

Delivering a superior multi-cloud developer experience on Kubernetes

VMware Tanzu Application Platform delivers a pre-paved path to production with a streamlined, end-to-end developer experience.

What challenges are organizations encountering in deploying and managing Kubernetes?

65%

Lack of internal experience and expertise

46%

Meeting security and compliance requirements

49%

Difficult to integrate with current infrastructure

As enterprises accelerate their digital transformation initiatives, they're adopting a multi-cloud strategy: A combination of public clouds, on-premises private cloud, and edge environments. They're taking advantage of cloud native technologies like Kubernetes to deploy and run applications for faster time to market. Kubernetes simplifies the work of operators, increasing agility and accelerating software delivery. As one of the fastest-growing open source projects in history, Kubernetes continues to gain momentum and is thriving across all industries. An important sign of Kubernetes' momentum is the continuing shift to production, growing from 59 percent in 2020 to 65 percent in 2021, according to our State of Kubernetes report¹

Nonetheless, along with their embrace of Kubernetes, many enterprises are experiencing the challenges of navigating the sprawling and complex cloud native ecosystem and the steep learning curve that comes with it. Although Kubernetes has enabled infrastructure and operations teams to automate application deployment and manage containers at scale, it has presented different challenges to developers.

Confronting the challenges developers face

Developers must build their software pipelines on Kubernetes by combining bags of parts from infrastructure providers and public clouds, with technologies and tools they must source from the fragmented cloud native ecosystem. This approach of accumulating disparate tools to work together is challenging: the tools are tough to set up and maintain, they work inconsistently across teams, connecting them to other apps and infrastructure is extremely complex, and they force developers to spend too much time grappling with underlying infrastructure instead of writing code.

Throughout the development cycle, developers need to iterate on their code quickly. Developers would typically follow the cycle of code, run, test, and debug over and over, an iterative process called the "inner loop." Developers want this inner loop cycle to be fast, as they spend most of their development time working on the inner loop. The inner loop process becomes lengthier when developing for Kubernetes.

1. [The State of Kubernetes 2021](#)

Every source code change involves not only rebuilding the source code, but also rebuilding and republishing the container image and redeploying Kubernetes resources before the code changes can be tested, which significantly reduces developer productivity.

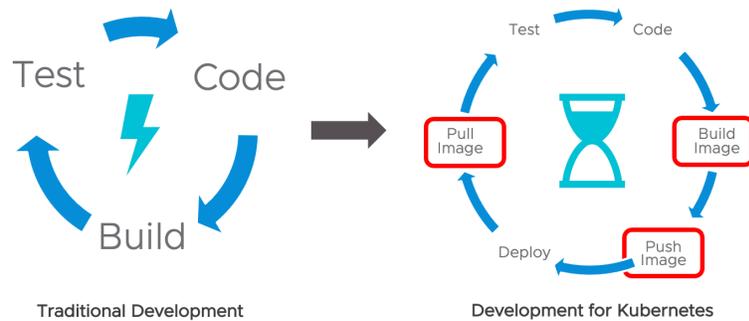


Figure 1: The development cycle on Kubernetes.

To be sure, Kubernetes is a great platform for building platforms, and developers shouldn't have to build it themselves. Nor should their application operations counterparts have to navigate IT and security compliance requirements for their apps. They shouldn't have to know the containers they run in or Kubernetes infrastructure they were deployed in before they can successfully deploy an app.

VMware Tanzu Application Platform delivers a prepped path to production and a streamlined, end-to-end developer experience on any Kubernetes.

Introducing a superior multi-cloud developer experience on Kubernetes

VMware Tanzu Application Platform is a modular, application-aware platform that runs on any compliant public cloud or on-premises Kubernetes cluster. It delivers a superior developer experience with a prepped path to production, including all the needed components preconfigured for developer teams to build and deploy software quickly and securely. It's a composable platform, so teams can customize it based on their organization's preferences and changing business needs. Since VMware Tanzu Application Platform can run on any Open Container Initiative (OCI)-compliant Kubernetes distribution or public cloud service, it supports enterprises' multi-cloud architectures.

Unlock developer productivity

Inspired by the open source [Spring Initializr](#) project, developers get a jump start on developing new applications using application starter templates (aka, [Application Accelerators](#)) instead of starting from scratch. Built by application architects and made available to developers, these templates consist of the skeleton code, configuration, and cloud native patterns combined with the organization's best practices and security policies that save developers significant time in bootstrapping new applications. Serverless abstractions built into the platform make it easy to achieve advanced applications patterns like microservices and event-driven architectures, as well as address operational concerns, such as automatic application scaling and connecting to systems not running in Kubernetes using APIs.

VMware Tanzu Application Platform is an app-aware platform that enables the following business benefits:

- Allows developers to better focus on defining the requirements for the app without having to worry about the underlying infrastructure
- Reduces the burden on developers by enabling a shift-left model
- Includes automatically applied best practices, security, and compliance
- Supports full portability from development to production

VMware Tanzu Application Platform provides a consistent graphical user interface (GUI) to underlying services and APIs, making them easy to discover and integrate, and thus increasing developer productivity.

Delivers an abstraction for Kubernetes Workloads

Along with other artifacts, an accelerator contains a declarative Workload resource specification that describes the characteristics of the Workload —this is the only YAML a developer needs to interact with. Developers specify information such as the type of Workload (e.g., web app, batch job, streaming function), the location of the source code, which backend services it should connect to (e.g., a PostgreSQL with 10GB of storage, a RabbitMQ cluster that guarantees 1,000MPS), and its resource utilization. The Workload resource specification—sometimes referred to as a manifest—establishes a contract between developers and operators for promoting source code to production. Based on the Workload resource specification, the platform performs the underlying interaction with Kubernetes for deploying and managing the Workload, given the source code location.

Build a rapid yet sustainable path to production

Deploying workloads on Kubernetes typically involves the following sequence of steps:

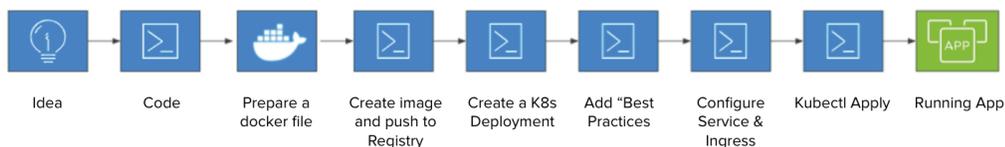


Figure 2: The typical sequence of deploying workloads on Kubernetes.

With VMware Tanzu Application Platform, tooling the Workload deployment becomes a much easier experience:

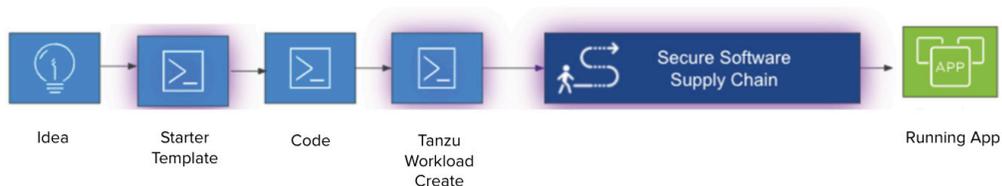


Figure 3: Deploying workloads with VMware Tanzu Application Platform.

Developers run a single CLI command ‘tanzu apps workload create -- file workload.yaml’ and get a running Workload on a Kubernetes cluster in minutes, starting from the skeleton code provided by an accelerator. VMware Tanzu Application Platform automates the entire application deployment process via an automated Secure Software Supply Chain workflow, relieving developers from the error-prone process of editing a “wall of YAMLS.”

VMware Tanzu Application Platform automates the application lifecycle.

It does so in a way that is responsive to the software being built and deployed within it. Since the entire platform is application aware, it can “read” an application and automatically know how to build the code into a container, establish new pipelines for the application, and deploy it in any environment such that it conforms with reliability, security, and compliance guardrails pre-established by ops and security teams.

VMware Tanzu Application Platform includes the entire end-to-end supply chain, with its components preinstrumented to work together seamlessly out of the box. Having a set of strong defaults eliminates many decisions that teams would normally have to make when building the platform from the thousands of possible combinations of technologies available in the Kubernetes ecosystem.

Bring your own opinions

Although strong defaults make it easier to get started, if one of VMware’s choice of components doesn’t work, platform engineers and application operations teams can swap out components based on their organization’s requirements and preferences. Built with modularity in mind, VMware Tanzu Application Platform is composable and lets operations teams set their own guardrails based on their expert opinions. In other words, they can substitute individual components easily through adapters. From CI to container build system, developers can use whatever they prefer, as long as they’re defined by the operations teams. VMware Tanzu Application Platform does not lock the DevOps teams into technologies chosen by VMware. Although the defaults are necessary and make it easy to get started, these choices are dynamic and easy to change in VMware Tanzu Application Platform.

Drive efficiency while coordinating the work of dev and ops

Application teams that are prolific software producers organize their work into inner and outer loops. The inner loop consists of shared or local development environments where developers have self-service access to the right resources and cloud native application patterns. The outer loop is where DevOps, platform operations, and security teams work with each other and with developers to promote applications to production and maintain them there. VMware Tanzu Application Platform facilitates collaboration between these groups because the work that happens on the platform is coordinated around these inner and outer loops.

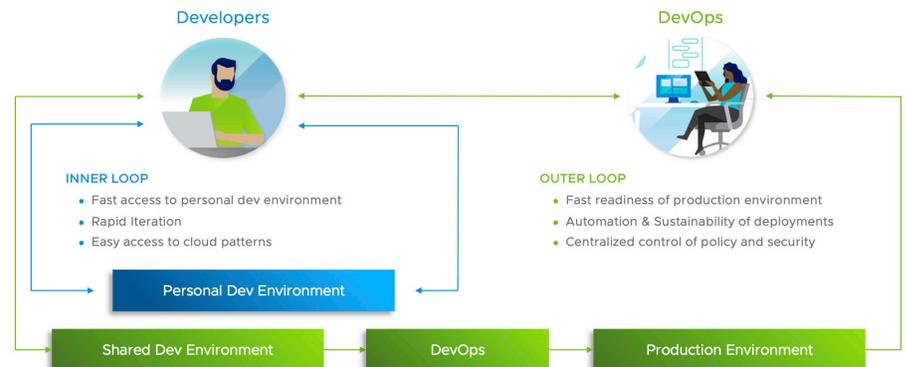


Figure 4: The development loops.

Create a seamless inner loop experience

After a fast bootstrapping of a new project, developers enter the inner loop cycle of iteratively adding code, building, deploying, and testing the code changes, and debugging—and preferably like to do it all right from their integrated development environment (IDE). This allows developers to continue to follow their familiar development workflows. VMware Tanzu Application Platform lets developers debug a running container on any Kubernetes cluster—whether it's running locally or as a managed Kubernetes cluster or cloud—from the IDE itself.

The tooling shortens the path for live updates of code changes by eliminating the steps of rebuilding, republishing, and deploying the container, instead directly injecting the updated code to the running container. This means developers can test the code changes instantly as they iterate on code.

When iterating on their code, developers often need to inspect a running application to analyze the behavior for troubleshooting, debugging, or fine-tuning the runtime configurations of the application. VMware Tanzu Application Platform provides [App Live View](#), a diagnostic tool for developers to drill into the runtime characteristics of applications (e.g., resource consumption or incoming traffic pattern). It also allows them to change parameters such as log levels and environment properties for troubleshooting running application.

Consume services in a standardized way

Service Binding for Kubernetes implements the spec that enables a simplified experience of discovering and using services that connect to the application in a standardized way. Combined with the services toolkit, it provides easy enterprise management and offering of services with a consistent consumption experience, either on that cluster or across clusters.

Establish a separation of concerns

VMware Tanzu Application Platform establishes a separation of concern between application developers and application operators (also known as DevOps engineers or Site Reliability Engineers). Operators in an organization are responsible for configuring software supply chain workflows that ensure consistency between development and production environments without getting in developers' way. A software supply chain configured in a developer's personal environment is optimized for inner loop cycle work and uses the same set of tools for taking source code to a running application. This consistency established by the application operations team between the two environments gives developers a high level of confidence that the code developed in their personal environment will run as it should in the production environment. VMware Tanzu Application Platform lets developers build portable applications and avoid the expensive debugging in production environments that is often caused by inconsistencies between development and production environments.

Additional resources:

- [Tanzu Application Platform](#)
(Solution Page)
- [VMware Tanzu Application Platform Creates a Better Developer Experience](#) (Demo)
- [Getting Started with VMware Tanzu Application Platform](#)
(Tanzu Developer Center)

Modernize a complex system

Reduce risk and determine a strategy based on business goals, and informed by hands-on modernization work. We'll help you execute and deliver value faster than you thought possible.

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Enjoy frictionless handoff between developers and operators

When developers are satisfied with their code, they commit it to a shared repository and the development lifecycle transitions from the inner loop (personal development environment) to the shared outer loop environment, where it's promoted to a production environment. Because the operations team has configured security and compliance requirements into the supply chain, the path of getting that code into production should be seamless for the developer. This smooth handoff between developers and operators is a critical factor in rapid deployment of code into production. VMware Tanzu Application Platform makes that handoff frictionless because it only requires the developer to commit their code (e.g., 'git push'). As developers commit code, the software supply chain is triggered automatically, providing a continuous path to production.

Follow runtime best practices for efficient applications deployment

There are best practices that should be followed when deploying applications in Kubernetes, in the absence of which the deployed Workload may have unpredictable runtime behavior that can disrupt business continuity. However, application developers—who are not experts on Kubernetes—would often be unaware of such runtime best practices. The [VMware Tanzu Convention Service](#) provides a framework for operators to configure policies (aka, conventions for runtime configuration of deployed workloads) and automatically applies applicable conventions to workloads, as configured by operators.

Start your journey to a superior developer experience on Kubernetes

With VMware Tanzu Application Platform, you can build and deploy cloud native applications on Kubernetes in a multi-cloud environment. VMware Tanzu Application Platform unlocks developer productivity—enabling development teams to rapidly develop applications without disrupting their familiar workflows—and allows DevOps professionals and application operators to deploy developers' code faster into production with baked-in security and compliance. Contact your VMware account team or reach us at tanzu.vmware.com/application-platform to learn more.