How to Choose the Right K8s Deployment Model

Guide For The CTO Of A SaaS Company

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Management Summary

Kubernetes offers unique opportunities for Software-as-a-Service (SaaS) companies. Organizations have seen tremendous gains in their ability to scale, deploy, and manage SaaS products. However, small- and medium-sized companies often struggle to find a suitable deployment model due to a lack of familiarity with the technology, cost, security, scalability, and business requirements not aligning with the selected Kubernetes model. We aim to provide an overview of K8s deployment models and tips on finding a model fulfilling the needs of an innovative SaaS company. Collaborating with a cloud infrastructure provider can help SaaS companies to deploy Kubernetes efficiently and exploit the full potential of Kubernetes.

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Introduction

Kubernetes has become the leading platform for powering modern cloud-native micro-services. It offers several benefits, especially for Software-as-a-Service (SaaS) providers. However, if SaaS products are forced into Kubernetes without the proper understanding of the system, there is a high probability of accruing technical debt and wasting time.

This whitepaper aims to help organizations on their path towards deploying Kubernetes in their IT environments.

What is Kubernetes, and Why is it so Popular These Days?

Kubernetes, also known as K8s, is an open-source system for automating deployment, scaling, and managing containerized applications.

The system groups containers that make up an application into logical units for easy management and discovery. A container is a software package comprising the application code, runtime, system libraries, and other components required to run an application. Containers can run complex and critical applications, which has resulted in a rise in their popularity and a need for a system to manage them.

Google launched Kubernetes, which is currently being maintained by the Cloud Native Computing Foundation (CNCF). Kubernetes was developed with a focus on the experience of developers writing applications that run in a cluster, making it easy to deploy complies distributed systems while still leveraging improved utilization that containers enable, as Brendan Burns and other authors in their ACM Queue paper write.

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Relevance of Kubernetes for SaaS Providers

Kubernetes system's popularity continues rising with the increased adoption of cloud technology and services. The Enterprisers Project, a community helping CIOs and IT leaders solve problems, unpacks a set of numbers that speak to Kubernetes 'continuing rise to IT ascendancy. One of the intriguing findings the blog quotes is the recent CNCF survey that found that 84 percent of organizations were running containers in production, up roughly 15 percent from the previous year. Kubernetes has become the ideal solution for more than three in four enterprises included in the CNCF report.

Forrester's 2020 Container Adoption Survey reveals that roughly 65 percent of surveyed organizations are already using, or are planning to use, container orchestration tools as part of their IT transformation strategy. In the perspective of Kubernetes usage, statistics from Statista show that one-third of organizations are using the Kubernetes container technology system in some way in 2020. They are either experimenting with Kubernetes, running the system in production, or using it for development and testing, as shown in figure 1 below.
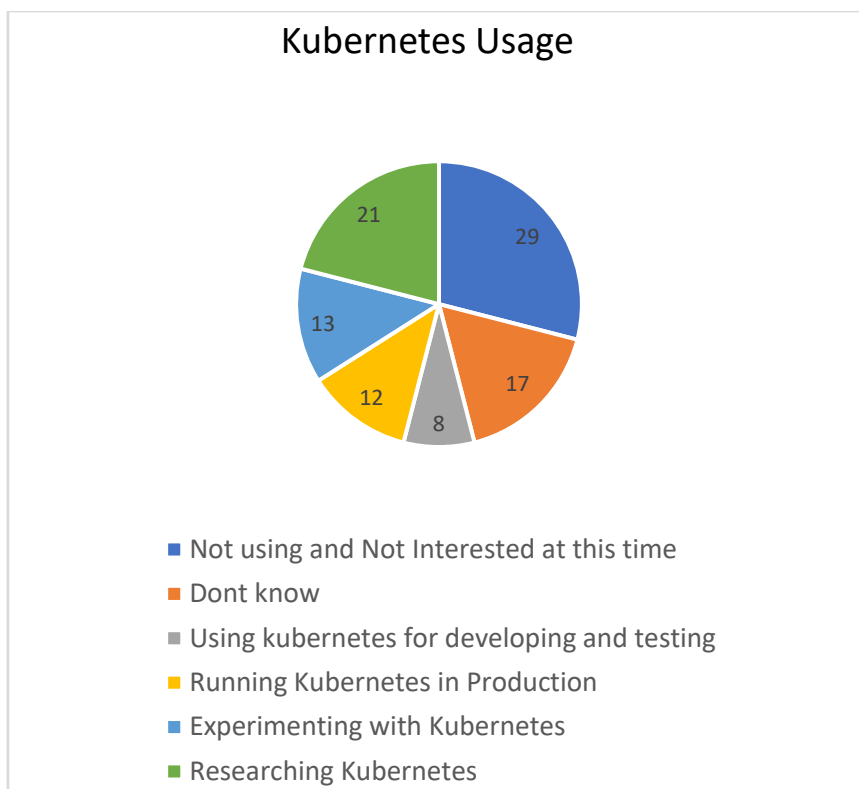
Figure 1: Additional Kubernetes data (source: Statista)

Kubernetes has gradually become the de-facto standard for SaaS providers for several reasons:

- SaaS providers can employ Kubernetes for easy container scaling across multiple services in a cluster. The system is designed on the same principles that allow Google to run billions of containers a week; it can scale without stretching your resources.

- Kubernetes allows automated rollouts and rollbacks, allowing application changes without disrupting instances.

- Kubernetes can self-heal by restarting containers that fail or replacing and rescheduling containers when nodes die.

- Kubernetes provides fault tolerance clustering, improving stability and reliability of a system.

- The system offers enhanced security – Kubernetes has built-in data encryption and vulnerability scanning capabilities.

Some of the popular Kubernetes use cases include Babylon, Booking.com, Adidas, Huawei, IBM, Nokia, Spotify, Airbnb, and New York Times.

Kubernetes Best Practices

We have designed a curated checklist of best practices to help you deploy secure, resilient, and scalable services on Kubernetes.

- With an active community of users and contributors, Kubernetes regularly releases new version updates, features, and fixes. Always download the latest system version on your cluster. An updated version has all the features and security patches fixing flaws that potential attackers exploit.

- Use namespaces to achieve team-level isolation for users accessing the same cluster resources concurrently.

- Use smaller container images to create faster builds.

- Set resource requests and limits for cluster resources to limit disproportionate resource usage by applications and services.

- Leverage Kubernetes check probes such as the livenessProbe and readinessProbe to perform health checks needed to ensure applications run as intended.

- Leverage Role-Based Access Controls (RBAC) to implement access control security measures.

- Utilize Kubernetes' autoscaling mechanisms for automatic cluster service scaling during a surge.

Guidelines

Before getting started with Kubernetes, it is essential to note that there is no one-size-fits-all approach since every organization has unique needs and capabilities. It is vital to assess and understand the factors to consider to establish and prioritize the correct Kubernetes deployment model.

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Tips on How to Choose the Right Model

- Size: an organization's size plays an important role when choosing a deployment model. A large enterprise will undoubtedly face more challenges than a smaller one since Kubernetes becomes more complex with scale.

- Region and industry: different organizations are governed by varying compliance requirements based on industry and geographical location.

- Budgets: always go for a model that fits your resource constraints best.

- IT infrastructure: the go-to strategy for the Kubernetes deployment model depends on the IT environment. Will you deploy the system in on-premise infrastructure, in the cloud, or a hybrid setup with multiple public clouds across on-premises and public clouds?

- Skills: Google open-sourced the Kubernetes project in 2014, but the system's enterprise adoption and support occurred from 2017. Being a relatively new and complex technology that is constantly evolving, many experts and teams feel like they are always learning. Most organizations lack in-house experience related to specific Kubernetes use cases.

- Security: which model offers you the desired security level? New research confirms organizations have embraced Kubernetes but are struggling to secure data stored in cloud-native environments properly.
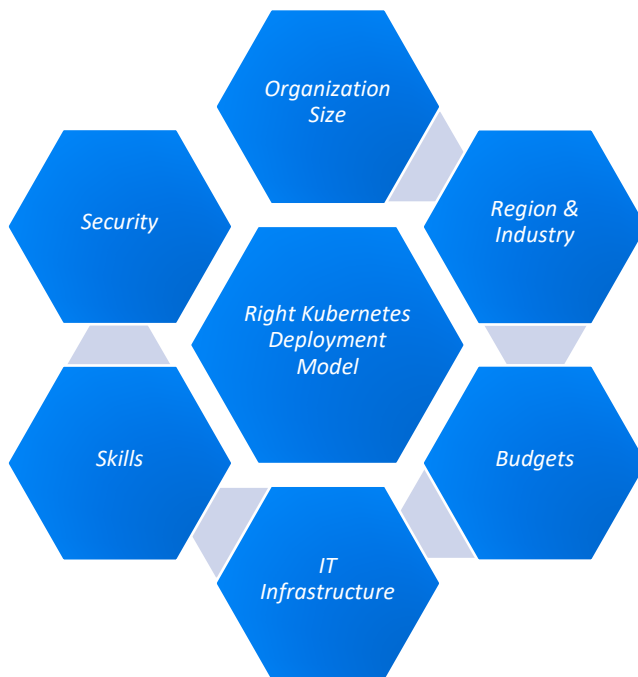
Figure 2: Selecting the Right Deployment Model

Overview of Kubernetes Deployment Models

Companies planning to adopt Kubernetes can choose from one of the following models available today.

Vanilla Kubernetes

Downloading and installing open-source Kubernetes is an option that most individuals will have experience with. This model gives you the classic Kubernetes system with all its benefits and drawbacks. Vanilla Kubernetes is exceptionally extensible and flexible, and you have the freedom to customize it. But you also get bugs to deal with.

[CNCF and a diverse community of Kubernetes users and contributors](#) support this model. It is 100 percent free, and it allows you to update to new versions just like any other open-source system. Another benefit of Vanilla Kubernetes is that users can install it on different environments and operating systems.

Some of the disadvantages of using Vanilla Kubernetes include:

- Running open-source Kubernetes is a technically challenging option. You will likely need dedicated engineers familiar with Kubernetes and the system's intricacies to design and maintain the Vanilla Kubernetes model

- Organizations going with this model might end up outspending hiring and retaining experts.

- Another limitation of Vanilla Kubernetes is the time to market. Compared to other deployment models, developing applications in this model undoubtedly takes longer.

- Running it in production without expert support may result in critical downtimes.

- Going down this route has security and privacy concerns that require an organization to invest more in security controls.

Who is Vanilla Kubernetes for? Only organizations with satisfactory in-house expertise capable of customizing tools and providing support can consider utilizing Vanilla Kubernetes. Vanilla Kubernetes is also suitable for organizations eager to experiment.

Platform as a Service (PaaS) Kubernetes

Numerous vendors create Kubernetes packages and offer them as PaaS services. Unlike Vanilla Kubernetes, the PaaS option comprises pre-

configured services and tools, security features, storage, and networking capabilities as part of the package. The PaaS Kubernetes model reduces configurations and time needed to select tools, making it such a cakewalk for users to get in full swing while launching applications. The skills gap is also not a significant challenge since vendors lower entry barriers for users to get weaving.

What are some of the disadvantages of PaaS Kubernetes?

- Cost – PaaS Kubernetes comes with license and support fees from vendors.
- Vendor lock-in – migrating from your PaaS offering to other providers or models in the future may be time-consuming.
- Portability – it can be challenging to move from one environment to another in PaaS Kubernetes.

Who is PaaS Kubernetes for? Organizations that lack in-depth technical finesse and are in a tight spot with releasing their applications can leverage the PaaS model. Moreover, highly regulated industries in terms of security and privacy can work with a vendor to ensure secure deployment.

 Public Cloud Kubernetes

In this model, developers can access a managed Kubernetes service through a public cloud infrastructure as a service (IaaS) provider such as Amazon Elastic Container Service for Kubernetes, Google Kubernetes Engine, or Azure Kubernetes Service. The cloud service provider controls the configurations and tools that users can integrate. As with PaaS Kubernetes, the public cloud model offers an easy way for users to get up

and running with minimal skill requirements. Besides, the model offers rapid time to market with reduced investment in configuration and tool setup.

What are some of the disadvantages of Public Cloud Kubernetes services?

- Vendor lock-in – Public Cloud Kubernetes services make hybrid and multi-cloud options impossible. The model also makes it challenging for organizations to switch from one cloud provider to another.

- High costs – Just like in the PaaS Kubernetes model, the cloud-hosted option is expensive, especially for compute-intensive applications.

- Low flexibility – Public cloud Kubernetes limits organizations to the tools and services that the provider supports.

Who is Public Cloud Kubernetes for? This model is suitable for companies that lack in-house skills but want to get started quickly with Kubernetes. It is also a good option for enterprises that don't anticipate requiring exceptional functionalities or tools that the provider is not supporting.

 Managed Kubernetes Solution

In the managed Kubernetes model, vendors handle Kubernetes functions on behalf of the customer. The service provider offers implementation, support, uptime guarantees, and other functional requirements for the clients.

What are the benefits of a Managed Kubernetes model? Managed Kubernetes has a steep learning curve, making it easy for engineers to set up and run applications with fundamental Kubernetes expertise. The

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vendor offers system support, including patching and upgrading. The Managed Kubernetes deployment model also features reliable security controls as compared to other models. Besides, the Managed Kubernetes option allows users to move between cloud environments.

What are some of the disadvantages of Managed Kubernetes services?

- Vendor lock-in – you can overcome cloud provider lock-in by selecting a managed solution, but you remain prone to managed service provider lock-in.

- Cost – the managed Kubernetes model tends to be more expensive than a cloud-hosted option.

- Low flexibility – organizations are often limited in the tools they can choose or other features outside what the vendor offers.

Who is the solution for? The Managed Kubernetes model is suitable for enterprises beginning their Kubernetes journey but lacking in-house expertise. This deployment model allows companies to focus on delivering applications while the vendor manages the infrastructure.

 Enterprise Kubernetes Platforms

Enterprise Kubernetes services bundle Kubernetes with tools to manage the entire application lifecycle. Such platforms allow centralized teams to control configurations and access management. The Enterprise Kubernetes Platform model offers more flexibility than PaaS, cloud-based, and managed solutions.

The main advantage of the Enterprise Kubernetes platform is tooling. The model comes with a complete suite of tools and allows easy integration with new tools. Besides, Enterprise Kubernetes platforms manage the entire application lifecycle, and organizations can pursue a hybrid or multi-cloud approach. The model is highly scalable to meet the needs of users managing multiple environments and clusters. Engineers can also move workloads quickly between environments.

What are some of the disadvantages of Enterprise Kubernetes Platforms?

- Skills gap – organizations require expertise to make the best of features like increased flexibility and control.

- Cost – the model has high licensing and support contracts fees.

- Security – the user is responsible for ensuring security in the Enterprise Kubernetes option.

Who is the solution for? Enterprise Kubernetes platforms make sense for large companies managing several clusters and complex environments. Such businesses should have the adequate technical expertise to leverage this option's flexibility.

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Kickstart Your Kubernetes Journey with Xelon

SaaS companies can only exploit the full potential of Kubernetes if their IT infrastructure is stable, secure, and highly scalable. It is recommended to work with a cloud platform provider that guarantees stability, the highest security standards, and a pay-as-you-go payment model.

Xelon is a thought leader in Kubernetes deployment. The Xelon Kubernetes service allows SaaS providers to create new Kubernetes clusters within minutes and supports software developers in building and operating secure and highly available applications and microservices. Xelon Kubernetes services make it easy for your engineers to set up and run applications with fundamental Kubernetes expertise. The experienced Xelon Cloud Engineers and Solution Architects offer system support, including patching and upgrading.

Why Xelon?

Xelon provides first setup, full services for SaaS providers creating Kubernetes clusters. Here is what users get with the Xelon Kubernetes service:
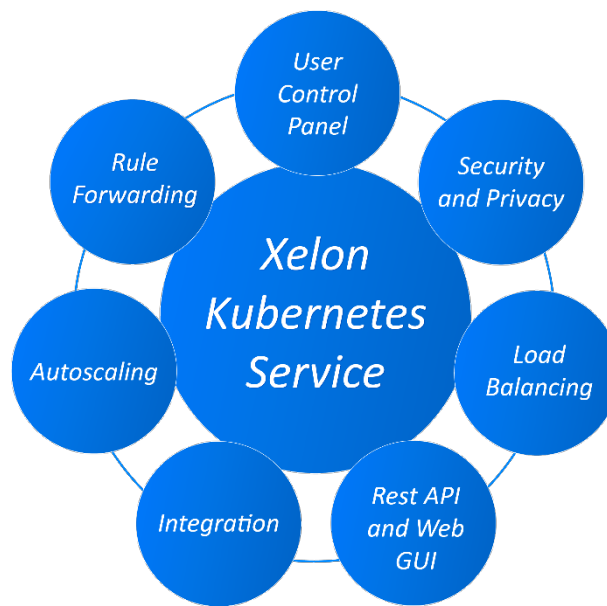
Figure 3: Xelon Kubernetes Service Capabilities

- Kubernetes Control Plane that you can access with Kubectl or any other Kubernetes tool

- Capabilities to manage load balancer and forwarding rules

- Manage pools and nodes of Cluster Config Files with a single mouse click via Xelon HQ.

- Xelon allows you to integrate persistent storage volumes into your Kubernetes cluster and make them available to all applications and services in the cluster.

- Highly scalable infrastructure to suit all your Kubernetes development needs

- Xelon creates your Kubernetes cluster in a completely separated private network to enhance security and privacy.

- The Xelon Kubernetes cluster grants full Kubectl access, which you can configure as usual via CLI or any Kubernetes tool.

- You can configure all Xelon HQ functions through the web GUI or the RestAPI service.

- The Xelon infrastructure is stored in ISO-certified datacenters in Switzerland and all data is protected by Swiss data protection laws.

Conclusion

Countless organizations all over the world are going with the Kubernetes container orchestration solution for its architecture, immense open source community support, security, high availability of free manuals, scalability, and innovation. This whitepaper summarizes best practices, relevance, and suitable deployment model for setting up a production environment with Kubernetes. The most appropriate model for SaaS should provide resource scalability, the ability to perform mass updates, self-healing capabilities, flexibility, high availability, portability, and security.

The Managed Kubernetes services model is the best option for SaaS companies looking to deploy their applications with higher availability, more effortless scalability, and low costs. Xelon continuously monitors your Kubernetes control plane to make sure you can access and deploy your cluster expediently. Create your free account and get started today!

Thank you for downloading our whitepaper!
We hope you enjoyed it. If you have any further questions, the Xelon Kubernetes Cracks will happily help you out.

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