WHITEPAPER

Building a Foundation for Cloud-Native Success

A Platform Engineering Guide to Kubernetes in Hybrid Multicloud Environments

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Cloud-Native Computing Drives Software Success

IDC estimates that by 2026 developers will create 750 million new applications, more than during the past 40 years combined.[1] However, the accelerating pace of application development results in a long list of complications, including poor workload placement, excessive costs, performance degradation, increased security risks, compliance issues, and poor business service performance.[2]

Cloud-native technologies empower platform engineering teams to remedy this chaos by building and running scalable applications faster and with higher quality across data centres, public clouds and the edge. Kubernetes, and the large and growing ecosystem of cloud-native technologies enable enhanced business agility, greater efficiency, and faster time to market, yielding a competitive advantage to organisations that successfully master them.

Choosing the right infrastructure strategy to maximise the benefits of cloud-native technology and accelerate the delivery of modern software is essential for companies to thrive in the digital age.

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> Nutanix's secure, resilient, and scalable cloud platform allows us to modernise our manufacturing environment and move away from traditional compute and storage.
>
> **Anand Bahl**
> Chief Information Officer - Micron

[1] *IDC, 750 Million New Logical Applications: More Background, doc #US48441921, December 2021*
[2] *Gartner Predicts 2022: The Distributed Enterprise Drives Computing to the Edge, October 2021*

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The Building Blocks of a Cloud-Native Enterprise

Cloud-native technologies offer a competitive advantage to organisations that adopt them. Here are the key building blocks of a cloud-native enterprise.

Containers are a lightweight, portable and self-contained method of packaging application code with dependencies. Containers isolate applications from the underlying infrastructure, making it easier to run applications consistently across different operating systems and cloud platforms.

Containers can be spun up and down quickly, allowing for dynamic scaling of an application in response to changes in workload demands. They allow applications to be built as small, independent, and reusable services that can be integrated to build complex applications. When used with a container management platform like Kubernetes, microservices architecture allows applications built on containers to be operated efficiently in hybrid multicloud environments.

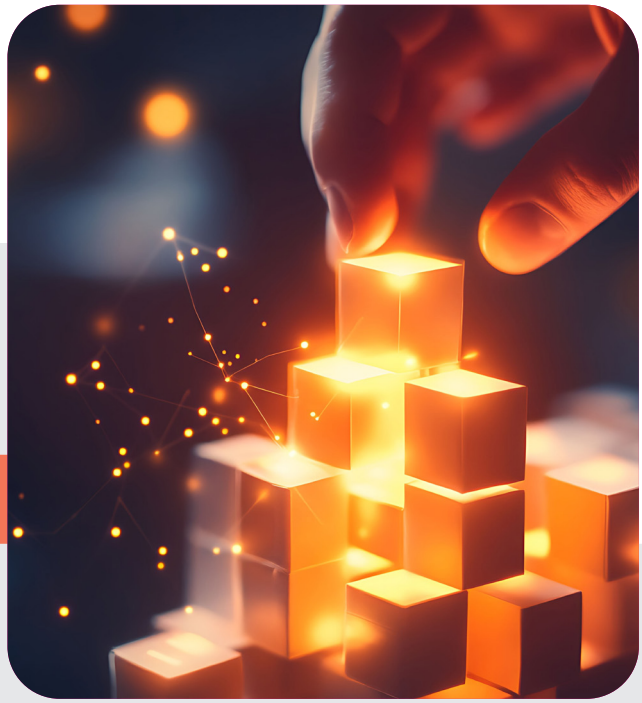
Kubernetes Orchestrates Containerised Workloads

Kubernetes has become the de facto standard for container orchestration and cloud-native operations. It automates the deployment, scaling and management of containerised workloads, providing a framework that can be used on-premises, across clouds and at the edge. This enables organisations to easily deploy containerised workloads across multiple environments with greater consistency. Kubernetes monitors and manages application availability and resource utilisation, ensuring that applications remain in a healthy state.

Kubernetes can detect changes in a workload and scale out the number of running container instances to adapt to demand. Built-in service discovery and load balancing enable you to manage containerised services and improve application performance, with the application workload distributed across multiple container instances to improve performance and reliability.

Hyperconverged Infrastructure Simplifies Cloud-Native Infrastructure

Containers, Kubernetes, and other elements of the cloud-native ecosystem put new demands on infrastructure. Given the steep learning curve associated with cloud-native technologies, infrastructure modernisation has become essential to success. Hyperconverged infrastructure (HCI) is rapidly replacing traditional hard-to-manage three-tier environments with a centralised, easily managed system that can support the growing demand for automation—while allowing your operations to extend from the data centre to the cloud and beyond.



Advantages of Deploying HCI*

97% reduction in unplanned downtime

43% reduction in TCO

356% average five-year ROI, 12-month payback

63% faster deployment

53% more efficient IT management

IDC White Paper, sponsored by Nutanix, The Business Value of Nutanix Cloud Platform, October 2022 (#US49715622)

**Among organisations using Nutanix Cloud Platform*

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Challenges of Running Kubernetes in Hybrid Multicloud Environments

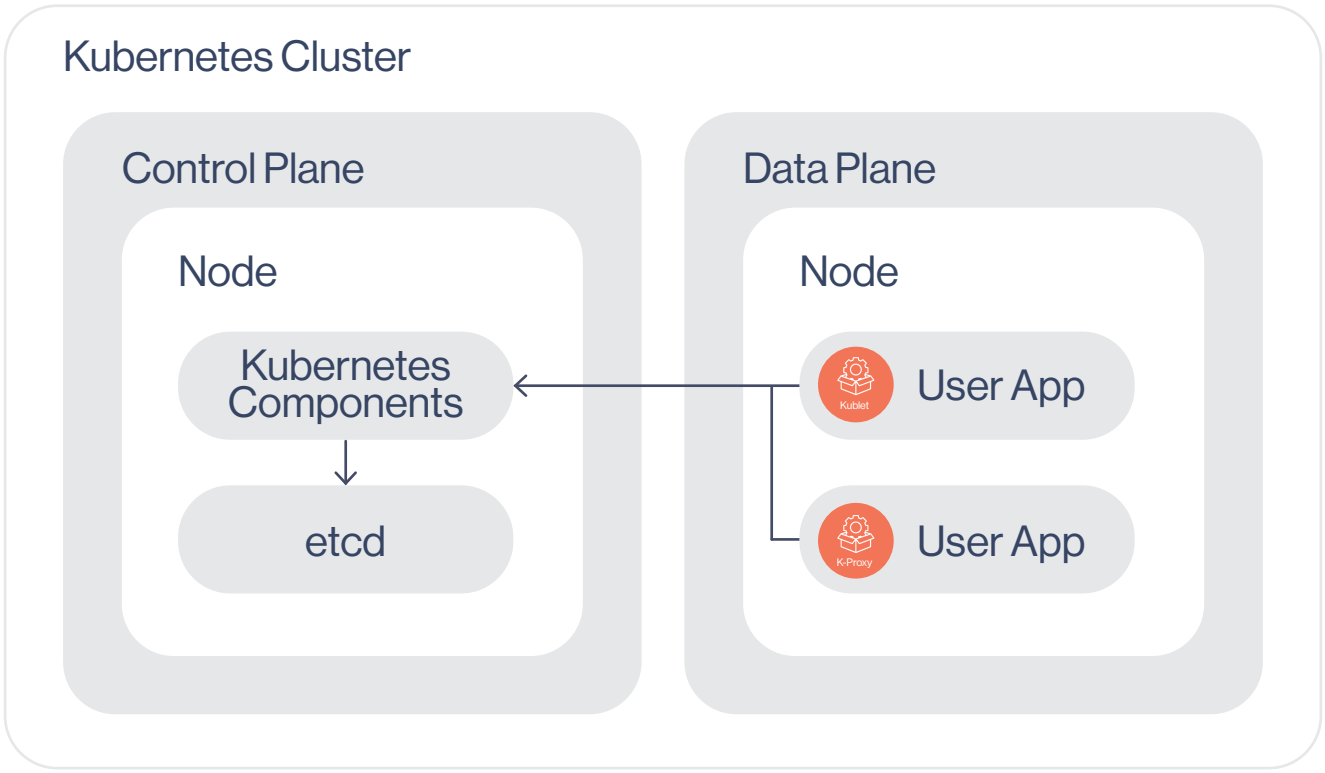
Cloud-native computing holds out the promise of running any workload anywhere—on-premises, in the cloud and at the edge. Yet many organisations struggle to achieve this goal. IT operators, used to working in legacy IT environments, find configuring and managing storage, networking, monitoring, and security—while also contending with Kubernetes lifecycle management tasks—challenging. This becomes a recipe for disaster as you extend your digital footprint to multiple clouds.

The following section explores the infrastructure challenges associated with cloud-native environments. The chapters that follow look at how the Nutanix Cloud Platform—with its industry-leading HCI architecture—can better address your hybrid multicloud requirements.

Legacy Infrastructure Can't Handle the Resource Demands of Kubernetes

Legacy three-tier infrastructure isn't designed for the way Kubernetes and containerised applications use compute, storage, and network resources. Kubernetes is a dynamic, distributed platform that offers rapid scaling and resiliency. It continuously creates and destroys container instances to adapt to changing demands.

Kubernetes necessitates a different approach. A Kubernetes cluster typically consists of a control plane plus one or more worker nodes. Worker nodes are where "pods," consisting of one or more containers, run. Kubernetes can be configured to autoscale compute resources in response to workload by increasing or decreasing the number of pods of a specific type. To accommodate all this activity may require hundreds or thousands of times a day. Microservices need new network topologies with secure, trusted interconnectivity. Organisations building cloud-native Kubernetes environments are often beset by complexity. Productivity is impacted when infrastructure resources aren't in lockstep with developer and application needs.



Organisations Struggle to Build and Optimise Hybrid Multicloud Kubernetes

The legacy infrastructure model is hard to extend to hybrid and multicloud operations. Kubernetes enables application portability, making it possible to move applications across environments including public, private and hybrid clouds—as well as ROBO and edge locations—without modification.

However, this requires access to similar compute, storage and networking resources in every environment. If your cloud-native application was built to run on-premises, some work may be necessary for it to run in the cloud and vice versa—and the management processes and tools in each environment may be completely different.

Optimising your cloud-native operations across a hybrid multicloud environment requires having access to the same tooling and processes everywhere. With few integrated solutions, deployment in a hybrid or multicloud environment often requires far too much time and toil.

Managing Cloud-Native Application Data

The ephemeral nature of containers makes managing application data more challenging. Kubernetes uses the container storage interface (CSI) to define persistent volumes (PVs) that enable file and block storage to persist as container instances come and go.

As more applications are refactored or implemented with containers and microservices, configuring different types of storage becomes a roadblock. Platform teams need to figure out which storage services they need to make available to their Kubernetes clusters and how to make the same or similar services available in every environment. This can include file, block and object storage as well as database services, message brokers, caching services and more.

The Kubernetes Ecosystem is Rapidly Evolving

With an average of three releases every year, Kubernetes—and the cloud-native ecosystem around it—is evolving rapidly. This creates many options for enterprises running cloud-native applications. But it can also create a lifecycle management nightmare as you struggle to keep up with the latest releases, security fixes, and other updates for your hardware without impacting production applications.

Kubernetes Solutions Need to Simplify Management

A final challenge for companies adopting Kubernetes is that expertise is in short supply. To succeed, you need enterprise-grade Kubernetes management that dramatically simplifies provisioning, day-to-day operations, and lifecycle management for Kubernetes clusters.

Important Capabilities Include:

- Deploy production-ready Kubernetes clusters with a few clicks
- Provide the cloud-native data services needed by modern applications
- Integrate and automate enterprise storage features like snapshots and clones
- Scale without limit
- Integrate best-in-class open-source tools for cluster monitoring, logging and alerting
- Full stack support

Your goal should be to take the complexity out of deploying cloud-native workloads—in any environment—while automating ongoing management to the greatest extent possible to ensure your operations will scale with your expanding digital footprint.

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Nutanix Solves Your Cloud-Native Challenges

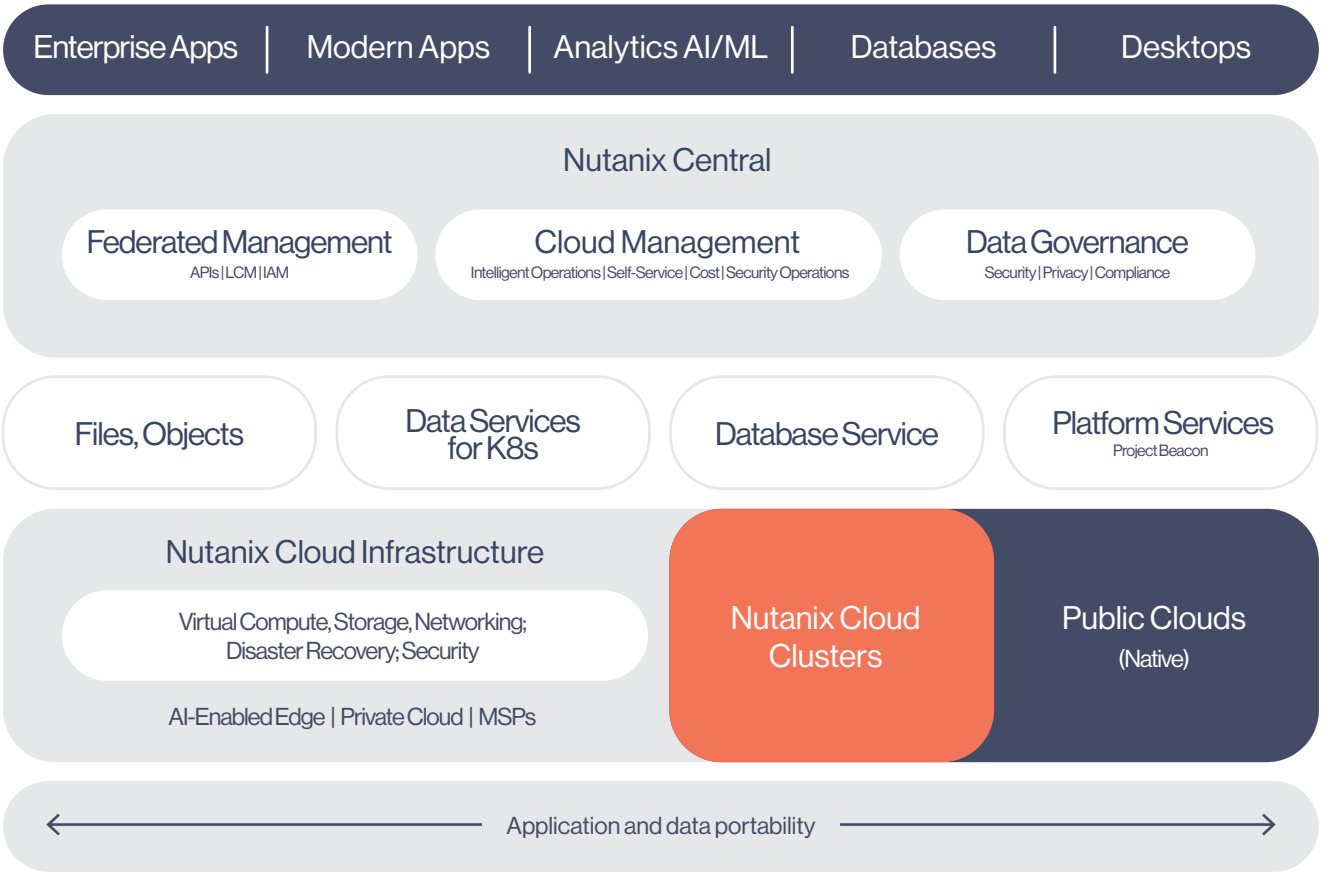
Kubernetes and cloud-native technologies offer a path to faster, more efficient application deployment, overcoming the limitations of traditional development. A hyperconverged platform provides the foundation for a robust cloud-native enterprise. Many organisations have chosen Nutanix HCI and Nutanix Cloud Platform for their cloud-native journey because it offers significant operational benefits.

One Platform. Nutanix delivers a single unified platform that minimises complexity and maximises efficiency, enabling you to run apps and data anywhere. Nutanix HCI supports traditional enterprise applications running in VMs and cloud-native applications—at the same time. And Nutanix gives you the flexibility to deploy and operate the Kubernetes platform of your choice, including industry-leading OpenShift from our strategic partner Red Hat, EKS Anywhere from Amazon Web Services, and our own offering, the Nutanix Kubernetes Engine (NKE).

Runs Everywhere. Nutanix gives organisations the freedom to choose the best operating environments for the job. Nutanix Cloud Platform extends their proven HCI architecture to run in your datacentre, at the edge, in AWS and Azure clouds, or managed by leading service providers such as Cyberfort. Run your applications your way—on your preferred technology stack—without compromising on performance or adding excessive costs. Nutanix turns cloud complexity into multicloud simplicity.

The Services You Need. Nutanix Cloud Platform integrates many of the services you need for cloud-native success, providing a complete infrastructure solution to support Kubernetes and your cloud-native apps. Critical capabilities include integrated data protection and DR, microsegmentation, advanced network security, data-at-rest encryption, database services, and block, file, and object storage services.

Nutanix Cloud Platform: One Platform for Hybrid Multicloud



Building a Foundation for Cloud-Native Success

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Nutanix Cloud Platform is the Ideal Choice for Hybrid Multicloud Kubernetes

Nutanix Cloud Platform is a secure, resilient, and self-healing platform that simplifies planning and deploying hybrid multicloud infrastructure to support all your workloads and use cases. Our proven HCI solution offers a robust, scalable, high-performance infrastructure for deploying and managing cloud-native workloads and Kubernetes alongside traditional applications.

Runs Everywhere

Nutanix Cloud Platform runs any workload anywhere with a unified platform that offers unparalleled support for virtual machines and containers. Whether you prefer to run your workloads on-premises, in a public cloud, at a service provider data centre, or at the edge, Nutanix Cloud Platform has you covered, with consistent management processes and security across all environments.

Scalable

Nutanix HCI combines compute, storage, and networking resources across a cluster of servers into a single resource pool that is managed as a unit, providing a highly available platform that can scale out or up to support modern microservices applications, high-performance databases, and traditional mission-critical applications.

Resilient

Nutanix HCI combines compute, storage, and networking resources across a cluster of servers into a single resource pool that is managed as a unit, providing a highly available platform that can scale out or up to support modern microservices applications, high-performance databases, and traditional mission-critical applications.

Integrated

By giving organisations the capabilities they need out of the box, Nutanix simplifies the cloud-native stack and reduces tedious, time-consuming administrative tasks. Nutanix Cloud Manager (NCM) enables you to build and manage multicloud deployments more simply and quickly by automating routine operational tasks. With security and cost governance, NCM can help you increase the efficiency and security of your fast-growing cloud-native application environment, while driving financial accountability and aiding regulatory compliance.

Easily Upgraded

With frequent Kubernetes releases and patches, lifecycle management is a major headache for teams running Kubernetes, especially if it is on bare metal. Nutanix Lifecycle Manager (LCM) takes the pain out of planning and executing Kubernetes infrastructure upgrades—even in the busiest and most complex environments.

Simplify Kubernetes with Nutanix Cloud Platform

Nutanix Cloud Platform addresses the challenges of cloud-native computing with an integrated platform that provides choice, flexibility, ease of use, and security. Nutanix makes it simple to develop and run all your applications—legacy apps running in VMs and containerised apps—on-premises, in public clouds and at the edge—reducing the complexity of infrastructure management so your teams can focus on developing and operating great applications.

At most companies, VMs and containers will continue to coexist for a long time. Nutanix Cloud Platform offers a single environment that provides exceptional support for both paradigms, with the freedom to choose your preferred Kubernetes distribution. Nutanix Kubernetes Engine (NKE), our native Kubernetes solution, simplifies provisioning, operations and lifecycle management. Because Nutanix software runs on supported hardware from leading vendors on public clouds and at leading service providers, you're never locked in. •

Our Mission: One Platform for Any Kubernetes Solution

NKE · OPENSHIFT · RANCHER · Anthos · kubernetes · Amazon EKS · Azure Arc[1]

Nutanix Cloud Platform

AOS AHV

Nutanix Unified Data Services

DELL EMC · Hewlett Packard Enterprise · Lenovo · aws · Microsoft Azure

[1] *Not a K8s distribution*

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Discover more about Cyberfort's Services

Hybrid multicloud environments are quickly becoming an enterprise necessity for meeting the unique requirements of each business workload.

To avoid the expense and time constraints of operating each distributed IT environment independently using dedicated staff, processes, and tools, enterprises need a unified management platform that lets them view and operate them all in the same way.

Nutanix delivers on this promise by offering a single platform to run apps and data across on-premises, public clouds, hybrid environments, and at the edge, while simplifying operations and enabling business agility.

To test drive the Cyberfort and Nutanix Cloud Platform across hybrid multicloud environments, email info@cyberfortgroup.com and one of our Hybrid Cloud experts will be in touch.

For more information on our Secure Cloud services and how we work with Nutanix please contact us at the details below:

+44 (0)1304 814800 | info@cyberfortgroup.com | https://cyberfortgroup.com

We look forward to working with you

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