Civo White Paper | 2022

The Kubernetes State of Play 2022

A Civo whitepaper looking into the challenges and opportunities of Kubernetes in 2022

Introduction

In the 12 months since we ran our first survey of how developers use Kubernetes, things have moved quickly. Cloud-native is increasingly seen as the future of our tech-driven economy. Kubernetes has led the charge here, supporting organizations to manage their containers and handle their production workloads.

Kubernetes, if you're not familiar with it, was launched just under a decade ago, and is a cloud-native and open-source system for the management of containerized applications. Containers see applications and other workloads packaged into a virtual container, which is then able to run on any OS, wherever you need – that could be in the cloud, on-premises or locally. Kubernetes comes in to manage multiple containers at once, opening the door to automated deployment and rapid scaling of workloads to meet the agile needs of today's modern developer.

I truly believe the last few years have seen a profound shift in Kubernetes's role in modern IT. Its beginnings were as an emerging tool full of potential, but largely the talk of single developers. Today it has shifted to go truly "mainstream" [1], embraced by a growing list of large enterprise organizations – joining early adopters like The New York Times, Tinder, and Airbnb. With hundreds of millions of users accessing their sites every day, these companies have embraced Kubernetes as a fundamental part of their tech stack, where it helps in offering stability and high performance for testing, development and running of new services.

As Kubernetes becomes increasingly integrated across IT environments, organizations are growing more ambitious in how they use the technology, building on established use cases like infrastructure management and microservices into new and ambitious fields like machine learning and edge computing.

Is Kubernetes ready for this new era? What obstacles still lie in the way that risk slowing growth?

Our new report 'Kubernetes State of Play 2022' sought to answer these questions and more. We spoke to 1,000 cloud developers about how they were using Kubernetes across their operations, the challenges they were seeing, and the evolving use cases they saw for the technology in the years to come.

The results reveal a picture of Kubernetes going truly mainstream. They also point to sobering truths where more still needs to be done in our industry, especially on areas like education and security. Only when these problems are addressed will Kubernetes achieve the full potential it offers to today's cloud native world.

I hope you enjoy reading this year's Kubernetes survey and if you would like to discuss it in more detail, feel free to get in touch.

Mark Boost, CEO & Co-founder of Civo

[1] CNCF Annual Survey 2021: https://www.cncf.io/reports/cncf-annual-survey-2021

Kubernetes continues to grow

Last year's report came out in the peak days of the COVID-19 pandemic. Businesses had undergone a once-in-a-generation process of digitisation and uptake of technology across society. The cloud had particularly captured the attention of the market, with firms embracing it as a flexible and agile way to rapidly scale up the capacity of their IT infrastructure.

A year on, we have settled into a new normal of hybrid IT. Recent research from Gartner found that by 2025, 40% of Infrastructure & Operations leaders will implement at least one hybrid cloud storage architecture, up from 15% in 2021.[2] Organizations are looking to complement their cloud strategies with a presence in the secure and reliable locations offered by on-premises infrastructure.

Containers are tailor-made for this world of hybrid IT, with Kubernetes enabling easy portability between cloud and on premises environments.

In our survey of 1,000 cloud developers, we found that 51% respondents are now using Kubernetes and/or containers in their operations. That's up from 49% in last year's report.

Kubernetes is offering firms a platform for testing, development and scaling their workloads across any environment. Our research revealed businesses turning to Kubernetes in local environments like on-premises (35%) and data centers (27%), almost as much as public cloud (39%) or private cloud (28%).

Our research aligns with a big picture of increasing adoption across the industry. Cloud Native Computing Forum (CNCF) research highlights that 5.6 million developers are using Kubernetes today. There has been significant growth in enterprise adoption: CNCF's latest data found that respondents from organizations larger than 5,000 employees are "far more likely to use Kubernetes than those working at smaller organizations".[3]

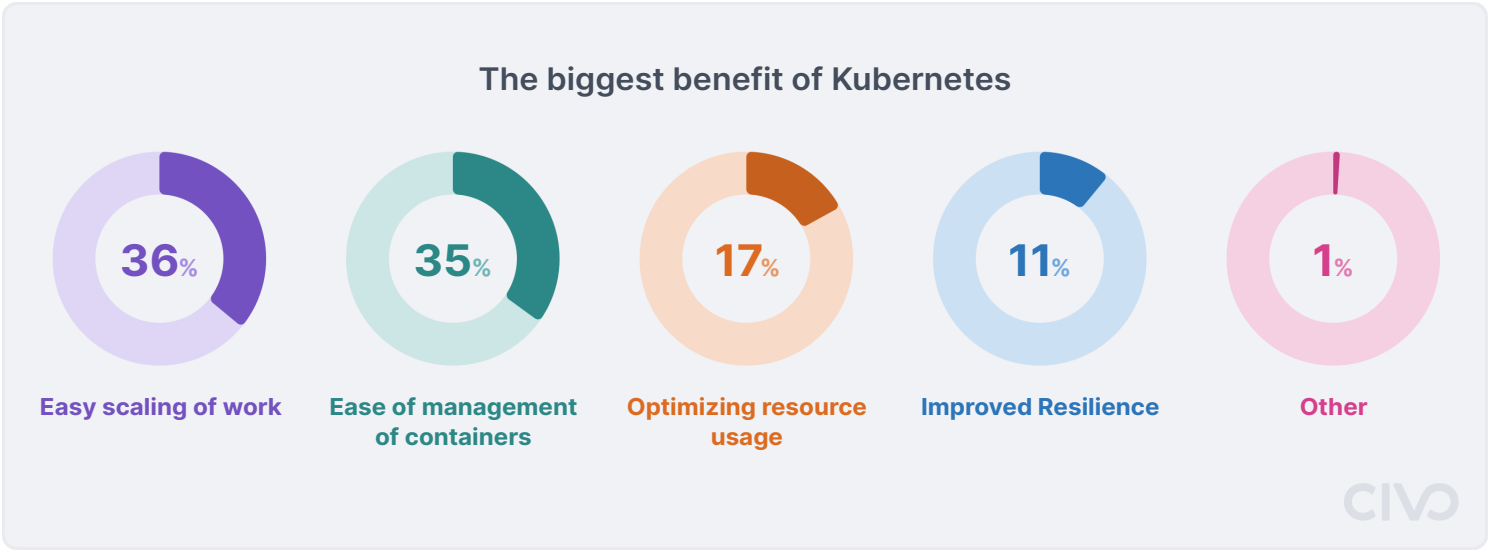
Across the last 12 months, Civo research highlighted that 57% respondents have seen an increase in the number of Kubernetes clusters their organization is running. This builds on significant rises the year before as well. This trend is rising, and fast. In fact, the majority saw up to a 25% rise in the number of Kubernetes clusters they were running.

[2] Gartner's Market Guide for Hybrid Cloud Storage 2021: https://www.gartner.com/document/4001209?ref=solrAll&refval=340962715

[3] CNCF Annual Survey 2021: https://www.cncf.io/reports/cncf-annual-survey-2021/

Kubernetes continues to grow

This is being driven by growing awareness of the benefits Kubernetes offers to organizations. When we asked developers about the biggest benefit of Kubernetes:



There were notable changes from last year's report on this question. The biggest shift was in respondents who said optimizing resource usage was the biggest benefit of Kubernetes, rising from 14% (2021) to 17% (2022). By comparison, ease of scaling saw a fall in respondents backing it as the biggest benefit, dropping from 41% (2021) to 36% (2022).

What's clearly appealing to respondents too is the flexibility that Kubernetes offers. Kubernetes opens the door to companies without gigantic tech budgets to adapt and scale at speed, and to compete more efficiently. Businesses need to evolve and even pivot with the bare minimum of friction now have that option, harnessing the benefits of cloud with necessary security for peace of mind. What's more, there tends to be cost savings involved too, and few organizations are going to resist those.

Obstacles facing Kubernetes

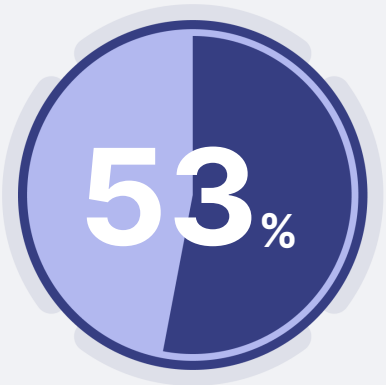
When discussing Kubernetes it is important to always be realistic. As an industry, it is far too easy for us to talk amongst ourselves to the 'converted', making the case for Kubernetes without considering the obstacles that still lie in the way of wider adoption.

It'd be remiss not to acknowledge that there's some degree of nervousness from organizations thinking of making the move to Kubernetes. As the technology develops and advances, there is a risk of its complexity leaving users behind. Last year, we reported that 47% of IT professionals viewed complexity around Kubernetes as slowing their use of containers. In 2022, that figure hit 54%.

Failure to handle this complexity can leave organizations vulnerable. A majority (53%) of developers told Civo they were concerned about the security of Kubernetes. Crucially, just over 50% of developers said misconfigurations or exposures were driving their concerns around Kubernetes security.

It is essential here to follow Kubernetes security best practice. Examples of security fundamentals here include ensuring Kubernetes endpoints are password protected (failure to do so led to a notable breach at Tesla) and configuring ports to not make them publicly accessible.[4]

There is a bigger picture at play here of anxiety with the fundamentals of Kubernetes technology. Our research found that 66% developers are worried about the security consequences created by Kubernetes vulnerabilities. Thankfully, the industry is engaged in a concerted effort to keep Kubernetes safe for everyone. Developers are being mobilized to spot and flag any Kubernetes vulnerabilities – Google upped its fees in November 2021 for security researchers to identify flaws in Kubernetes running on the Linux kernel.[5] In the US, Congress this year looks set to pass the Open Source Software Security Act to create an industry-wide approach to tackling vulnerabilities connected to open-source software like Kubernetes.[6]



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[4] Bleepingcomputer.com (2022): https://www.bleepingcomputer.com/news/security/over-900-000-kubernetes-instances-found-exposed-online

[5] Hackernews.com (2021): https://thehackernews.com/2021/11/google-to-pay-hackers-31337-for.html

[6] Washingtonpost.com (2022): https://www.washingtonpost.com/politics/2022/09/22/senators-introduce-bill-protect-open-source-software/

Obstacles facing Kubernetes

These actions to address security concerns are important first steps, and will be crucial to win the trust of the technology community at large.

This year's research found plenty of cause for optimism on one of the biggest concerns in the Kubernetes industry: staff knowledge and training.

Staff knowledge/learning curve undoubtedly remains the biggest challenge today for using Kubernetes – 51% said it was their foremost issue. Yet compare that to last year, where the figure then stood at 57%. There is a tentative sign of progress.

There are a few reasons behind this change. When teams get hands-on with Kubernetes, it gives them a chance to learn practical uses of the technology and build up their knowledge. This experience (complemented by training opportunities created by the business) builds confidence amongst employees, equips them to start experimenting and innovating with the technology, and ultimately, overcome the lingering anxiety about embracing Kubernetes.

Looking forward, businesses need a talent strategy for Kubernetes that nurtures potential and provides staff with the education they need to get going. Tech professionals are clear-eyed on what needs to be done: 84% backed the industry doing more to support Kubernetes education and skills development.

The road will not be easy. Seventy-seven percent of respondents said they are experiencing a significant shortage of Kubernetes talent. But there are plenty of new approaches here. The old model of putting qualifications first is increasingly seen as outdated, with 63% firms telling us that real world experience with Kubernetes is more important when vetting a candidate than a qualification in the field.

The imperative now is moving the dial across the board, streamlining complexities with the platform and building the experience and skills of IT professionals to make the most of all that Kubernetes has to offer to modern IT.

New frontiers for Kubernetes: ‘disappearing under the hood’

In the recent CNCF annual report, it described a new trend of Kubernetes ‘disappearing under the hood’.[7] The phrase hints at Kubernetes shifting from its initial phase as a technology for testing and discovery at organizations, to something that was becoming an inexorable part of the operations of an organization’s entire stack.

Our research found that 48% of developers said they were using containers in production environments, compared to 50% using them in development environments.

More businesses are opting to run production workloads in containers. We have seen a steady increase on last year’s report, where 81% of firms were running up to three-quarters of their production workloads on containers – this has risen to 83% in this year’s research.

Gartner expects this trend to continue. By 2027, they predict that more than 90% global organizations will be running workloads as containerised applications.[8]

Kubernetes now has a well-established place in organizations’ infrastructure. When we asked developers, 86% told us they foresaw the role of Kubernetes in their infrastructure management growing in the years ahead. It’s a job for which it’s very well suited.

After all, Kubernetes is the salient solution for the way many organizations now choose to work. It comfortably straddles traditional on-premises infrastructure, cloud workloads, and hybrid solutions. Furthermore, Kubernetes clusters flexibly, quickly, and automatically get on with their work. They handle the computing side of operations, they network those operations together, and make it accessible whenever and wherever it’s needed.

[7] CNCF Annual Survey 2021: https://www.cncf.io/reports/cncf-annual-survey-2021/

[8] Gartner.com: https://www.gartner.com/document/4015168?ref=solrAll&refval=340987051

New frontiers for Kubernetes: ‘disappearing under the hood’

Our research also identified the use cases of Kubernetes that are capturing the attention of organizations. Here are the top 5:

Top 5 use cases of Kubernetes that are capturing the attention of organizations

1. **App deployment**
   The speed and scale of deployment means users get the benefits of evolving apps as efficiently and securely as possible.
2. **Microservices**
   Once applications have been broken into small independent services, Kubernetes helps organizations to launch and manage these microservices at scale.
3. **Machine Learning**
   Developers are increasingly being drawn to Kubernetes as an accessible way to rapidly tap into the benefit of machine learning and shape it to closely match the needs of an organization.
4. **Heavy computing**
   The big draw for developers here has been the promise of Kubernetes clusters taking on the work of the traditional mainframe in a far more cost-efficient manner.
5. **CI/CD**
   This methodology of rapid app deployment is a natural fit for Kubernetes, helping automate and streamline the journey of code from testing to deployment.

The maturity and complexity of these use cases in an organization’s tech stack is only set to grow in the years ahead. Currently, 63% developers told Civo that ‘internal or customer enterprise applications’ was the primary workload type running in containers, compared to 37% using it for customer-facing apps/web pages.

Managing costs and the Big Three

The successful growth of any technology relies on managing the costs. Kubernetes is no different. We found that 47% developers have seen an increase in their year-on-year spend on Kubernetes clusters. Of this group, the majority saw a rise of up to 25% in year-on-year spend – a significant group (10%) had seen more than a 50% rise in year-on-year spend.

Understanding this trend is vital for the future of Kubernetes technology. In part it reflects growing use of the technology, with organizations scaling up the number of clusters they are running in their operations.

That explanation, however, is not entirely satisfactory. Our research found that the number of users who use one of the Big Three of AWS, Azure or Google Cloud as their main cloud provider has increased: 68% (2021) and 72% (2022).

Cloud technology is integral to Kubernetes in 2022. Many organizations rely on the cloud for running containers, scaling up their operations at pace and connecting with users anywhere around the world. And it is an unavoidable reality that the charges levied by the hyperscale cloud providers are only going in one direction – ever upwards.

Today the hyperscalers of AWS, Azure & Google Cloud are hitting record profits. AWS recently reported record profits of nearly $25 billion for the full year 2021, and an operating margin of 29.8% in Q4 2021.

Customers aren't feeling the benefits of any economies of scale from the hyperscalers, and this is damaging the bottom line for many businesses. Our cloud cost whitepaper found that over three-quarters (76%) of IT teams from companies with 1000+ employees reported increased cloud costs.

Civo's research revealed that enterprise cloud spend has risen by 93% on average in the past year. Enterprise developers now report their organization is spending $49,600 per month on average on cloud deployments.[9]

When we then add in the overly complex and opaque pricing practices from the Big Three, it results in customers being unable to work out how much they are going to be charged across the year. The loss of that predictability can be devastating, particularly in the current challenging economic climate.

Getting these costs under control, and focusing on a predictable, fair and transparent approach to pricing will be essential to support the continued growth of Kubernetes in the months and years ahead.

[9] Civo - The Cost Of Cloud White paper: https://www.civo.com/the-cost-of-cloud

Conclusion

There's a resounding message that comes through in our 2022 survey: that it's been a year of growth and expansion for Kubernetes. We're seeing more and more users and organizations deploying it, and while concerns remain over its complexity, staff familiarity has clearly increased too. Given that the overriding majority of organizations are looking to increase their Kubernetes deployment, the lessening skills gap – though still a concern – is encouraging.

It's not just the broader use of Kubernetes that's on the increase as well, but what it's been used for. We're now seeing that its deployment is going ever-deeper. It's increasingly trusted with the streamlined management of an organization's infrastructure, and rapidly moving up the stack into more mature functions – driving innovation across the enterprise.

At Civo, we are committed to seeing Kubernetes realize its potential in today's cloud-native world. Indeed, it was fantastic to see this year that use of Civo Kubernetes has doubled on last year's research.

Far from a peripheral technology restricted to Proof of Concepts and test environments, we see a role for Kubernetes in helping businesses easily manage workloads across complex hybrid IT infrastructure and rapidly scale up deployments across the board.

Developers do not want complexity slowing them down when using Kubernetes. That is why at Civo we have doubled down on simplifying the developer experience, and combined that with blazing fast cluster launch times of under 90 seconds. In so doing, we are committed to giving developers everything they need to focus on innovation and less on managing infrastructure.

More than that, I am particularly passionate about the change we need to see in our industry. We cannot go on with a situation where so much in the tech sector is reliant on just a handful of companies. This creates an unsustainable situation where should the worst happen and one of these providers has a prolonged issue, it could severely impact businesses and consumers alike, having a knock-on effect to the world economy.

Users are being overwhelmed with a steady stream of new services and solutions that hyperscale providers are continually releasing, ensuring expenses continue to ratchet up. Today's developers want a service that can act as a platform for innovation, allowing them to move quickly to match today's fast-paced digital economy.

The old saying of 'Nobody Gets Fired For Buying IBM' often applies to how IT teams view the Big Three today. We need a world where providers are judged on things like transparent pricing, customer service and performance, not on their name.

I firmly believe that Civo is leading the charge in shaking up an industry dominated by just a few.

I look forward to working with the amazing team at Civo and all our partners in the developer community to make this fairer and more equitable cloud-native world a reality.

Mark Boost, CEO & Co-founder of Civo

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