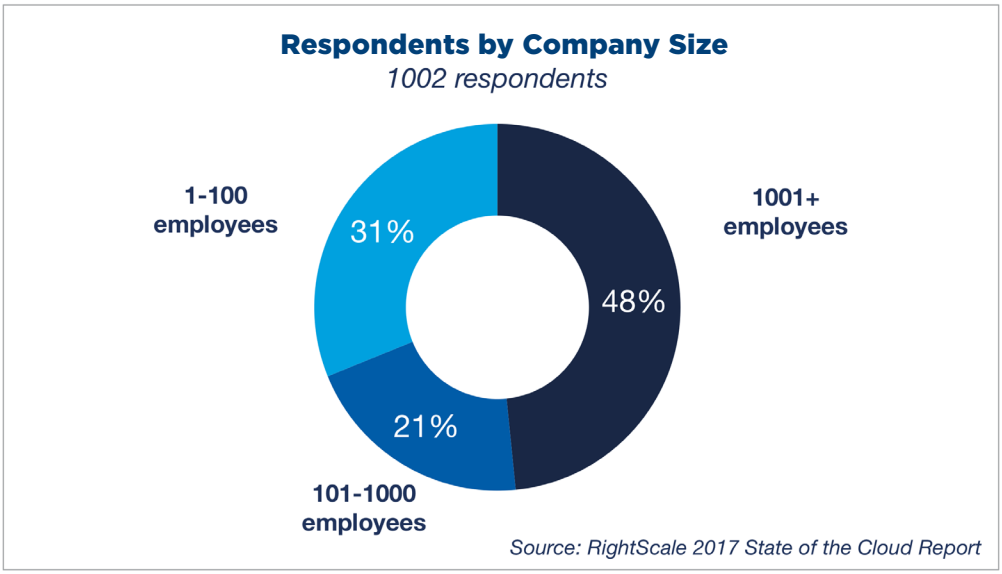
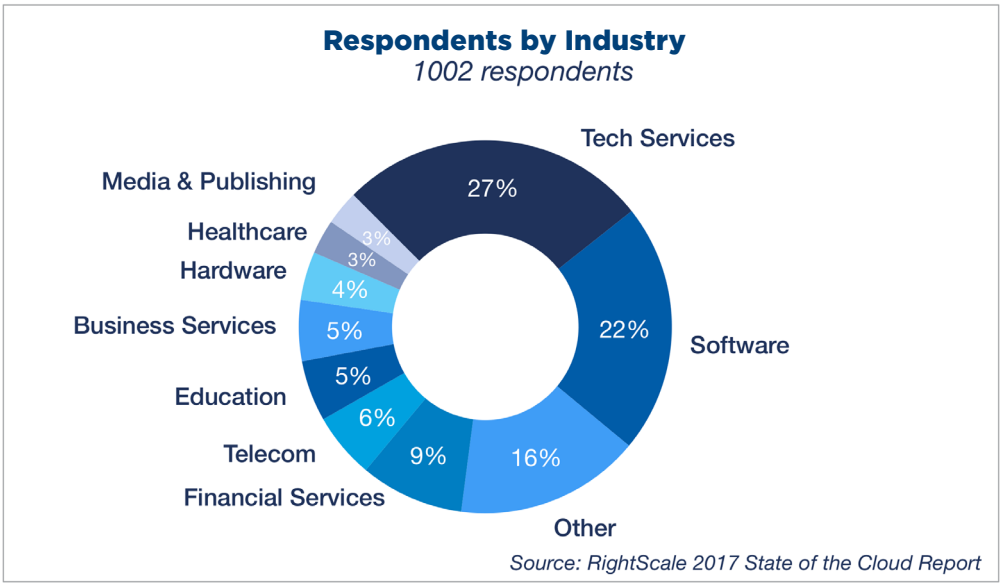
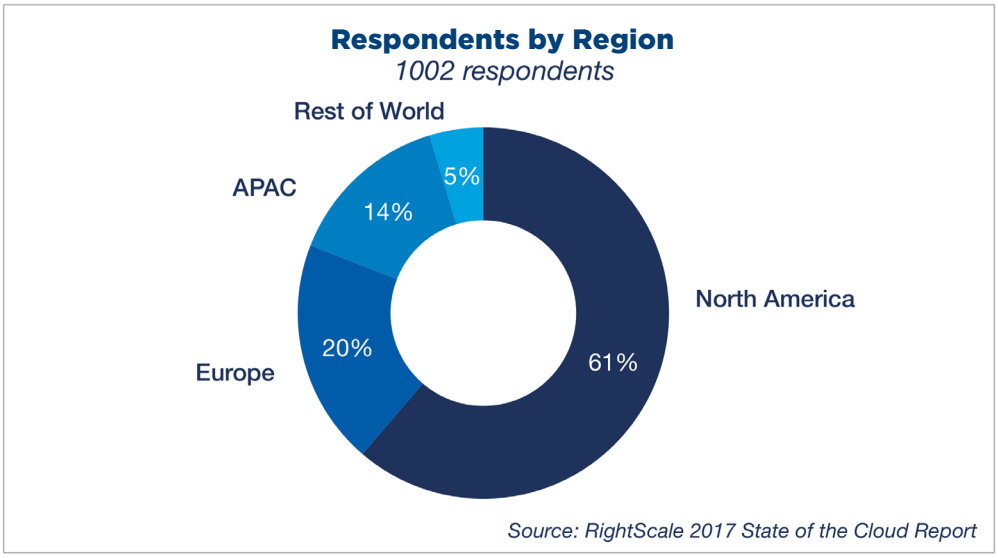
Respondent Demographics







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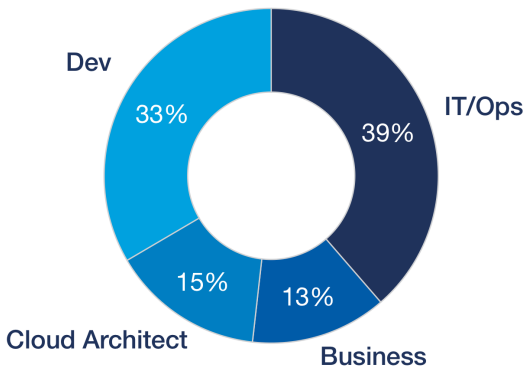
Role of Respondents

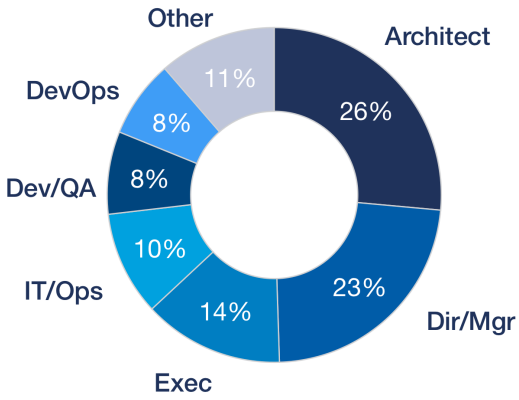
1002 respondents



Source: RightScale 2017 State of the Cloud Report

Level of Respondents

1002 respondents



Source: RightScale 2017 State of the Cloud Report

The Cloud Maturity Model

In this report, RightScale uses its Cloud Maturity Model to segment and analyze organizations based on their levels of cloud adoption. The Cloud Maturity Model identifies four distinct stages of cloud maturity. Denoting cloud adoption by organizations from least to greatest experience, the four stages are:

Cloud Watchers are organizations that are developing cloud strategies and plans but have not yet deployed applications into the cloud. Cloud Watchers want to evaluate available cloud options and determine which applications to implement in the cloud.

Cloud Beginners are new to cloud computing and are working on proof-of-concepts or initial cloud projects. Cloud Beginners want to gain experience with cloud in order to determine future projects.

Cloud Explorers have multiple projects or applications already deployed in the cloud. Cloud Explorers are focused on improving and expanding their use of cloud resources.

Cloud Focused businesses are heavily using cloud infrastructure and are looking to optimize cloud operations as well as cloud costs.

The survey on which the RightScale 2017 State of the Cloud Report is based includes organizations across all the stages of cloud maturity.

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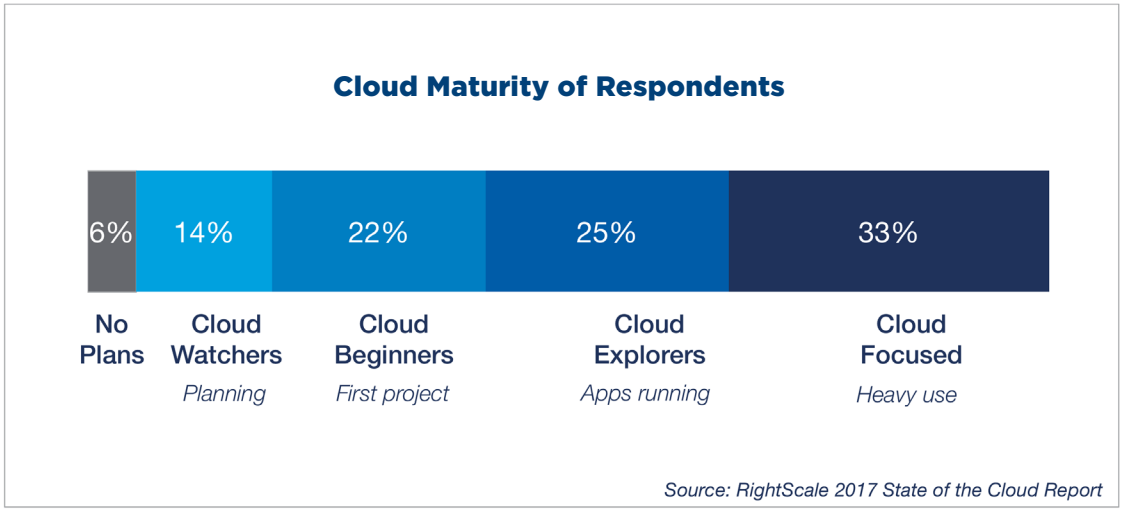
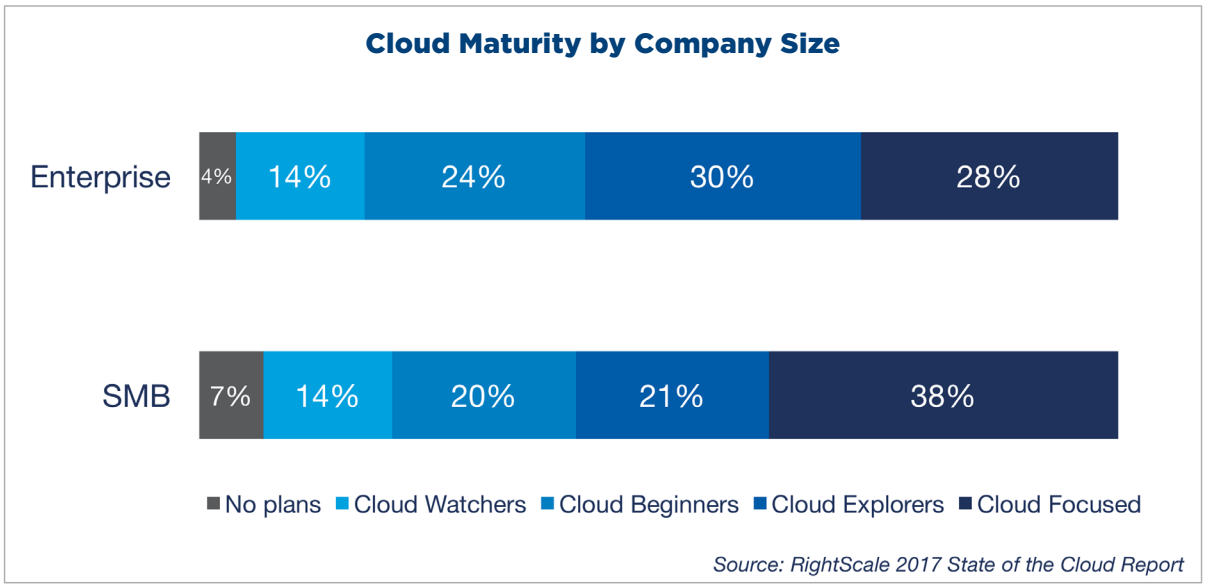


When comparing cloud adoption in large and small companies, it is interesting to note that while smaller organizations are more likely to be Cloud Focused, an almost equal portion of enterprise respondents are in the two most mature stages — Cloud Explorers and Cloud Focused.



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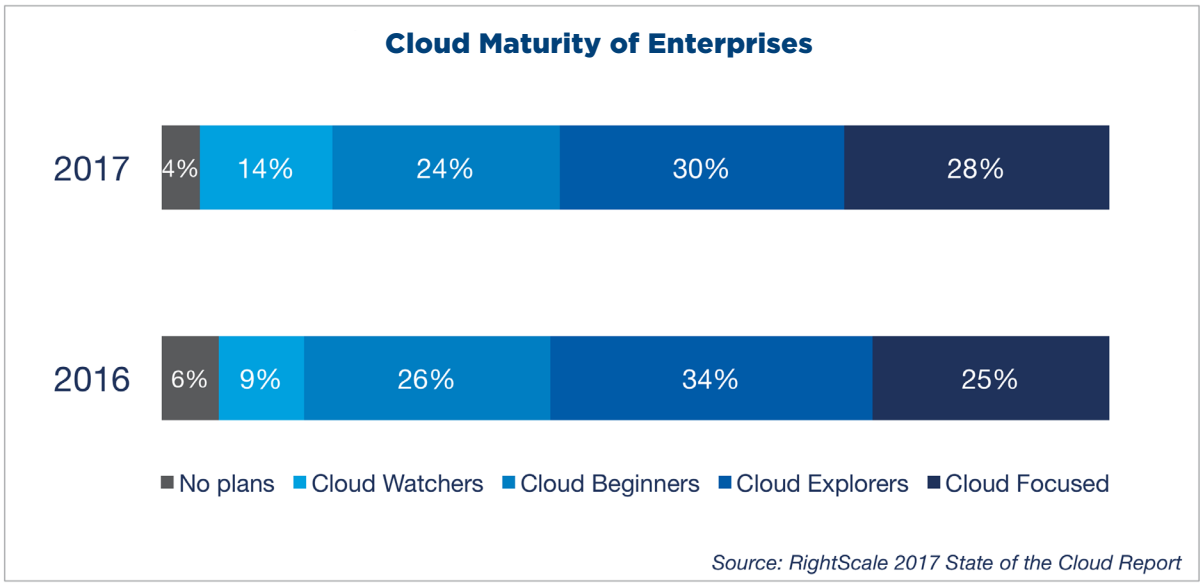
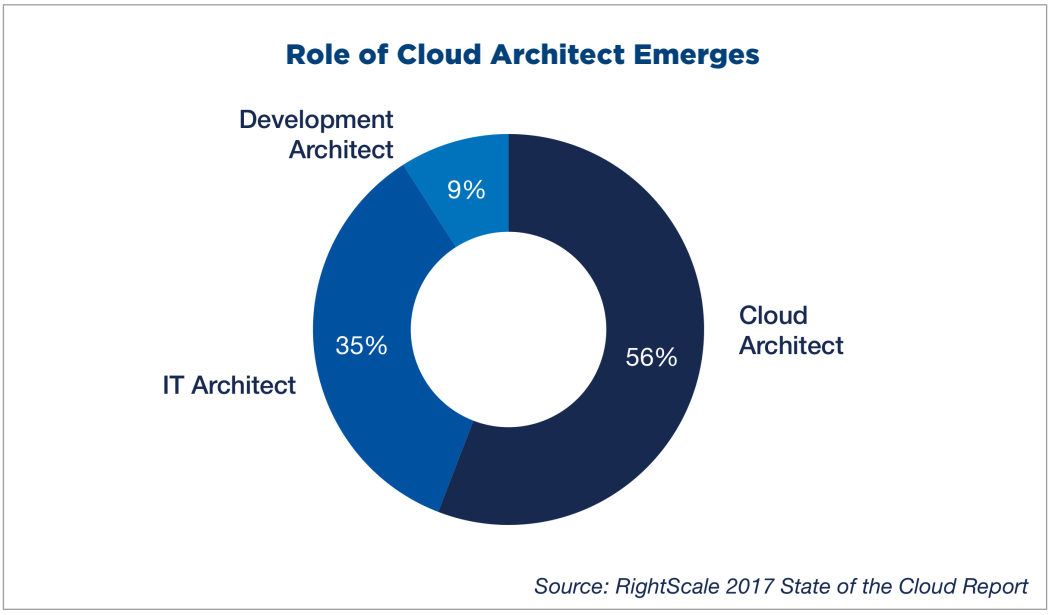
In the last year, many enterprises have progressed from the Cloud Explorers stage to the Cloud Focused stage — now representing 28 percent of respondents vs. 25 percent in 2016.



As cloud maturity has increased, the role of cloud architect has emerged. Among respondents with an architect role, 56 percent identify themselves as cloud architects vs. 40 percent in 2016.



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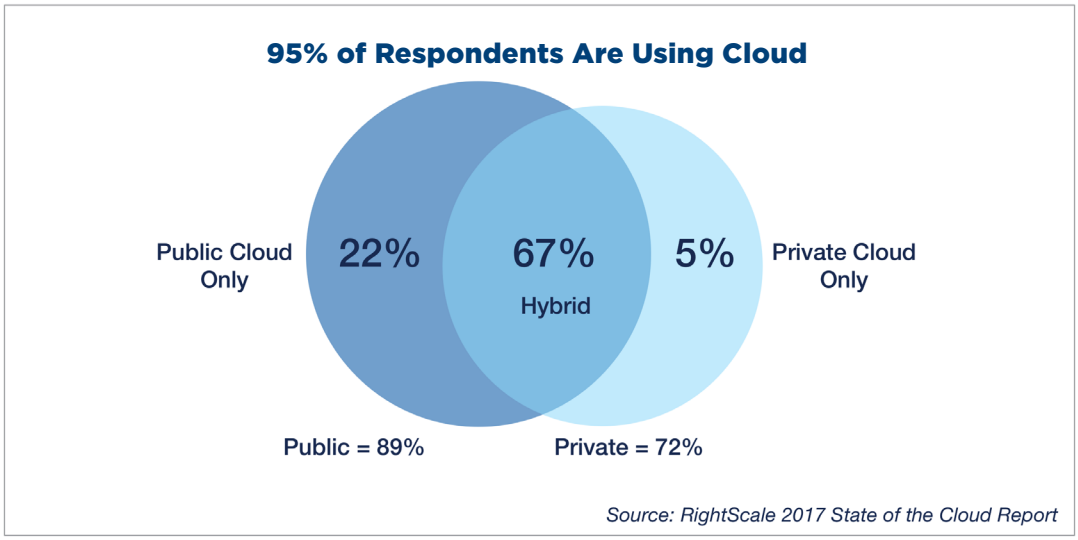
Key Findings

Private cloud adoption fell.

In the twelve months since the last State of the Cloud Survey, we've seen private cloud adoption fall slightly. The percent of respondents now adopting private cloud is 72 percent, down from 77 percent last year. As a result, use of hybrid cloud environments has fallen to 67 percent from 71 percent last year. In total, 95 percent of respondents are now using cloud.



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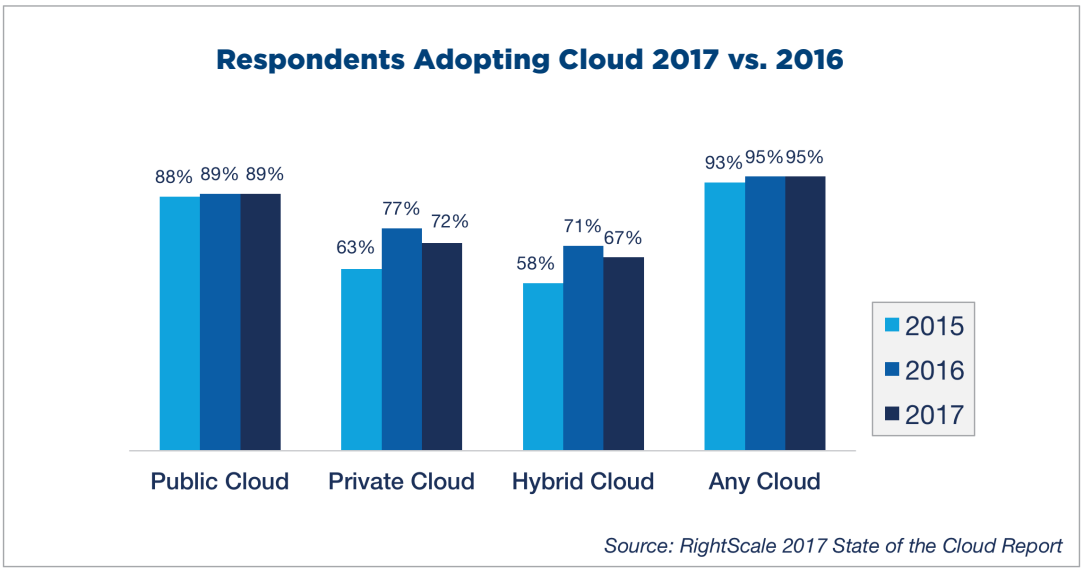

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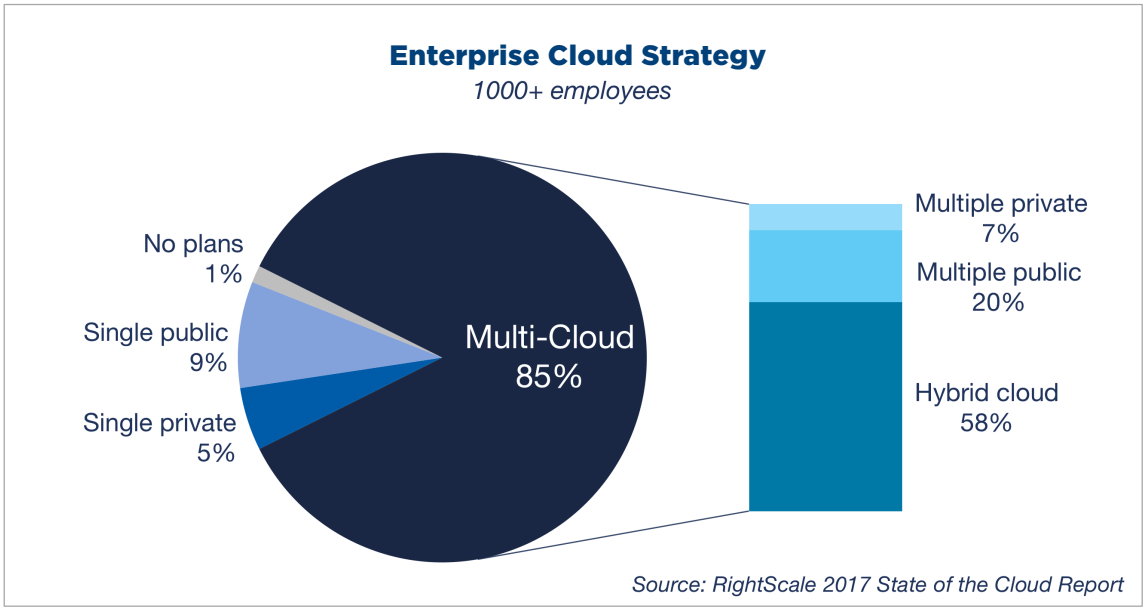
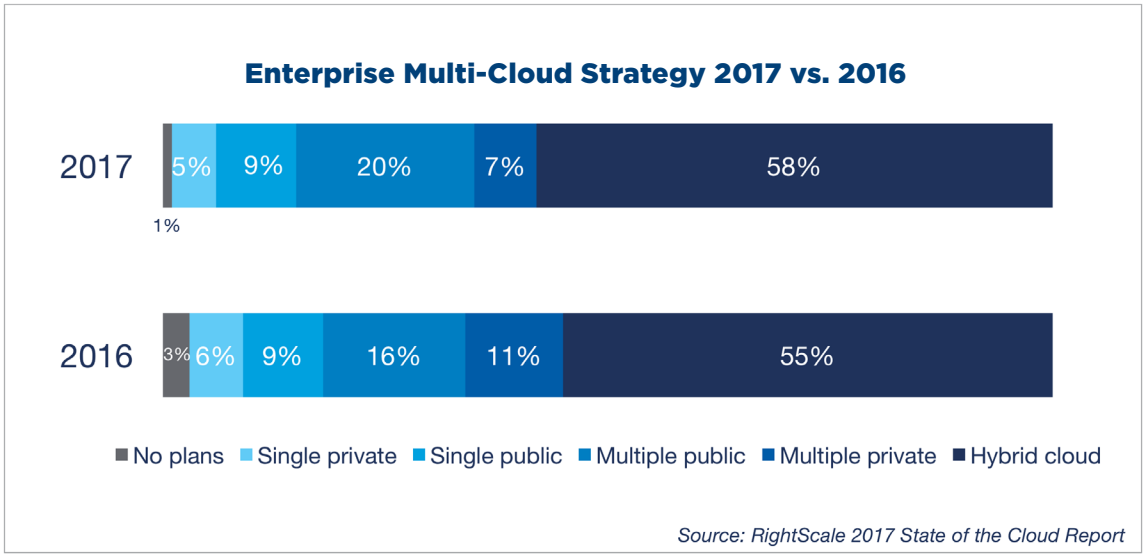
Enterprises hold firm on hybrid cloud strategy.

The percentage of enterprises that have a strategy to use multiple clouds grew to 85 percent (vs. 82 percent in 2016) with 58 percent planning on hybrid (vs. 55 percent in 2016). There was also an increase in the number of enterprises planning for multiple public clouds (up from 16 percent to 20 percent) and a concurrent decrease in those planning for multiple private clouds (down from 11 percent to 7 percent).





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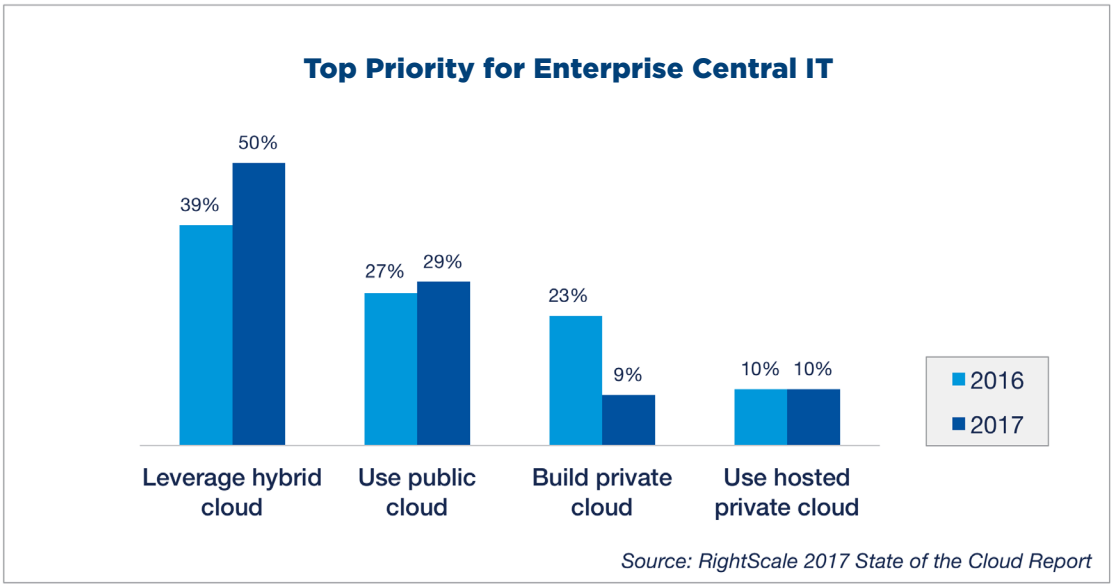
Among enterprises, the central IT team is typically tasked with assembling a hybrid portfolio of "supported" clouds. The top priority for these central IT teams is to leverage hybrid cloud (50 percent vs. 39 percent in 2016), which aligns with the predominant strategy. Only 9 percent of enterprises are focusing on building a private cloud, down significantly from 23 percent in 2016.



Source: RightScale 2017 State of the Cloud Report

Cloud users running applications in 8 clouds on average.

Companies that use public cloud are already running applications in an average of 1.8 public clouds and experimenting with another 1.8 public clouds. While fewer companies are using private clouds, those that do use more, running applications in an average of 2.3 private clouds and experimenting with an additional 2.1 private clouds.

# of Clouds Used	Public Clouds *All respondents*	Private Clouds *All respondents*
Running applications	1.8	2.3
Experimenting	1.8	2.1
Total	**3.6**	**4.4**

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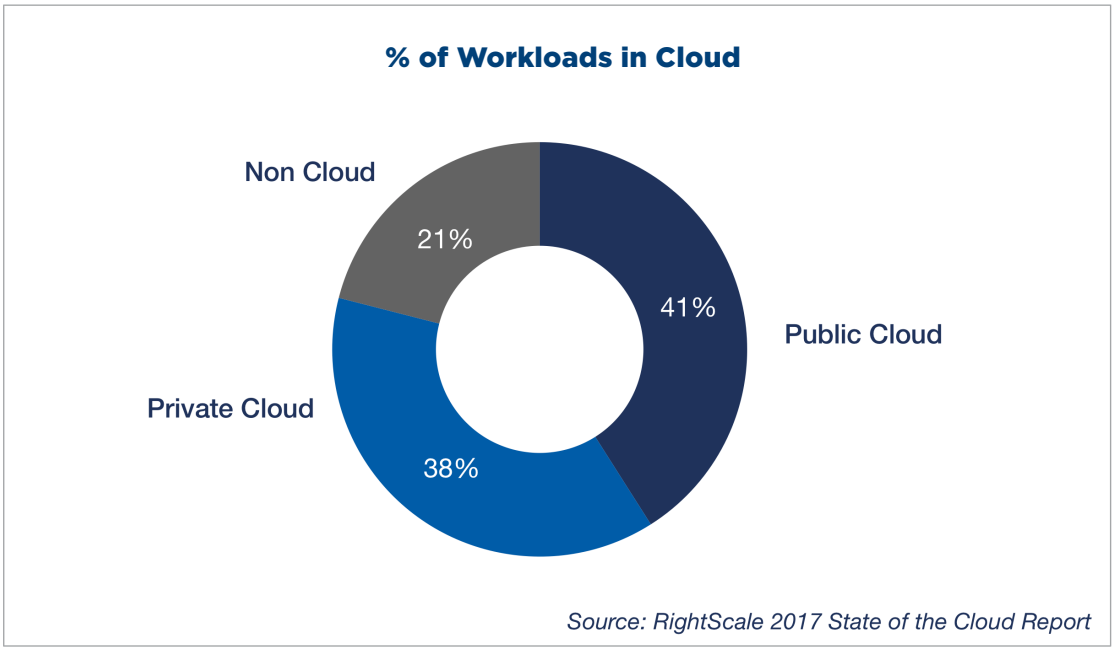
Companies run a majority of workloads in cloud.

Companies now run 79 percent of workloads in cloud, with 41 percent of workloads in public cloud and 38 percent in private cloud. It's important to note that the workloads running in private cloud may include workloads running in existing virtualized environments or bare-metal environments that have been "cloudified."

Enterprises run 75 percent of workloads in cloud with more in private cloud (43 percent) vs. public cloud (32 percent). SMBs run 83 percent of workloads in cloud with more in public cloud (50 percent) vs. private cloud (33 percent).



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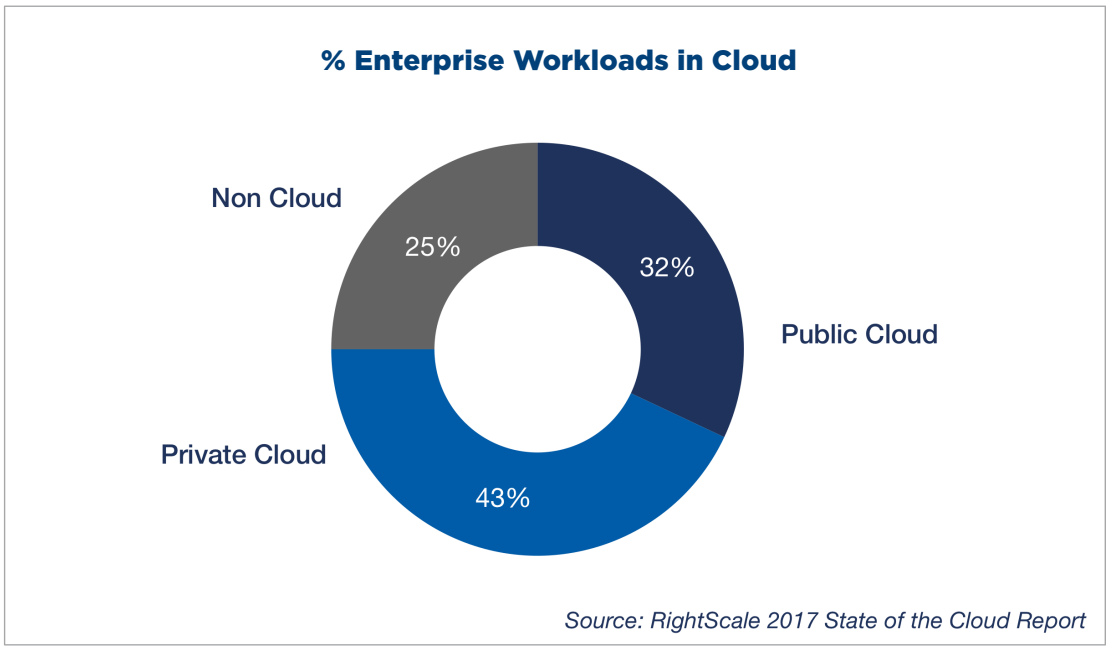

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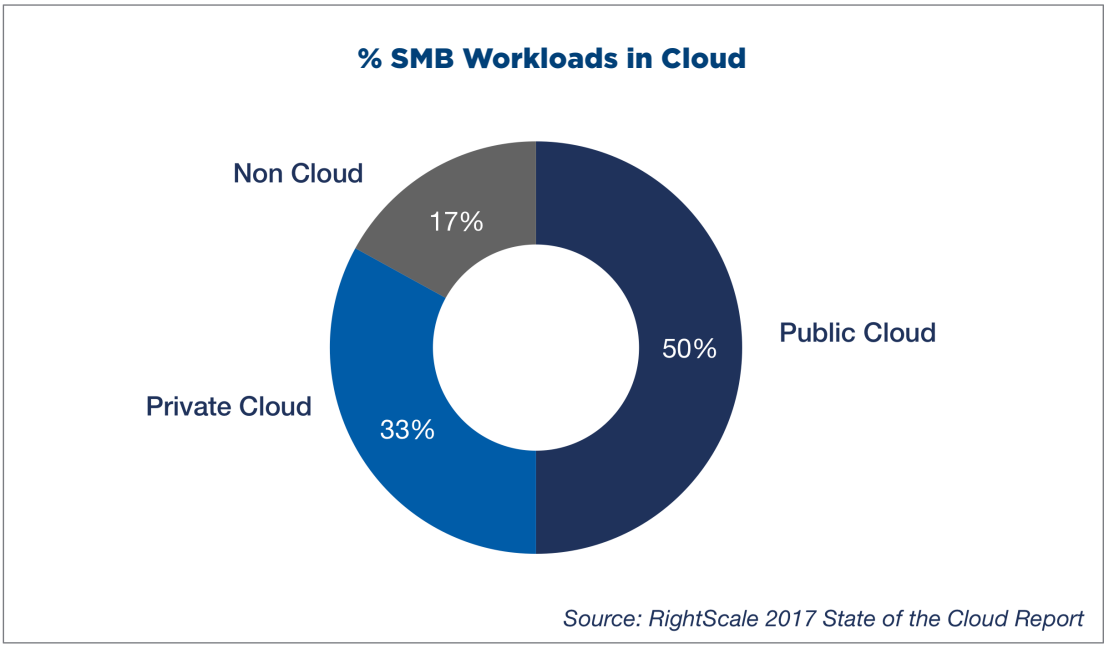
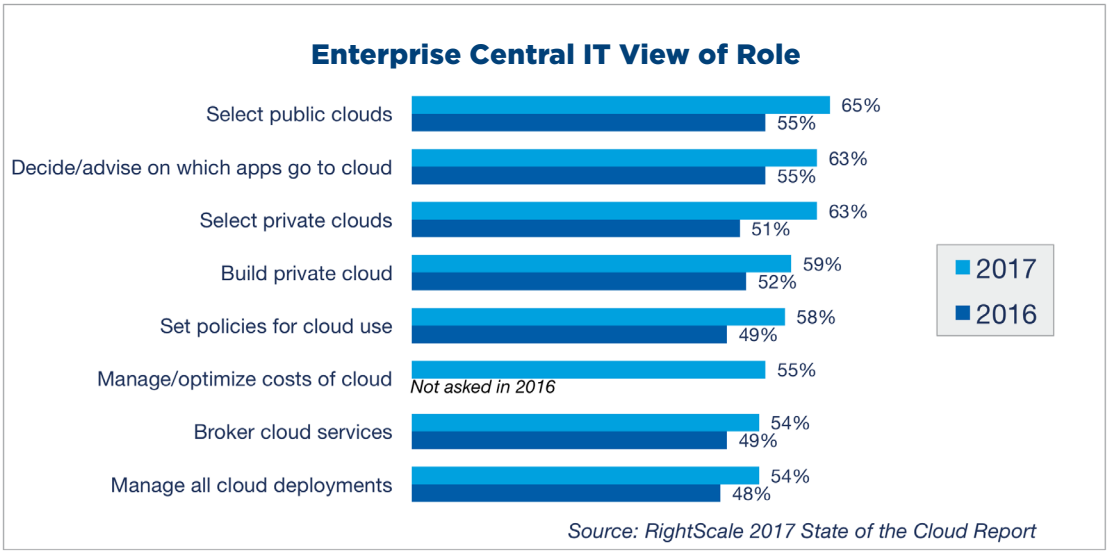


Enterprise central IT teams take stronger cloud role.

This year we saw a strong shift toward centralization, with more central IT teams taking a broader view of their role in cloud. They see a role for themselves in selecting public clouds (65 percent), deciding/advising on which apps to move to cloud (63 percent), and selecting private clouds (63 percent).



However, there is now a significant gap between the view of central IT and that of the business units they support. Respondents in business units are less likely to delegate authority to central IT for selecting public clouds (41 percent), deciding/advising on which apps to move to cloud (45 percent), and selecting private clouds (38 percent).

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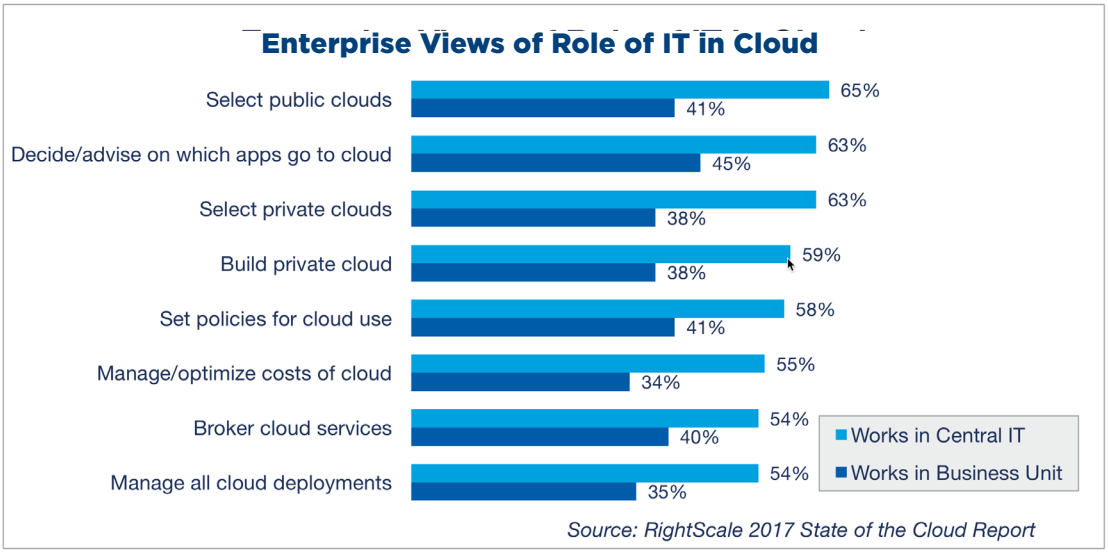
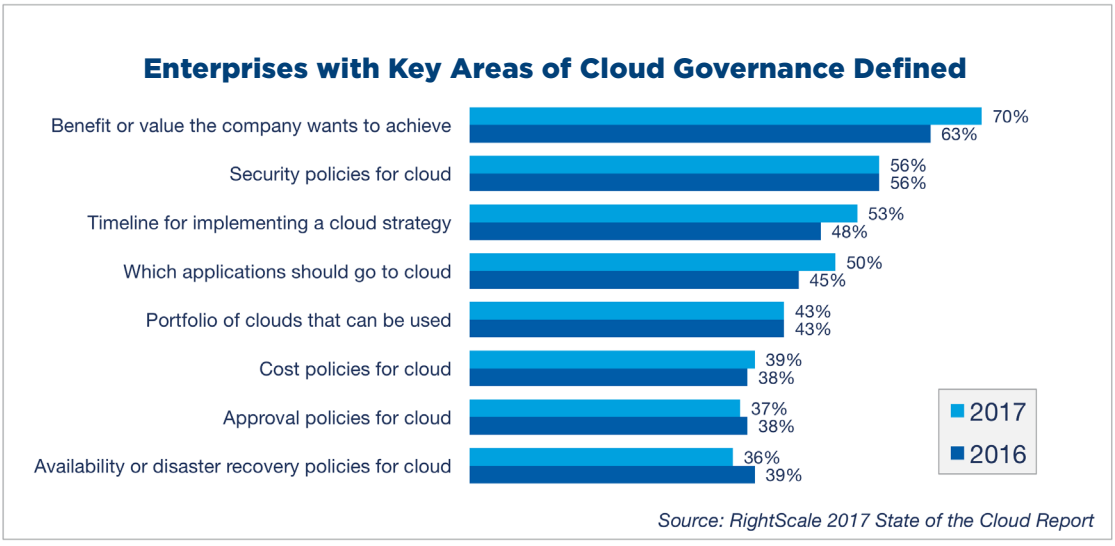


Despite this disconnect, enterprises continue to progress on cloud governance; 70 percent of respondents have now defined the value they want to achieve from cloud, up from 63 percent in 2016, while 53 percent now have a timeline for implementing a cloud strategy, up from 48 percent in 2016. They also made progress in defining which applications should move to cloud. There were several areas of governance where enterprises failed to make headway, including cost policies, approval policies, and availability/DR policies.



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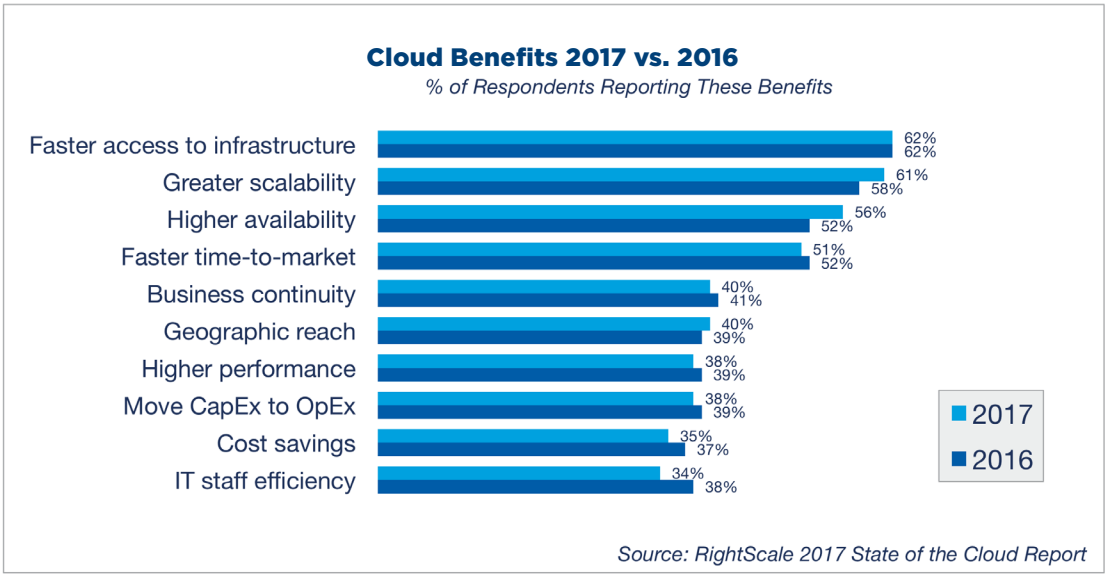
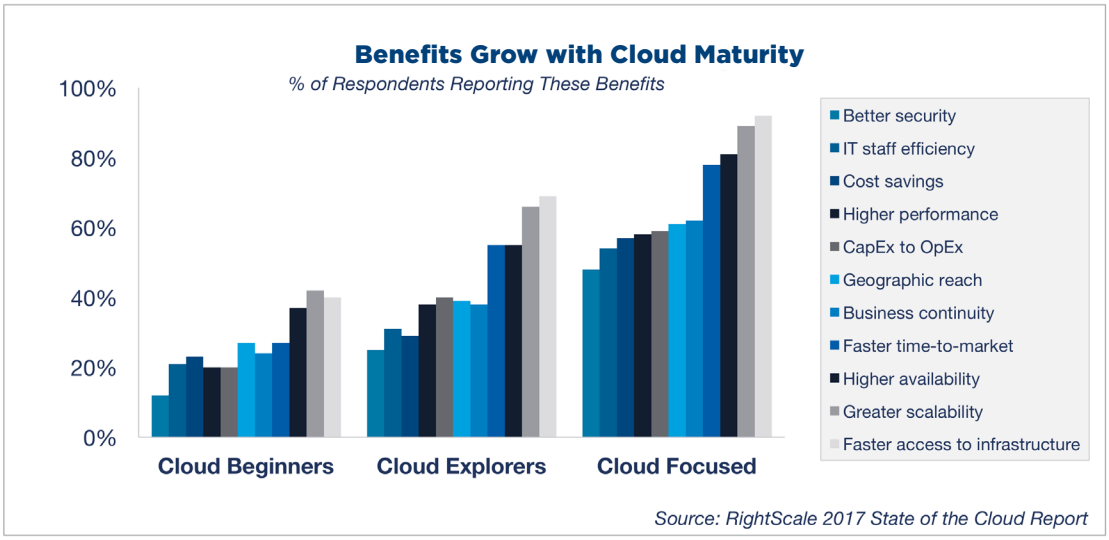
Cloud benefits level out.

In 2017, the number of respondents reporting many cloud benefits was flat. The two areas that showed the most increase were scalability (58 to 61 percent) and availability (52 to 56 percent), while there were decreases in IT staff efficiency (38 to 34 percent) and cost savings (37 to 35 percent).



As in prior years, greater cloud experience continues to unlock increasingly greater levels of value for organizations. Respondents report a growth in the benefits that their organizations get from cloud computing as they mature.



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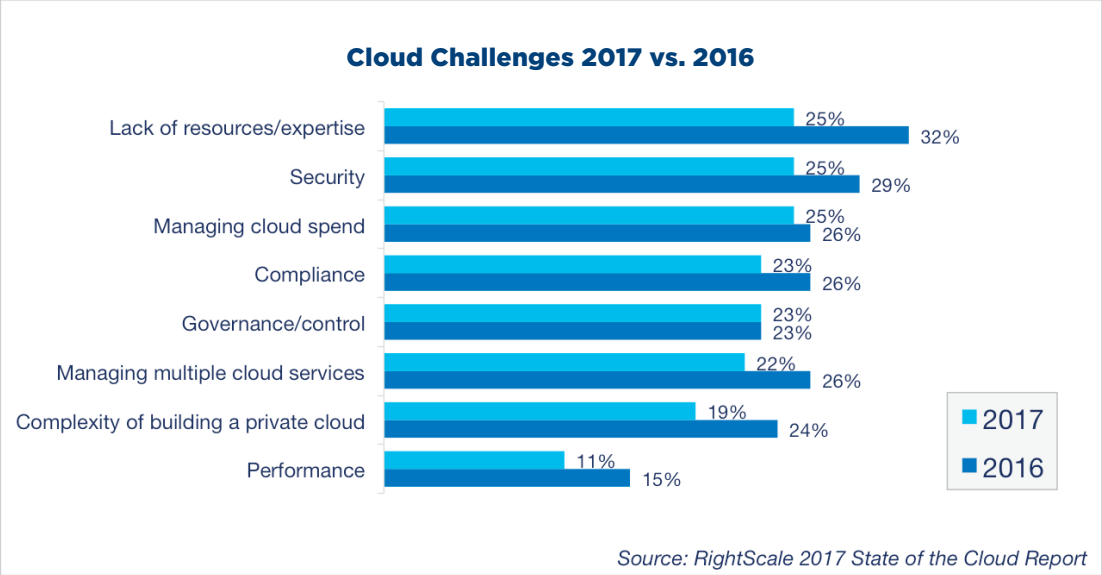
Cloud challenges decline overall: Expertise, security, and spend tie for #1.

In 2017, cloud challenges declined across the board with the exception of governance/control, which remained flat. This year expertise, security, and spend were all tied for the top challenge with 25 percent of respondents citing each as a significant challenge.

Lack of resources/expertise, the #1 cloud challenge in 2016, was less of a challenge in 2017 with only 25 percent citing it as a major concern, down significantly from 32 percent in 2016. Concerns about security fell to 25 percent vs. 29 percent last year. Managing cloud spend fell only slightly from 26 to 25 percent.



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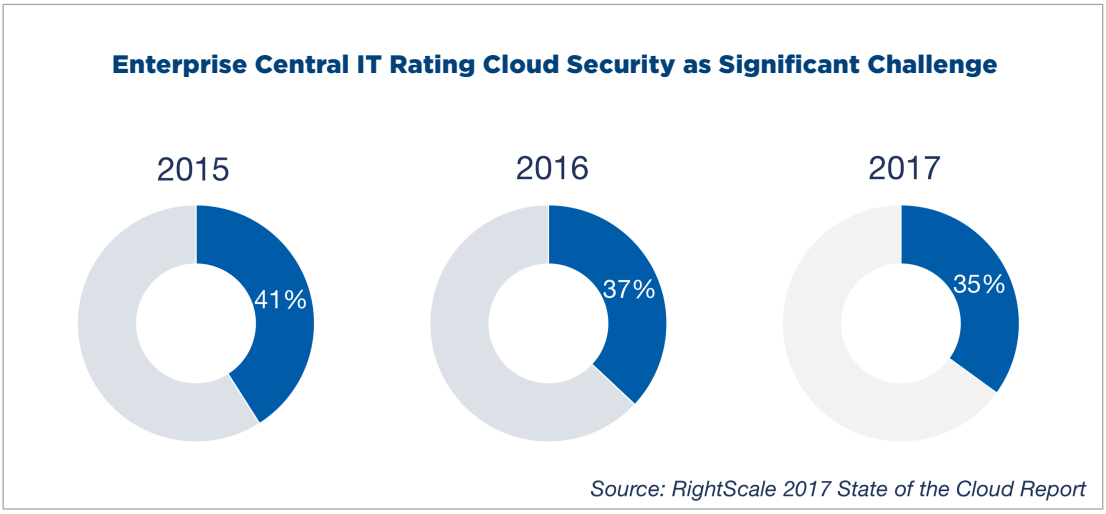
Even among enterprise central IT teams, who typically have the most responsibility for security, there has been a significant decline in security concerns among this group over the last few years, declining further to 35 percent in 2017.



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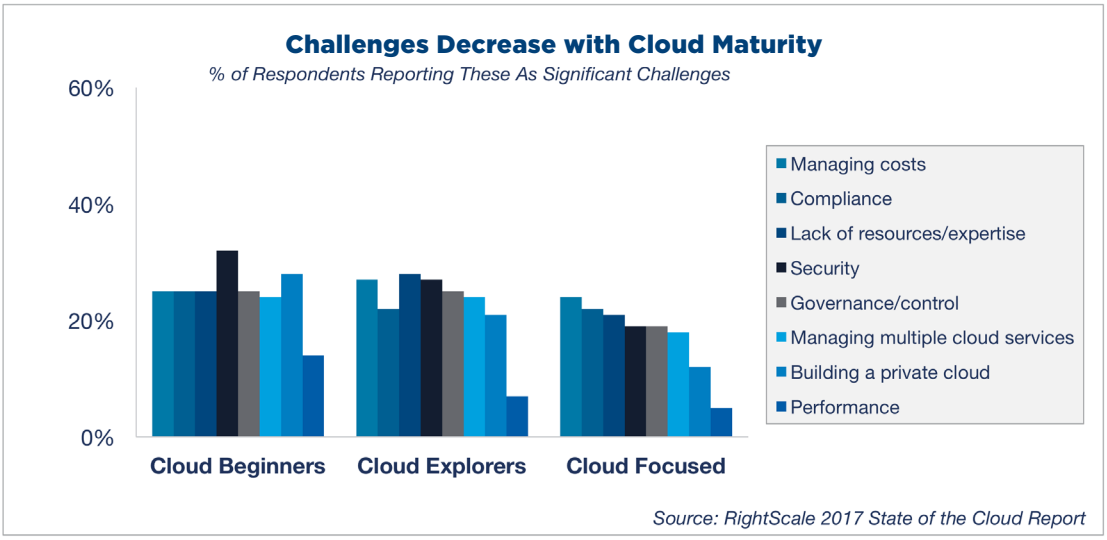
As in prior years, cloud challenges decline as users gain more experience and cloud maturity increases.



Source: RightScale 2017 State of the Cloud Report

The top challenges change as cloud users mature. Security is the top concern among cloud beginners, while managing costs is the top concern for mature cloud users.

Top 5 Challenges Change with Cloud Maturity

Place	Cloud Beginners	Cloud Explorers	Cloud Focused
#1	***Security*** (32%)	Lack of resources/expertise (28%)	**Managing costs** (24%)
#2	Building a private cloud (28%)	**Managing costs** (27%)	Compliance (22%)
#3	**Managing costs** (25%)	***Security*** (27%)	Lack of resources/expertise (21%)
#4	Lack of resources/expertise (25%)	Governance/Control (25%)	***Security*** (19%)
#5	Compliance/Governance/ Control (25%)	Managing multiple cloud services (24%)	Governance/Control (19%)

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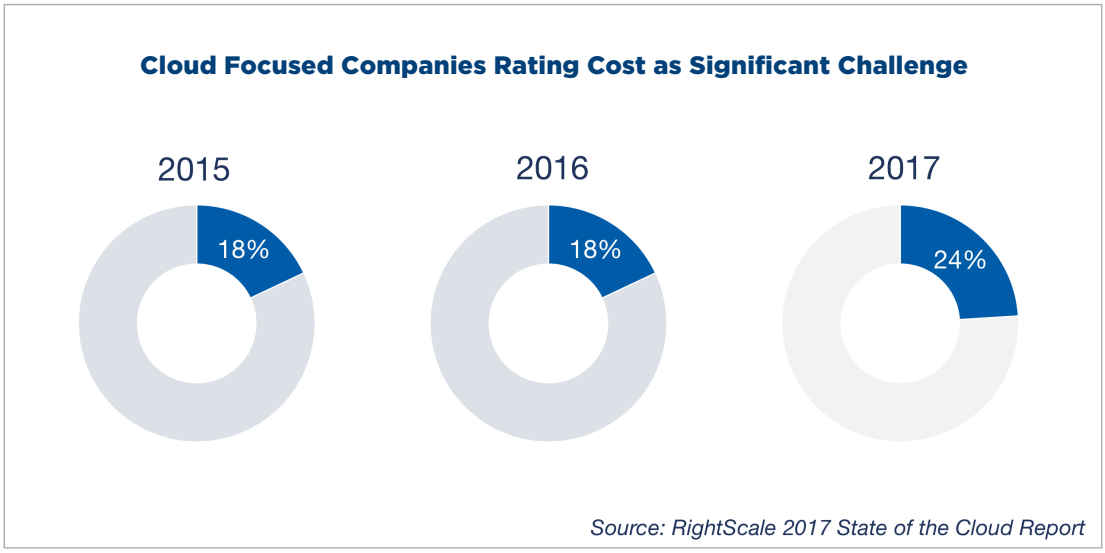
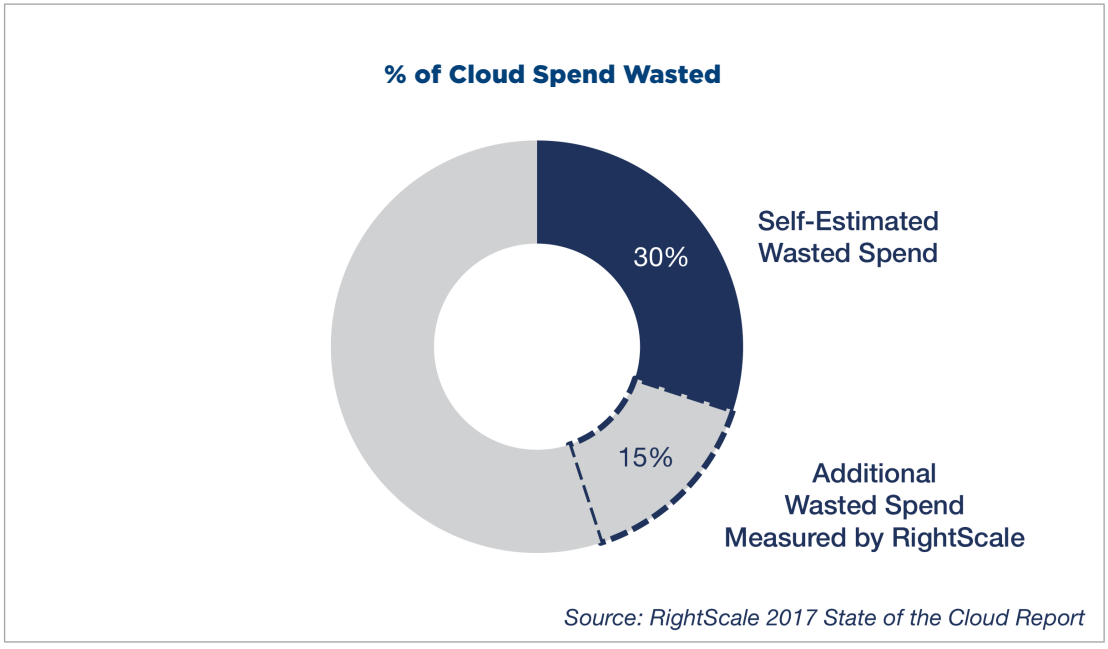
There was a large jump this year in the number of mature cloud users that rate cost as a significant challenge.



Significant wasted cloud spend drives users to focus on costs.

Even as managing cloud costs becomes a top challenge, cloud users underestimate the amount of wasted cloud spend. Respondents estimate 30 percent waste, while RightScale has measured actual waste between 30 and 45 percent.



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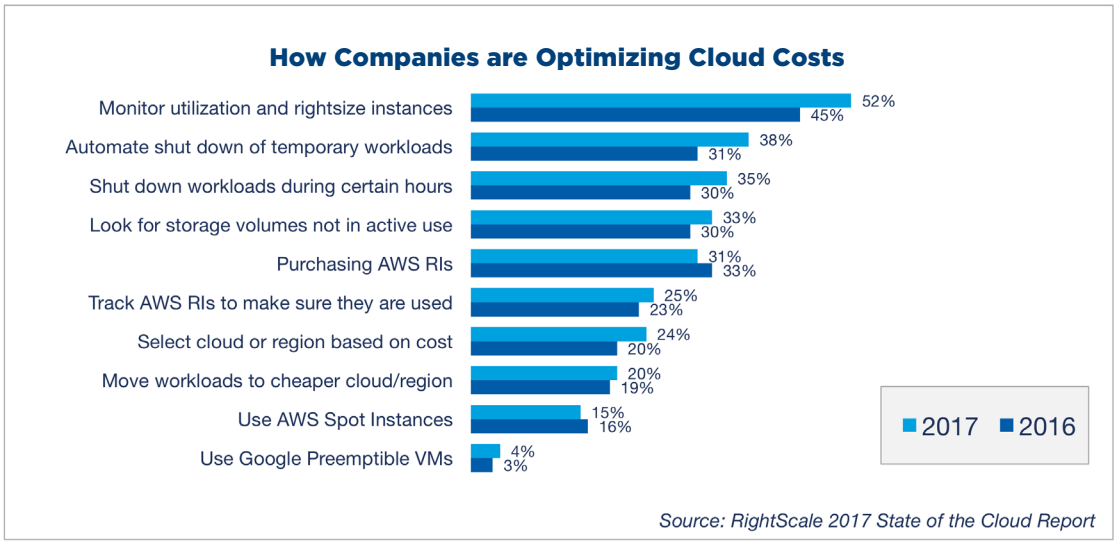
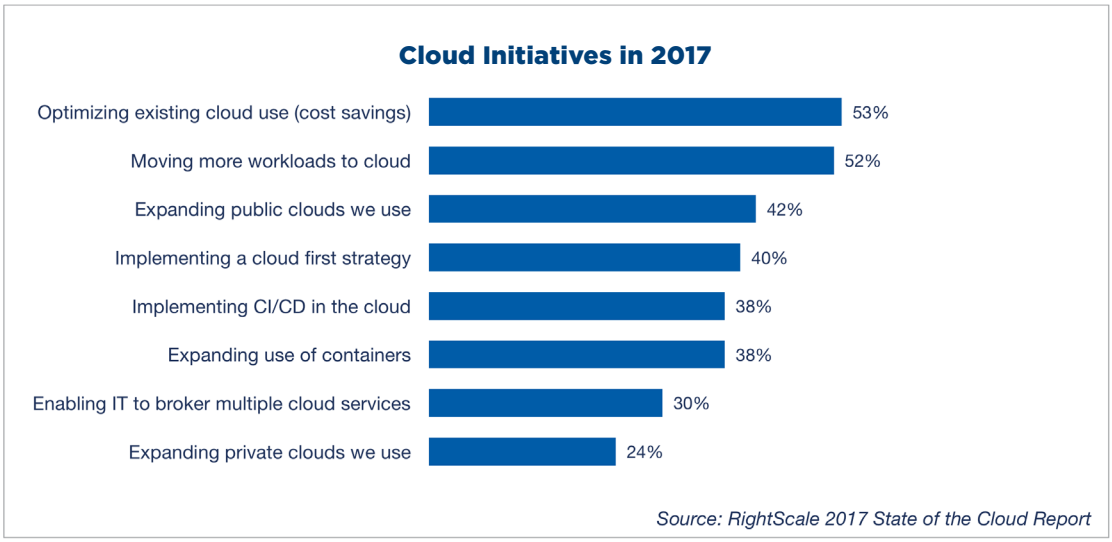
Despite an increased focus on cloud cost management, only a minority of companies are taking critical actions to optimize cloud costs, such as shutting down unused workloads or selecting lower-cost cloud or regions. This represents an opportunity for increased efficiency and increased savings.



This increased concern about costs has made optimizing cloud costs the top initiative for 2017 across all cloud users (53 percent) and especially in mature cloud users (64 percent).



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Top 2017 Initiatives by Cloud Maturity

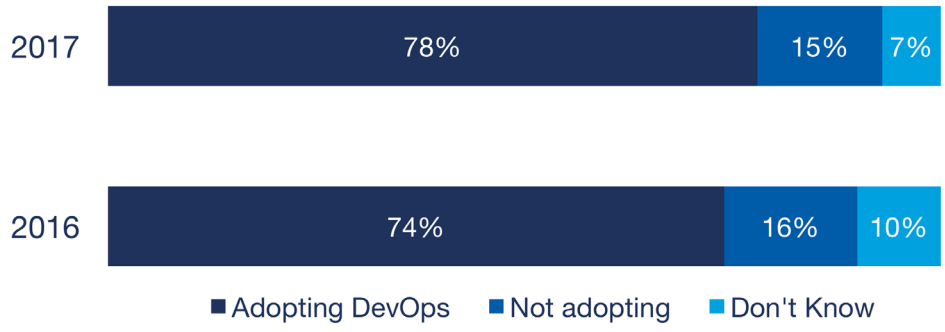
Place	Cloud Beginners	Cloud Explorers	Cloud Focused
#1	Move more workloads to cloud (51%)	**Optimizing existing cloud use/cost savings (65%)**	**Optimizing existing cloud use/cost savings (64%)**
#2	Implement a cloud first strategy (45%)	Move more workloads to cloud (65%)	Expand public clouds we use (51%)
#3	**Optimizing existing cloud use/cost savings (44%)**	Expand public clouds we use (46%)	CI/CD in the cloud (51%)
#4	Enable IT to broker cloud services (37%)	Expand use of containers (43%)	Expand use of containers (50%)
#5	Expand public clouds we use (35%)	CI/CD in the cloud (41%)	Move more workloads to cloud (49%)

Source: RightScale 2017 State of the Cloud Report

DevOps adoption spreads in the enterprise.

The march toward DevOps is now widespread, and it has become the default approach for developing cloud-based applications. Overall DevOps adoption increased from 74 to 78 percent this year with enterprise adoption reaching 84 percent.

DevOps Adoption Up in 2017



Source: RightScale 2017 State of the Cloud Report

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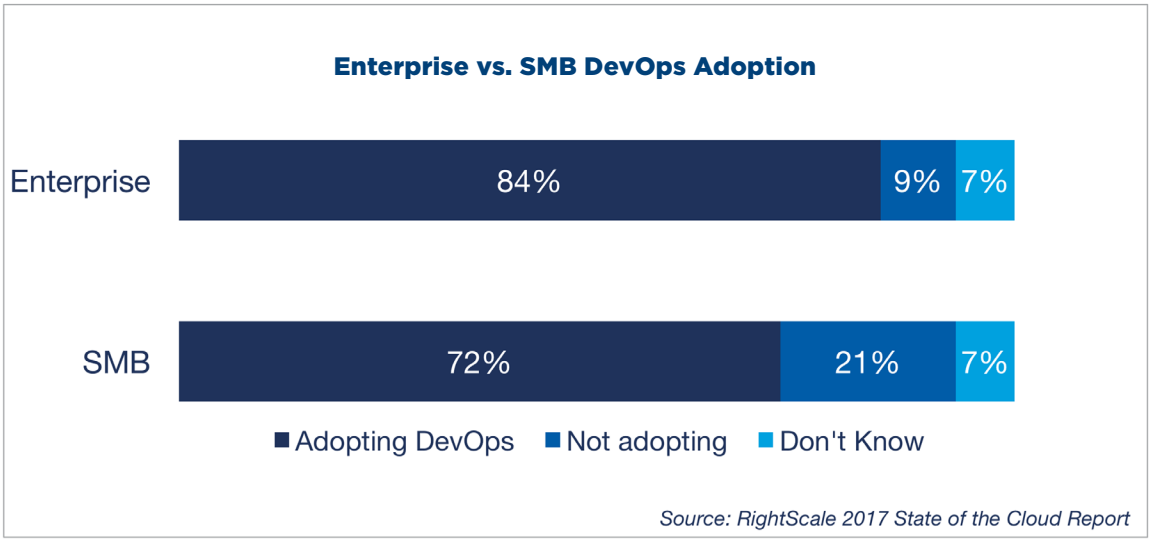
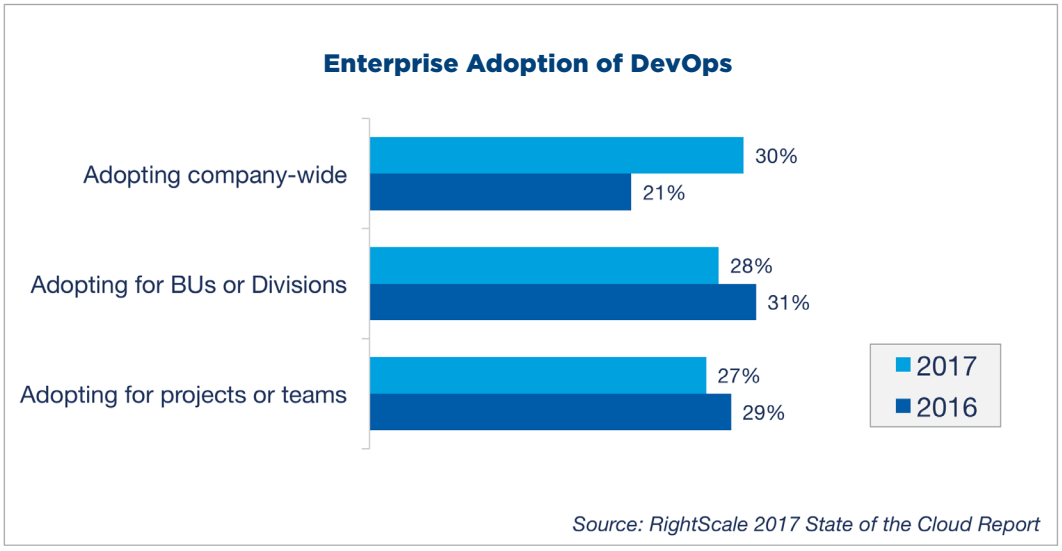


DevOps adoption in larger enterprises has spread organically, starting with individual teams and business units. However, in 2017, there has been a significant jump in the percentage of enterprises that are adopting DevOps company-wide, from 21 percent to 30 percent.



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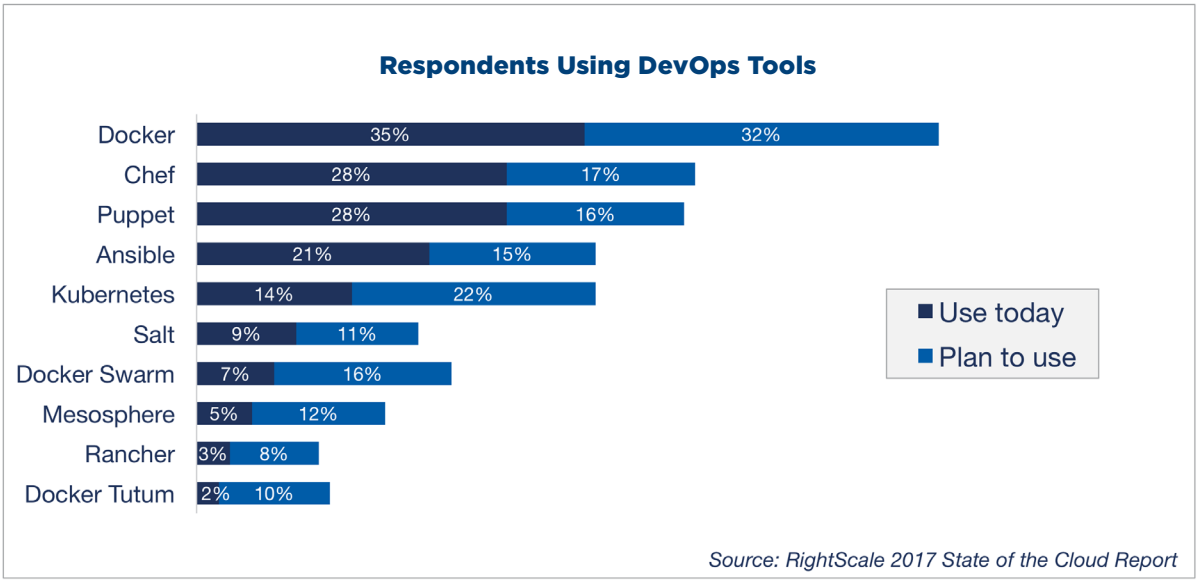
Docker shoots into the lead for DevOps tools.

As part of adopting DevOps processes, companies often choose to implement new tools that allow them to standardize and automate deployment and configuration of servers and applications. These tools include configuration management tools (such as Chef, Puppet, and Ansible) and, more recently, container technologies, such as Docker, and container orchestration and scheduling tools such as Kubernetes, Swarm, and Mesosphere.

The meteoric rise in the use of containers now makes Docker the top DevOps tool among those included in our survey. Overall Docker adoption surged to 35 percent, taking the lead over Chef and Puppet at 28 percent each. (Note that we did not ask about continuous integration tools such as Jenkins, Travis, and others.)

While Docker and Kubernetes adoption has grown in 2017, adoption of non-Docker tools is flat or down, indicating that some of the growth of Docker may be coming at the expense of configuration management tools. Use of Puppet and Chef fell this year from 32 percent to 28 percent of respondents for each. Ansible stayed steady, used by 21 percent of respondents vs. 20 percent in 2016.

Container orchestration tools are also seeing increased adoption with Kubernetes showing the strongest gains (up from 7 to 14 percent).



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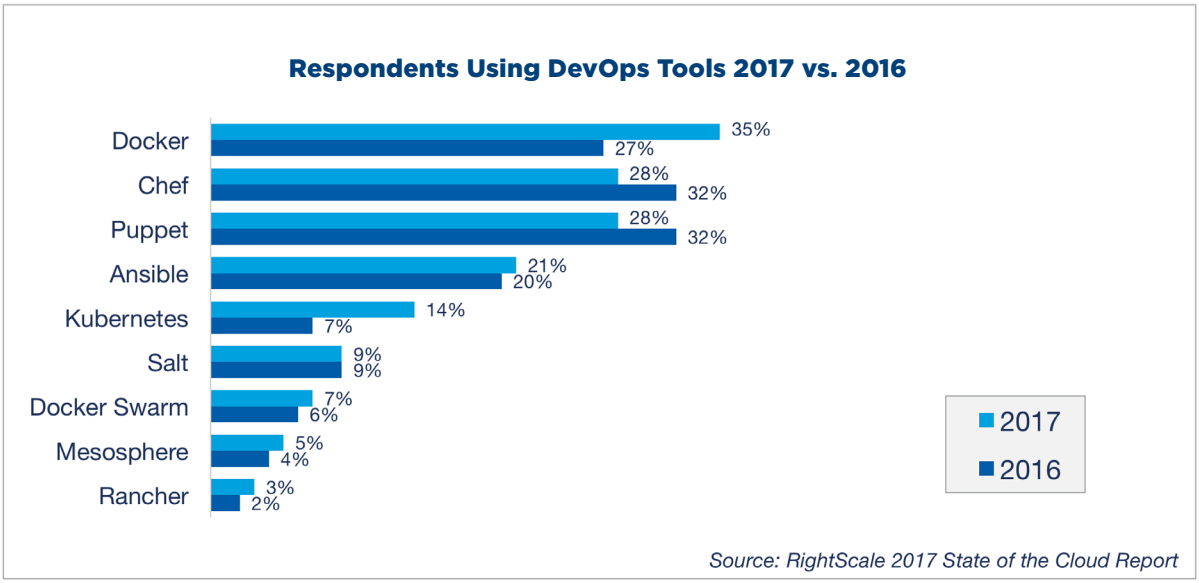
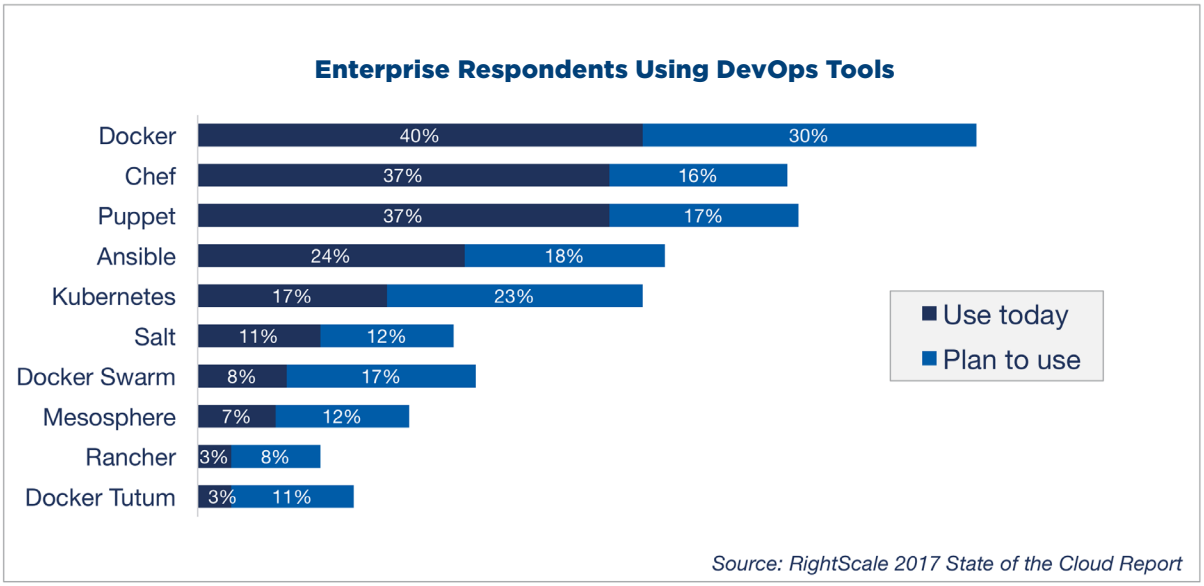


Among enterprises, Docker use is even higher (40 percent) with an additional 30 percent that are planning to use Docker. Chef and Puppet are tied for #2 at 37 percent adoption each, but only 15-16 percent are planning to use these tools.



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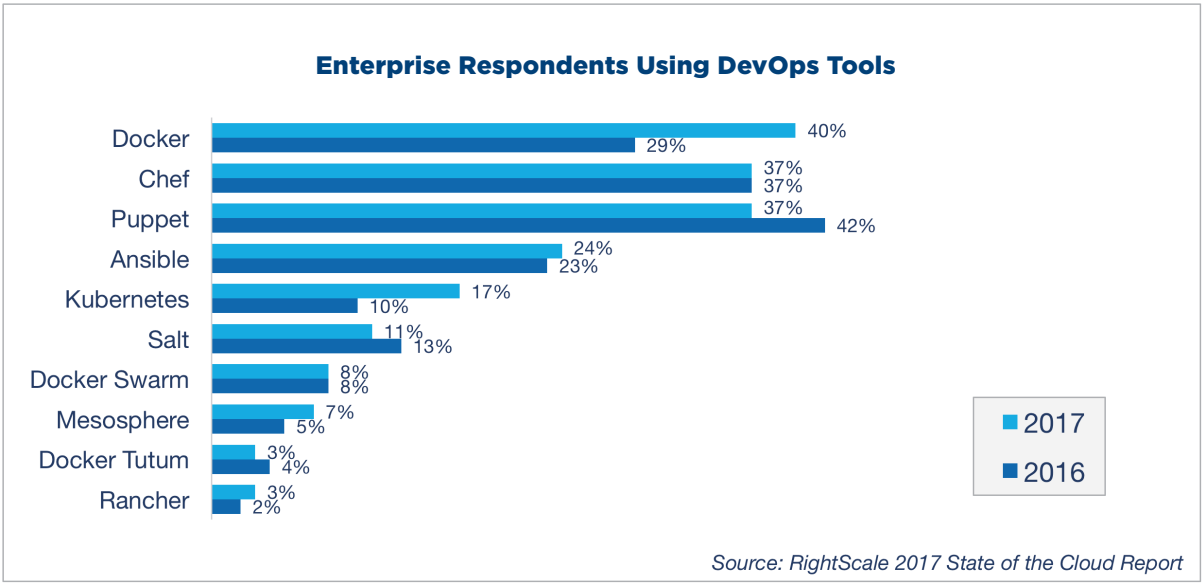
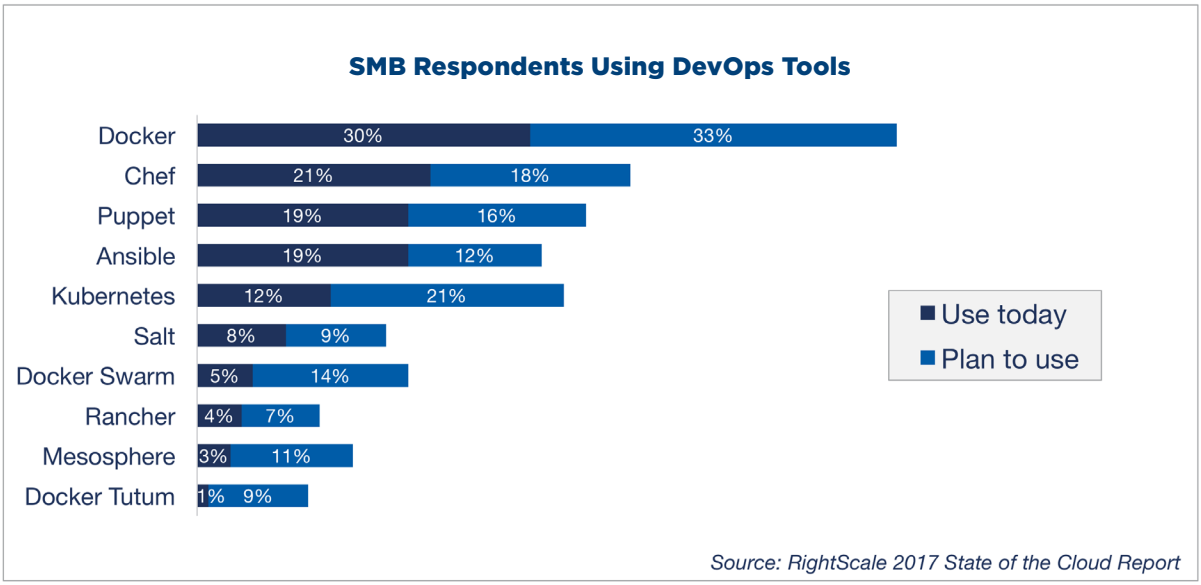


Among SMBs, Docker leads with 30 percent adoption, up from 26 percent last year. Interest in Docker is strong, with another 33 percent planning to use it. While Docker grew, there were significant declines in Chef (down from 28 to 21 percent) and Puppet (25 to 19 percent). Ansible managed to grow slightly (up from 17 to 19 percent).

Kubernetes showed strong growth among smaller companies, up from 5 percent to 12 percent in 2017, with 21 percent that are planning to use it in the future.



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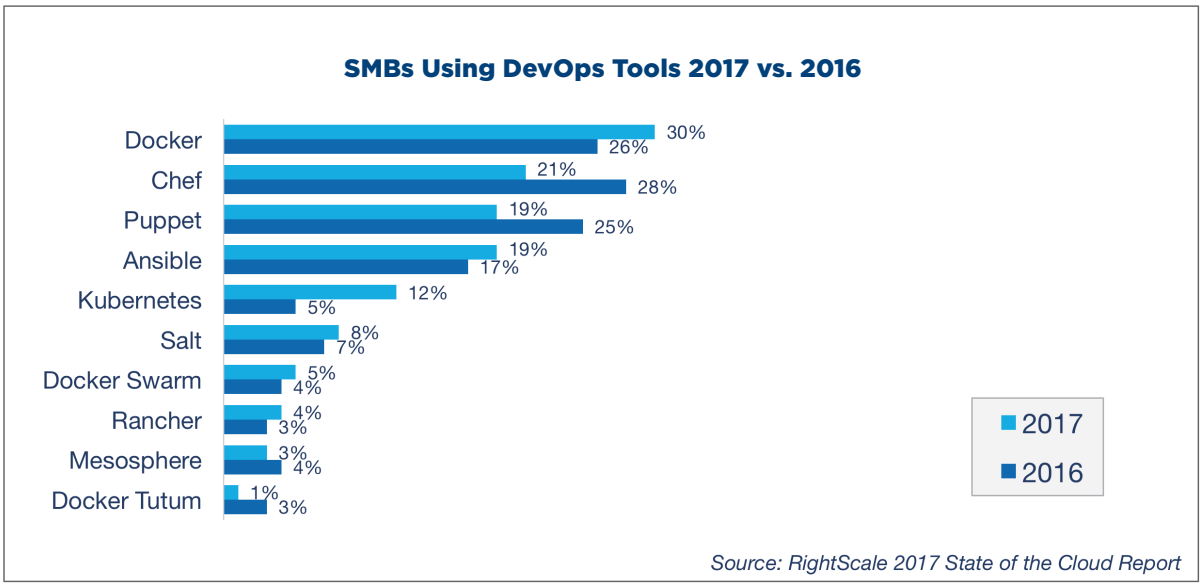
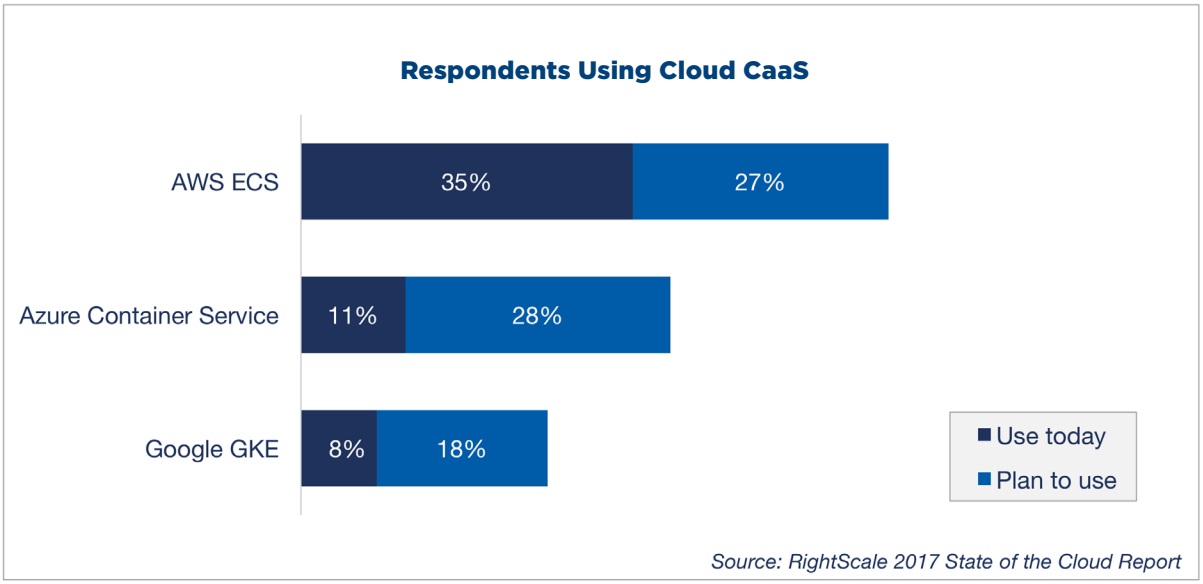


Container-as-a-service (CaaS) becomes a common approach for Docker.

Many respondents use Docker through container-as-a-service offerings from cloud providers including AWS ECS (35 percent), Azure Container Service (11 percent), and Google Container Engine (8 percent). Significant numbers are also planning to use CaaS offerings in the future.



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Public Cloud Adoption Grows, Private Cloud Wanes

We asked respondents to tell us which clouds they were using and whether they were running applications in cloud, experimenting with cloud, planning to use cloud, or had no plans to use cloud. Most respondents are using more than one cloud so totals will add up to more than 100 percent. These results indicate whether a respondent is using any cloud but do not specify the number of applications that are running in each cloud.

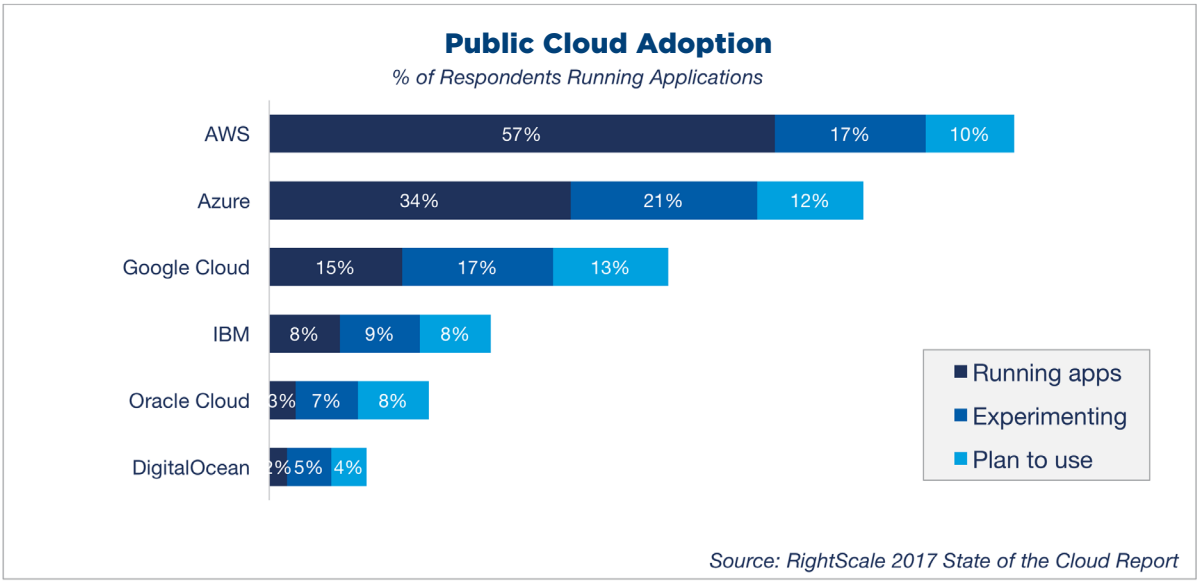
Azure increases market penetration for public cloud, reducing the AWS lead.

Although AWS continues to lead in public cloud adoption (57 percent of respondents currently run applications in AWS), this number has stayed flat since both 2016 and 2015. It is important to note that while the percentage of companies running at least one application in AWS is flat, the number of applications and VMs they are running is increasing, thereby driving increased revenue for AWS.

In contrast, over the last year, we've seen significant growth in the percentage of respondents running applications in Azure and Google, the #2 and #3 public cloud providers. Overall Azure adoption grew from 20 to 34 percent of respondents to reduce the AWS lead, with Azure now reaching 60 percent of the market penetration of AWS. Google also increased adoption from 10 to 15 percent.

We can also gauge interest and potential for future adoption by measuring respondents who are experimenting or planning to use particular clouds. This year there were a higher percentage of respondents experimenting or planning to use Azure vs. any other cloud. This indicates a potential for Azure to accelerate adoption in future years as the respondents' experiments and plans come to fruition.

Other cloud providers beyond the top 3 showed only small increases or decreases within the 3 percent margin of error.



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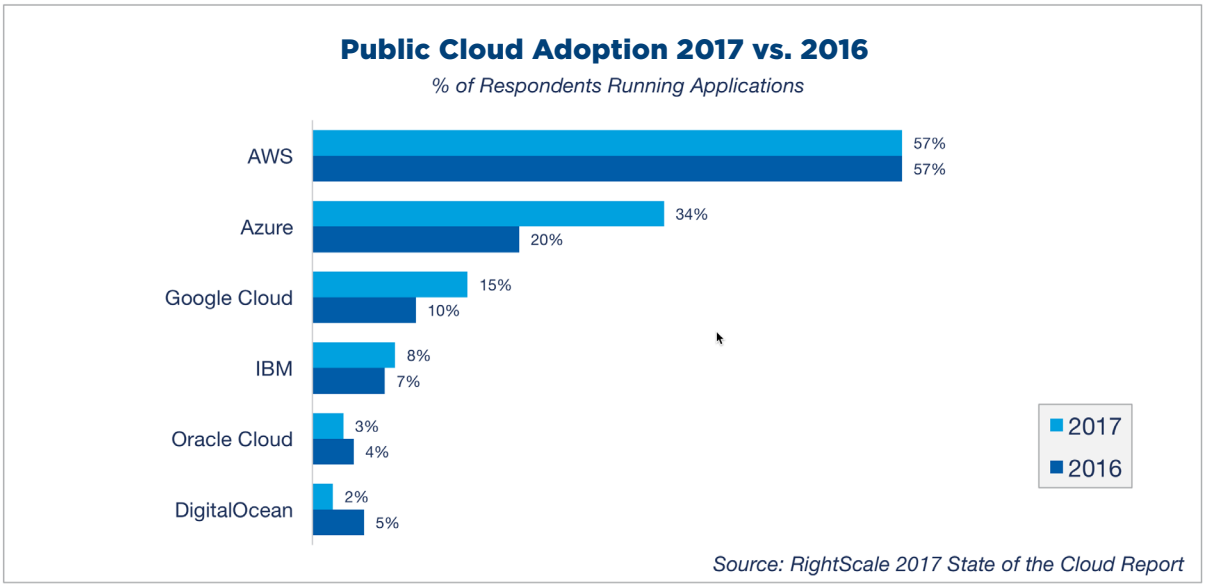
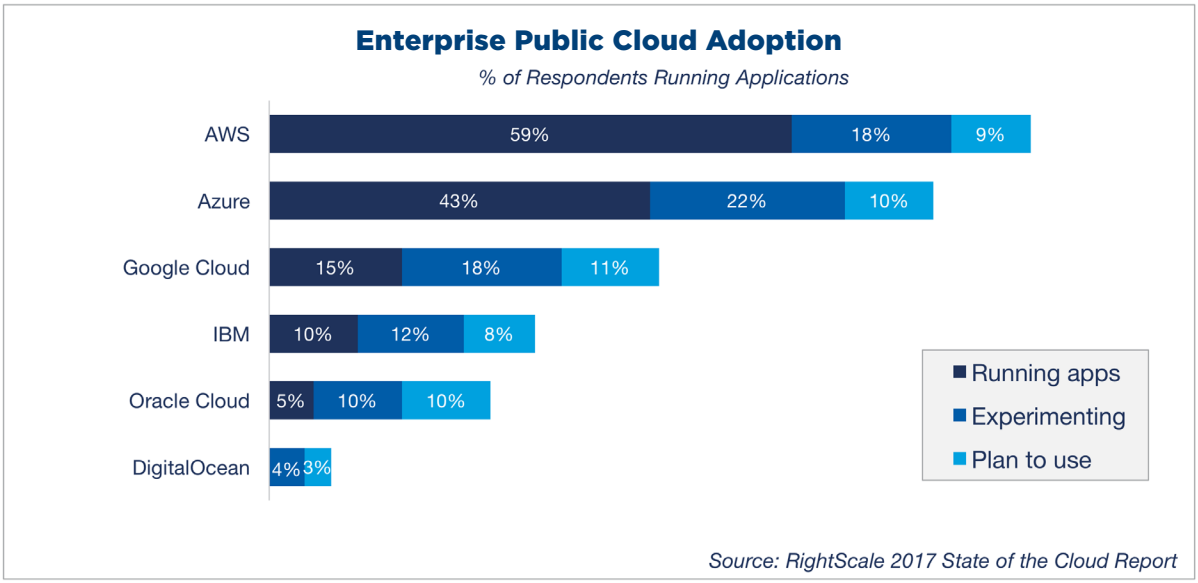


Among enterprises (1,000+ employees), AWS grew slightly over last year, now with adoption at 59 percent compared to 56 percent last year. Microsoft Azure surged from 26 to 43 percent and Google from 9 to 15 percent. Respondents with future projects (the combination of experimenting and planning to use) show the most interest in Azure (32 percent).



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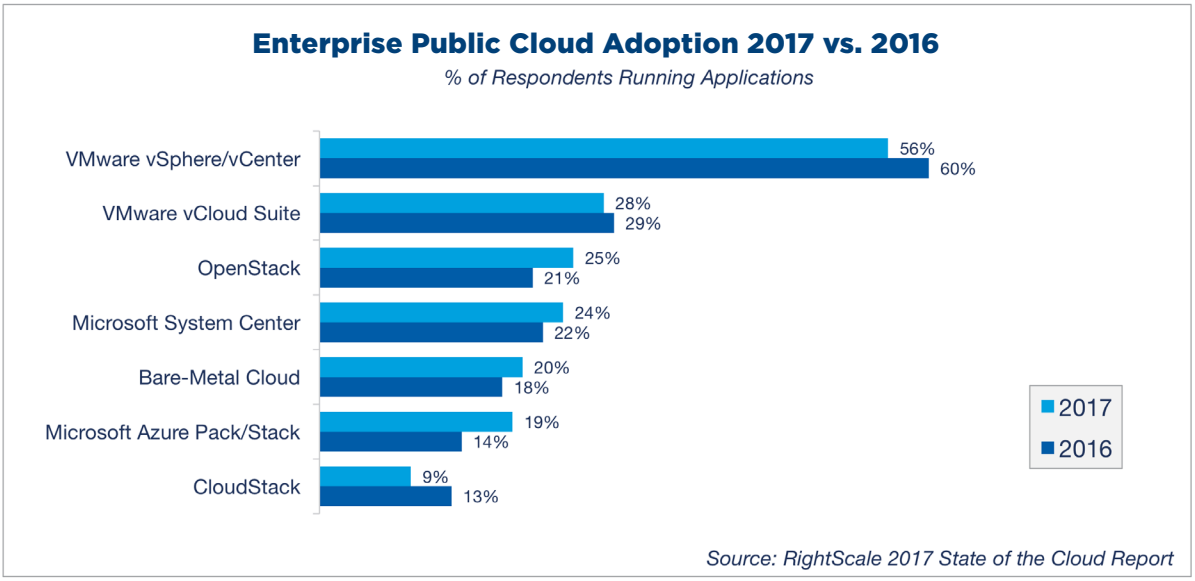
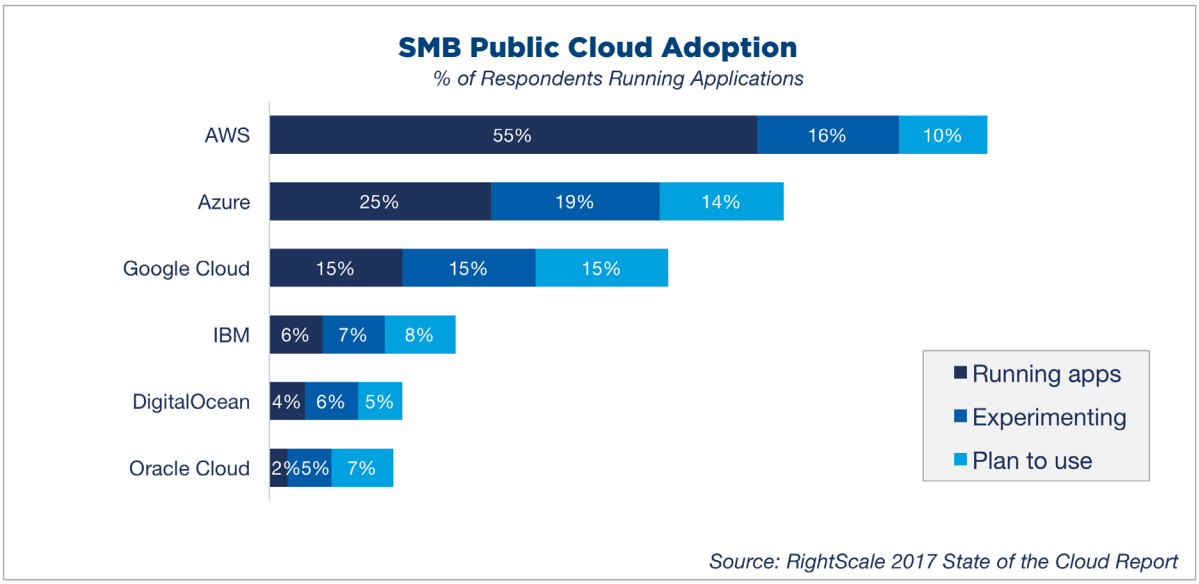


Among smaller organizations (fewer than 1,000 employees), AWS is still in first position despite a slight decline in adoption (58 to 55 percent), which is right at the 3 percent margin of error. Azure increased adoption significantly (15 to 25 percent), and Google also saw strong growth (11 to 15 percent). Azure also has the highest number of respondents that are experimenting or planning to use.



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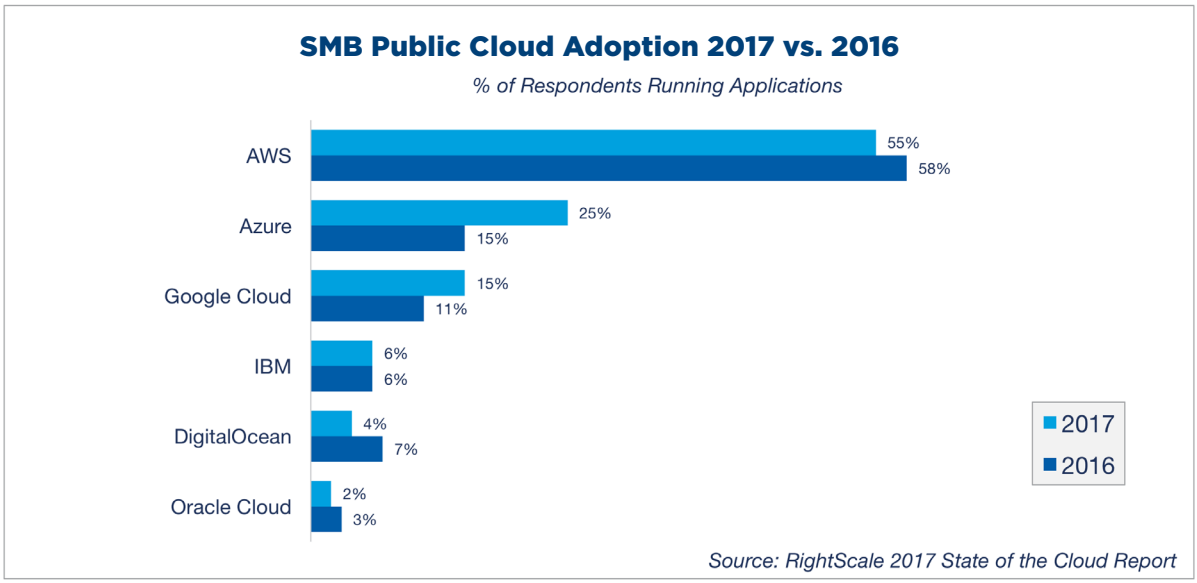

Public cloud adoption patterns are now largely the same across larger enterprises and smaller organizations. The top 4 public clouds used in both segments are AWS, Azure, Google, and IBM.

Top Public Clouds Used

Place	Enterprise *(1000+ employees)*	SMB *(Under 1000 employees)*
#1	AWS	AWS
#2	Azure IaaS	Azure IaaS ↑ 1
#3	Azure PaaS	Azure PaaS ↑ 2
#4	VMware vCloud Air ↑ 1	Google App Engine
#5	IBM SoftLayer ↑ 3	DigitalOcean
#6	Google App Engine (PaaS)	IBM SoftLayer ↑ 1
#7	Oracle Cloud (IaaS)	Google IaaS ↓ 1
#8	Google IaaS ↓ 1	VMware vCloud Air
#9	DigitalOcean	Oracle Cloud (IaaS)

Source: RightScale 2016 State of the Cloud Report

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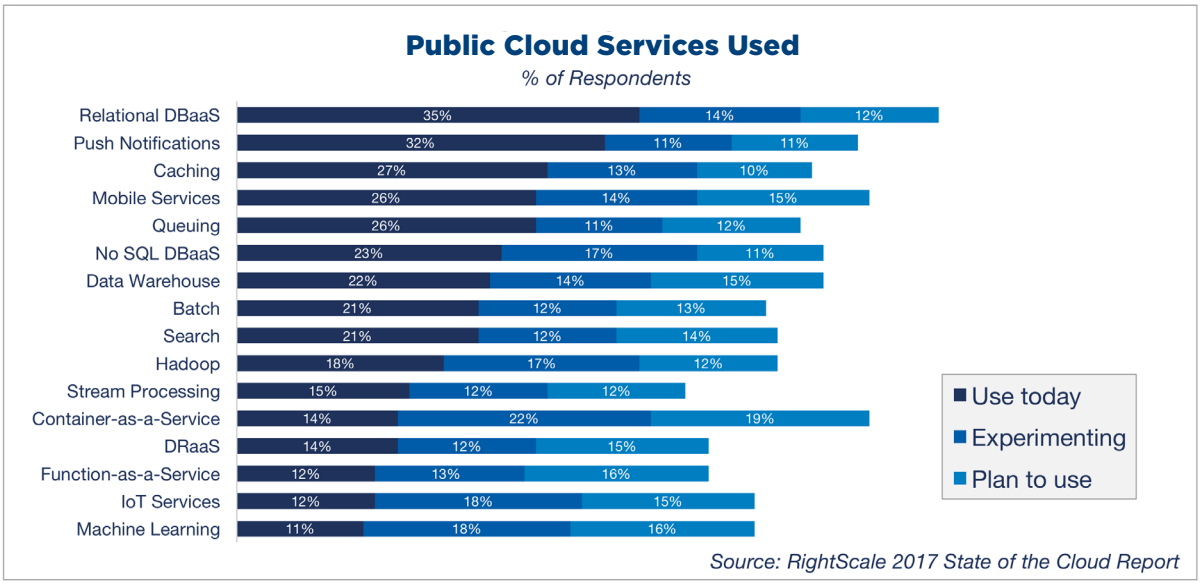
Users leverage a variety of extended services from public cloud providers.

A significant number of public cloud users are now leveraging services beyond just the basic compute, storage, and network services. Below we see the most popular extended services, including relational DBaaS, push notifications, and caching taking the top three positions.



Private cloud adoption flattens.

In contrast to last year's survey when we saw private cloud adoption grow, the 2017 survey shows that adoption of private cloud is flattening across all providers. Across all sizes of organizations, VMware vSphere continues to lead with 42 percent adoption, slightly below last year (44 percent). OpenStack (20 percent) and VMware vCloud Suite (19 percent) were also flat in growth, with OpenStack barely eking into the #2 slot. Azure Pack/Stack was the only private cloud technology to show significant growth, up from 9 percent to 14 percent. Microsoft System Center showed 3 percent growth, which is right at the 3 percent margin of error.

Microsoft Azure Pack/Stack leads among respondents who are experimenting or planning to use private cloud (28 percent) followed by OpenStack (25 percent). This could lead to increased adoption of both in future years.

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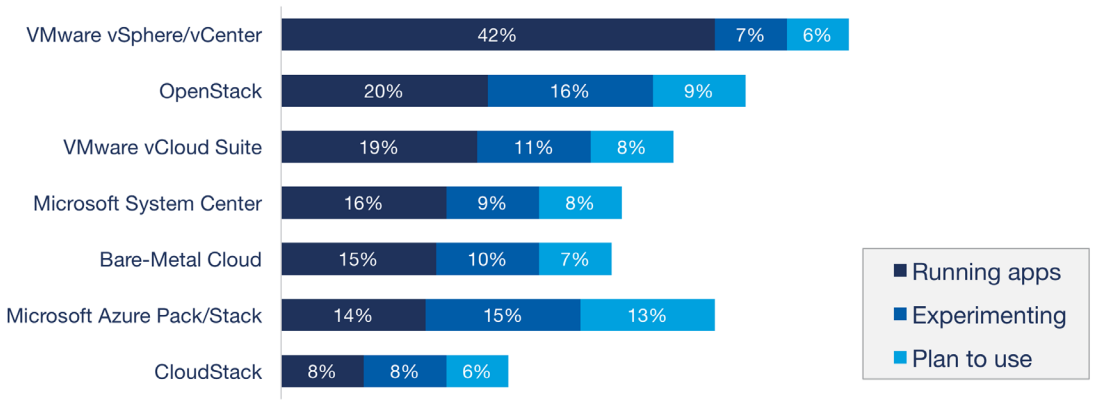
Private Cloud Adoption

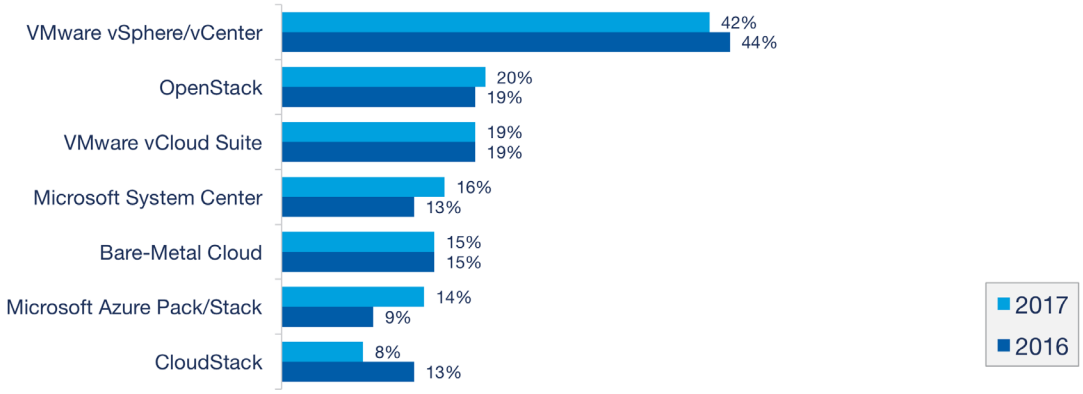
% of Respondents Running Applications



Source: RightScale 2017 State of the Cloud Report

Private Cloud Adoption 2017 vs. 2016

% of Respondents Running Applications



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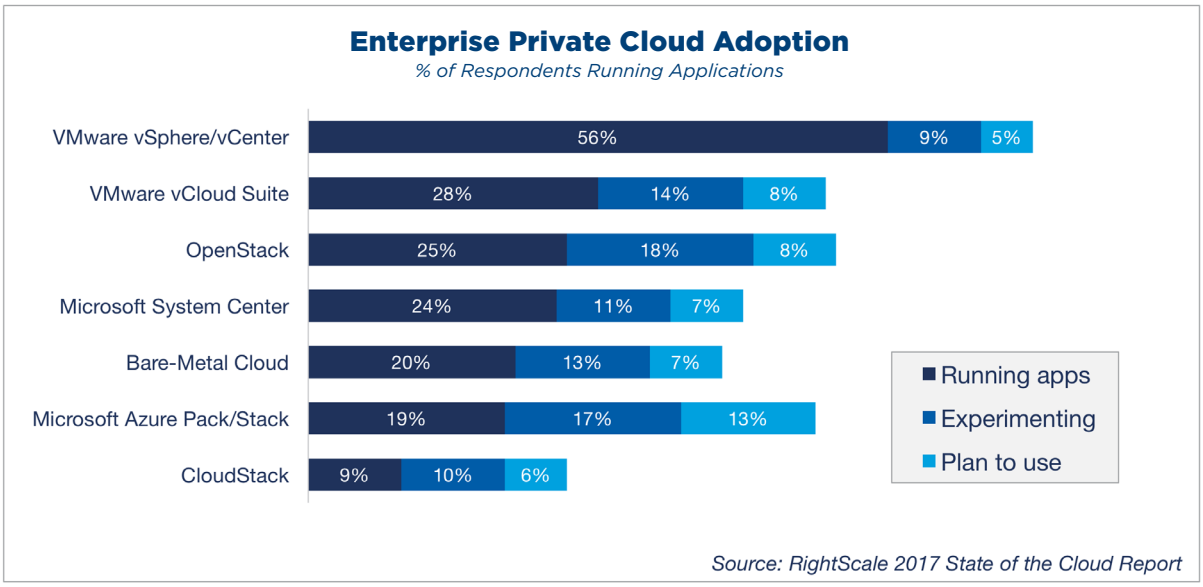
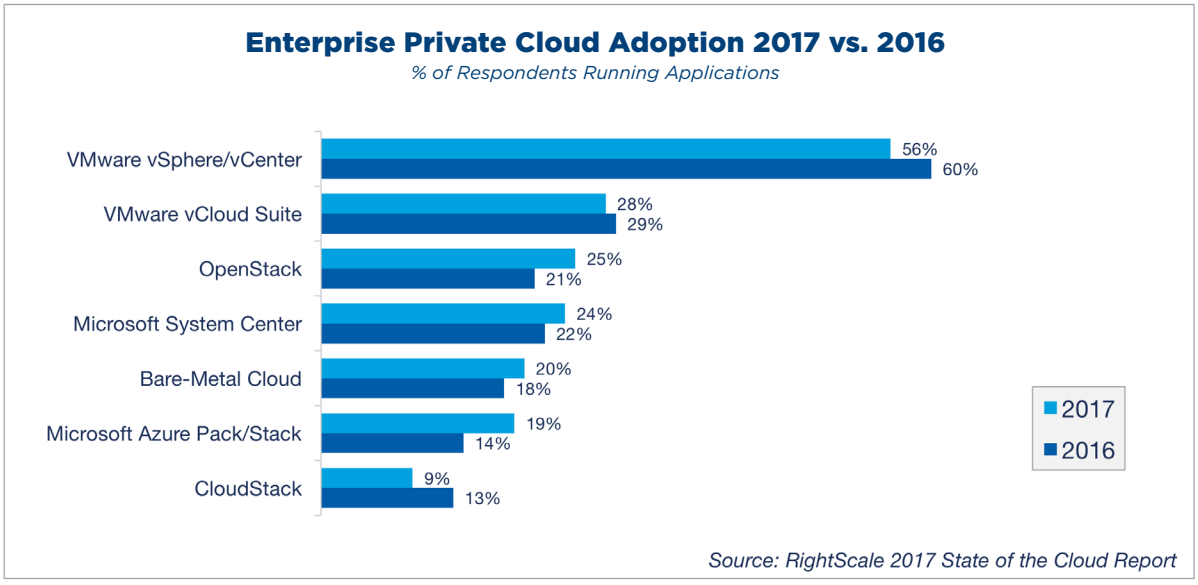
Among enterprises, VMware vSphere (56 percent) and vCloud Suite (28 percent) top the list, followed closely by OpenStack (25 percent) and Microsoft System Center (24 percent). This includes respondents who view their vSphere environment as a private cloud — whether or not it meets the accepted definition of cloud computing. While Azure Pack/Stack ranks sixth in current usage by enterprises, it leads the way at 30 percent among respondents who are experimenting with and planning to use private cloud.

Compared to last year, VMware vSphere and CloudStack showed 4 percent declines in enterprise adoption, while Azure Pack/Stack and OpenStack showed growth of 5 percent and 4 percent, respectively. Other private cloud providers showed only 1-2 percent changes up or down (within the 3 percent margin of error).





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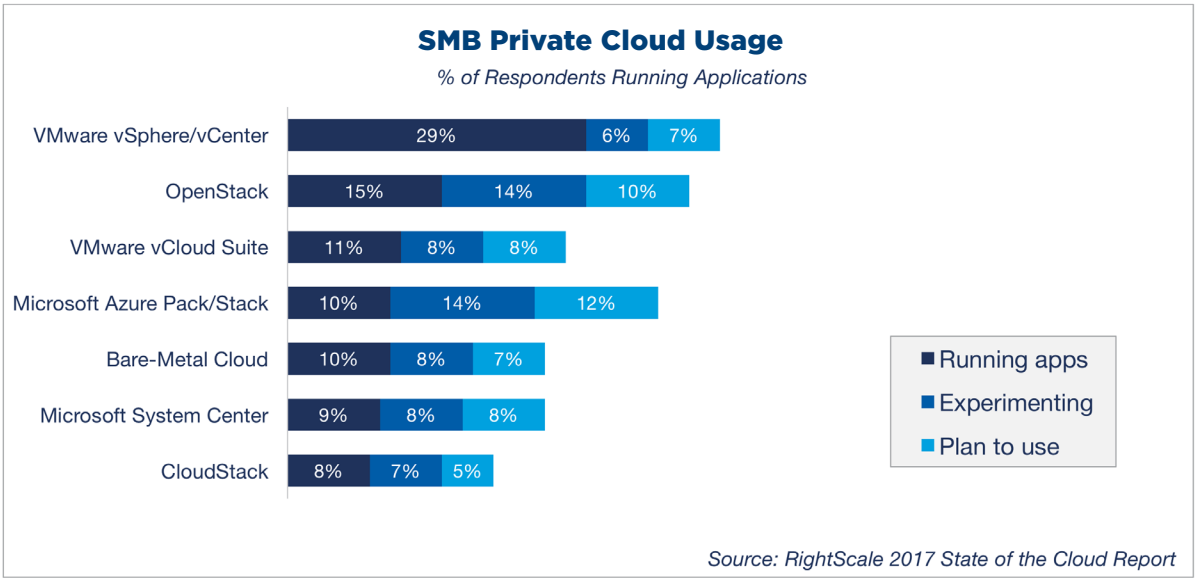
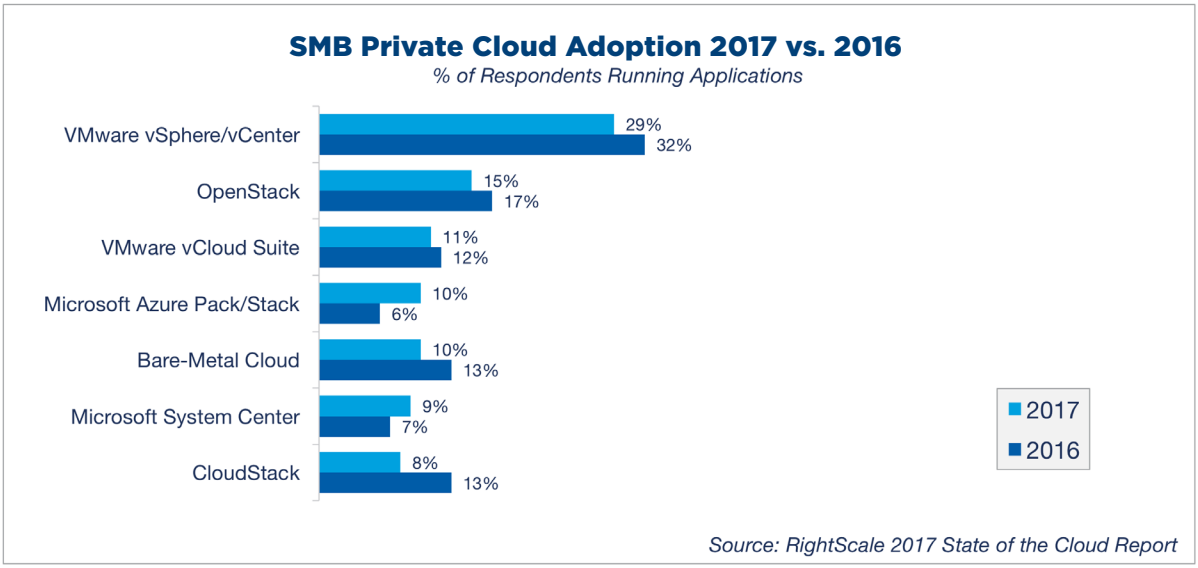
Private cloud adoption by smaller organizations is lower overall than for enterprises. While VMware vSphere/vCenter (29 percent) is still the top option, OpenStack took second place in this group with 15 percent of respondents already running applications. This year Microsoft Azure Pack/Stack has gained mindshare with 26 percent of SMBs experimenting or planning to use it, and OpenStack also has garnered strong interest with 24 percent of enterprises experimenting or planning to use it.

Year-over-year, most vendors saw declines in smaller organizations. VMware vSphere/vCenter was down from 32 to 29 percent, and CloudStack fell from 13 to 8 percent. Microsoft Azure Pack/Stack was the only option that showed significant gains exceeding the 3 percent margin of error.





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Comparing enterprises and SMBs, VMware vSphere/vCenter is in the top position for both groups. OpenStack ranks #2 in SMBs, as compared to VMware vCloud Suite in the #2 slot for enterprises.

Top Private Clouds Used

Place	Enterprise *(1000+ employees)*	SMB *(Under 1000 employees)*
#1	VMware vSphere/vCenter	VMware vSphere/vCenter
#2	VMware vCloud Suite	OpenStack
#3	OpenStack ↑ 1	VMware vCloud Suite ↑ 2
#4	Microsoft System Center ↓ 1	Microsoft Azure Pack/Stack ↑ 3
#5	Bare-Metal Cloud	Bare-Metal Cloud ↓ 2
#6	Microsoft Azure Pack/Stack	Microsoft System Center
#7	CloudStack	CloudStack ↓ 4

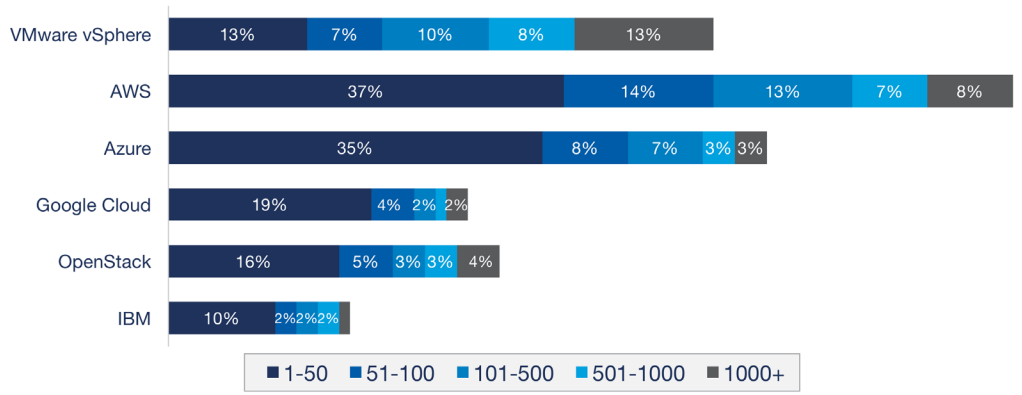
Source: RightScale 2017 State of the Cloud Report

Cloud users still have a larger footprint in VMware vSphere and AWS.

The adoption numbers above indicate the number of respondents who are running *any* workloads in a particular cloud. However, it is also important to look at the number of workloads or VMs that are running in each cloud.

The charts that follow show the number of VMs being run. Among all respondents, VMware vSphere shows the largest footprint for private clouds with 13 percent of respondents running more than 1,000 VMs and 31 percent of respondents running more than 100 VMs. AWS shows the largest footprint for public clouds with 8 percent running more than 1,000 VMs and 28 percent running more than 100 VMs. In comparison, Azure only has 3 percent running more than 1,000 VMs and 13 percent running more than 100 VMs.

Number of VMs in Cloud



Source: RightScale 2017 State of the Cloud Report

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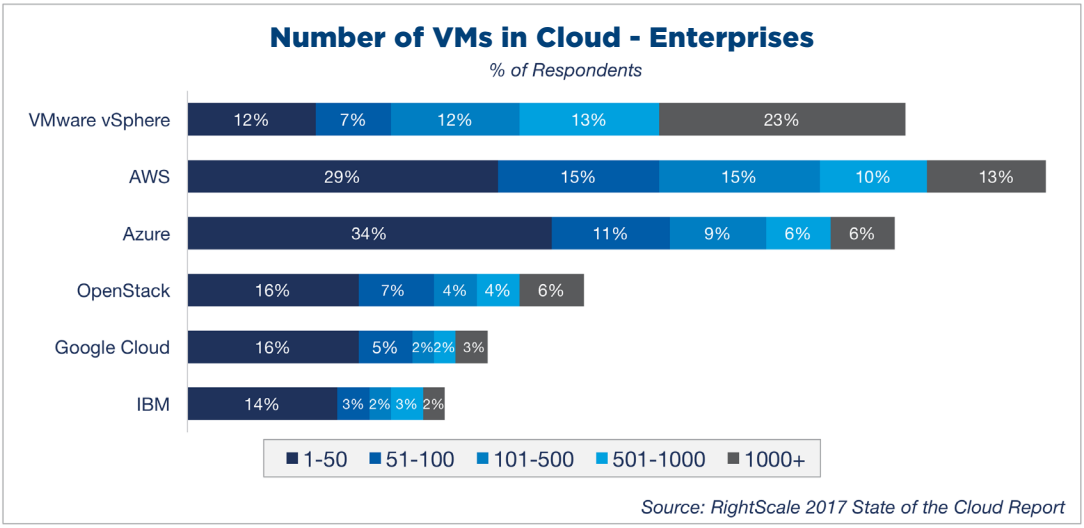
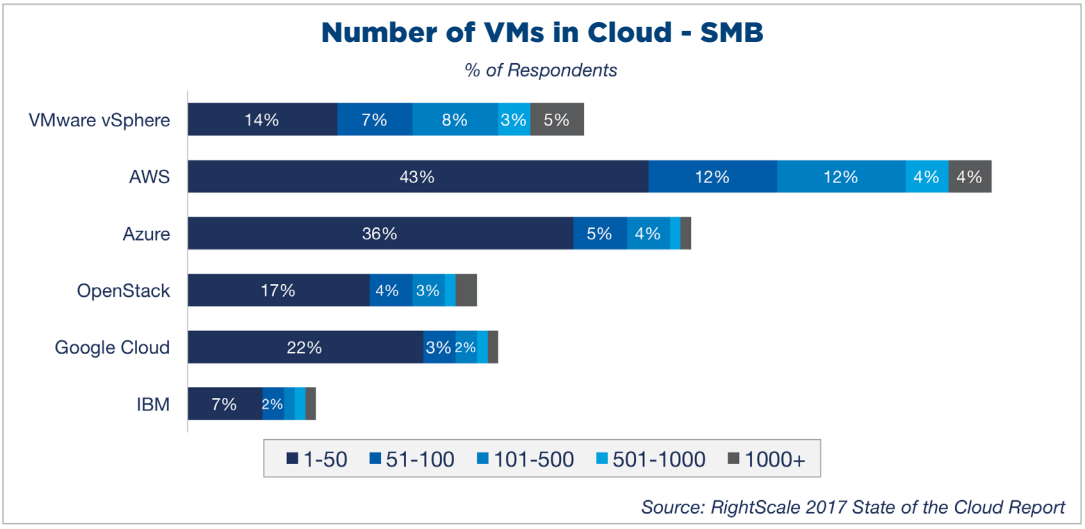
Among enterprises, who have larger numbers of workloads, 23 percent have more than 1,000 VMs in VMware vSphere and 38 percent have more than 100 VMs. Among public clouds, 13 percent have more than 1,000 VMs in AWS and 38 percent have 100+ VMs.



Among SMBs, VMware vSphere had a slight lead over AWS among those respondents with more than 1,000 VMs (5 percent vs. 4 percent). However, AWS led VMware vSphere in the number of respondents running more than 100 VMs (20 percent vs. 16 percent).



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Summary: Public Cloud Adoption Grows, While Private Cloud Wanes

The 2017 State of the Cloud Survey shows that while hybrid cloud remains the preferred enterprise strategy, public cloud adoption is growing while private cloud adoption flattened and fewer companies are prioritizing building a private cloud. This was a change from last year's survey, where we saw strong gains in private cloud use.

Companies are already using 4 different clouds and experimenting with 4 more, and a majority of workloads are now running in cloud.

AWS leads in public cloud adoption despite staying flat for the last two years in the number of respondents using it. However, respondents are running more VMs in AWS than in other public clouds, which explains the AWS lead in revenue. Azure made strong gains in adoption in this year's survey, closing the lead on AWS. Google also made gains and still remains in the #3 position.

VMware vSphere continues to lead as a private cloud option (both in adoption and number of VMs), despite declines in adoption from last year. OpenStack made a small amount of progress in enterprises, but Azure Pack/Stack stood out with the strongest growth year-over-year.

Enterprise central IT teams are taking a stronger role in cloud adoption; however, business units seem reluctant to give up authority. Cloud governance continues to progress, which will serve to help increase alignment between central IT and the business units they support.

With increasing maturity of both cloud users and cloud providers, we are seeing an across-the-board reduction in cloud challenges. Unlike last year when concern about resources and expertise was the most widespread (32 percent of users), this year security, spend, and expertise tied for the largest concern, albeit with only 25 percent of users expressing concern about each.

As adoption grows, cloud bills and cost concerns are also growing. As a result, the most cited challenge among mature cloud users was managing cloud costs. Most organizations, however, continue to underestimate the level of waste in cloud spend (30 percent) when compared to actual waste between 30 and 45 percent measured by RightScale. Although only a minority of cloud users have taken action to reduce waste, they are now turning their focus to this issue, making it the top initiative for 2017, followed closely by migrating more workloads to cloud.

The use of DevOps practices and tools continues to increase, with enterprises moving beyond piecemeal adoption to company-wide DevOps programs. This year Docker surged to become the top DevOps tool in the survey, seemingly at the expense of configuration management tools such as Puppet and Chef, which showed declines in adoption. Kubernetes also showed strong increases as a container orchestration solution, and many users are also adopting container-as-a-service offerings from public cloud providers.

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RightScale: A Single Pane of Glass to Manage All Your Clouds

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About RightScale

The Industry Leader in Cloud Management

RightScale Universal Cloud Management enables leading enterprises to accelerate delivery of cloud-based applications that engage customers and drive top-line revenue while optimizing cloud usage to reduce risk and costs. With RightScale, IT organizations can deliver instant access to a portfolio of public, private, and hybrid cloud services across business units and development teams while maintaining enterprise control. RightScale Consulting Services help companies develop cloud strategies, deliver cloud projects, and optimize cloud usage. RightScale was named a "100 Best Places to Work in 2015" by *Outside Magazine* and was listed in "The Best Enterprise Cloud Computing Startups to Work For in 2015" by *Forbes*. Since 2007, leading enterprises including Audi, Pinterest, and Yellow Pages Group have launched millions of servers through RightScale.

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