Kubernetes Demystified

What CIOs need to know about the fastest growing open-source technology in the world
Executive Summary

Applications are the modern lifeblood of the enterprise, and the desire to keep up with market demands has elevated most enterprise IT strategies from purely on-premises to hybrid and multi-cloud. But the desire to be even more agile and productive—and connect with end users in new and exciting ways—is pushing investments even further into new application environments, development processes, and management tools all leveraging cloud-native technology.

In this executive brief, we home in on one component of the cloud-native movement, Kubernetes, and break down its role in achieving enterprise agility, experimentation, and innovation for competitive gain.

The Impact of Kubernetes on Your IT Organization and the Business

<table>
<thead>
<tr>
<th>IT Output</th>
<th>Business Outcome</th>
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<tbody>
<tr>
<td>Faster time-to-market&lt;br&gt;68% shortened software development cycles</td>
<td>Rapidly adapt to changes in market conditions and consumer preferences with faster, more reliable delivery of high-quality digital services and software</td>
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<tr>
<td>Enhanced operational efficiency&lt;br&gt;69% more efficient resource utilization</td>
<td>Deliver better products and services at a lower cost to the business</td>
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<tr>
<td>Increased productivity&lt;br&gt;Up to 47% increased access to new capabilities</td>
<td>Empower development teams with self-service access to resources and fewer impediments to deployment</td>
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Figure 1. What Kubernetes means for the business
What Kubernetes Means to Your Business

Kubernetes is now considered a component of modern application architecture and operations. It’s the only platform of its kind offered as a managed service by the top five public cloud vendors and, ultimately, it helps organizations bring new ideas, new products, and new revenue streams to market faster while reducing OpEx.

A key feature of Kubernetes is automation, which brings with it a host of tangible benefits:

- **Faster time-to-market** – Automation of ongoing container orchestration tasks speeds up software development and deployment cycles.
- **Improved resource utilization** – Kubernetes’ auto-scaling capabilities spin up additional container instances automatically in response to demand.
- **Increased resilience** – An automated, self-healing approach to fault tolerance improves availability.

Because Kubernetes is open source and can run on premises, on bare metal and virtual environments, and in private, hybrid, and multi-cloud environments, existing infrastructure is never a barrier to entry. The API-rich, open-source technology protects existing investments through extensible integration with a large ecosystem of infrastructure and service providers.

In a recent poll of developers, Kubernetes was the third “most loved” platform, after Linux and Docker.

![Figure 2. Kubernetes is the third most loved platform according to developers](image-url)

- **83.1%** for Linux
- **77.8%** for Docker
- **76.8%** for Kubernetes
- **72.1%** for Raspberry Pi
- **71.6%** for Amazon Web Services
- **70.5%** for macOS
- **68.1%** for iOS
- **66.8%** for Google Cloud Platform
- **65.4%** for Microsoft Azure

High-performing organizations capable of delivering software with both speed and stability have a 50 percent higher market capitalization growth rate.

Sixty percent of IT decision makers have used Kubernetes for container orchestration.

SOURCE: HEPTIO STATE OF KUBERNETES 2018
The Journey to Kubernetes

The journey to Kubernetes begins with the journey to cloud. No matter the industry, business success now depends on a company’s ability to deliver and operate digital services and software quickly, reliably, and with greater frequency. Businesses can do so by utilizing cloud-native technologies.

The rise of cloud native

Cloud native is an approach to building and running applications that takes full advantage of the cloud computing delivery model. Cloud-native applications are distributed rather than monolithic and are built in container-based environments that break an application into its component services, each running in a separate container. This microservices architecture enables greater parallelism during both development and execution, reducing cycle time while improving quality.

The rise of containers

Eighty-eight percent of IT decision-makers whose organizations have adopted cloud-native infrastructure use containers. The adoption of containerization technology is increasing because of its portable, flexible, and predictable way of packaging, distributing, modifying, testing, and running applications.

Containers are abstracted from the underlying infrastructure, and multiple containers can share a single operating instance. They can be moved easily from one computing environment to another, meaning they’re incredibly lightweight and allow for simple shared control between developers and IT operations teams.

The rise of Kubernetes

As containers are used more widely, it becomes difficult to manage them at scale. This is where Kubernetes comes in. Kubernetes, or K8s, is a container management platform designed to orchestrate the networking, storage, security, image registry, and general computing of containerized workloads.

Kubernetes was developed by Google and open-sourced in 2014. It’s the technology behind Google’s own cloud offerings and builds upon a decade and a half of experience running Google’s production workloads at scale. Combined with best-of-breed ideas and practices from its robust community, it’s the number one container orchestrator with a large, rapidly growing ecosystem.
Is Kubernetes Worth It?

Studies show that companies using Kubernetes in production are highly likely to realize the “big three” benefits of shortened software development cycles, more efficient resource utilization, and access to complementary open-source technologies. Kubernetes and its related technologies are the tools that make that possible.

Networking | Persistent Storage | Security | Image Registry
---|---|---|---
Kubernetes

Container | Container | Container | Container | Container | Container | Container | Container | Container | Container | Container | Container | Container | Container

Host | Host | Host

Figure 3. How Kubernetes fits into the robust cloud-native ecosystem

So how do you know if Kubernetes is right for your business? How do you navigate the critical design and deployment decisions needed to integrate cloud-native technologies and operate in new ways? Is it worth it to work through the obstacles and deploy Kubernetes?

In short, yes, it’s worth it.
Key Considerations

There is no shortage of solutions or managed service providers available no matter what stage of cloud-native, container, and Kubernetes deployment your business is in. And the best advice generally comes from those who came before you. In fact, here’s some sound advice from fellow Kubernetes adopters:

- **Invest in the architectural stage** – The majority of organizations deploying Kubernetes report their biggest challenges at the architectural stage. The onset can seem arduous for good reason: Organizations have to evaluate current infrastructure, figure out how to integrate new technologies, and operate in different ways. A thoughtful investment of time and resources in the design stage, including a deep understanding of the wide variety of ecosystem solutions and capabilities available, often leads to stabilization of cloud-native deployments relatively quickly.

- **Work with multi-cloud, open-source partners** – Avoid vendor lock-in by working with partners that can help you manage Kubernetes clusters across multiple cloud environments and are tied to the open-source community. Not only will you have greater access to best-in-class open-source technologies, but you’ll be set up for maximum flexibility at a time when the ecosystem is changing so rapidly.

- **Find a mentor** – Ensure you have access to a variety of sources for advice, expert consulting, and support, especially if you don’t have internal expertise. In fact, only 4 percent of survey respondents in Heptio’s The State of Kubernetes 2018 deployed Kubernetes without any outside help.

- **Organize your team** – In many IT organizations, it’s unclear where the responsibility for Kubernetes should reside. When asked who is driving architectural decisions for their Kubernetes footprint, respondents to Heptio’s State of Kubernetes survey revealed answers ranging from the infrastructure team to IT operations, site reliability engineering, or lines of business. Of those organizations not yet using Kubernetes, 41 percent reported that a major roadblock is lack of urgency. There are a lot of seats at the table and different interests at play. Champion the cause and align teams early to avoid this unnecessary pain point.
The Future of Kubernetes

This much is clear: Innovative and captivating applications are now a strategic differentiator for businesses, and a well-run software development organization contributes directly to the bottom line.

The move to cloud-native technologies—including Kubernetes—is not necessarily foolproof, but it’s clearly worth it for organizations that want to build business differentiation on the backs of high-performing, reliable apps and digital experiences. For now, and the foreseeable future, the Kubernetes ecosystem will continue to mature and expand, enabling a wide variety of new capabilities built on top of Kubernetes as a foundation.

New application architectures and access to best-in-class open-source technology is today’s most efficient model for application development and operations, and Kubernetes’ proven ability to keep up with the pace of innovation—and contribute to the enterprise’s strategic business goals—means it will have staying power for some time.