Where PaaS, Containers and Serverless Stand in a Multi-Platform World

CLOUD FOUNDRY

June 2018

- **A Multi-Platform World:** Technologies are today being used side by side more than ever before. IT Decision Makers report 77 percent are using or evaluating Platforms-as-a-Service (PaaS), 72 percent are using or evaluating containers and 46 percent are using or evaluating serverless computing. More than a third (39 percent) are using a combination of all three technologies together.

- **A Mix of New Cloud-Native & Refactoring Legacy Applications:** 57 percent of IT Decision Makers report their companies do a mix of building new cloud-native applications and refactoring existing applications, an increase of nine percentage points from late 2017.

- **Containers Have Crossed the Chasm:** For companies choosing to develop new or refactor existing applications, they are choosing containers.

- **Serverless is on the Upswing:** Serverless computing is being evaluated with rapid momentum. Only 43 percent of respondents are not using serverless and 10 percent more companies are evaluating serverless than in 2017.

- **PaaS Usage Continues to Swell:** PaaS is being more broadly deployed than ever before and companies are developing new cloud-native applications at increased momentum. It stands to reason that these two upsurges happen in tandem. This growth in usage is bolstered by the 62 percent of IT Decision Makers who report their companies save over $100,000 by using a PaaS.

- **Flexibility & Interoperability Are Key**: IT Decision Makers ranked "Integration with existing tools" and "Flexibility to work with new tools" in the top five attributes in a platform, alongside Security, Support, and Price.

Why flexibility and interoperability are fundamental to the developer experience for technologies today and tomorrow.

In the world of information technology, the most significant innovation has been the advent—and subsequent adoption—of the cloud. Less than six months ago, our 2017 report "Innovation & Relevance: A Crossroads on the Cloud Journey" indicated IT Decision Makers were advancing in their cloud journeys. In 2016, IT Decision Makers reported a lack of clarity around IaaS (Infrastructure-as-a-Service) and PaaS (Platform-as-a-Service) technologies, and most were still in the evaluation stages. By late 2017, they had progressed to selection and broader deployment of cloud solutions.

Our latest round of global research[1] confirms the trend that companies are using different cloud-native technologies side-by-side at an increasing pace to both build new cloud-native applications and to refactor traditional applications. As IT Decision Makers settle into their cloud journey, they are more broadly deploying a combination of available platforms, including PaaS, containers and serverless. This is a multi-platform approach.

In this multi-platform world, it should come as no surprise that, as they become more agile in the usage of these tools, IT Decision Makers are searching for a suite of technologies to function interoperably. They want technologies that integrate with their current environments in order to address their needs today—but that are flexible enough to address their needs in the future.

By choosing platforms offering maximum flexibility and easy integration, IT Decision Makers can be confident that whatever technology or culture change comes next—whether serverless, continuous integration/continuous delivery (CI/CD), or Artificial Intelligence and Machine Learning (AI/ML)— they will seamlessly integrate new innovations and deliver maximum developer productivity.

FACETS OF A MULTI-PLATFORM

39% of IT decision makers use PaaS, containers and serverless side-by-side for the flexibility they need, thanks to these cloud technologies' interoperability.

This multi-platform strategy applies to developing both new cloud-native apps and refactoring legacy apps.

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1   See Methodology at end of document.

IT Decision Makers are advancing in their cloud journeys. 57 percent of IT Decision Makers report their companies do a mix of building new cloud-native applications and refactoring existing applications, an increase of nine percentage points from late 2017. Another 20 percent report primarily building new cloud-native applications, up five percentage points, while only 13 percent say they are primarily refactoring, a drop of 11 points.

CHANGES IN ENTERPRISE APPLICATION DEVELOPMENT

57%	20%	13%
NEW CLOUD-NATIVE AND REFACTORING	NEW CLOUD-NATIVE	REFACTORING
▲ 9%	▲ 5%	▼ 11%
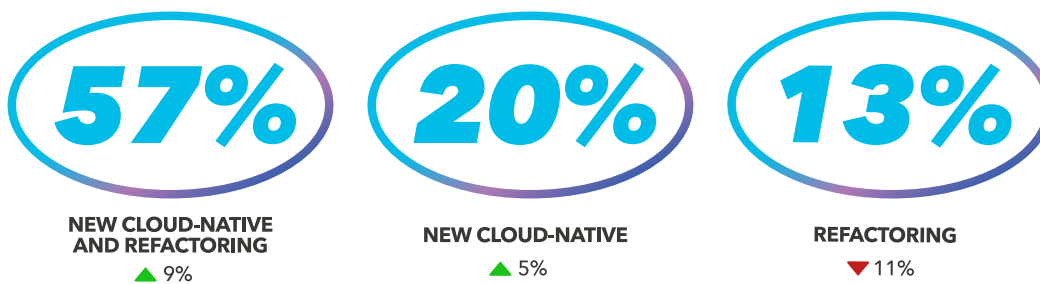
There is an increasing number of companies developing new cloud-native applications at the same time that PaaS is being broadly deployed by more companies than ever. It stands to reason that these two upsurges happen in tandem.

For companies needing a technology for building and refactoring applications, they are more frequently evaluating and adopting containers than a year ago, indicating the technology has crossed the chasm. And, despite being earlier in its trajectory, serverless computing is being evaluated with rapid momentum, on par with the velocity of container evaluation and adoption in 2016. A serverless experience for developers enables business to move faster with greater agility and decreased production cycles.

As they advance in their cloud journeys, IT Decision Makers increasingly embrace the power of different platforms to ensure their businesses take advantage of new technologies to make their developers most productive. More than a third (39 percent) of respondents are using a combination of PaaS, containers and serverless technologies together. Of respondents, 64 percent report using PaaS and containers together, 43 percent report using PaaS and serverless together, and 42 percent report using containers and serverless together.

PAAS

43%

64%

39%
OF ITDMS ARE USING
ALL THREE
TECHNOLOGIES

SERVERLESS

CONTAINERS

42%
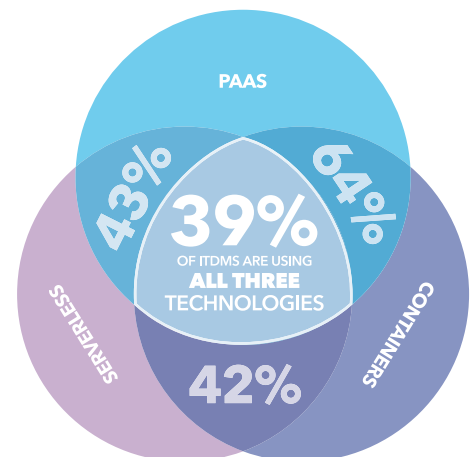
Containers Cross the Chasm

Our research shows that containers appear to have "crossed the chasm." Almost a full three-quarters of respondents (72 percent) say they are using or evaluating containers. This is an increase of five percentage points since late 2017. Perhaps more telling, the percentage of respondents "not using" containers has continued its precipitous drop since early 2016 (34 percent to 19 percent from 2016 to 2018) as more and more respondents report both evaluating (+11 percent over the same time period) and using (+8 over the same time period).
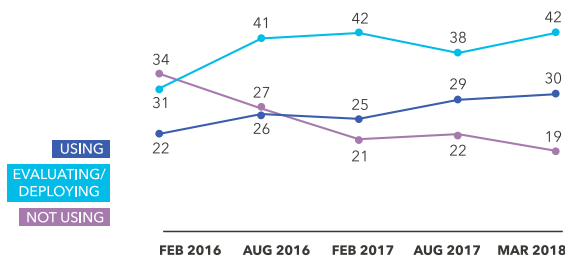
Examining our past data, we see a parallel between the current state of containers and that of PaaS a year ago. Similar to PaaS in the first half of 2017, most IT Decision Makers we spoke with were evaluating containers with a smaller number actually using containers—and roughly in the same proportion we saw before PaaS's inflection point late last year.

Furthermore, as with PaaS in late 2017, 80 percent of IT Decision Makers today report limited or early deployment of containers. As evaluators[2] became users, early deployment dropped and broad deployment rose for PaaS. We can already see these trends materializing in container deployment. Since late 2017, early container deployment dropped by 10 percentage points and broad deployment increased by six percentage points—now putting the breakdown of container deployment within the margin of error for where PaaS was in late 2017.
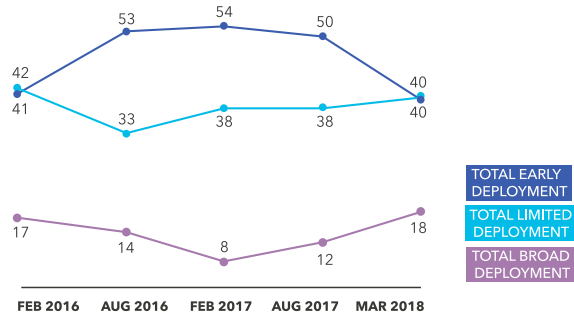
So why have containers crossed the chasm? A simple explanation is they give companies on their cloud journey a way to test out cloud-native technologies, for example building in continuous delivery practices and refactoring applications. For example, companies using containers can orchestrate them with the much-discussed Kubernetes, which IT Decision Makers rank as the top orchestration tool, overtaking Docker Swarm for the first time since we began tracking container orchestration tools.

CONTAINER DEPLOYMENT

Are you currently using or evaluating containers in your company?

USING
EVALUATING/ DEPLOYING
NOT USING

| | FEB 2016 | AUG 2016 | FEB 2017 | AUG 2017 | MAR 2018 |

How would you characterize your container deployment?

TOTAL EARLY DEPLOYMENT
TOTAL LIMITED DEPLOYMENT
TOTAL BROAD DEPLOYMENT

| | FEB 2016 | AUG 2016 | FEB 2017 | AUG 2017 | MAR 2018 |

2   Evaluators are defined as "in the process of considering or evaluating or deploying containers."

Sharp Rise in Interest for Serverless Computing

In 2017, a majority of respondents reported they were not using serverless but today, only 43 percent of respondents report not using serverless—a drop of nine percentage points. In fact, 46 percent of IT Decision Makers report using and evaluating serverless. 35 percent alone report evaluating serverless computing, a ten percentage point increase year over year.

The level of interest in evaluating serverless computing is comparable to where evaluation stood for containers in early 2016. Our tracking data of containers suggests a drop in "not using" is a leading indicator for crossing the chasm, as non-users first become evaluators and then users. It stands to reason that the same pattern will manifest itself with serverless.

46%

OF COMPANIES ARE USING AND EVALUATING SERVERLESS COMPUTING

▲ 10% FROM LAST SURVEY
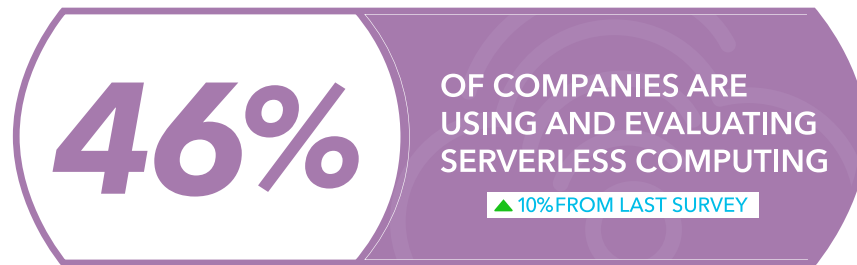
PaaS Continues to Entrench

Tracking PaaS deployment across companies shows that, over the past year, there has been a linear trend upwards in current usage and a corresponding trend downward in the process of evaluating or deploying a PaaS. In other words: More people are using PaaS now in production, rather than simply evaluating it. This indicates market maturity of PaaS, as "evaluators" become "users."
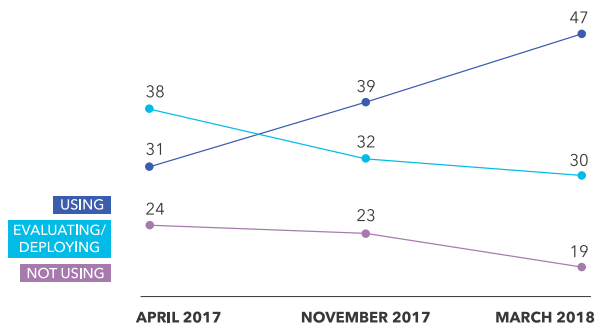
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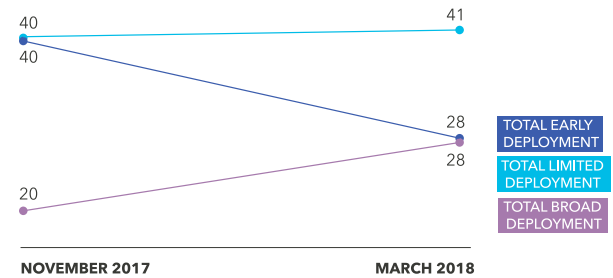
CLOUD F UNDRY

Accordingly, research shows an increase in broad deployment since late 2017, indicating that companies are expanding their deployment because they are seeing results. 62 percent of IT Decision Makers report their companies save over $100,000 by using a PaaS, an increase of eight percentage points (from 54 percent) since late 2017.

PAAS DEPLOYMENT

Are you currently using or evaluating a PaaS deployment in your company?

How would you describe your current use of PaaS(es)?

Chart 1 data (Are you currently using or evaluating a PaaS deployment in your company?):

	APRIL 2017	NOVEMBER 2017	MARCH 2018
USING	31	39	47
EVALUATING/DEPLOYING	38	32	30
NOT USING	24	23	19

Chart 2 data (How would you describe your current use of PaaS(es)?):

	NOVEMBER 2017	MARCH 2018
TOTAL EARLY DEPLOYMENT	40	41
TOTAL LIMITED DEPLOYMENT	40	28
TOTAL BROAD DEPLOYMENT	20	28

IT Decision Makers credit PaaS for providing seamless integration with their current work environments and instilling the confidence to be prepared to work with new technologies in the future. Respondents spoke with clarity about comparing, selecting and using different PaaS options—a stark difference from early research done by the Foundation in 2015 and 2016, which surfaced a nebulous understanding of PaaS and limited grasp of its features.

Flexibility and Integration Ensure Companies Maximize New Technology Platforms

As companies continue to evaluate and adopt multiple platforms, including PaaS, containers and serverless, they prioritize platform flexibility and ease of integration as necessary attributes to increase developer productivity.

> *"One of the biggest issues right now is integration. I want the best-in-breed, but it all has to work together. If it doesn't work together, we're likely to say no."*
>
> –Enterprise developer, London

CLOUD FOUNDRY

Out of a list of 18 attributes to consider when deciding to adopt a new application development platform, IT Decision Makers ranked "Integration with existing tools" and "Flexibility to work with new tools" as third and fifth, respectively. These two attributes join standard business requirements of Security, Support, and Price as the Top Five attributes IT Decision Makers look for in a platform. This means Flexibility and Integration outpace other more traditionally valued attributes like brand name, preferred vendor status, and even whether a technology is mature and established.

TOP PLATFORM ATTRIBUTES

1	2	3	4	5
91%	**83%**	**82%**	**80%**	**79%**
SECURE	GOOD SUPPORT	INTEGRATION WITH OUR EXISTING TOOLS	COMPETITIVE PRICE	FLEXIBILITY TO WORK WITH NEW TOOLS

Saves us money on new app development - - - - - **78%**
More powerful than our existing platform - - - - **76%**
Reduces total time to develop and deploy new apps - **76%**
Mature and established - - - - - - - - - - - - **70%**
Leads to new or additional revenue - - - - - - **68%**
Enterprise-grade- - - - - - - - - - - - - - **64%**
Languages supported - - - - - - - - - - - - **63%**

Preferred vendor/supplier of my company - - - - - **55%**
Brand of the technology suopplier - - - - - - - - **54%**
Open source - - - - - - - - - - - - - - - - - **51%**
Active community - - - - - - - - - - - - - - - **51%**
Large community - - - - - - - - - - - - - - - **50%**
Recommendation by my peers - - - - - - - - - - **45%**

This suggests the road to adoption requires:

• Frictionless integration of technology with a company's current process and workflow

• Flexible capabilities of tools and technologies with what is coming next

Specifically, IT Decision Makers require new technologies that integrate with their current process and environment and those technologies must be flexible enough to adapt to what's next.

"Our company talks about future-proofing. Something's interoperability controls future-proofing and whether you can interact with whatever is the next big thing."
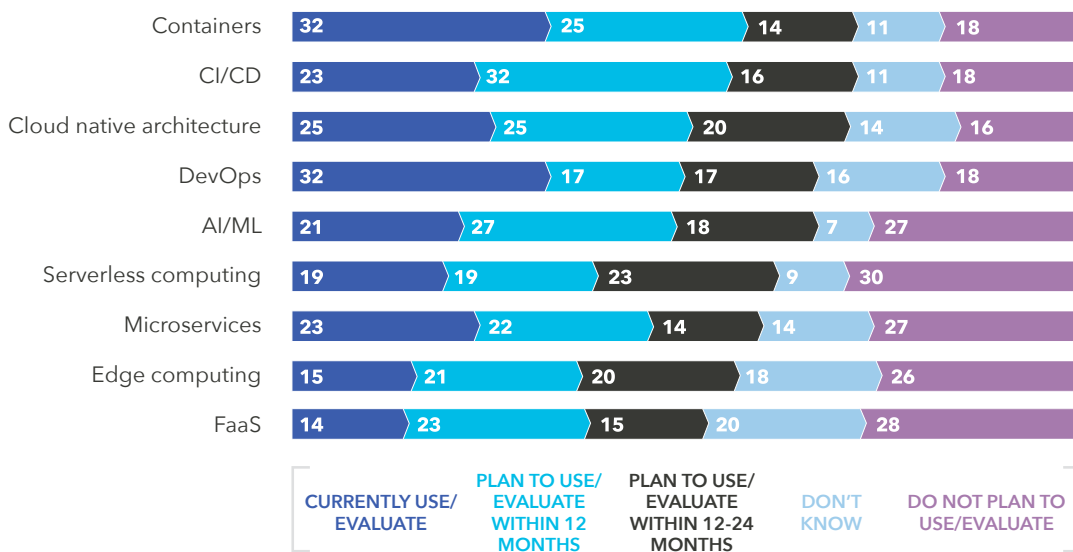
– Enterprise developer, Boston

CLOUD FUNDRY

As companies make decisions on new technologies, it is crucial to understand which are poised for wide-scale adoption—and which will fizzle as hype. IT Decision Makers need their current technology platforms to be able to integrate and work well with technologies and trends today, tomorrow, and in the near future. Here is a look at their priorities over the next one to two years:

TECHNOLOGY TRENDS

	CURRENTLY USE/ EVALUATE	PLAN TO USE/ EVALUATE WITHIN 12 MONTHS	PLAN TO USE/ EVALUATE WITHIN 12-24 MONTHS	DON'T KNOW	DO NOT PLAN TO USE/EVALUATE
Containers	32	25	14	11	18
CI/CD	23	32	16	11	18
Cloud native architecture	25	25	20	14	16
DevOps	32	17	17	16	18
AI/ML	21	27	18	7	27
Serverless computing	19	19	23	9	30
Microservices	23	22	14	14	27
Edge computing	15	21	20	18	26
FaaS	14	23	15	20	28

Containers, continuous integration/continuous delivery (CI/CD)[3], and cloud-native architecture[4] rank highest in companies' plans in the next year. This is followed by DevOps, which is currently more in use than planned, and Artificial intelligence/Machine learning (AI/ML), which is less used, but very much part of companies' future plans.

Given that some of these terms' definitions overlap or, at the very least, are understood to be similar, these results suggest the way about which certain technologies are spoken reaches market demands differently. For example, even though DevOps and CI/CD are intertwined concepts, IT Decision Makers see DevOps as culture change happening today, and CI/CD technology to support it as something they planning on incorporating within the next year.

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3   With the DevOps-centric CI/CD approach, releases are not necessarily scheduled every six or 12 months, for example, but as the software continuously evolves. Version numbers and major upgrades are often still announced, but the overall goal is to refine the software on a continuous basis. This is in contrast to the traditional "waterfall" methods of software development, in which projects move from step to step over a defined period of time. The automated flow reduces risk.
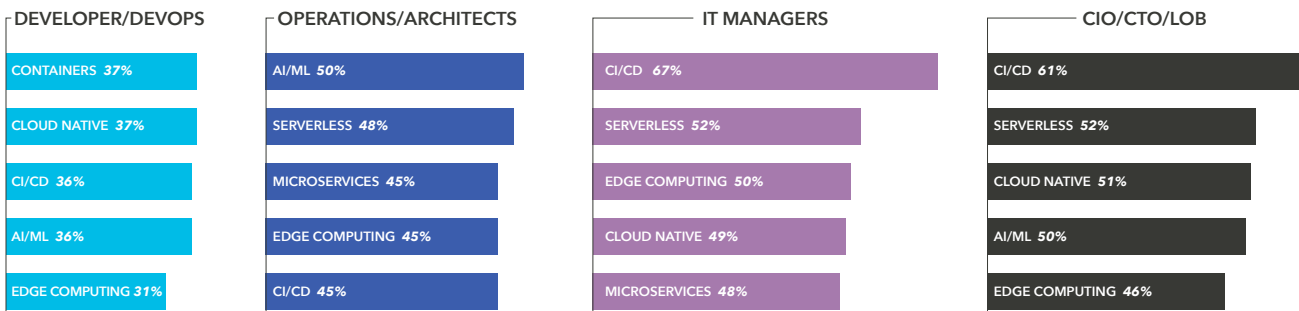
4   Cloud-native architecture is system built specifically to run in the cloud. They have more flexibility over legacy systems that were built to run on a specific hardware infrastructure.

Different technology trends matter to different companies and different IT personas who require different solutions on their cloud journeys:

- CEOs, CIOs, CTOs, Line of Business leaders, and IT Managers disproportionately see CI/CD as central to their two-year plans, suggesting a desire to change the culture and workflow for how software development and deployment occur.
- Developers/DevOps have less differentiation within their top tier of priorities.
- Ops and architects see AI/ML and serverless as a bigger part of their companies' future plans than other choices in the top tier of options.
- Mid-sized enterprise companies are focusing on cloud-native architecture and CI/CD in their future.
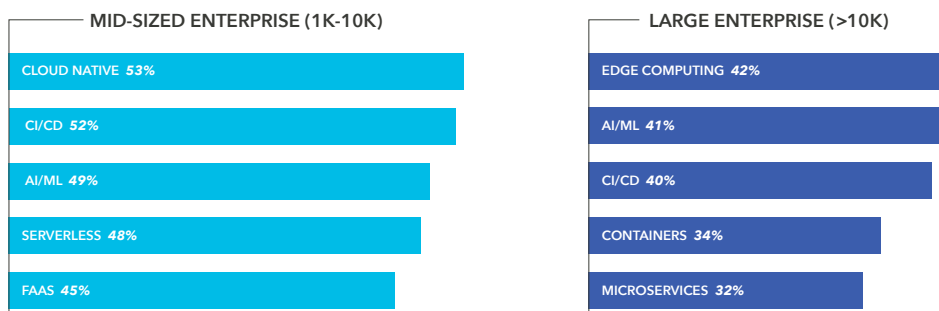- Larger enterprise are looking towards edge computing and AI/ML, in addition to CI/CD.

TECHNOLOGY TRENDS BY IT DECISION MAKER
*Which of these technologies do you plan to use in the next 12-24 months?*

DEVELOPER/DEVOPS

CONTAINERS	37%
CLOUD NATIVE	37%
CI/CD	36%
AI/ML	36%
EDGE COMPUTING	31%

OPERATIONS/ARCHITECTS

AI/ML	50%
SERVERLESS	48%
MICROSERVICES	45%
EDGE COMPUTING	45%
CI/CD	45%

IT MANAGERS

CI/CD	67%
SERVERLESS	52%
EDGE COMPUTING	50%
CLOUD NATIVE	49%
MICROSERVICES	48%

CIO/CTO/LOB

CI/CD	61%
SERVERLESS	52%
CLOUD NATIVE	51%
AI/ML	50%
EDGE COMPUTING	46%

TECHNOLOGY TRENDS BY COMPANY SIZE
Which of these technologies do you plan to use in the next 12-24 months?

MID-SIZED ENTERPRISE (1K-10K)

CLOUD NATIVE	53%
CI/CD	52%
AI/ML	49%
SERVERLESS	48%
FAAS	45%

LARGE ENTERPRISE (>10K)

EDGE COMPUTING	42%
AI/ML	41%
CI/CD	40%
CONTAINERS	34%
MICROSERVICES	32%

Conclusion

IT Decision Makers are finding their footing on their cloud journeys—and they want the most out of their options. That is why they have chosen a multi-platform approach that enables the interoperability they need today and the flexibility they need tomorrow.

Organizations are opting for a mix of building new cloud-native applications and refactoring existing applications, compelling them to choose a bespoke combination of technologies for their specific needs—whether PaaS, containers or serverless. As PaaS usage continues to swell, container usage has crossed the chasm and serverless usage begins its upswing, these technologies pave the way for the future of cloud—and the future of business.

IT'S A MULTI-PLATFORM WORLD

77% PAAS

46% SERVERLESS

72% CONTAINERS

39% OF ITDMS ARE USING **ALL THREE** TECHNOLOGIES
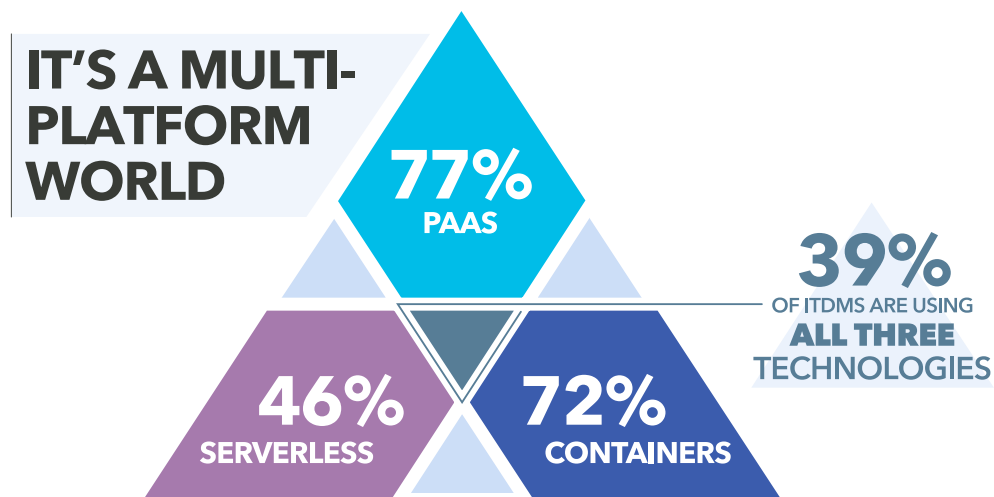
PaaS, containers and serverless computing offer three discrete options for organizations seeking digital solutions, but the possibilities don't stop there. With their ability to integrate with one another and with current technical environments, these technologies give companies the flexibility to evaluate, test and deploy a cocktail of technologies to surface the combination that meets their needs now and in the future.

Methodology Note

Since 2015, ClearPath Strategies, a strategic consulting and public opinion research firm, has conducted Cloud Foundry Foundation's Global Perception Study (GPS), a series of deep-dive research on topics critical to cloud and developers. The results in this report come from the seventh round of this global quantitative and qualitative research in that series.

The qualitative portion of the GPS consisted of six focus groups conducted in February 2018 in three locations with enterprise developers—two groups each in China, Europe, and the United States. These developers were heavily screened based on size of company (enterprise), awareness of cloud computing and specific products, and tools used.

The quantitative portion of the GPS consisted of a global survey of IT Decision Makers from March 19th to 28th. The survey consisted of 601 respondents from a leading global online panel provider. Respondents were selected from the panel provider based on geographic and role-based quotas, as well as screening questions based on role in IT, decision-making role, company size, and how long they have been in IT. Selected respondents were further screened based on self-reported IT knowledge and attentiveness to survey questions. These interviews were distributed across four major IT Decision Maker roles: Developers, Ops, IT manager and Line of Business.