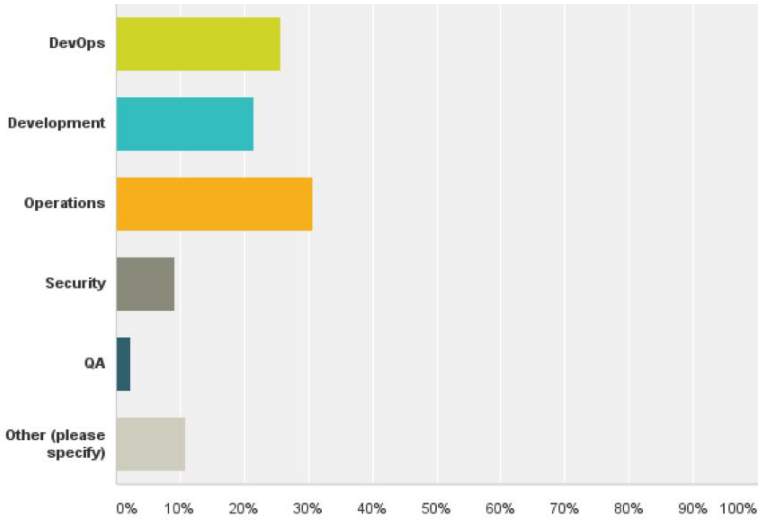
Portworx Annual Container Adoption Survey 2017

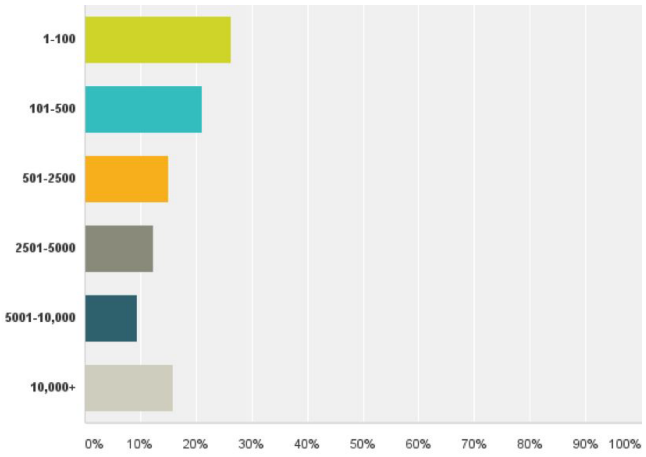
Executive Summary:

The Portworx Annual Container Adoption survey was distributed in March 2017 and includes insights from 491 IT pros across a variety of industries and company sizes. It asked questions about the state of container usage, tooling, environments and barriers to adoption to get a snapshot of container adoption today. The 2017 survey asked many of the same questions included in a previous Portworx survey and the container survey distributed in 2015 and 2016 by ClusterHQ before the company closed its doors.This creates a multi-year dataset that we can use to draw conclusions on how container adoption has changed over time.

Respondents by role



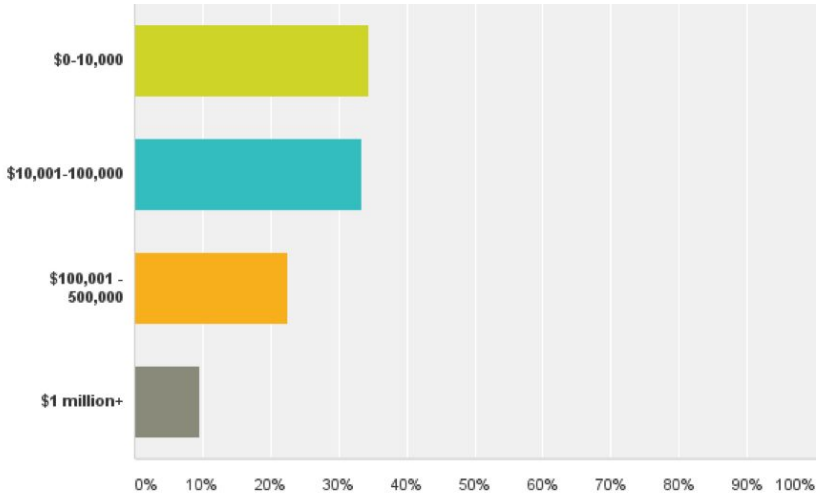
Company size



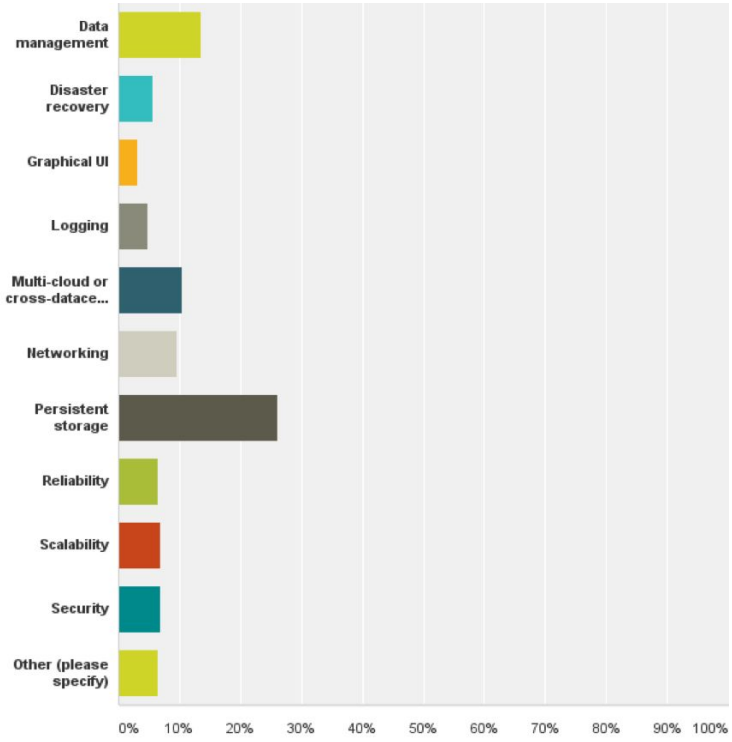
Annual financial investment: license and usage fees for container technologies

Companies are investing significantly in containers.

The survey results indicate that containers continue to grow in relevance with 32% of companies spending $500,000 or more a year on license and usage fees for container technologies, up from a reported 5% last year. This huge increase in IT spend is an indication that container market leaders are taking advantage of interest in containerized workloads.



In order to deploy containers, which challenge has been the most difficult to overcome?



Challenges around persistent storage top the list of adoption barriers.

As container adoption proceeds at a fast pace, some of the challenges of years past remain, while others appear to have been largely addressed. For two years running, persistent storage is the #1 challenge for running containers, with 26% of the sample identifying persistent storage as the most difficult challenge to overcome. Given that most companies have started moving the stateless parts of their applications to containers first, it makes sense that

they are still investing solutions for stateful services as they increase their container adoption.

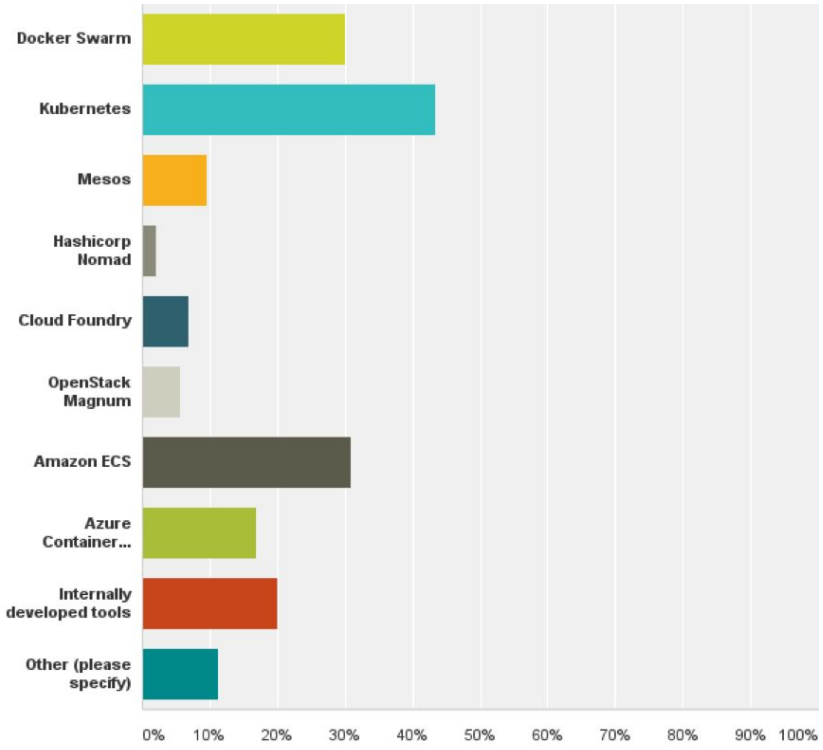
In previous years, security and networking have rounded out the top three challenges identified in the survey, but this year, neither are in the top three, with only 10% of the sample indicating that networking is the top challenge and 7% of the sample saying security is the top challenge. This is somewhat surprising given the intense debate both of these topics have generated in previous years. But with Docker and Kubernetes offering a number of pluggable networking and security options, it appears that more and more of the industry is feeling good about their ability to securely run multi-node container deployments.

In 2017, in addition to persistent storage, the other top challenges included data management (13%) and multi-cloud or cross-datacenter support (10%). The multi-datacenter problem is interesting because it indicates that companies are taking up containers on their promise of application portability, but struggling to make it a reality.

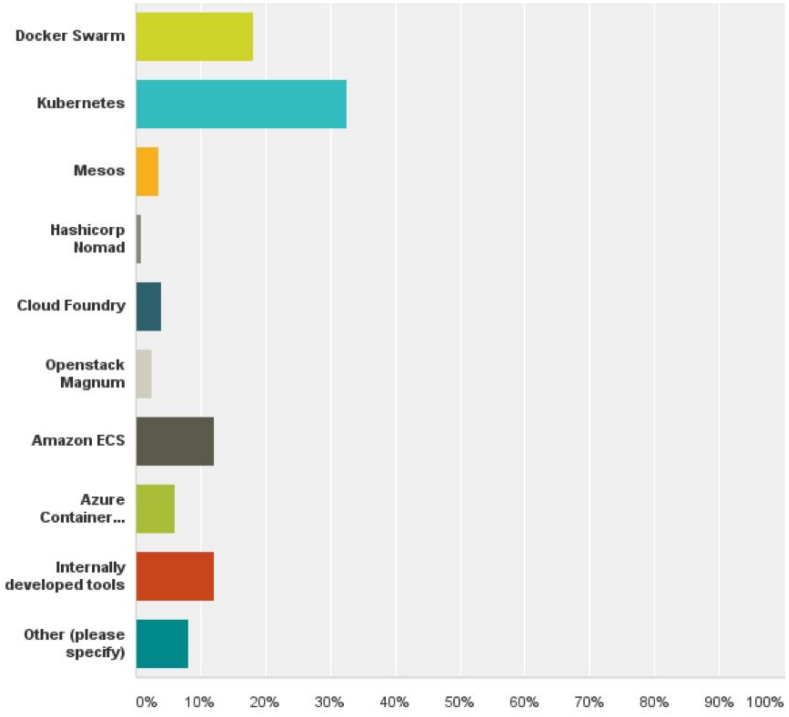
No clear winner among orchestration tools yet.

One area of intense focus within the community is orchestration tools. This year's survey makes it clear that there is no winner yet in the race to provide the best container management solution. In fact, it appears that customers are still trying multiple solutions. While Kubernetes is the most popular scheduler, it may be another year or more before we can draw concrete conclusions about winners, with a likely outcome being that customers use multiple tools for different jobs.

Which container orchestration tools do your organization use? (Choose all that apply.)



Which container orchestration tools does your organization use most frequently?



Summary of findings:

- Financial investment in containers grow with million dollar investments more than doubling year-on-year

Sixty-nine percent of respondents with knowledge of their company's financial investments said their company is making an investment in containers. That percentage is up from 52% in 2016. Of these companies, 10% are making over a million dollar investment in license and usage fees for containers, more than doubling between 2016 and 2017 when the percentage was only 4%. Thirty-two percent of the sample was spending more than $500,000 per year, up from 5% in 2016.

Increases in spending for personnel to use container technologies also increased at similar rates, with companies investing more than $1 million in personnel, rising from 6.5% in 2016 to 13% in 2017. Companies spending more than $500,000 per year went from 13% in 2016 to 38% in 2017.

- Persistent storage remains the top challenge for running containers two years in a row

Persistent storage is the #1 challenge for running containers, two years running, with 26% of the sample identifying persistent storage as the most difficult challenge to overcome. In previous years, security and networking have rounded out the top three challenges identified in the survey, but this year, neither are in the top three, with only 10% of the sample indicating that networking is the top challenge and 7% of the sample saying Security is the top challenge. In 2017, the other top challenges included data management (13%) and multi-cloud or cross-datacenter support (10%). This last challenge is interesting, indicating that companies are taking up containers on their promise of application portability, but struggling to make it a reality.

- Lack of tools for managing container storage holding back adoption

When asked about the storage challenges users have experienced, 46% of the sample stated that they lacked adequate tools for managing container storage and 39% of the sample had concerns about data loss, echoing the concerns people have about persistent storage in general. Twenty-six percent of respondents complained that storage does not effectively scale with number of containers.

- Kubernetes is the most popular orchestration tool

Kubernetes is the most widely used orchestration tool, with 43% of respondents saying they used Kubernetes and 32% saying that it is their primary orchestration tool. This is an increase

from last year, when Kubernetes was the primary tool of only 27% of the sample. However, 32% of Kubernetes users also say they are using Docker Swarm, so it appears that many businesses have not made their final orchestration decision.

For companies with more than 5000 employees, Kubernetes is used by 48% and the primary orchestration tool for 33%.

- AWS ECS is growing.

One of the more surprising findings in this year's survey is how quickly AWS ECS is coming up in the orchestration market. Thirty-one percent of respondents say they are using ECS (up from 21% in 2016), with 12% saying it is their primary orchestration tool (up from 10%) . However, most people seem to be experimenting, with 46% of ECS users also using Kubernetes and 35% also using Docker Swarm.

For companies with more than 5000 employees, ECS is used by 37% and the primary orchestration tool for 15%.

- Docker continues to dominate the container landscape, Swarm remains a top choice

Seventy-nine percent of the sample chose Docker as their primary container technology, demonstrating that the Docker Engine project continues to be synonymous with containers. Swarm also continues to be a popular orchestration choice. Thirty percent of the sample said they are using Docker Swarm, with 18% saying it is their primary scheduler. This is roughly in line with last year's survey, with 29% using it and 19% saying it is their primary.

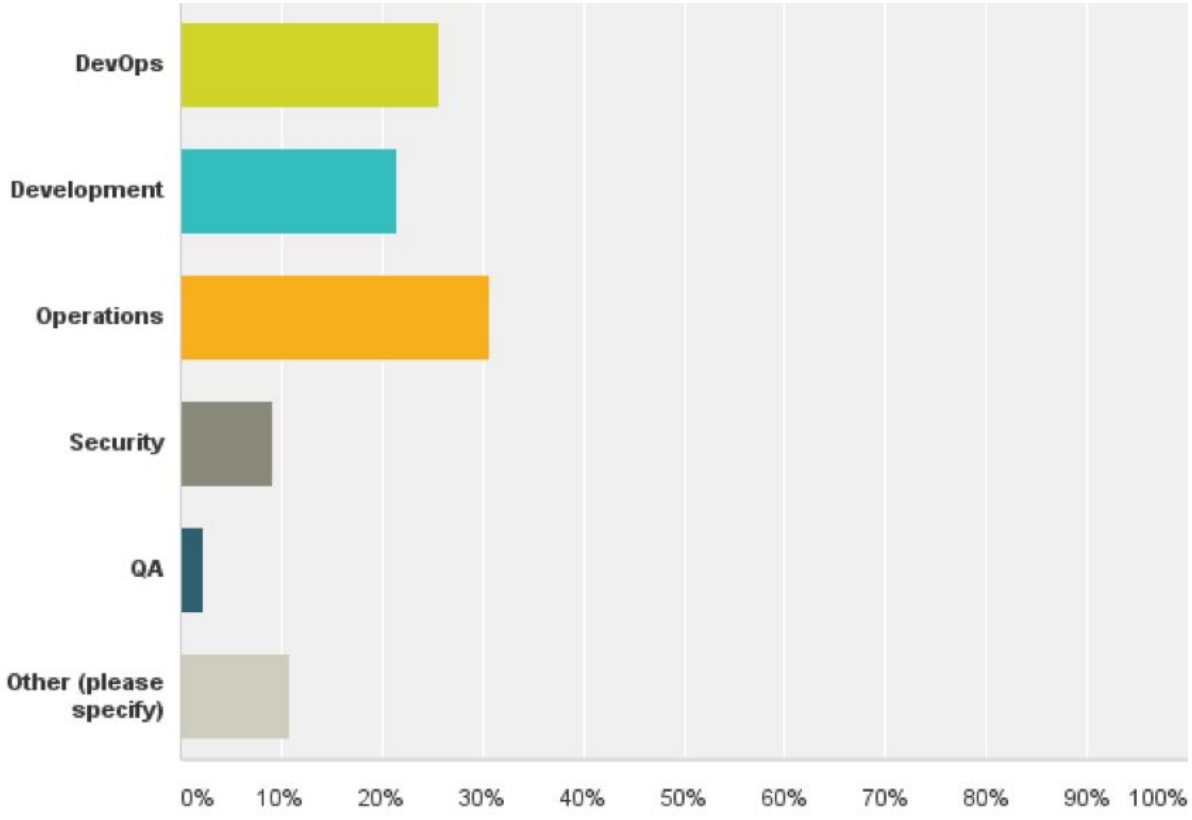
For companies with more than 5000 employees, Swarm is used by 32% and the primary orchestration tool for 15%.

- Windows containers usage has tripled year-on-year

In 2017, nearly one-third of the sample, or 29%, said they were running containers on Windows, up from only 9% in 2016. This indicates that Docker's investment in the Microsoft ecosystem is paying off fast.

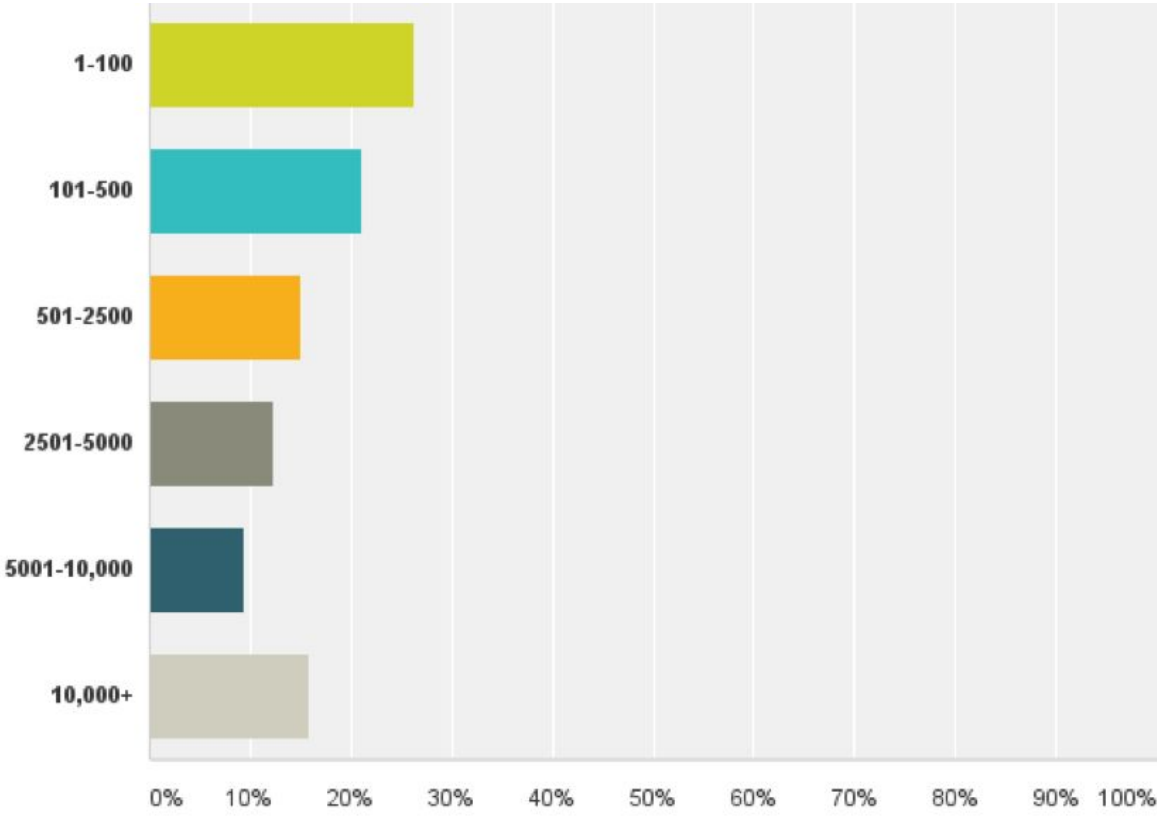
All survey questions:

Q1: Which of the following best describes your primary role? (Choose one.) n=473



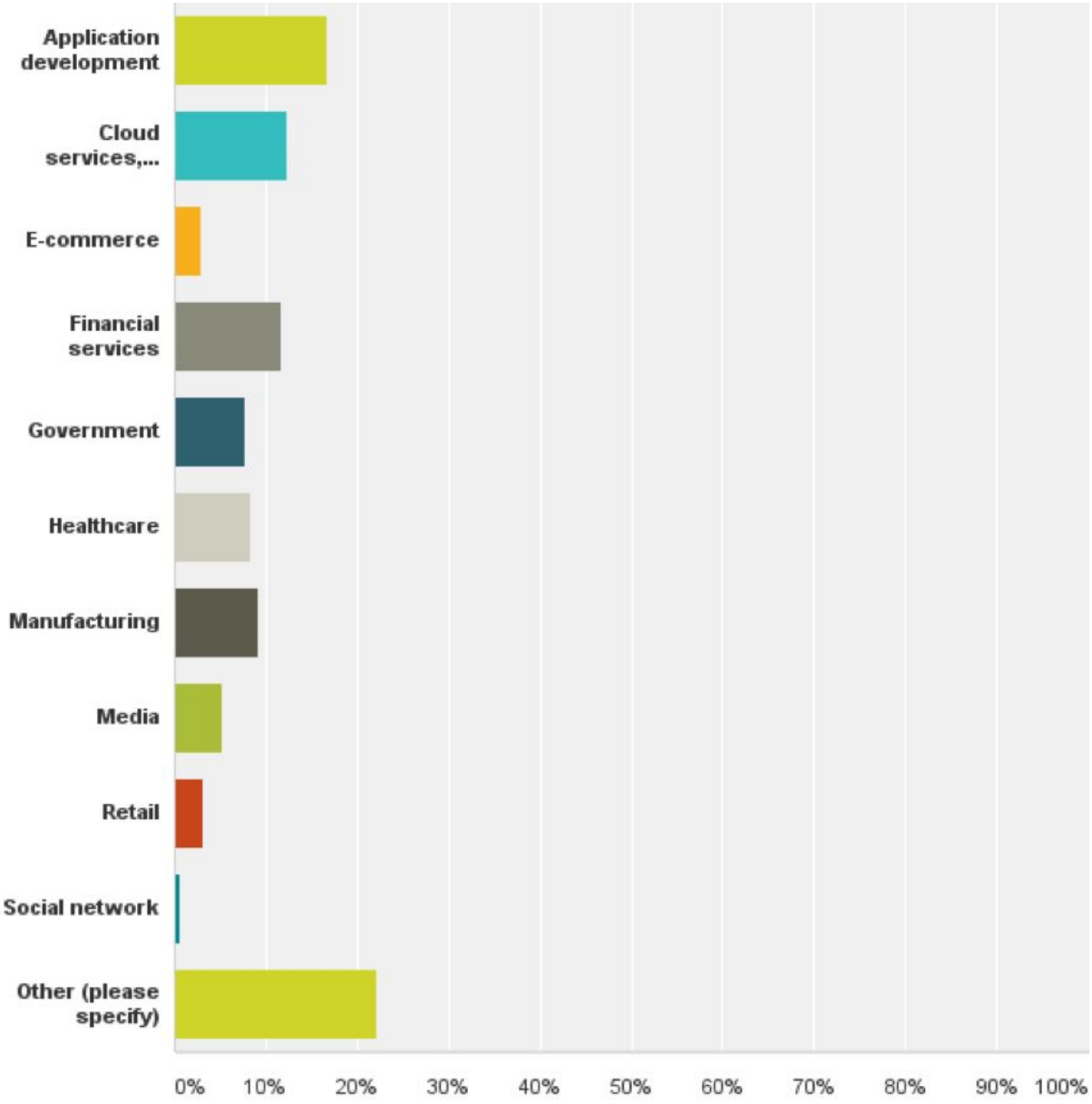
Answer Choices	Responses	
DevOps	**25.58%**	121
Development	**21.56%**	102
Operations	**30.66%**	145
Security	**9.09%**	43
QA	**2.33%**	11
Other (please specify)	**10.78%**	51
Total		**473**

Q2: How many employees are in your organization? (Choose one.) n=466



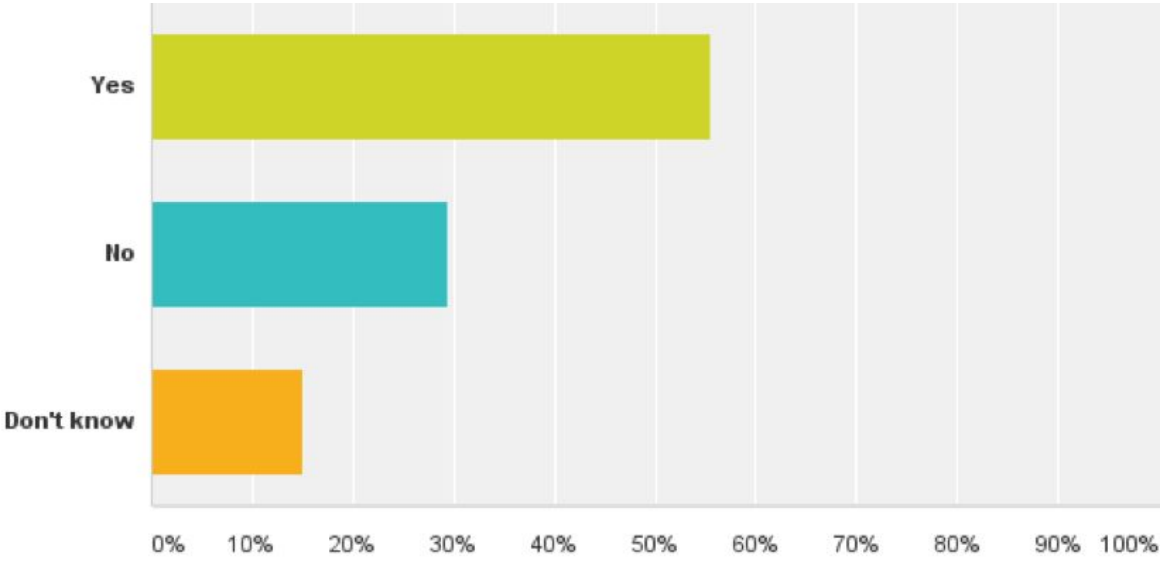
Answer Choices	Responses	
1-100	**26.39%**	123
101-500	**21.03%**	98
501-2500	**15.02%**	70
2501-5000	**12.23%**	57
5001-10,000	**9.44%**	44
10,000+	**15.88%**	74
Total		**466**

Q3: In which industry is your organization? (Choose one). n=459



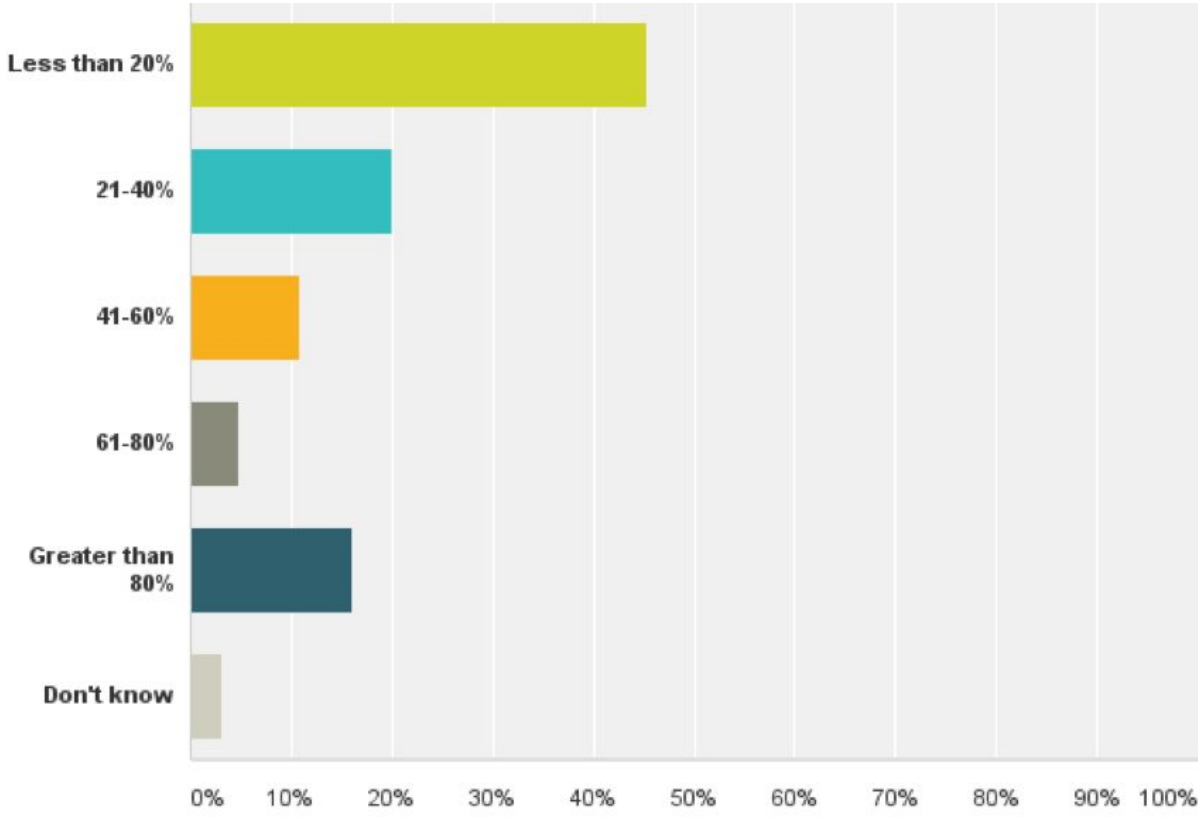
Answer Choices	Responses	
Application development	**16.78%**	77
Cloud services, infrastructure provider	**12.42%**	57
E-commerce	**2.83%**	13
Financial services	**11.76%**	54
Government	**7.63%**	35
Healthcare	**8.28%**	38
Manufacturing	**9.15%**	42
Media	**5.23%**	24
Retail	**3.05%**	14
Social network	**0.65%**	3
Other (please specify)	**22.22%**	102
Total		**459**

Q4: Does your organization run container technologies? n=453



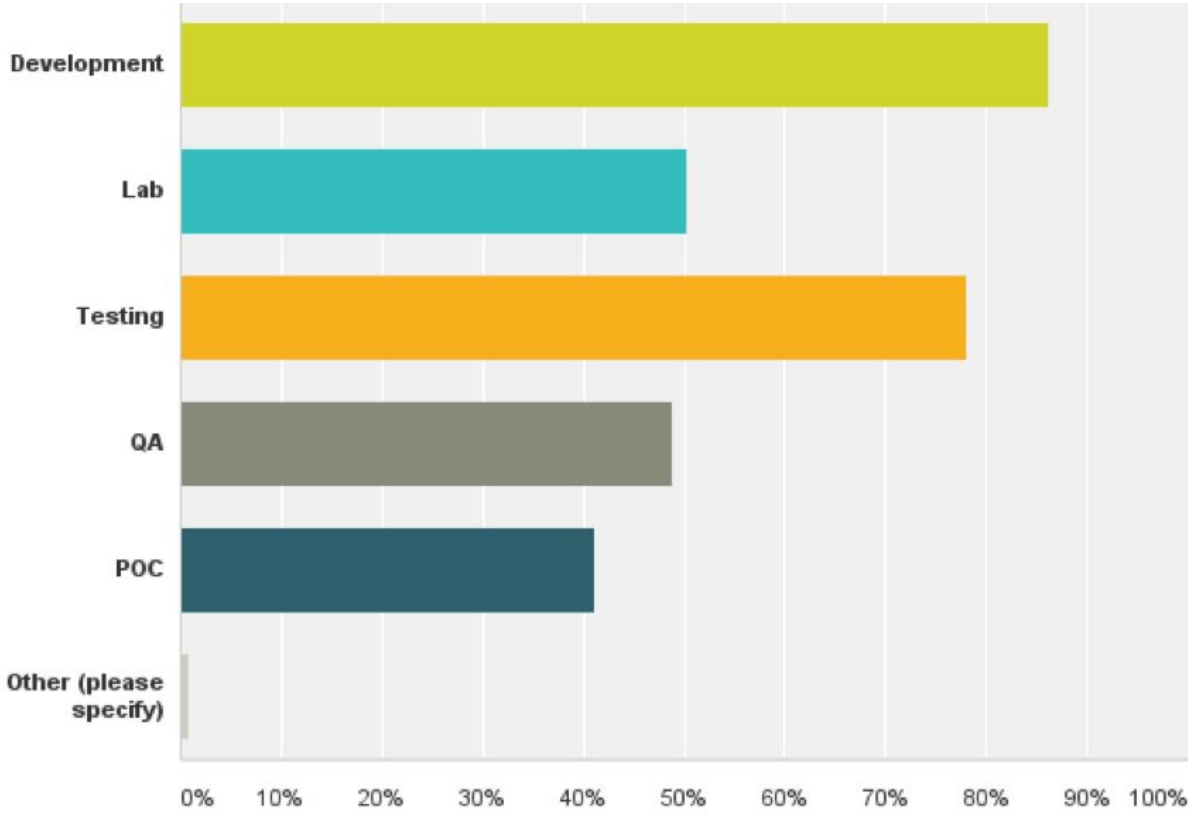
Answer Choices	Responses	
Yes	**55.63%**	252
No	**29.36%**	133
Don't know	**15.01%**	68
Total		**453**

Q5: What percentage of your apps are running in containers? n=250



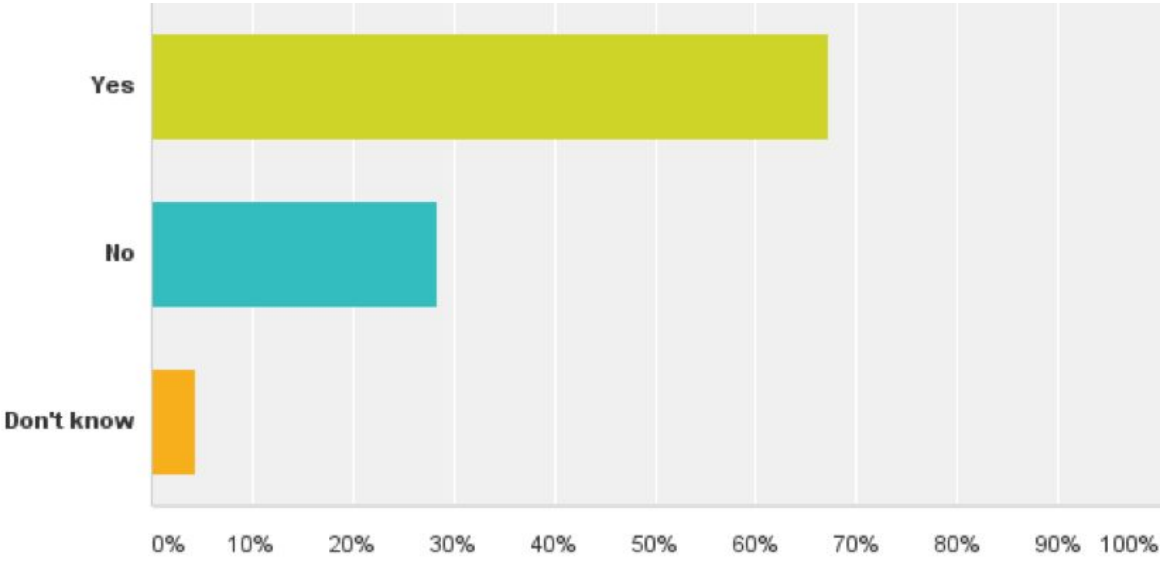
Answer Choices	Responses	
Less than 20%	**45.20%**	113
21-40%	**20.00%**	50
41-60%	**10.80%**	27
61-80%	**4.80%**	12
Greater than 80%	**16.00%**	40
Don't know	**3.20%**	8
Total		**250**

Q6: In which of these non-production environments is your organization running containers?(Choose all that apply.) n=246



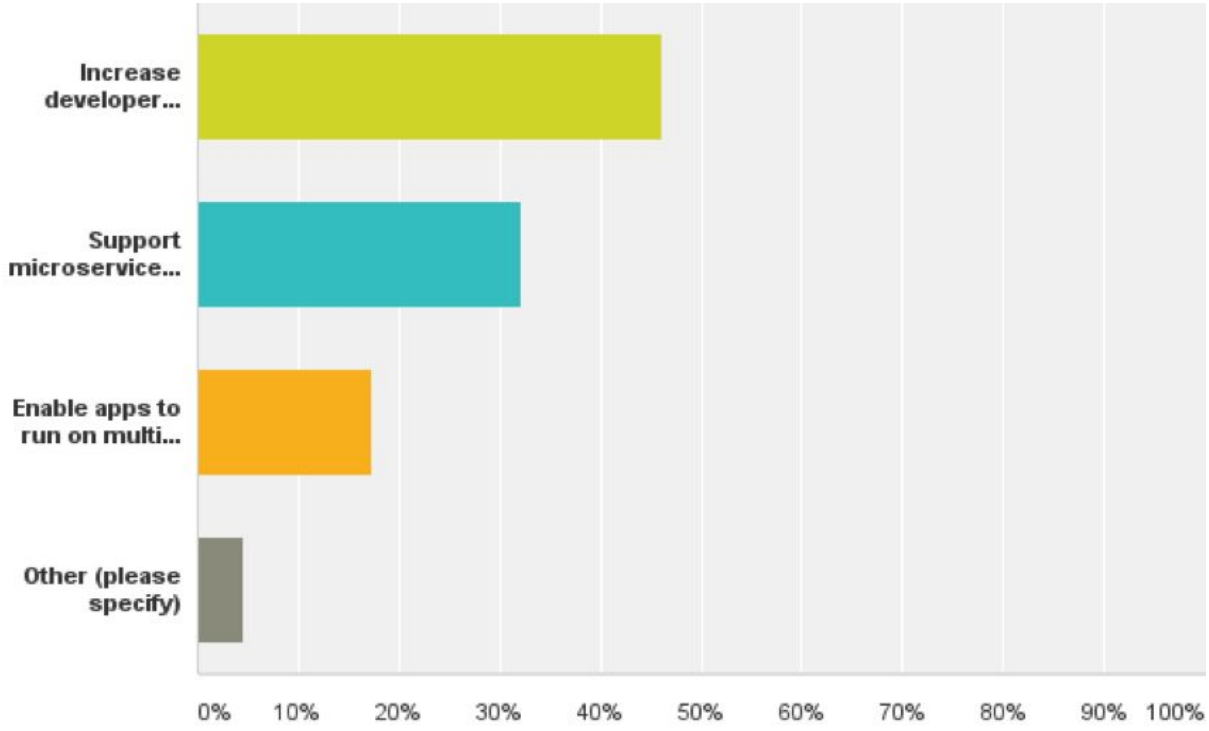
Answer Choices	Responses	
Development	**86.18%**	212
Lab	**50.41%**	124
Testing	**78.05%**	192
QA	**48.78%**	120
POC	**41.06%**	101
Other (please specify)	**0.81%**	2
Total Respondents: 246		

Q7: Is your organization running container technologies in production? n=247



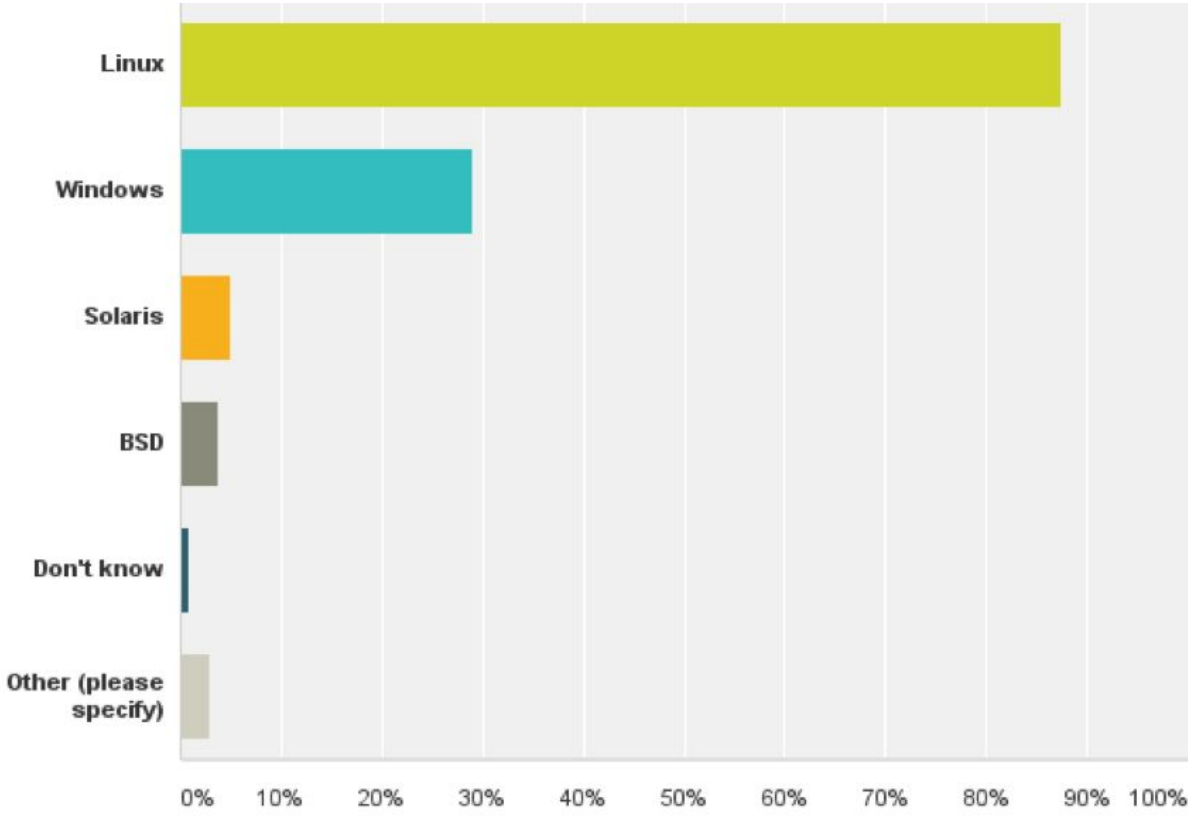
Answer Choices	Responses	
Yes	**67.21%**	166
No	**28.34%**	70
Don't know	**4.45%**	11
Total		**247**

Q8: What is the primary reason why your organization is running container technologies? (Choose one.) n=243



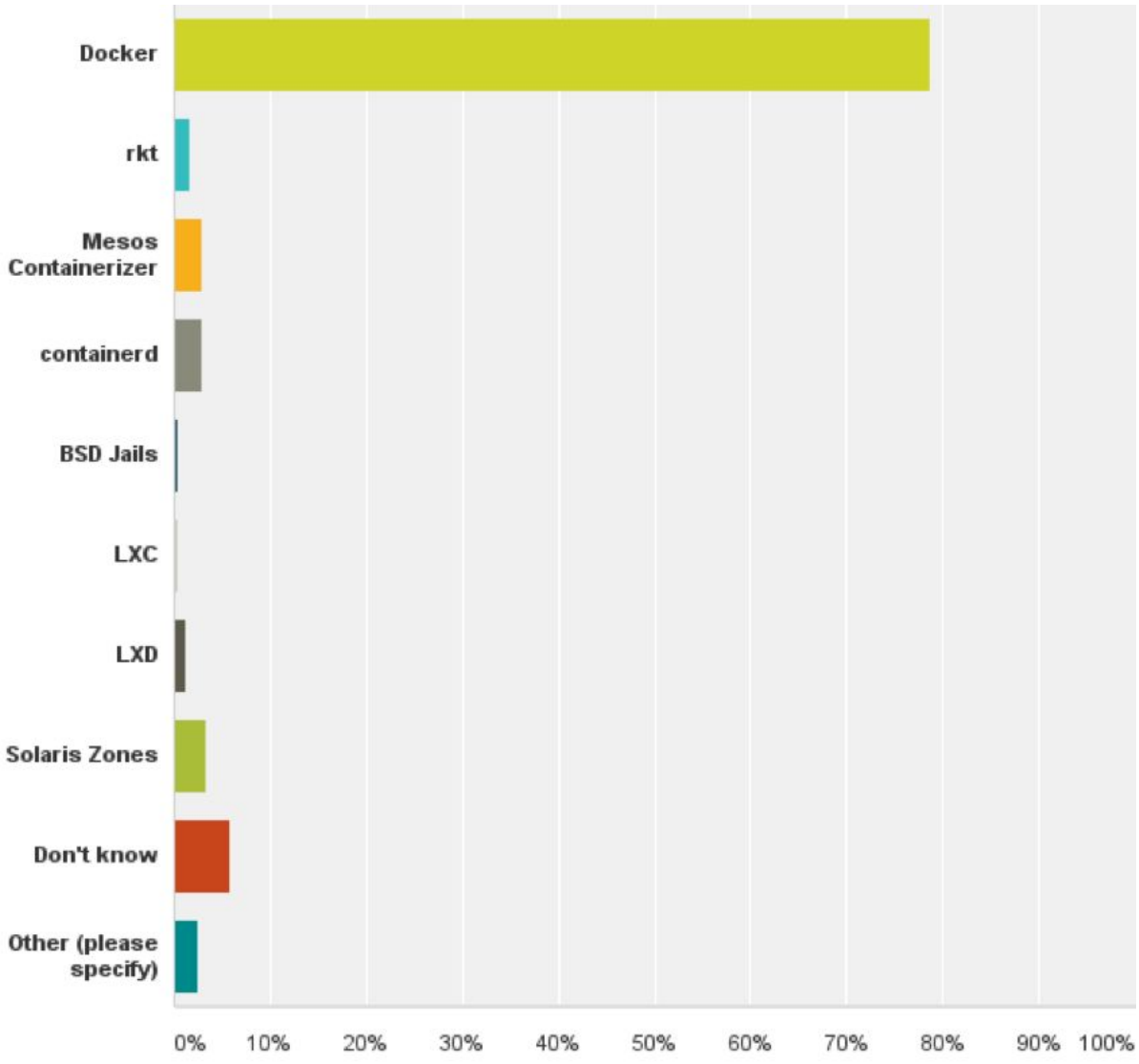
Answer Choices	Responses	
Increase developer efficiency	**46.09%**	112
Support microservices architectures	**32.10%**	78
Enable apps to run on multiple cloud platforms (avoid lock in)	**17.28%**	42
Other (please specify)	**4.53%**	11
Total		**243**

Q9: On which operating system(s) does your organization run container technologies? (Choose all that apply.) n=241



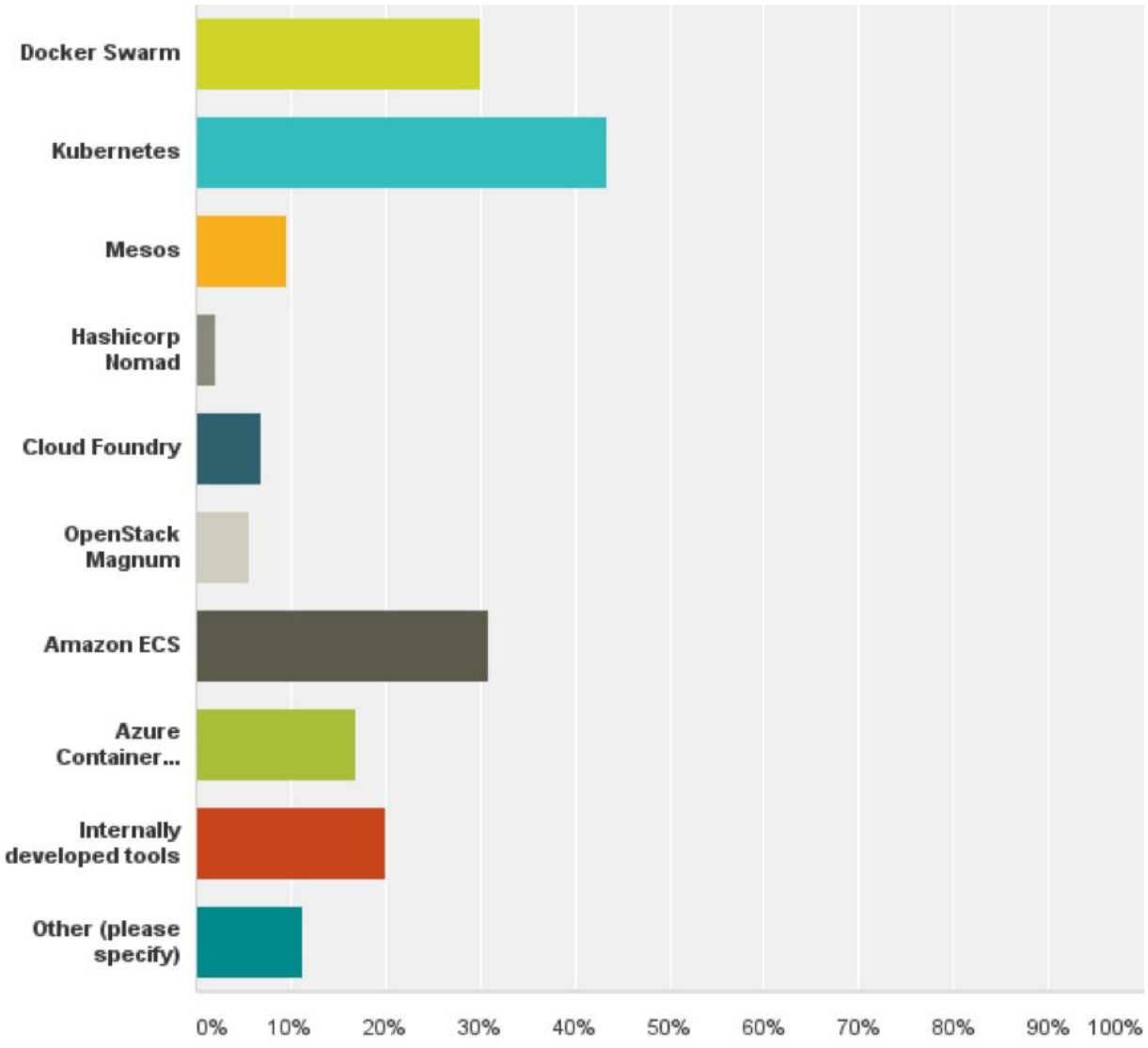
Answer Choices	Responses	
Linux	87.55%	211
Windows	29.05%	70
Solaris	4.98%	12
BSD	3.73%	9
Don't know	0.83%	2
Other (please specify)	2.90%	7
Total Respondents: 241		

Q10: Which container technology does your organization run most frequently? (Choose one.) n=239


Docker
rkt
Mesos Containerizer
containerd
BSD Jails
LXC
LXD
Solaris Zones
Don't know
Other (please specify)
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%

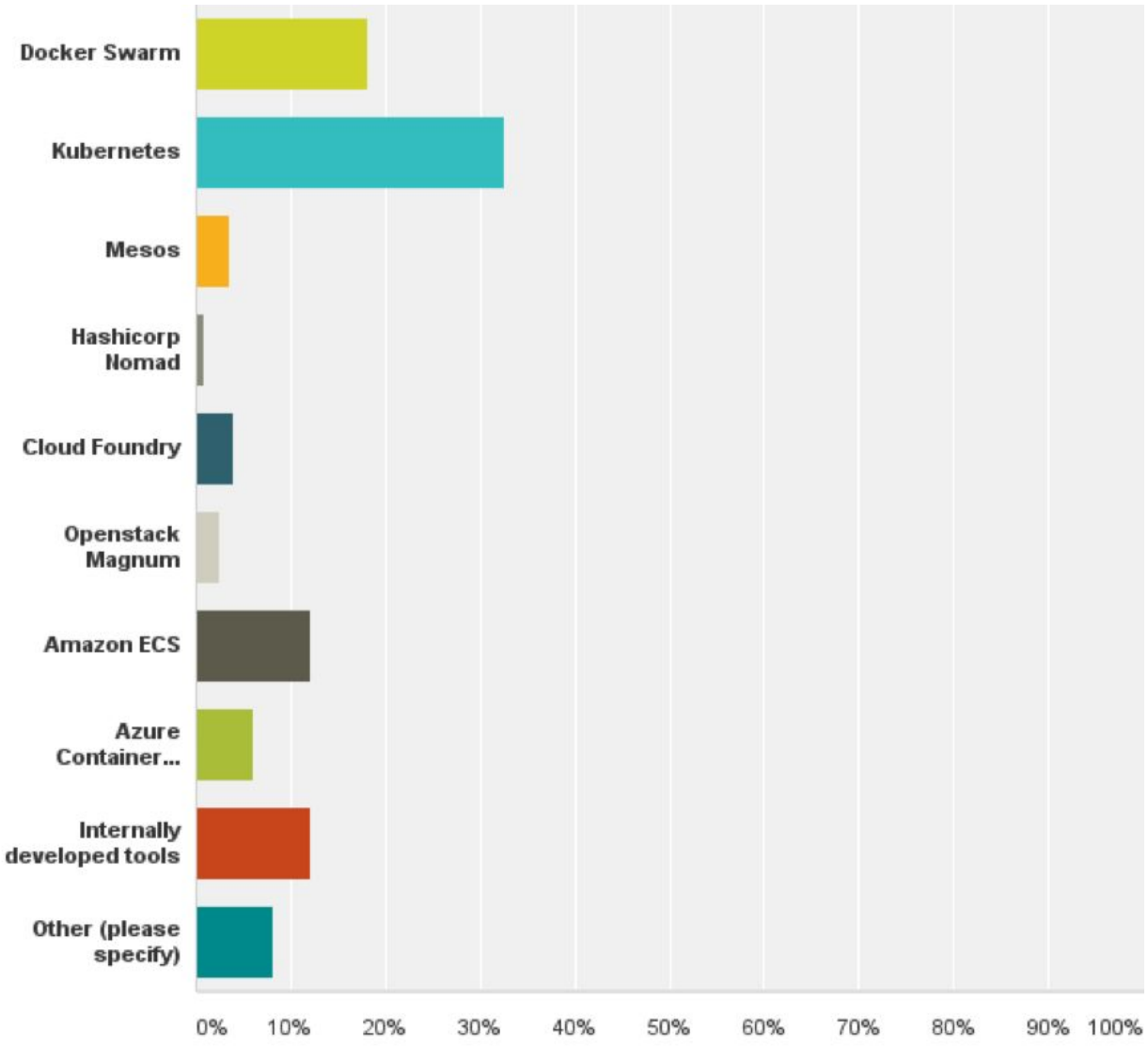
Answer Choices	Responses	
Docker	**78.66%**	188
rkt	**1.67%**	4
Mesos Containerizer	**2.93%**	7
containerd	**2.93%**	7
BSD Jails	**0.42%**	1
LXC	**0.42%**	1
LXD	**1.26%**	3
Solaris Zones	**3.35%**	8
Don't know	**5.86%**	14
Other (please specify)	**2.51%**	6
Total		**239**

Q11: Which container orchestration tools do your organization use? (Choose all that apply.) n=230


Docker Swarm
Kubernetes
Mesos
Hashicorp Nomad
Cloud Foundry
OpenStack Magnum
Amazon ECS
Azure Container...
Internally developed tools
Other (please specify)
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%

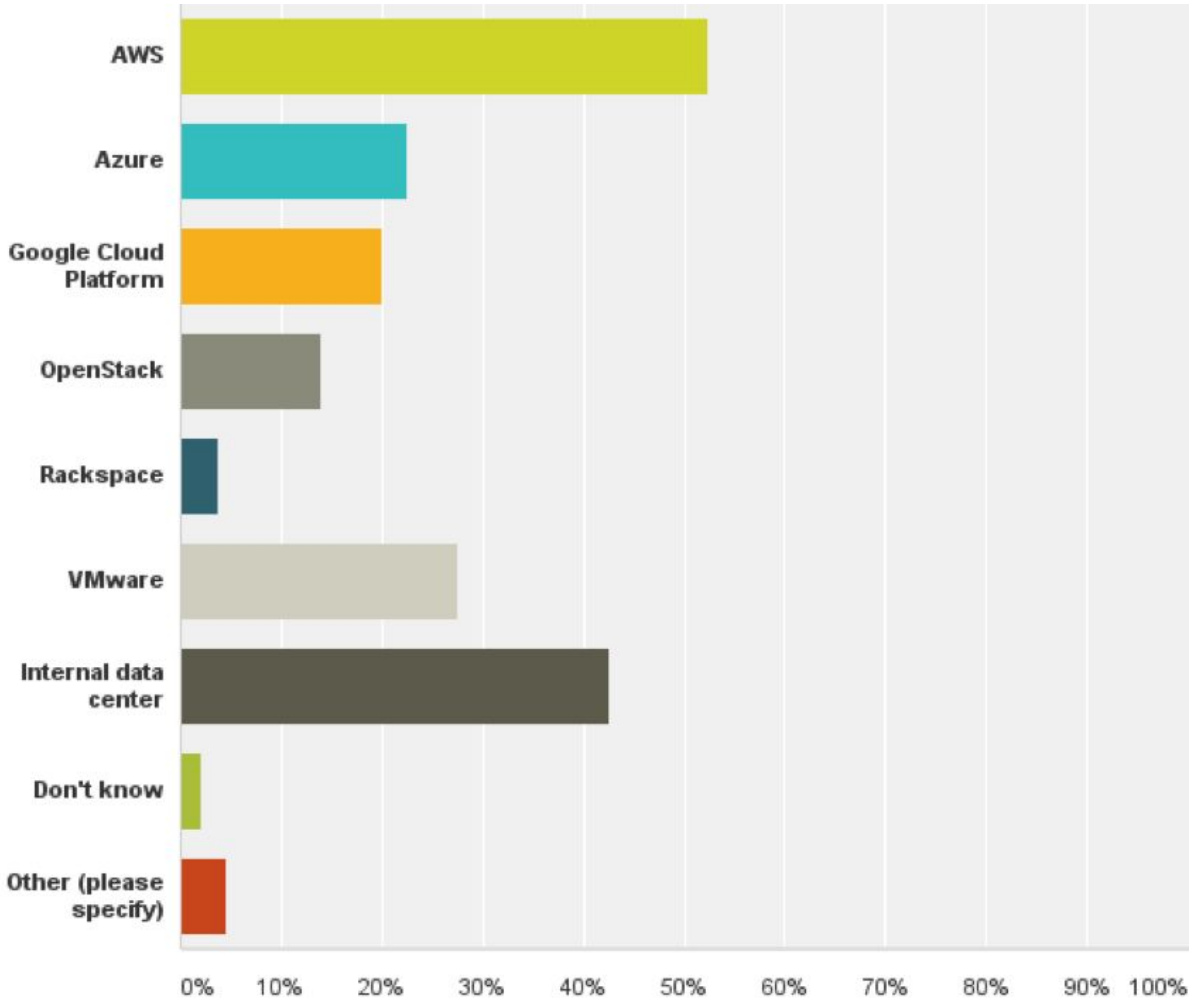
Answer Choices	Responses	
Docker Swarm	**30.00%**	69
Kubernetes	**43.48%**	100
Mesos	**9.57%**	22
Hashicorp Nomad	**2.17%**	5
Cloud Foundry	**6.96%**	16
OpenStack Magnum	**5.65%**	13
Amazon ECS	**30.87%**	71
Azure Container Service	**16.96%**	39
Internally developed tools	**20.00%**	46
Other (please specify)	**11.30%**	26
Total Respondents: 230		

Q12: Which container orchestration tools does your organization use most frequently? (Choose one.) n=231


Docker Swarm
Kubernetes
Mesos
Hashicorp Nomad
Cloud Foundry
Openstack Magnum
Amazon ECS
Azure Container...
Internally developed tools
Other (please specify)
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%

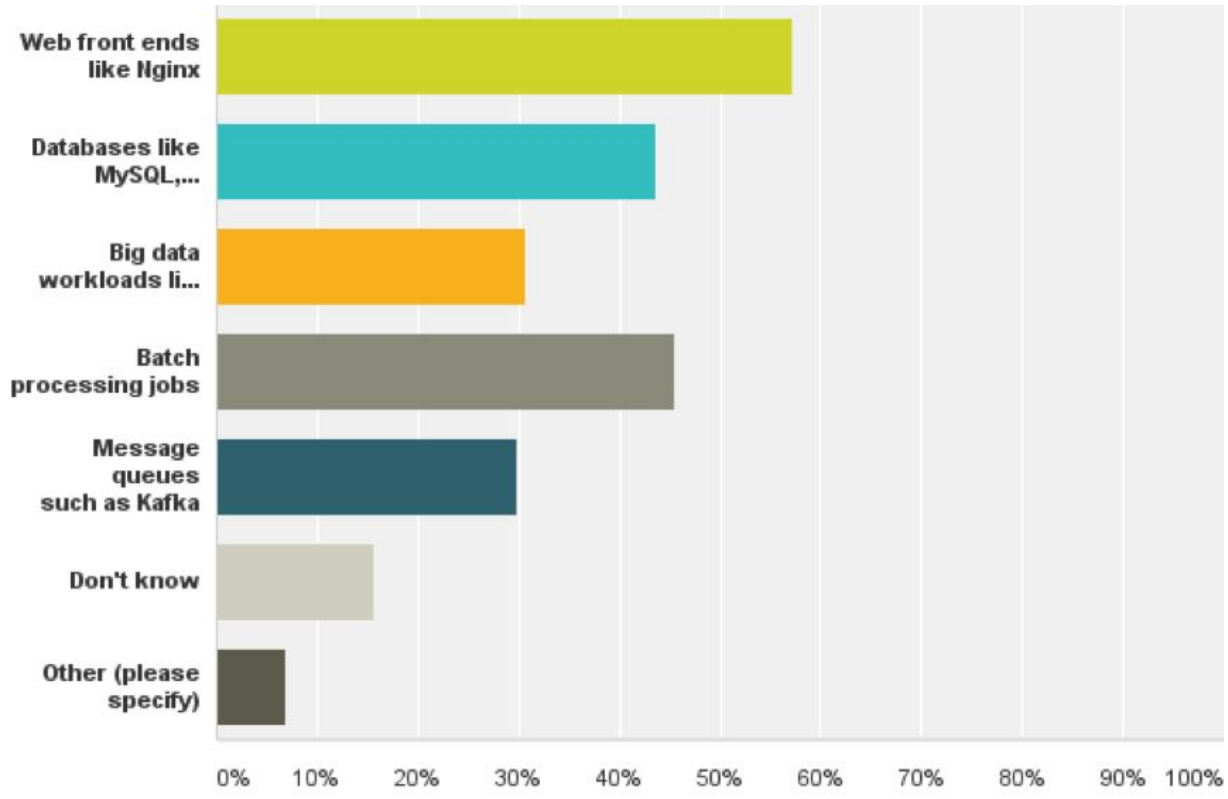
Answer Choices	Responses	
Docker Swarm	**18.18%**	42
Kubernetes	**32.47%**	75
Mesos	**3.46%**	8
Hashicorp Nomad	**0.87%**	2
Cloud Foundry	**3.90%**	9
Openstack Magnum	**2.60%**	6
Amazon ECS	**12.12%**	28
Azure Container Service	**6.06%**	14
Internally developed tools	**12.12%**	28
Other (please specify)	**8.23%**	19
Total		**231**

Q13: Which infrastructure providers do you use to run container technologies? (Choose all that apply.) n=235


AWS
Azure
Google Cloud Platform
OpenStack
Rackspace
VMware
Internal data center
Don't know
Other (please specify)
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%

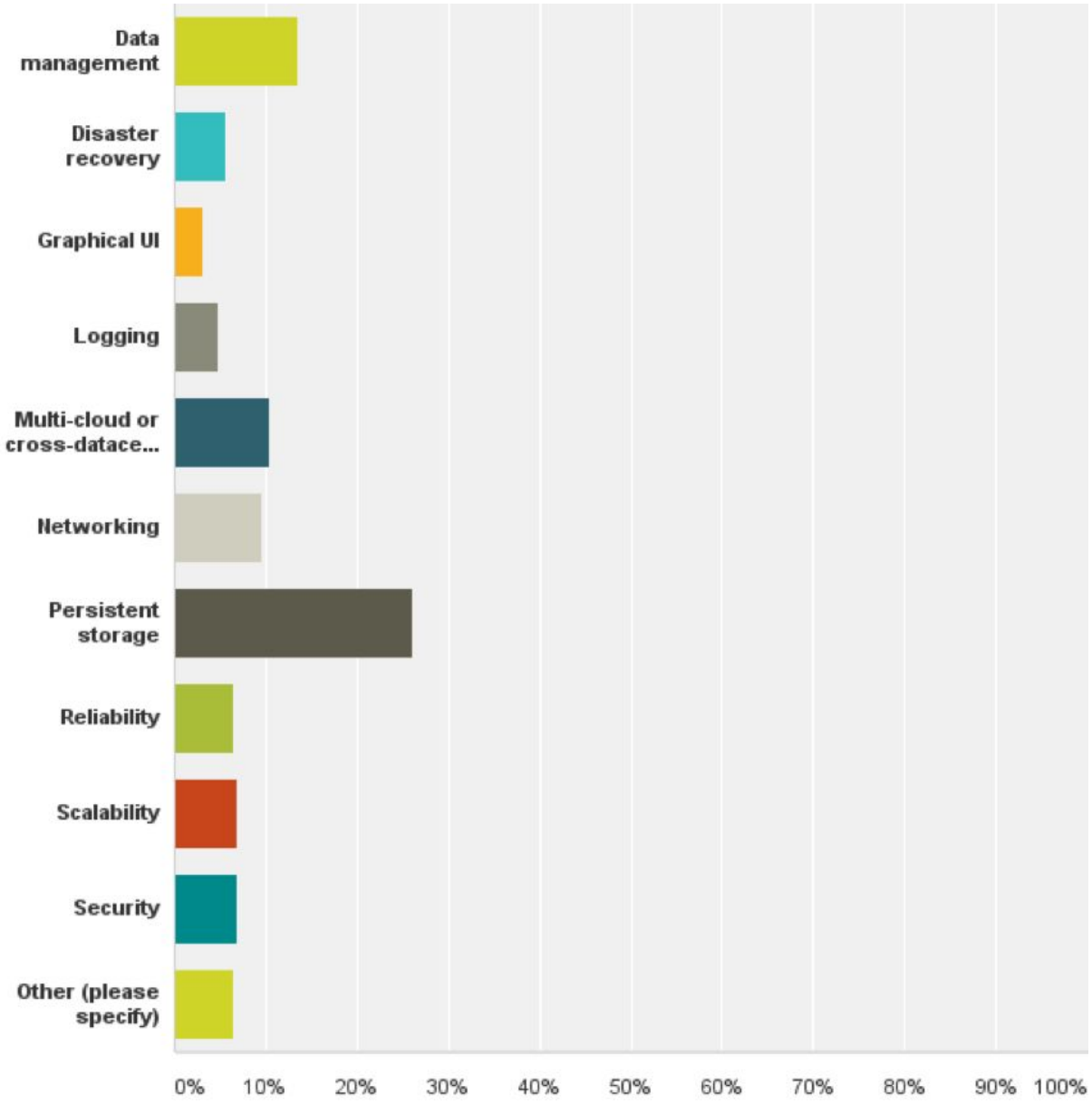
Answer Choices	Responses	
AWS	**52.34%**	123
Azure	**22.55%**	53
Google Cloud Platform	**20.00%**	47
OpenStack	**14.04%**	33
Rackspace	**3.83%**	9
VMware	**27.66%**	65
Internal data center	**42.55%**	100
Don't know	**2.13%**	5
Other (please specify)	**4.68%**	11
Total Respondents: 235		

Q14: Which applications do you plan to deploy on containers within the next year? (Choose all that apply.) n=231



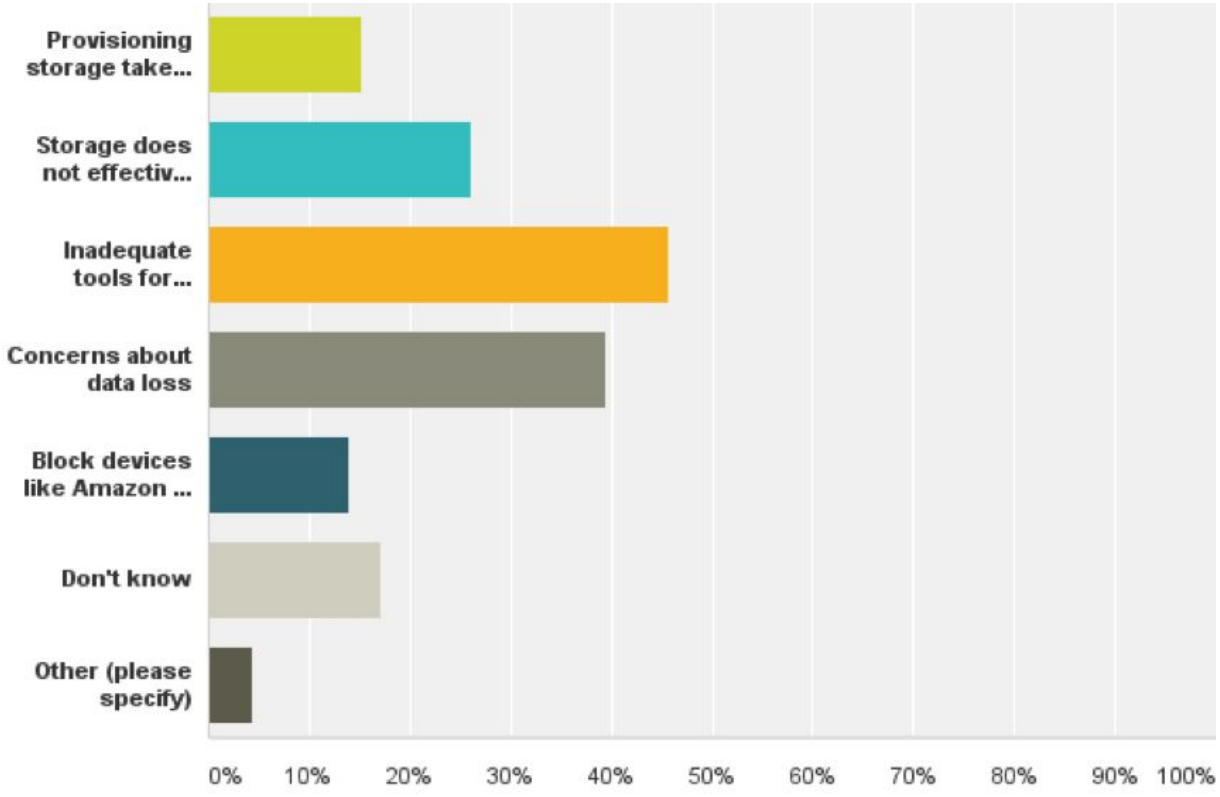
Answer Choices	Responses	
Web front ends like Nginx	**57.14%**	132
Databases like MySQL, Cassandra	**43.72%**	101
Big data workloads like Hadoop or Spark	**30.74%**	71
Batch processing jobs	**45.45%**	105
Message queues such as Kafka	**29.87%**	69
Don't know	**15.58%**	36
Other (please specify)	**6.93%**	16
Total Respondents: 231		

Q15: In order to deploy containers, which challenge has been the most difficult to overcome? (Choose one.) n=230


Data management
Disaster recovery
Graphical UI
Logging
Multi-cloud or cross-datace...
Networking
Persistent storage
Reliability
Scalability
Security
Other (please specify)
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%

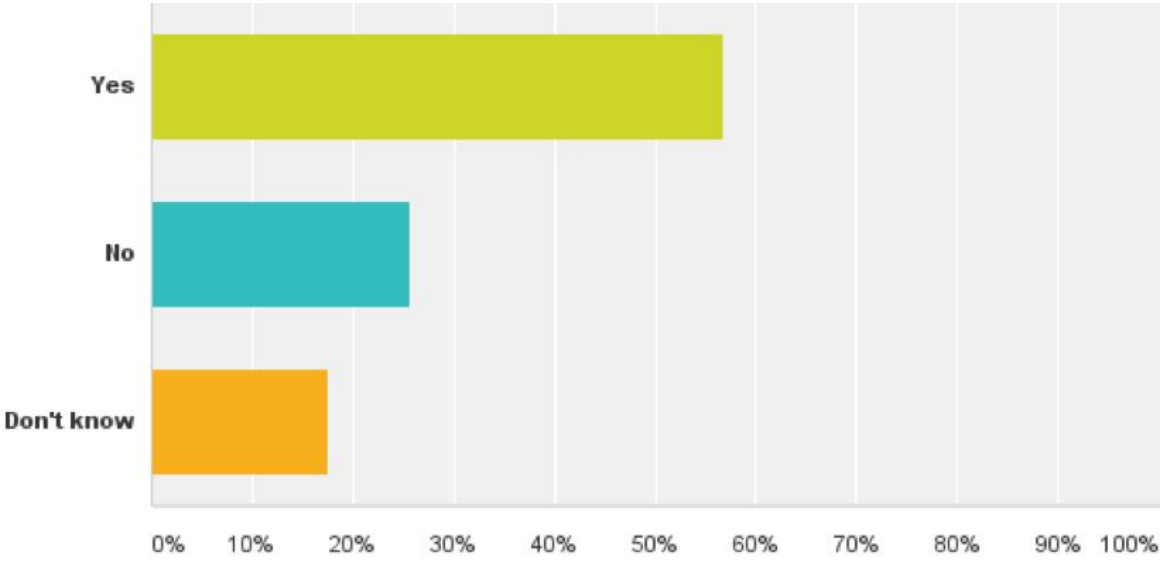
Answer Choices	Responses	
Data management	**13.48%**	31
Disaster recovery	**5.65%**	13
Graphical UI	**3.04%**	7
Logging	**4.78%**	11
Multi-cloud or cross-datacenter support	**10.43%**	24
Networking	**9.57%**	22
Persistent storage	**26.09%**	60
Reliability	**6.52%**	15
Scalability	**6.96%**	16
Security	**6.96%**	16
Other (please specify)	**6.52%**	15
Total		**230**

Q16: What storage challenges have you experienced when trying to run stateful containers? (Check all that apply.) n=223



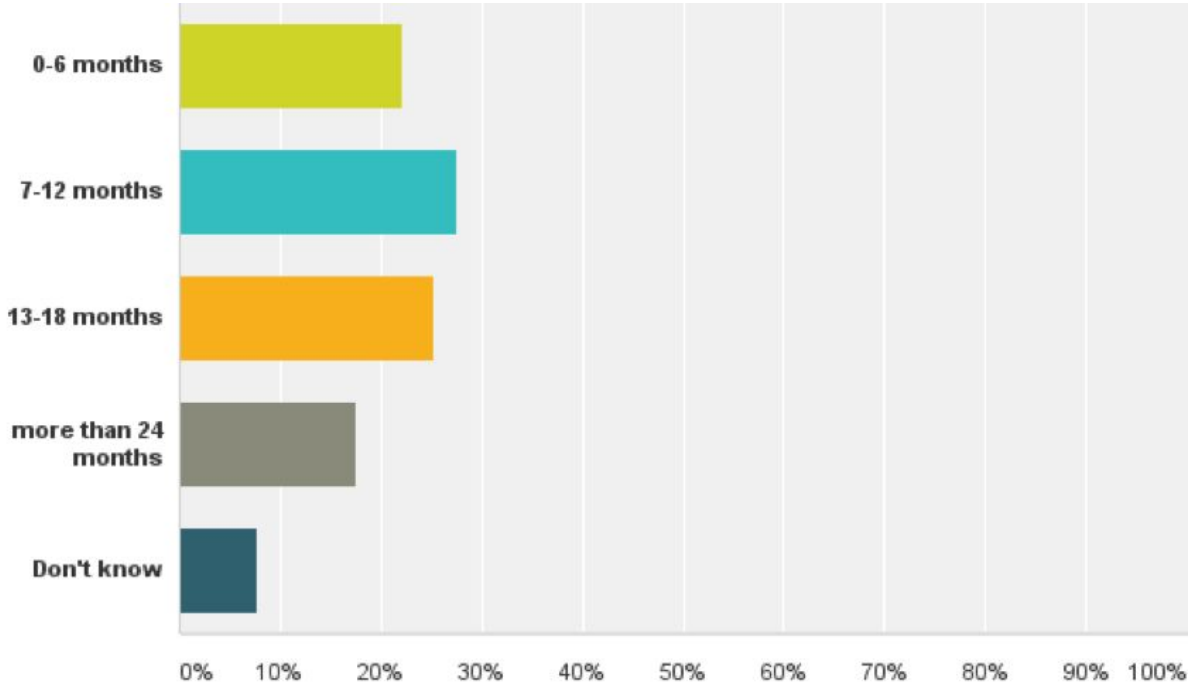
Answer Choices	Responses	
Provisioning storage takes too long due to SAN or NAS setup	**15.25%**	34
Storage does not effectively scale with the number of containers	**26.01%**	58
Inadequate tools for managing container storage	**45.74%**	102
Concerns about data loss	**39.46%**	88
Block devices like Amazon EBS are slow to mount	**13.90%**	31
Don't know	**17.04%**	38
Other (please specify)	**4.48%**	10
Total Respondents: 223		

Q17: Is your organization making a financial investment in container technologies? (Choose one.) n=229



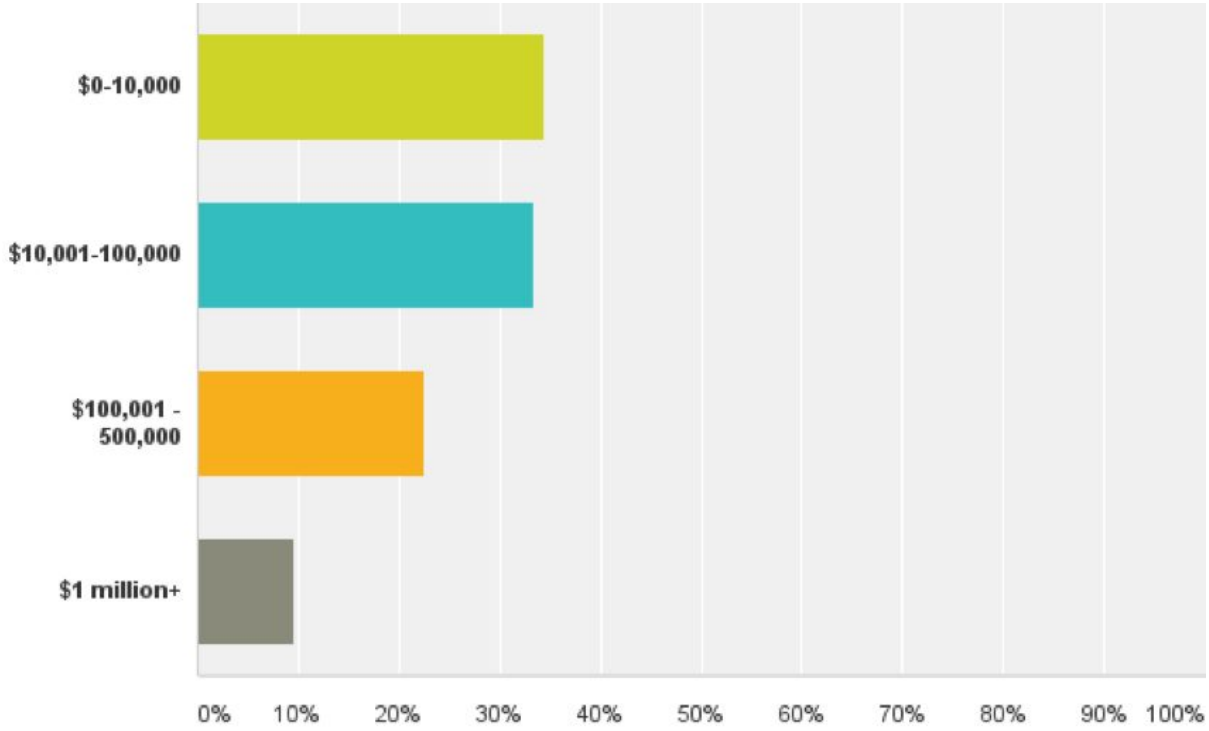
Answer Choices	Responses	
Yes	**56.77%**	130
No	**25.76%**	59
Don't know	**17.47%**	40
Total		**229**

Q18: How long has your organization been making a financial investment in container technologies? (Choose one.) n=131



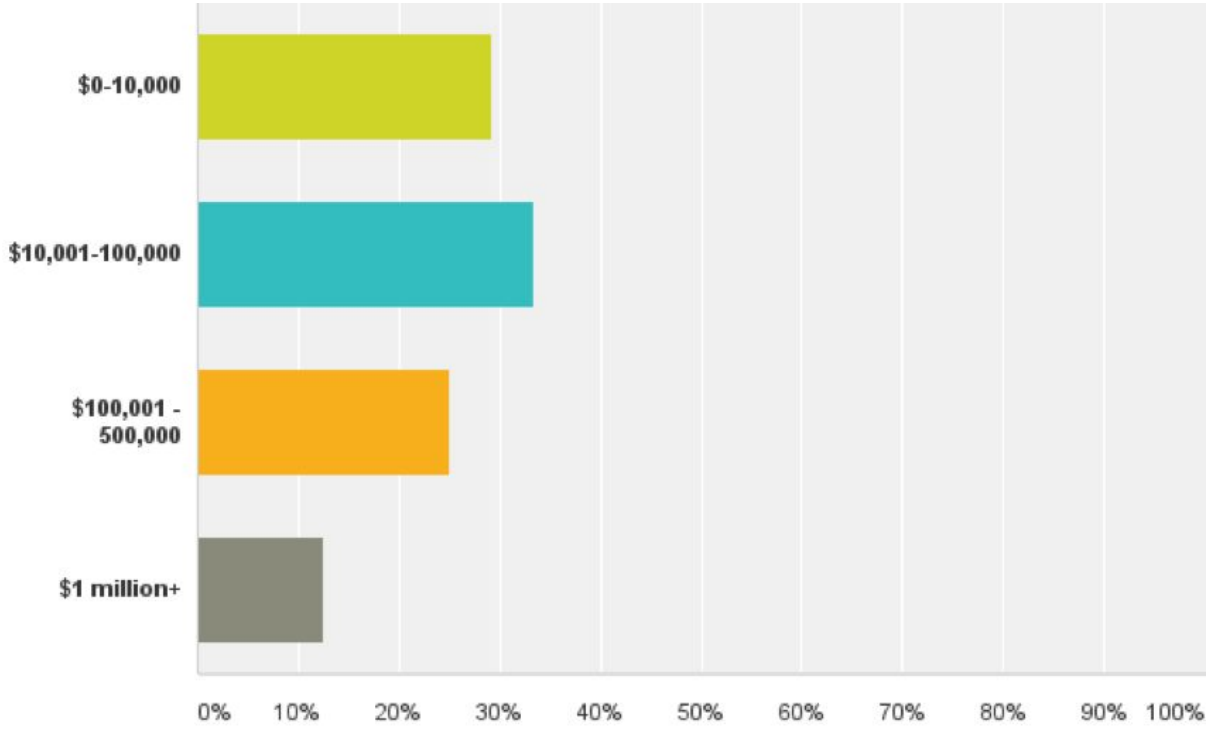
Answer Choices	Responses	
0-6 months	**22.14%**	29
7-12 months	**27.48%**	36
13-18 months	**25.19%**	33
more than 24 months	**17.56%**	23
Don't know	**7.63%**	10
Total		**131**

Q19: How much of an annual financial investment has your company made in container technology license and usage fees? (Choose one.) n=129



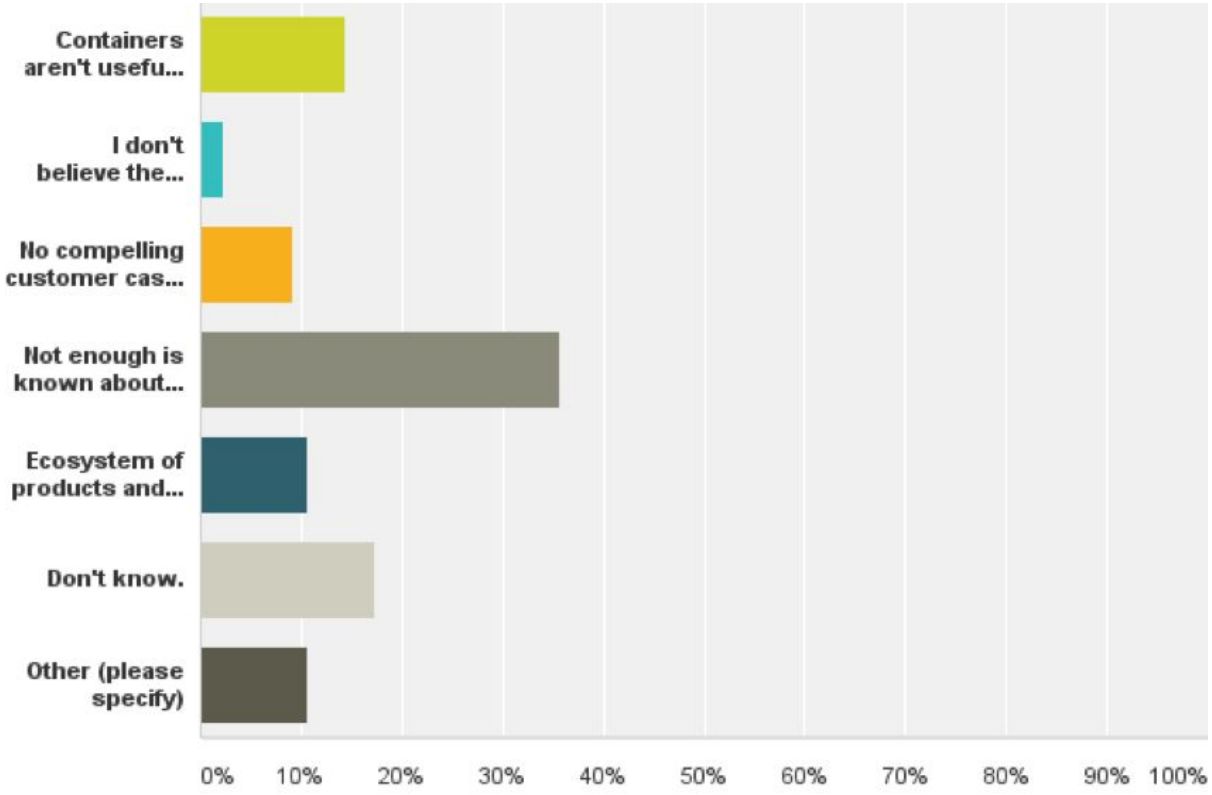
Answer Choices	Responses	
$0-10,000	**34.41%**	32
$10,001-100,000	**33.33%**	31
$100,001 - 500,000	**22.58%**	21
$1 million+	**9.68%**	9
Total		**93**

Q20: How much of an annual financial investment has your company made in personnel expenses to use container technologies?(Choose one.) n=128



Answer Choices	Responses	
$0-10,000	**29.17%**	28
$10,001-100,000	**33.33%**	32
$100,001 - 500,000	**25.00%**	24
$1 million+	**12.50%**	12
Total		**96**

Q21: What is the primary reason why your organization isn't using container technologies today? (Choose one.) n=132



Answer Choices	Responses	
Containers aren't useful for our applications.	**14.39%**	19
I don't believe the hype around containers.	**2.27%**	3
No compelling customer case studies demonstrating how containers provide benefits or ROI.	**9.09%**	12
Not enough is known about container technologies in order to invest any resources in them.	**35.61%**	47
Ecosystem of products and tools is too immature.	**10.61%**	14
Don't know.	**17.42%**	23
Other (please specify)	**10.61%**	14
Total		**132**