The Kubernetes State of Play

A Civo whitepaper looking into the challeneges and opportunities of Kubernetes in 2021

Computing infrastructure has come a long way since the early days of IT teams running their own expensive, dedicated, and invariably underutilised server hardware.

Virtualization was a big step towards allowing applications to securely share the same hardware and more efficiently use resources – especially when it came to private and public clouds - but it comes with a significant overhead of requiring multiple operating systems to run.

Containerization was the next logical step – it strips out the requirement for multiple operating systems by isolating user space instances at the kernel level allowing them to share resources securely. It has a further - and some would say bigger - benefit too. By packaging an application and its dependencies in a virtual container, it can run on any operating system on any location – in the cloud, on-premises, or locally. This portability between different clouds and platforms makes it a truly write once, run anywhere solution.

The principles behind containerization have been around for decades but it was only with the launch of Docker in 2013 and Kubernetes in 2015 that it really took hold.

Docker Engine is the software that hosts containers and Kubernetes is the software that manages ("orchestrates") multiple containers to allow for automated scaling and deployment. Although there are competitors to Docker and Kubernetes, as of today they are the gold standard for the majority of workloads.

Since its first release, Kubernetes has evolved into a reliable workhorse for larger enterprises to manage their containers and handle their production workloads.

Businesses increasingly recognise Kubernetes as a solution that can easily scale to support growth. Huge global firms like The New York Times, Tinder, and Airbnb have turned to Kubernetes to support their tech stack. These are businesses attracting hundreds of millions of users every month, and each one knows Kubernetes provides them with a stable and high-perfomance solution to test, develop and run the exciting new services demanded by users.

But these are not reasons for complacency. In our increasingly cloud-native world, Kubernetes needs to continue to evolve and grow to ensure it is serving the needs of modern developers. At Civo, we are always led by our community. In that light, we recently surveyed 1,000 cloud developers about their opinions on Kubernetes and containers. These results point to the value of this technology in the enterprise, obstacles to growth, and crucially, gives us some clues about where our industry goes next.

I hope you find the research enlightening, and if you would like to learn more about Kubernetes and its opportunities for your business – my door is always open!

Mark Boost , CEO & Co-founder of Civo

Even in the relatively short lifespan of Kubernetes so far, IT infrastructure has evolved dramatically. We have witnessed cloud become the backbone of modern IT, providing the capacity for businesses to rapidly run workloads with a flexibility and scale many firms would struggle to achieve with on-premises infrastructure.

The COVID-19 pandemic accelerated this process to an unprecedented degree. According to Flexera's 2021 State of the Cloud Report[1], 90% firms saw their cloud usage slightly or significantly increase during the pandemic.

This leaves many businesses pursuing a hybrid infrastructure strategy, with workloads spread across cloud, private data centres, and on-premises locations.

During the survey of our 1,000 strong IT professional community, we found the largest proportion, 44%, are hosting services in the public cloud, while a third use on premise solutions and 22% rely on outside data centres.

Respondents were also asked what other equipment and software they use to handle workloads. 38% professionals are still running services through more traditional bare-metal servers. However, more firms seem to be embracing virtualization strategies to run their services in a more efficient manner. 80% of respondents said they are running virtual servers, to allow apps to share the same server securely.

22% RELY ON OUTSIDE DATA CENTRES.

44% ARE HOSTING SERVICES IN THE PUBLIC CLOUD

34% RELY ON OUTSIDE DATA CENTRES.

Based on 1,000 surveyed IT professionals
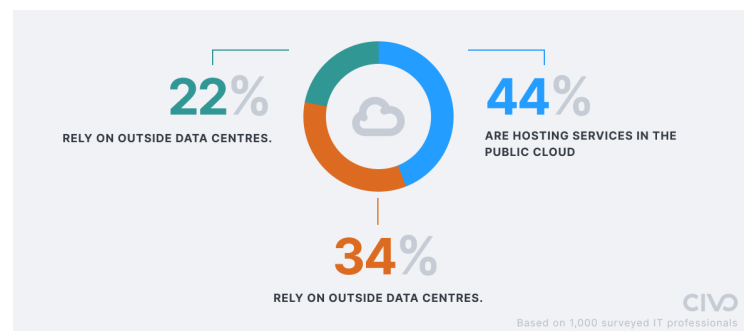
A growing segment of the industry is going a step further. Almost half of respondents (49%) are currently using containers and/or Kubernetes in their operations.Nearly half of those using containers are deploying the technology for either development and testing or production, while over half (54%) use it for both.

Research from the Cloud Native Computing Foundations (CNCF) supports our findings. In 2016, when the organization first started surveying developers, just 23% were using containerization in production. This proportion leaped to 92% by 2020.[2]

This appetite to spread containerization from testing deployments into service production means that over a third (36%) of organizations are using the technology for more than half of their workload. Initial interest is clearly giving away to containers being firmly bedded into the long-term planning of firms. Indeed, almost two-thirds (63%) of respondents using containers have been using them for more than a year.

1 https://info.flexera.com/CM-REPORT-State-of-the-Cloud

2 https://www.cncf.io/wp-content/uploads/2020/11/CNCF_Survey_Report_2020.pdf
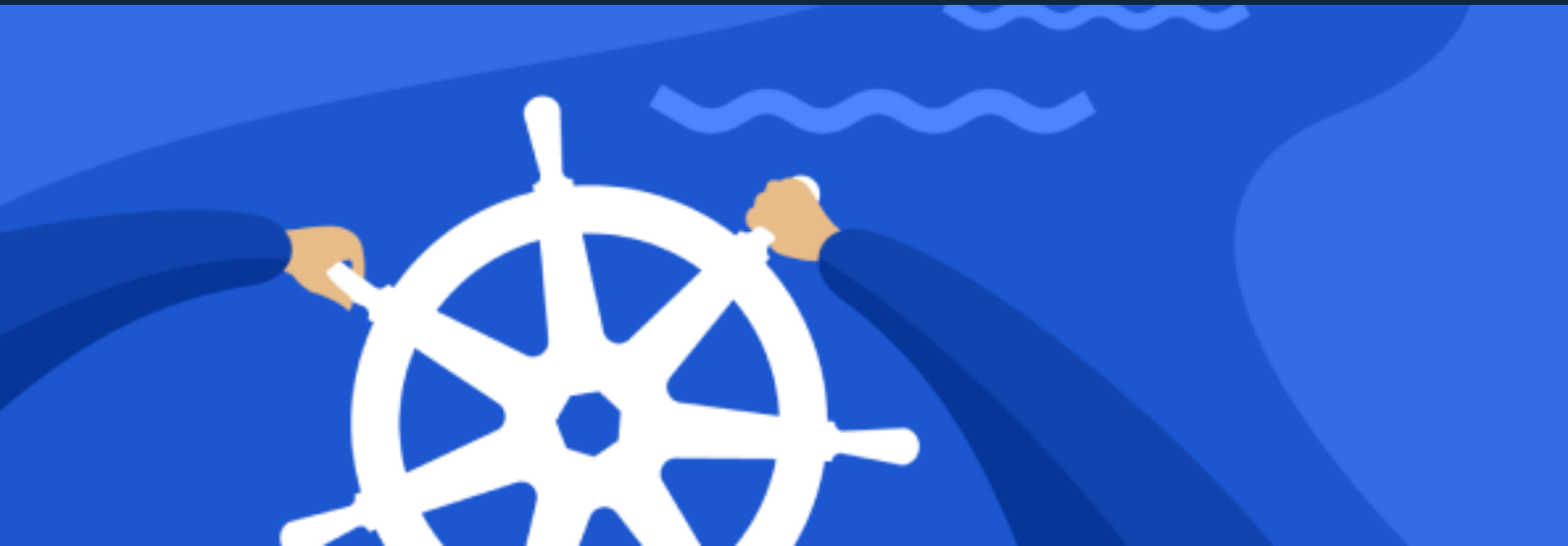
Organizations have been quick to realise the benefits of the container approach to rolling out infrastructure. Developers are leading the charge here, innovating and testing how Kubernetes can be best used to manage their containers across a range of environments.

Kubernetes is popular for autoscaling workloads both in stateless applications:

- 71%, which rely on the client's device to store data, and stateful applications
- 55% where the server holds session data.

Clearly, the ability for Kubernetes to flex capacity up and down automatically, according to demand, without interfering with other applications using shared resources is the key driver.[3]

Both pieces of research highlight how containerization empowers organisers to get the most from their resources, allowing flexible infrastructures to scale on demand.

Flexibility being the key to the future of Kubernetes. Many in the industry are excited about the possibilities of Kubernetes supporting the shift towards multi-cloud infrastructure. To achieve this goal, there is an important collective effort underway to remove integration barriers, and help Kubernetes to become a truly portable, platform-agnostic tool – able to help firms deploy and manage clusters across multiple cloud environments.[4]

CLOUD NATIVE
COMPUTING FOUNDATION

> DEVELOPERS ARE LEADING THE CHARGE HERE, INNOVATING AND TESTING HOW KUBERNETES CAN BE BEST USED TO MANAGE THEIR CONTAINERS ACROSS A RANGE OF ENVIRONMENTS

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[3] https://www.cncf.io/wp-content/uploads/2020/11/CNCF_Survey_Report_2020.pdf

[4] https://kubernetes.io/blog/2019/04/17/the-future-of-cloud-providers-in-kubernetes/

There are, of course, challenges in adapting to Kubernetes. Any IT professional will know the benefits are huge but it is a whole new way of approaching development, with its own buzz terms and new methodologies which provide a very steep learning curve.

Our research makes clear that it is far from straightforward for enterprises to realise the benefits of Kubernetes. A majority (57%) of cloud developers pointed to the steep learning curve/issues with staff knowledge as their top challenge when working with Kubernetes.

Developers rely on minimal wasted time to ensure the testing and running of applications can proceed with minimal interruption for the end-user. It is a concern, therefore, that 41% cloud developers told Civo that they are slightly frustrated or very frustrated by the time it takes to spin up a working cluster.

Container orchestration through Kubernetes is an invaluable way for IT teams to automate provision, deployment, scaling, networking and load balancing across multiple containers. It also allows teams to deploy the same app across different environments without having to be totally redesigned.
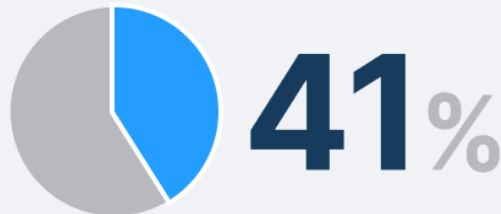
41%

OF CLOUD DEVELOPERS TOLD CIVO THAT THEY ARE SLIGHTLY FRUSTRATED OR VERY FRUSTRATED BY THE TIME IT TAKES TO SPIN UP A WORKING CLUSTER.

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Based on 1,000 surveyed IT professionals

The trouble is, nearly half of IT professionals, 47%, are reporting back to Civo that complexity around using Kubernetes is holding back their company's use of containers. It is undeniable that Kubernetes is complex and requires new ways of working which IT teams have not always adopted across the board. It is also layer-based, meaning a change to one container will often mean another will need updating, and that can be time consuming.

Crucially, there is a message of optimism from our research. Our research asked IT professionals what they would like to see to encourage greater use of Kubernetes. The resounding answer was 85% would be more inclined to use the technology, or use it more, if adopting the platform was easier. There is clearly an opportunity for significant growth for Kubernetes and containers when these lingering issues with complexity and accessibility are addressed.
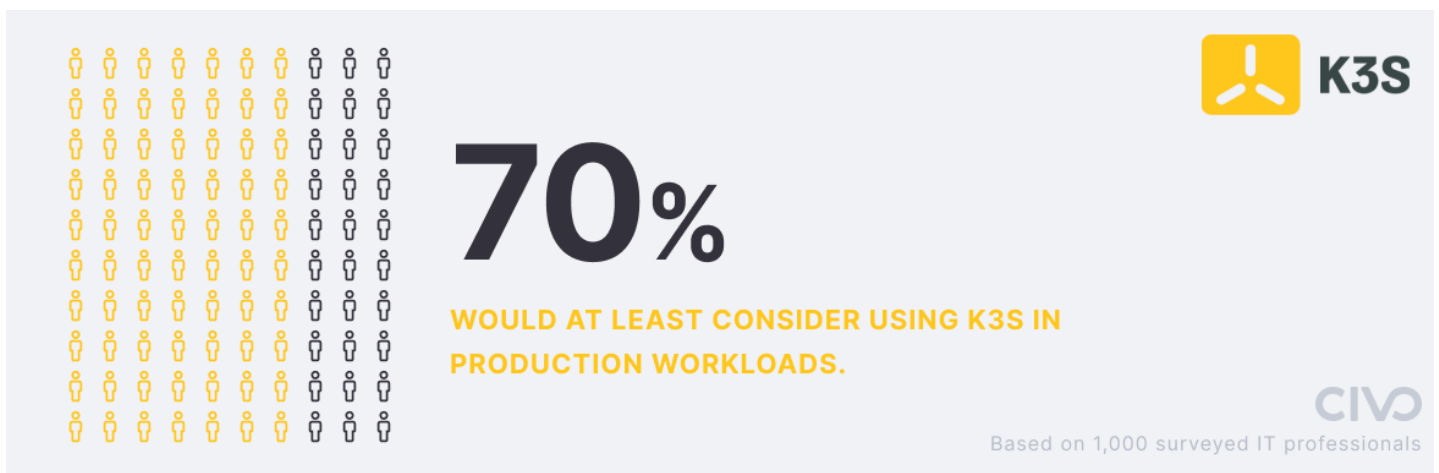
Given the vast majority of respondents are open to using Kubernetes more if it was easier to do so, the question remains what are their easiest routes to achieving that goal.

For 56% of cloud developers in our survey, their Kubernetes experience is defined by K8s – the traditional distribution. Yet the wide range of issues emerging in our research point to the need for a smoother & simpler container orchestration.

K3s answers all these challenges. As the reduction in number from 8 to 3 in its title suggests, this is a cut down, yet fully-functioning version of Kubernetes. In fact, it is roughly half the size. With fewer drivers, the technology is simpler to use and gets clusters launched much faster than K8s.

K3s is packaged as a single binary of just 50Mb and being so lightweight means it only requires 300Mb of RAM (as a bare minimum) to operate. It achieves this by stripping out superfluous drivers and yet everything developed in K3s is fully compatible with K8s environments - it's also fully CNCF certified. This means that YAML files (which handle the configuration of Kubernetes) will apply to both K8s and K3s.

70%

WOULD AT LEAST CONSIDER USING K3S IN PRODUCTION WORKLOADS.

Based on 1,000 surveyed IT professionals

Over the last two years, K3s has enjoyed huge success. According to Rancher Labs, K3s was downloaded more than a million times in its first year – that works out as an extraordinary 20,000 times every week.

Cloud developers are clearly taking notice. Our research found that 80% of respondents have heard of K3s, 23% of respondents have used it, and most exciting of all, 70% would at least consider using K3s in production workloads.

We are already seeing growing utilization of K3s in production environments across the enterprise, from edge settings to supporting data centre workloads. A lightweight distribution opens the doors to what is possible with the orchestration software. Given adoption is only set to continue to rise, it could be on course to challenge the dominance of K8s in our industry.

At Civo we believe in developers. We firmly believe that for Kubernetes to succeed, it needs to evolve and address lingering concerns that hold back wider adoption. A key route to doing so, in our opinion, is to simplify Kubernetes for developers of all levels.

Complexity is clearly the enemy of the good for developers – they want to spend less time worrying about deploying containers and more time building applications that can deliver tangible value to the business.

These concerns are compounded in some cases by fears about a steep learning curve – a perception that may put off businesses from upskilling IT teams to utilise Kubernetes technology.

There are, however, plenty of reasons for optimism.

K3s has been a gamechanger for our industry and it is already redefining what is possible in container orchestration for millions of users.

Civo was quick to see the potential in K3s. After two years of development, in May 2021 we launched our managed Kubernetes platform to early adopters. It is the world's first production ready, cloud native K3s managed platform. Developers no longer have to worry about time lost spinning up clusters. To the best of our knowledge, in terms of cluster deployments, we're the fastest Kubernetes service provider- with a fully usable cluster deploying in under 90 seconds.

The other issue we have sought to address at Civo is cost. We think developers have not been well served by the hyperscalers who dominate the market today. Indeed, our survey found that 47% reported issues working out how much cloud providers charge for containers each month.

Similarly, 47% of developers reported they have even faced surprise bills from a cloud hosting provider.

As the first pure play cloud native service provider, we aim to demystify pricing and make chargeable services more transparent for users, with simplified pricing plans from just $4 per month.

We believe in the innovative possibilities of open-source containerization technology and we can't wait to see where Kubernetes goes next. For users keen to begin their journey, our new Academy initiative provides a comprehensive set of guides and video tutorials to learn all you need to know about Kubernetes. And if you are keen to get started with Kubernetes, we would love to welcome you into the Civo community.

Find out more, and get started with Civo Kubernetes today.

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www.civo.com/kubernetes-report-2021