June 2026 | Guide

Definitive Guide to Enterprise Cloud Native

Learn how to cut Kubernetes complexity, unify operations, and modernize application delivery across hybrid environments.

NUTANIX

Table of Contents

Chapter 1

Successful Cloud Native Deployment for the Enterprise

Cloud native is a methodology for building and running applications that exploit the advantages of the cloud computing delivery model. At its core, cloud native is about how applications are created, deployed, and managed—not where they reside.

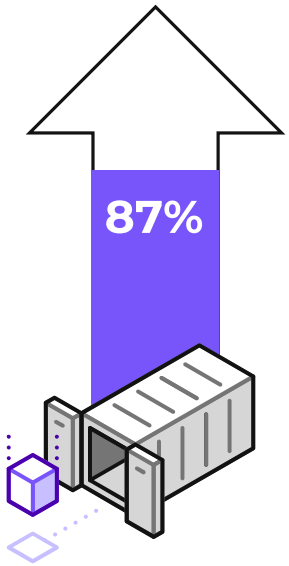
According to the 8th annual Nutanix Enterprise Cloud Index, today's enterprises are running Containerized applications across a range of environments, with: "**57%** using a managed service provider and **53%** using the public cloud. **52%** run them on-premises or in a private cloud. **51%** run containerized applications at the edge." The top 3 factors influencing the decision on where to deploy containers are: technical performance (**76%**), consistency across environments (**75%**), and regulatory, security, and data sovereignty (**75%**).

Cloud native methods rely on an ecosystem of technologies—containers, microservices, serverless functions, and infrastructure—typically orchestrated by Kubernetes®. Over the last decade, the cloud native ecosystem has grown into a massive and diverse set of capabilities—spanning automation, secure networking, infrastructure observability, and dozens of other functions—all largely under the auspices of the Cloud Native Computing Foundation (CNCF), which hosts, sustains, and fosters a range of vendor-neutral, open-source projects—including Kubernetes. The richness of this ecosystem has contributed to the widespread adoption of cloud native by cloud providers and enterprises alike.

The cloud native approach allows enterprises to build highly scalable applications spanning dynamic environments including public, private, and hybrid clouds as well as edge environments.

The shift to cloud native is an enterprise imperative, driven by the relentless market demand for speed and intelligence:

- **Accelerate software delivery:** In the digital economy, the speed at which you can deliver software provides the competitive edge. Cloud native architectures decouple services, allowing development teams to push updates independently and frequently, rather than waiting for release windows for monolithic software.
- **Create an AI-ready foundation:** Cloud native is the essential foundation for Artificial Intelligence (AI) and Machine Learning (ML). AI workloads often benefit from the scalability, portability, and resource efficiency offered by containerized environments.



Looking ahead over the next three years, the vast majority (87%) of executives expect the level of application containerization within their organization to increase.

Enterprise Challenges

Despite the clear benefits, the path to an enterprise-grade cloud native deployment still has many challenges:

- **Developers managing Kubernetes:** When platform engineering teams cannot provide a turnkey platform, developers are forced to manage Kubernetes themselves. This wastes valuable coding time and adds to complexity.
- **Cloud native beyond the cloud:** Many enterprises still run cloud native operations primarily in the public cloud. When they begin to extend beyond the cloud to include datacenters and edge locations, things can get tricky.
- **Silos for containers and VMs:** Running separate infrastructure silos for containers and virtual machines (VMs) can be inefficient and expensive. **86%** of organizations utilizing both want to unify them on a single platform.
- **Data services gap:** Storing data for containers often involves multi-platform and multi-vendor solutions, creating a disconnect between stateless microservices and stateful enterprise data needs. As cloud native applications grow in diversity and complexity, you may need support for file, block, and object storage, plus integration with higher-level data services like databases.
- **Operational complexity:** It can be difficult for platform engineering teams to create a platform that addresses strict enterprise needs including security, data protection, cost management, lifecycle management (LCM), and efficient Day-2 operations.

Nutanix helps bridge the gap between the agility of the public cloud and the control of the enterprise datacenter. Nutanix helps platform engineering teams deploy and operate an enterprise-grade Kubernetes platform at scale—with the ability to span datacenters, public clouds, and the edge, while staying tightly aligned with the cloud native ecosystem. By delivering a complete and flexible platform, Nutanix allows operations teams to take full responsibility for control, security, and resilience so developers can focus on code.

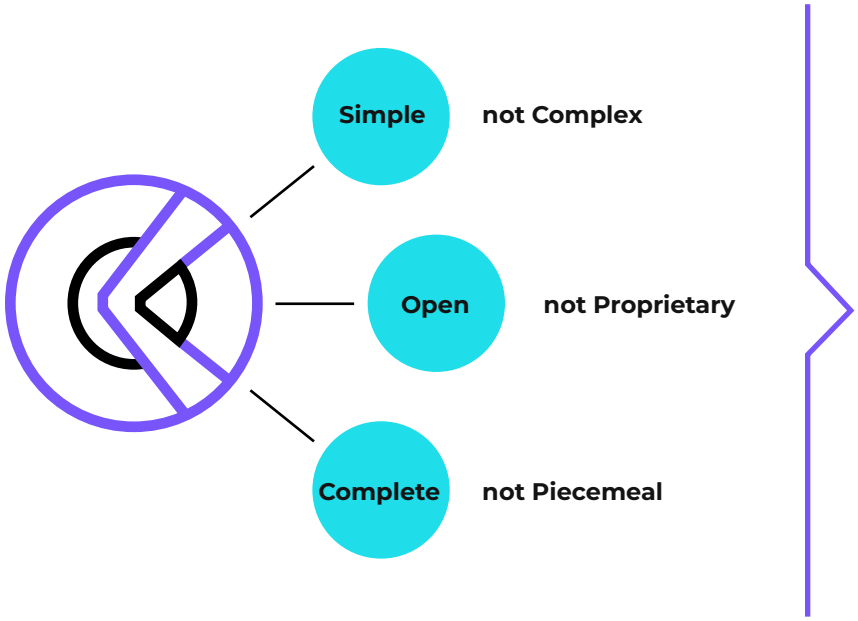
What You Will Learn

This guide explores how to conquer the complexity of Kubernetes, unify your data services, and secure your cloud native stack across any environment—from the datacenter to the edge to the public cloud.

Chapter 2

Take Control of Your Cloud Native Journey with a Full-Stack Enterprise Kubernetes Platform

To navigate the complexity of modern application delivery, organizations require a solution that balances ease of use with enterprise power. Nutanix Kubernetes Platform (NKP) solution is built on three foundational pillars—Simple, Complete, and Open—that help solve the toughest challenges in enterprise cloud native adoption, establishing consistency and reducing operational complexity across any environment.



One Platform to run all your cloud native workloads anywhere

Simple: Accelerate Time to Value

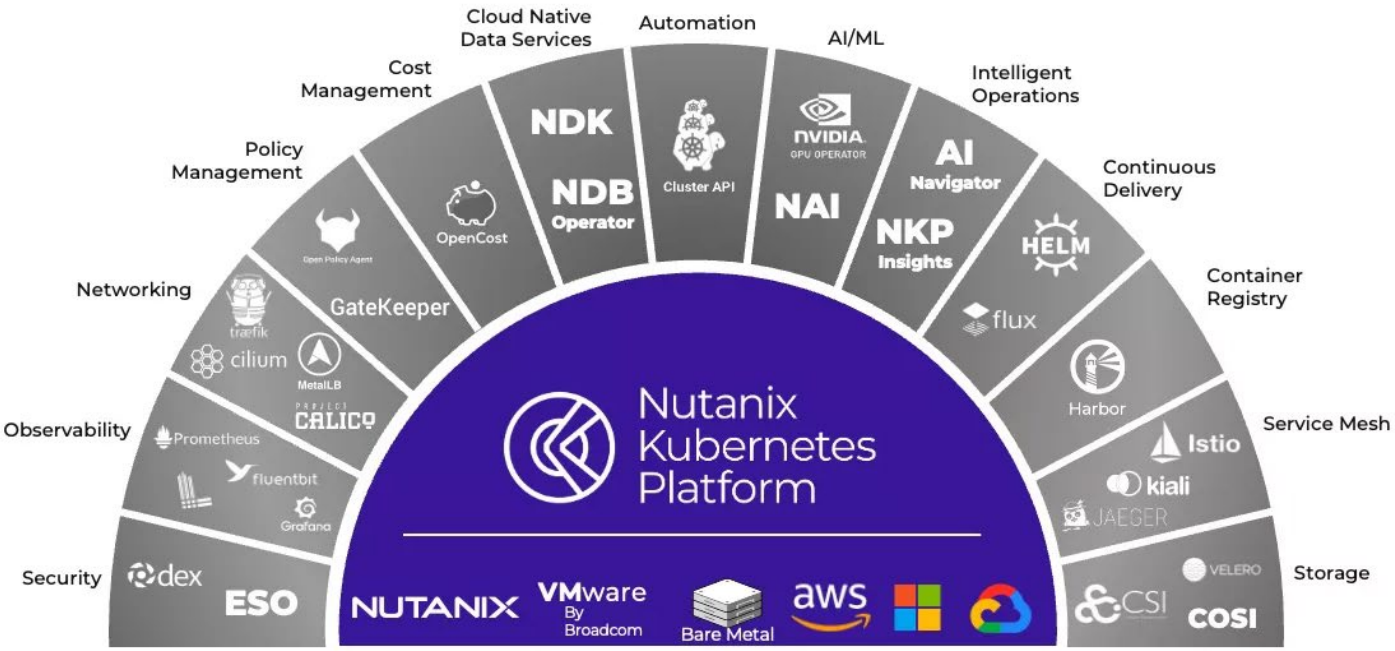
NKP removes the friction that comes with building a cloud native platform from scratch. It automates the provisioning of infrastructure and simplifies lifecycle management, streamlining deployment of high-availability clusters compared to traditional approaches.

Complete: Ready for Production

- **Production-ready:** NKP includes everything required to go to production, including networking, observability, storage integration, and fleet management, with the flexibility to run on bare metal or in VMs.
- **Value-add components:** NKP integrates powerful Nutanix services that address specific enterprise challenges:
  - **Nutanix Data Services for Kubernetes (NDK):** Enterprise-grade, application-aware data protection and disaster recovery. Learn more
  - **Nutanix Unified Storage (NUS):** High-performance block, file, and object storage for all cloud-native data needs. Learn more
  - **Nutanix Database Service (NDB):** Database-as-a-Service for fast, repeatable deployments of SQL, NoSQL, and vector databases. Learn more
  - **Nutanix Enterprise AI (NAI):** Full-stack support for Generative and other AI models. Learn more
  - **Cloud Native AOS:** Nutanix storage and data management for bare metal. Learn more
- **NKP Insights & AI Navigator:** Advanced tools provide AI-driven insight and intelligent troubleshooting.

Open: True Hybrid Cloud Portability

Built on pure, upstream, CNCF-conformant Kubernetes, NKP helps ensure you maintain control of your infrastructure. Our no-vendor-lock-in approach is designed to make workloads migrations easier and helps the platform adapt to your organization's needs.



NKP Runs Everywhere

NKP runs in the datacenter, at the edge, and in the public cloud, an architecture that allows your cloud native operations to utilize the same tools and capabilities everywhere. You can run development clusters in the cloud, production in the datacenter, and AI inference at the edge—all with a single platform.

Most companies need multiple teams to support hybrid operations—one or more "on-prem" teams plus additional teams for each public cloud they use. NKP allows one team to work efficiently across environments, avoiding redundancy, unifying operations, and reducing complexity.

Enterprise Benefits of NKP

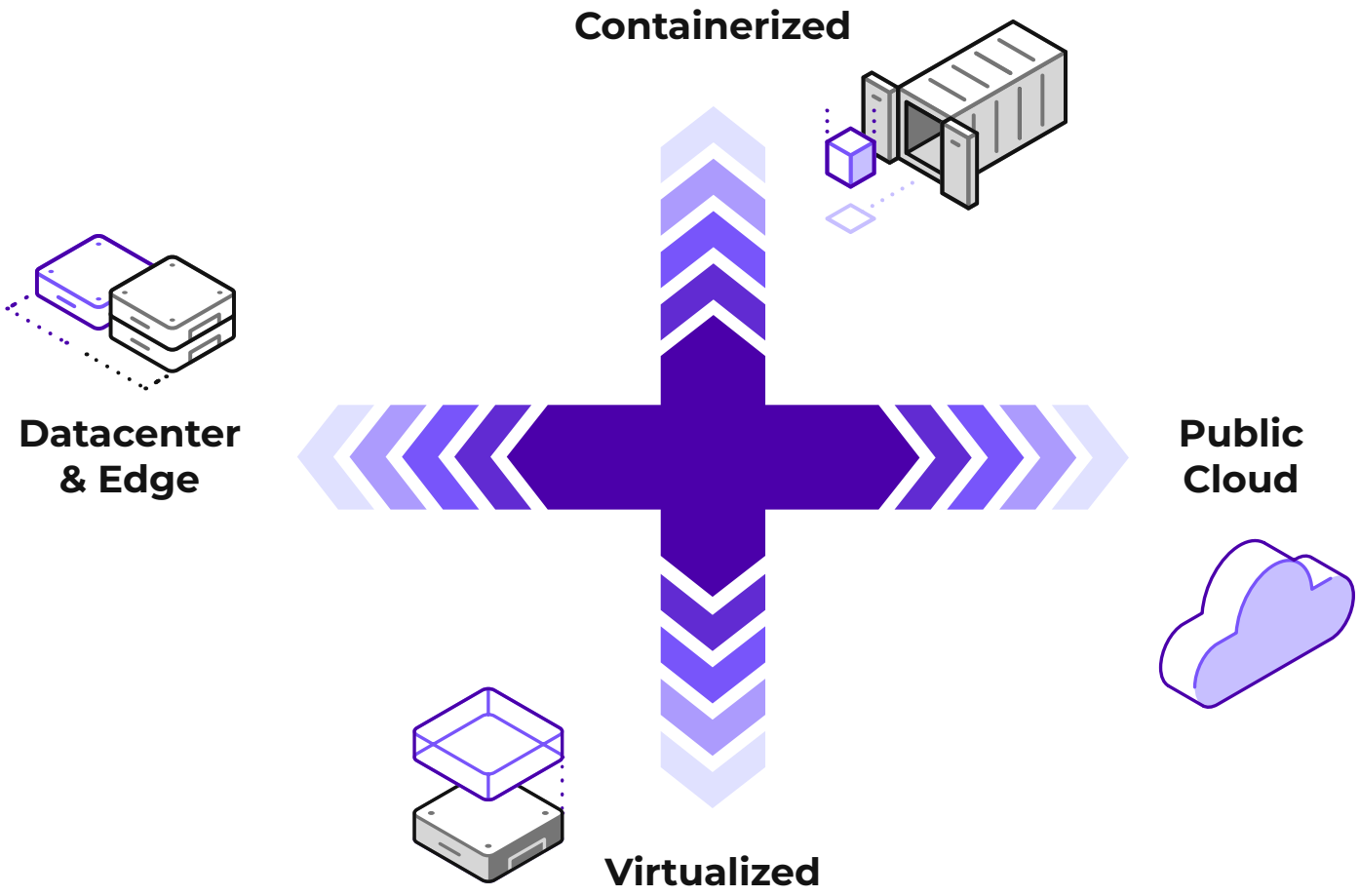
For today's enterprises, adopting a full-stack enterprise Kubernetes platform delivers tangible business benefits:

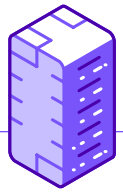
- **Streamline lifecycle management (LCM):** Manually managing the lifecycle of 30+ ecosystem components (Prometheus, Istio, Fluent Bit, etc.) is resource-intensive. With each project releasing 3-4 times annually, an enterprise could be looking at over 100 upgrades a year, each with its own compatibility testing, upgrade testing, etc. With NKP, you upgrade a single platform, which automates the upgrade of the cluster, the OS, and the add-on components—all of which have already been through upgrade testing and compatibility testing.
- **Control operational cost:** By unifying the management of clusters across different environments (cloud, on-prem, edge), NKP helps reduce the overhead of managing disparate tools and redundant teams.
- **Simplify operations:** Run dev clusters in the cloud, production in the datacenter on Nutanix Cloud Infrastructure (NCI), and AI inference at the edge (or any combination of environments)—all managed by a single team using a single pane of glass.
- **Accelerate software delivery:** Decrease time-to-market with a unified self-service experience, allowing developers to utilize critical tools and consume data services easily and without delay.
- **Increase security:** Designed to be secure by default, with centralized authentication, automated policy enforcement to prevent configuration drift, and alignment with CIS hardening benchmarks.
    - **Airgapped support:** Designed with an "air-gapped first" mentality, simplifying deployments in disconnected environments with self-contained images that require no external dependencies or public registry exposure.

Chapter 3

Solving Cloud Native Challenges Everywhere Kubernetes Platform

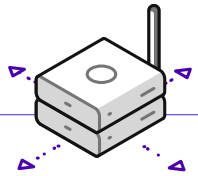
The modern enterprise application is rarely confined to a single location. NKP supports the most complex hybrid multicloud operational needs, providing a consistent operating model across the **Datacenter, Edge, and Public Cloud.**





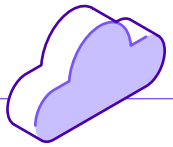
Datacenter

For cloud native deployments in the core datacenter, Nutanix recommends running virtualized Kubernetes on Nutanix Cloud Infrastructure (NCI). NCI provides a resilient, self-healing, and high-performance foundation for mission-critical microservices, blending the flexibility of virtualization with the density of containers. Combining NKP with NCI creates a full-stack solution that simplifies and accelerates datacenter deployment and lets you take advantage of Kubernetes capabilities such as dynamically sized clusters, ephemeral clusters, and custom-sized virtual nodes.



Edge

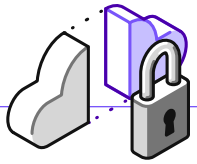
Edge environments often have strict resource constraints and performance requirements. Cloud Native AOS offers the enterprise feature set of the Nutanix storage stack for NKP nodes running on bare metal. This allows edge locations to benefit from enterprise-class storage resilience—including snapshots, replication, and DR—without the need for a virtualization layer or a third-party storage solution. Cloud Native AOS is designed so that even lightweight edge clusters have enterprise-grade data protection.



Cloud

Many enterprises already have a strong commitment to Kubernetes in the cloud. NKP gives you the ability to manage native EKS and AKS clusters, while simplifying integration and management on-premises and cloud operations.

Cloud Native AOS extends Nutanix data services to public cloud Kubernetes—such as EKS or AKS—closing the gap between cloud-native agility and enterprise data SLAs.



Air-Gapped Environments

For military, government, or highly regulated industries, connecting to the internet to pull container images may violate certain security policies or requirements. NKP simplifies the deployment of clusters in disconnected environments by bundling all necessary dependencies and artifacts to help mission-critical systems run securely without external connectivity.

Simplifying Kubernetes Management in Complex Environments

Managing a fleet of clusters across diverse environments can be overwhelming. NKP offers advanced capabilities that help simplify management—even in the most complex, distributed environments:

- **NKP Insights** acts as an automated reliability engineer, scanning clusters using best practices and security benchmarks to detect anomalies before they cause outages.
- **AI Navigator** provides an integrated chatbot that allows platform engineers to troubleshoot issues using natural language. Studies show that manual root cause analysis increases MTTR, and the use of LLMs and other AI techniques simplify root cause analysis.
- **Prism Central** integration allows administrators to view Kubernetes clusters alongside VM infrastructure using a single interface.

Chapter 4

Getting More from Your Data

The design of containers makes them ephemeral and stateless. While containers are stateless, the majority of applications are themselves stateful, requiring persistent data and advanced storage capabilities. Managing this persistent data in a distributed Kubernetes environment presents unique performance, high availability (HA), and multi-protocol access challenges.

To confidently run stateful applications in production, enterprises must secure a data platform that delivers:

- **Intelligent Data Management:** Advanced features like application-aware snapshotting, cloning, and replication.
- **Performance:** Low latency and high throughput for demanding workloads, especially databases and AI.
- **Universal Capacity:** Ready access to block, file, and object storage capabilities.
- **Security & Policy:** Data protection and security policies that travel with the application.
- **Operational Simplicity:** Daily operations that don't require specialized storage expertise.
- **Scalability:** Deploy at any scale and grow with demand without sacrificing performance or resiliency.

Nutanix addresses these challenges with a complete suite of storage and data management solutions designed for the cloud-native era.

Nutanix Unified Storage (NUS)

Modern cloud-native apps rarely rely solely on block storage. They often need shared file systems or S3-compatible object storage for unstructured data. Developers often take the availability of storage services for granted when working in the cloud, but it often takes a lot of work to deliver the necessary storage services on-premises.

Nutanix Unified Storage integrates block, file, and object storage services with your Nutanix environment, eliminating the need for separate storage systems or external data services.

Our Files Storage and Objects Storage provide proven high-performance data access, suitable to address the needs of the most demanding applications, including AI.

Nutanix Data Services for Kubernetes (NDK)

Nutanix Data Services for Kubernetes extends the power of Nutanix Unified Storage to Kubernetes via a Container Storage Interface (CSI), transforming storage from a passive resource into an active data service with advanced capabilities including snapshots, cloning, and replication.

NDK enables synchronous and asynchronous replication for block and file storage across sites, allowing you to protect Kubernetes workloads with the same rigor and reliability as traditional VM-based applications. Importantly, NDK allows you to manage disaster recovery policies directly via Kubernetes manifests, **enabling true "Infrastructure as Code" for data protection**. Developers can now define application-level replication schedules as part of their deployment pipeline.

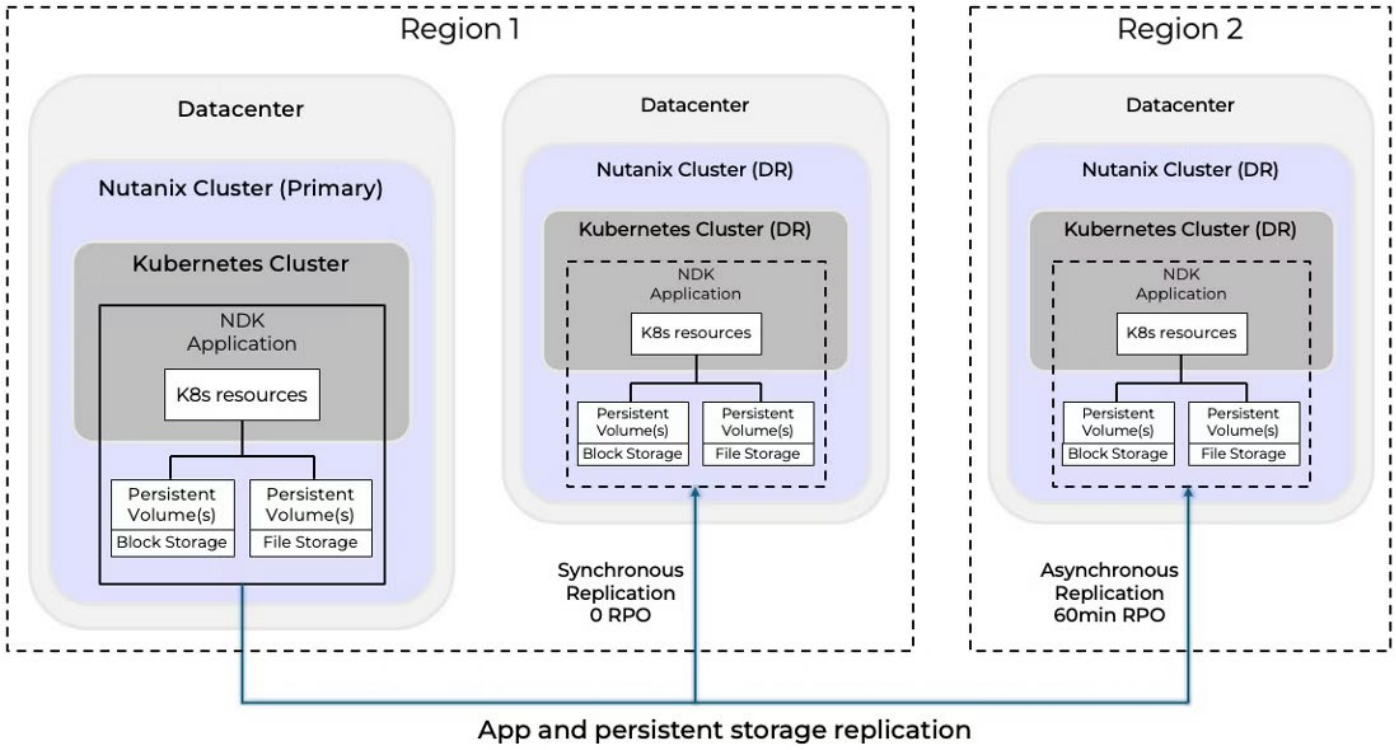


Figure 1. Nutanix Data Services for Kubernetes enables enterprise-grade disaster recovery for cloud native applications.

Nutanix Database Service (NDB)

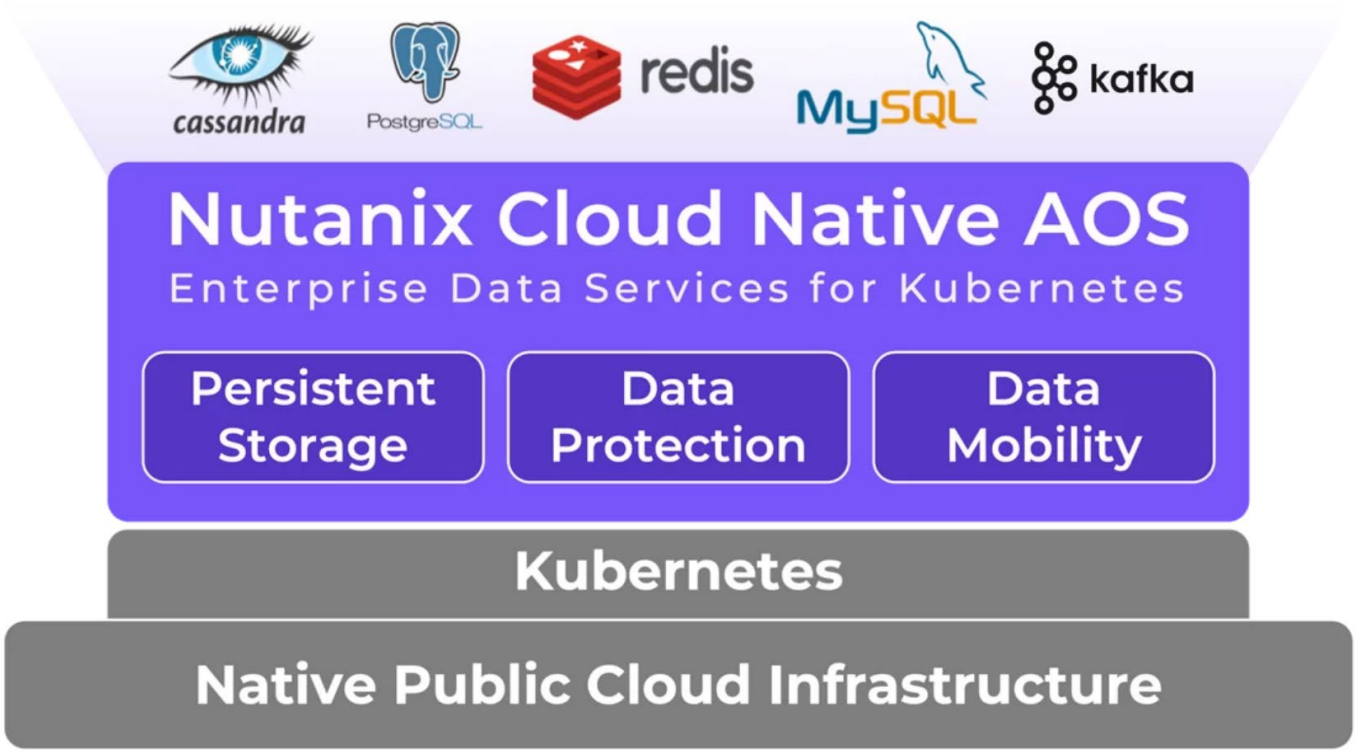
Developers are accustomed to utilizing databases as a service (e.g., Amazon RDS) in the public cloud, but they need alternatives that make databases easier to consume in the datacenter or at the edge.

Nutanix Database Service simplifies database operations by offering Database-as-a-Service (DBaaS), making it simple to deploy and consume a variety of databases on-premises—and in the cloud.

NDB automates the provisioning, patching, and backup of databases—including PostgreSQL, MongoDB, and MySQL. These database services can be easily consumed by applications running on NKP. Using the NDB Kubernetes Operator developers or platform teams can use "infrastructure as code" to automate the provisioning, patching and backup of databases from within NKP.

Cloud Native AOS

For environments requiring maximum performance or specialized hardware on bare metal, Cloud Native AOS delivers the resilience of Nutanix storage directly to Kubernetes nodes. This solution provides secure persistent storage, advanced Day-2 operations (such as snapshots, replication, and DR), simplified management, and workload mobility. Cloud Native AOS is the key to help bare-metal deployments meet strict business SLAs without the need for a virtualization layer.



Chapter 5

Cloud Native Networking

Networking in Kubernetes is often the most complex aspect of the ecosystem. As microservices proliferate, managing the communication between them (east-west traffic) and exposing them to the outside world (north-south traffic) becomes a bottleneck. Platform teams struggle with IP address management, load balancing, and helping to ensure network security policies are applied consistently to pods.

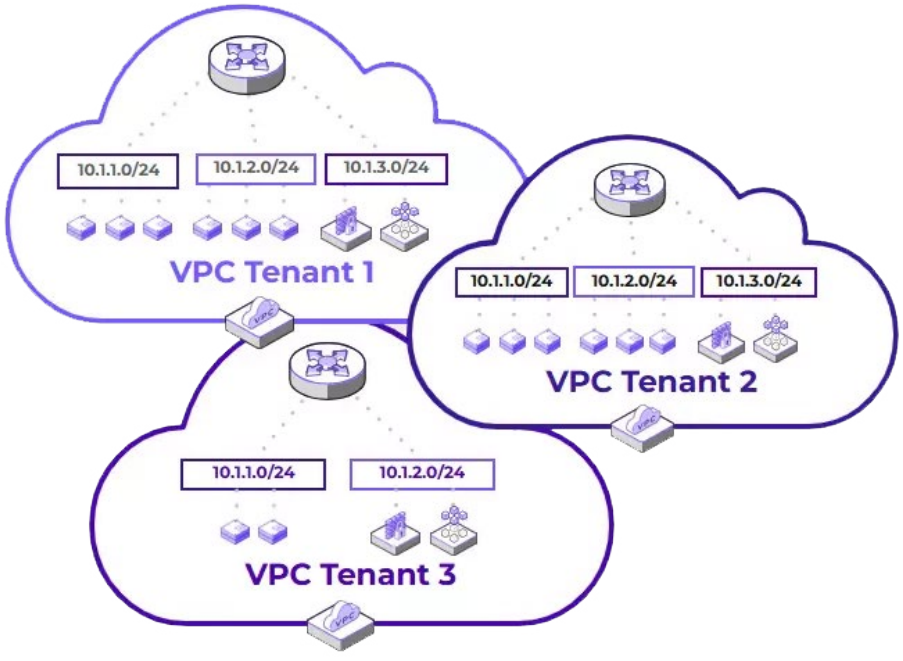
Cloud Native Networking Stack

NKP comes pre-integrated with a robust upstream networking stack to solve common Kubernetes challenges out of the box:

- **Container Network Interface (CNI):** NKP supports industry-standard CNIs like Cilium and Calico. These provide highly scalable pod networking and advanced network policies to control traffic flow.
- **Load Balancing:** For on-premises environments, NKP integrates MetalLB. This provides Layer 4 load balancing without requiring expensive external hardware load balancers.
- **Ingress:** Traefik, included with NKP, manages Layer 7 routing, helping external traffic reach the correct services securely and efficiently.

Flow Virtual Networking

Nutanix can also simplify underlay networking with Flow Virtual Networking, which creates a software-defined network that abstracts physical network infrastructure, allowing for the creation of Virtual Private Clouds (VPCs) on-premises. This mirrors the agility of public cloud networking, enabling multi-tenancy and overlapping IP ranges for different development teams without physical reconfiguration.



Unified Networking for VMs and Containers

One of the biggest constraints in hybrid application design is the network separation between VMs and containers, which can require complex routing and firewall rules to enable communication.

Nutanix Flow Container Network Interface (Flow CNI) removes this barrier by making both VMs and pods native citizens of the same VPC, enabling:

- **Seamless connectivity:** Applications can span both VMs and containers without networking layer changes.
- **Unified security:** Flow network security policies can be applied alongside native Kubernetes network policies, securing all workloads from a single pane of glass.

Flow Network Security

While CNIs handle pod-to-pod traffic, enterprise security requires defense-in-depth. Flow Network Security provides microsegmentation at the VM and infrastructure layer. It acts as a firewall around Kubernetes nodes, helping the cluster protect itself from lateral movement within the datacenter. This complements the internal policies set by the CNI, offering a comprehensive security posture for the cloud-native environment.

Chapter 6

Cloud Native Security

Security in a containerized world is multi-faceted, requiring defense across the supply chain (code), the infrastructure (cluster), and the runtime (active application).

How NKP Addresses Security

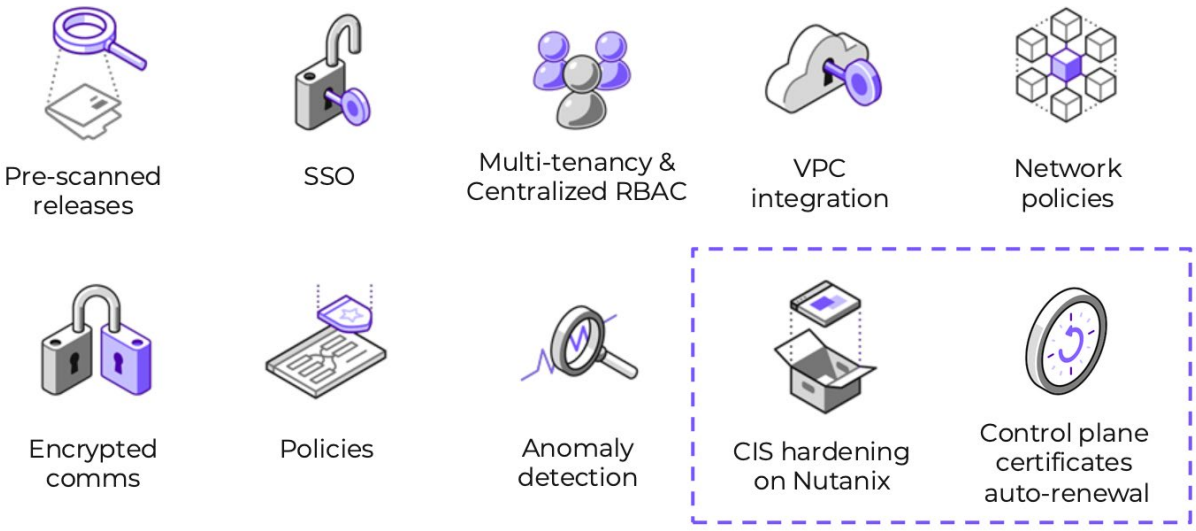
NKP incorporates rigorous standards to protect the entire stack:

- **Centralized Authentication & RBAC:** NKP integrates with enterprise identity providers (OIDC, LDAP, SAML) via Dex. This allows for centralized authentication and simplified Role-Based Access Control (RBAC), so users only have the permissions they need across all clusters.
- **Automated Lifecycle Management (LCM):** Security is a moving target. NKP automates the patching and upgrades of the entire stack to help ensure that CVEs in Kubernetes or its components are remediated rapidly.
- **Policy as Code Enforcement:** Using included tools like Gatekeeper (Open Policy Agent), NKP enforces policies automatically. For example, it can prevent the deployment of containers from untrusted registries or can help ensure that no container runs with “root” privileges.
- **Service Mesh (Istio) Encryption:** NKP includes Istio, which can provide mutual TLS (mTLS) encryption for traffic between microservices. This helps ensure that data in transit is always encrypted, protecting against eavesdropping within the cluster.

Military Grade DevSecOps

For the most sensitive and highly regulated deployments, NKP offers capabilities that can help customers meet strict federal and defense standards:

- **Hardening:** NKP clusters are hardened against CIS (Center for Internet Security) benchmarks by default.
- **Air-Gapped Support:** As mentioned earlier, the ability to operate NKP fully disconnected from the internet avoids a massive attack vector, making NKP suitable for top-secret and mission-critical deployments.



Chapter 7

Accelerate the Path to AI

Artificial Intelligence and cloud native are inextricably linked.
The tools used to build, train, and deploy AI models are natively designed to run on Kubernetes. Containers provide the essential scalability, portability, and resource efficiency to train models in the cloud and deploy them at the edge for inference. Cloud native is the essential foundation for an AI-ready enterprise.

Nutanix Enterprise AI

Nutanix simplifies the adoption of Generative AI (GenAI) and other AI models with Nutanix Enterprise AI (NAI). NAI is a secure, enterprise-ready platform that runs on top of NKP or any CNCF-compliant Kubernetes. It offers:

- **Self-Service Simplicity:** A clean user interface allows data scientists to select and deploy Large Language Models (LLMs) from hubs like Hugging Face or NVIDIA NIM with a single click.
- **Control and Privacy:** Unlike public AI services, NAI allows you to run models on your own infrastructure (on-prem or edge). This flexibility can help organizations keep sensitive data private while also supporting compliance efforts.
- **GPU Integration:** AI workloads are hardware-intensive. NKP includes the NVIDIA GPU Operator, which automates the complex task of configuring drivers and monitoring for GPUs. This allows AI models to utilize the underlying hardware without manual platform engineering effort.

By bundling NAI and the necessary GPU operators directly into the NKP catalog, Nutanix turns a complex AI setup process into a simple “point-and-click” deployment, accelerating your organization’s ability to leverage AI for tangible business value.

Chapter 8

Enabling Developers

Developers simply want to write code. They do not want to configure YAML files, manage ingress controllers, or worry about infrastructure limits. **They demand a self-service experience** that provides them with the tools they need—such as databases, messaging queues, and CI/CD pipelines—instantly.

Enabling Developers with NKP

Platform engineers can deploy NKP and take advantage of its advanced capabilities to build a robust **Internal Developer Platform** (IDP). By leveraging the NKP catalog, your organization can curate a list of approved, secure, and compliant applications.

- **Workspaces and projects:** NKP organizes resources into Workspaces and Projects. This provides developers with their own isolated namespaces where they have autonomy, while IT retains central governance over quotas and access.
- **GitOps:** NKP leverages FluxCD for GitOps-driven delivery. This allows developers to manage infrastructure and application deployments using the version control tools (like Git) they already use. A developer commits a change to a repository, and FluxCD automatically synchronizes the cluster to match that state. **This can help improve consistency, provide an audit trail, and streamline deployment cycles.**

Developers often need access to:

- **Object storage** to store data such as images, video, and audio
- **File storage** for logging
- **Databases** to store structured data such as login information

Especially for on-premises deployments, it can be difficult for developers to access the data services they need. In many organizations, developers may still have to file a trouble ticket and wait for a storage engineer to fulfill the request. As described earlier in the section *Getting More from Your Data*, Nutanix offers a full suite of storage and data management services that can be offered to developers via self-service, streamlining access and removing friction.

Integrating with Existing Toolsets

NKP meets developers where they are. It is designed to integrate seamlessly with existing CI/CD pipelines (Jenkins, GitLab, etc.) and offers a rich ecosystem of platform services—such as Grafana, Loki, and Prometheus—that can be deployed with a single click, empowering developers to innovate more easily and without delay.

Chapter 9

Take Control of Your Cloud Native Operations

The journey to cloud native doesn't have to be complex or chaotic. With the Nutanix Cloud Platform and NKP, your organization can build a scalable, secure, and resilient foundation for modern applications. You can bridge the divide between VMs and containers, secure your software supply chain, and empower your developers to innovate faster.

Whether you are just starting your Kubernetes journey or looking to tame the complexity of a sprawling fleet of clusters across the hybrid cloud, Nutanix provides a path that will allow you to reduce the complexity of your operations.

Next Steps

Experience the simplicity and power of the full-stack Nutanix Kubernetes Platform firsthand.

Test Drive Nutanix Kubernetes Platform

Nutanix Cloud Native Solutions

Explore the Cloud Native Tech Resource Center for technical blogs, how-to videos, and validated designs.

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