Shedding the VMware Layer: A Migration to Bare Metal Infrastructure

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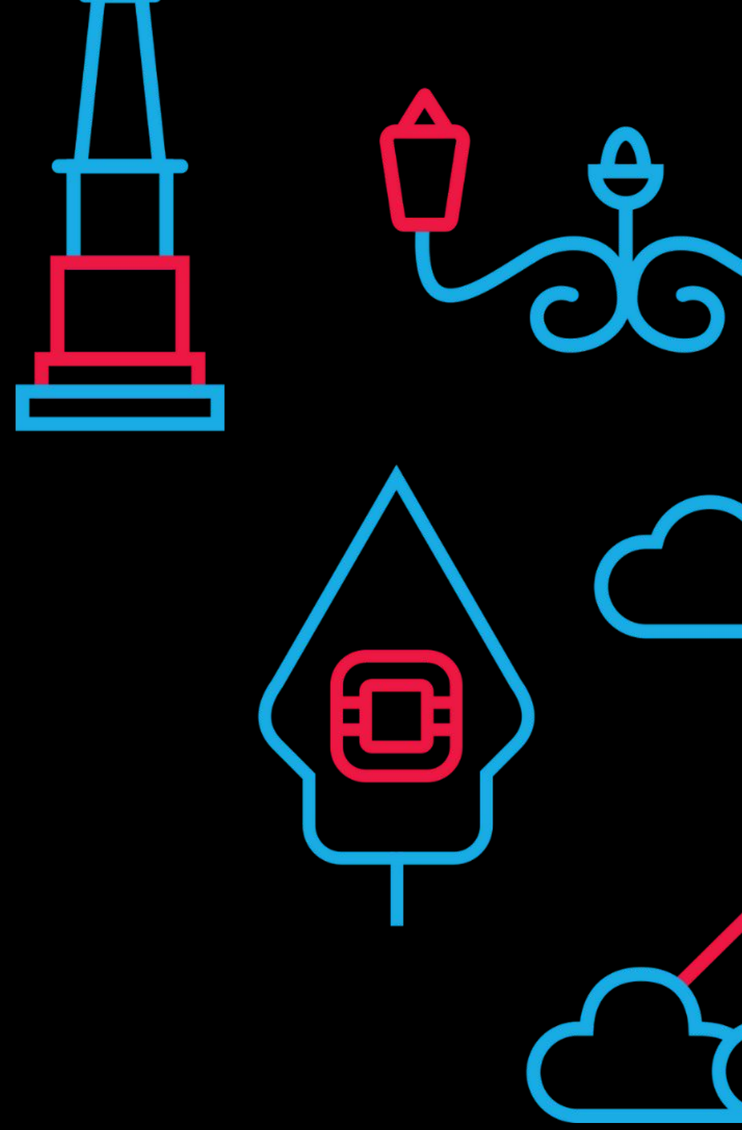


Yogyakarta, 19 July 2025

Life Since 2024

Hrittik Roy (@hrittikhere)

Platform Advocate at Loft Labs

- *CNCF Ambassador* 👋
- *CKA / KCNA / FOCP* 🔧
- *First time at OpenInfra* 🇮🇩

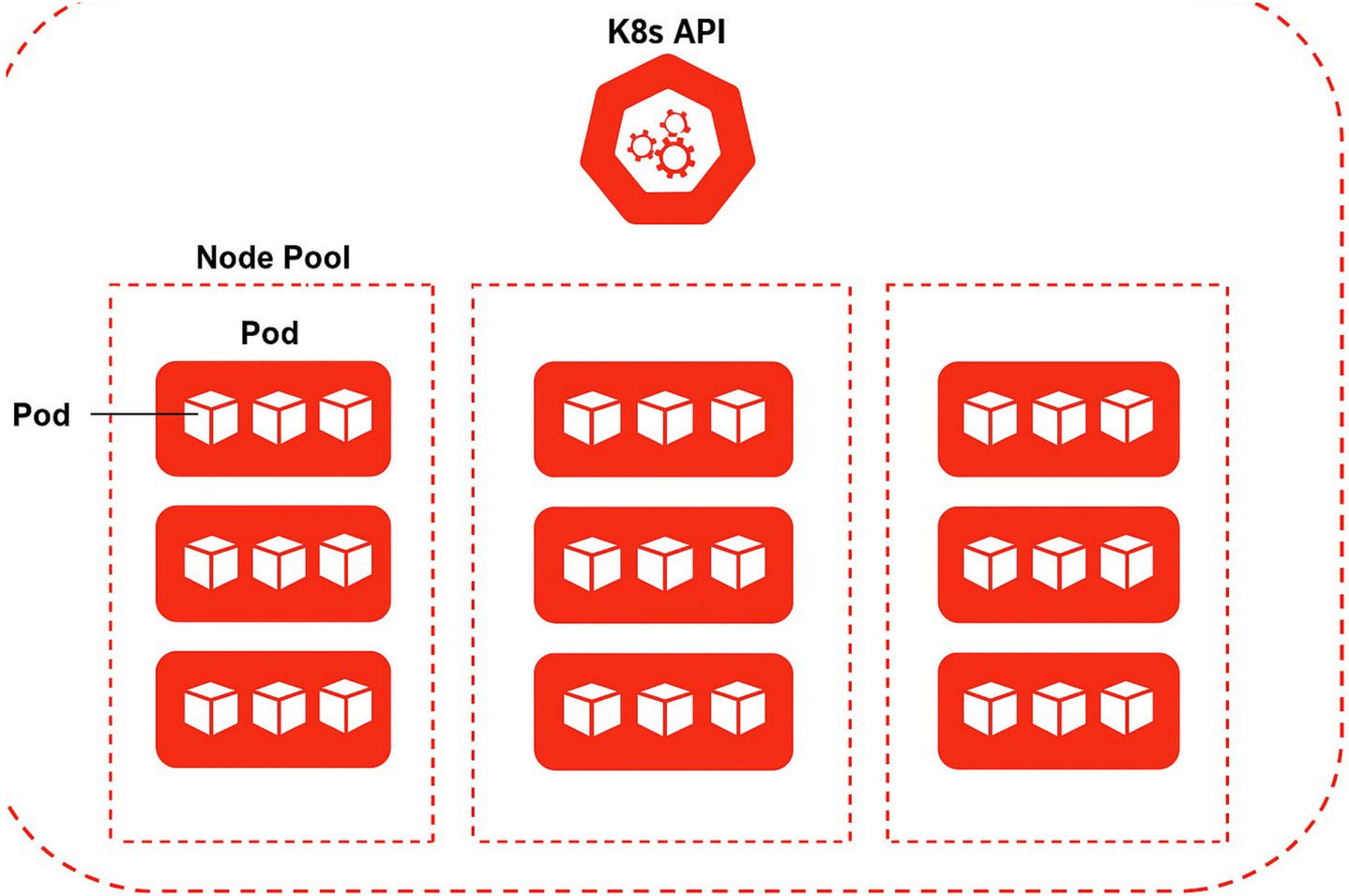
Kubernetes

- *Used by Many Organizations for Application Delivery*
- *Open source system for automating deployment, scaling, and management of containerized applications*
- *Key to cloud native architectures and modern infrastructure*

Kubernetes: Breaking Down

- *Cluster = **Control plane + Nodes***
- *Orchestrates containers, managing scheduling, scaling, and resilience*
- *Components: Pods, Services, Deployments, ConfigMaps, etc*

Kubernetes: Breaking Down



Control plane + Nodes

- *Nodes are the physical or virtual “machines” where workloads run*
- *Responsible for executing Pods (containerized applications)*

Nodes Dive Deep

- *A node = a physical or virtual server (bare metal, VM, or cloud instance)*
- *Each node runs essential services: kubelet, container runtime, kube-proxy*
- *Span Different Locations -> Brought together with k8s*

The Nodes Background: VMs and Hypervisor

- *Virtual Machines (VMs): Emulate complete hardware including CPU, memory, storage*
- *Hypervisor: Software (e.g., VMware, KVM) enabling multiple VMs on one server*
- *VMs offer strong isolation but add resource overhead*

Diagram Time

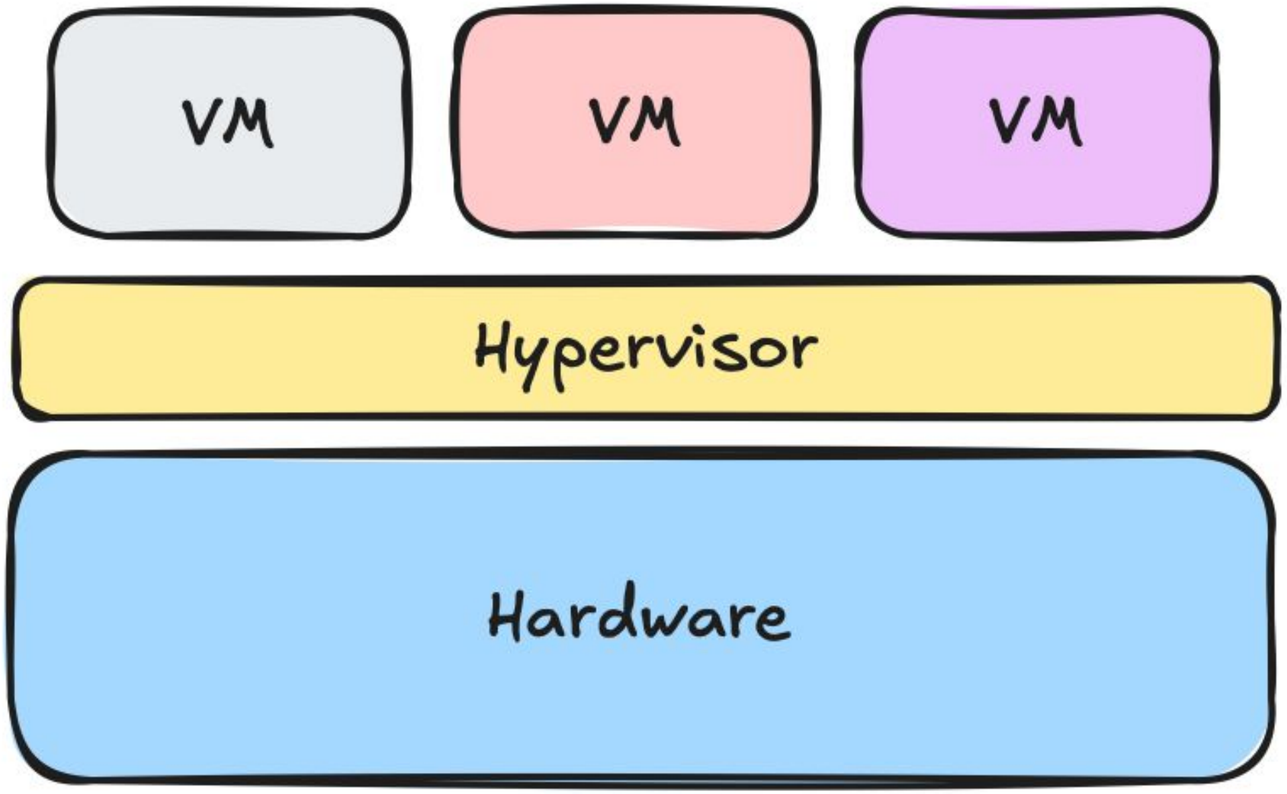
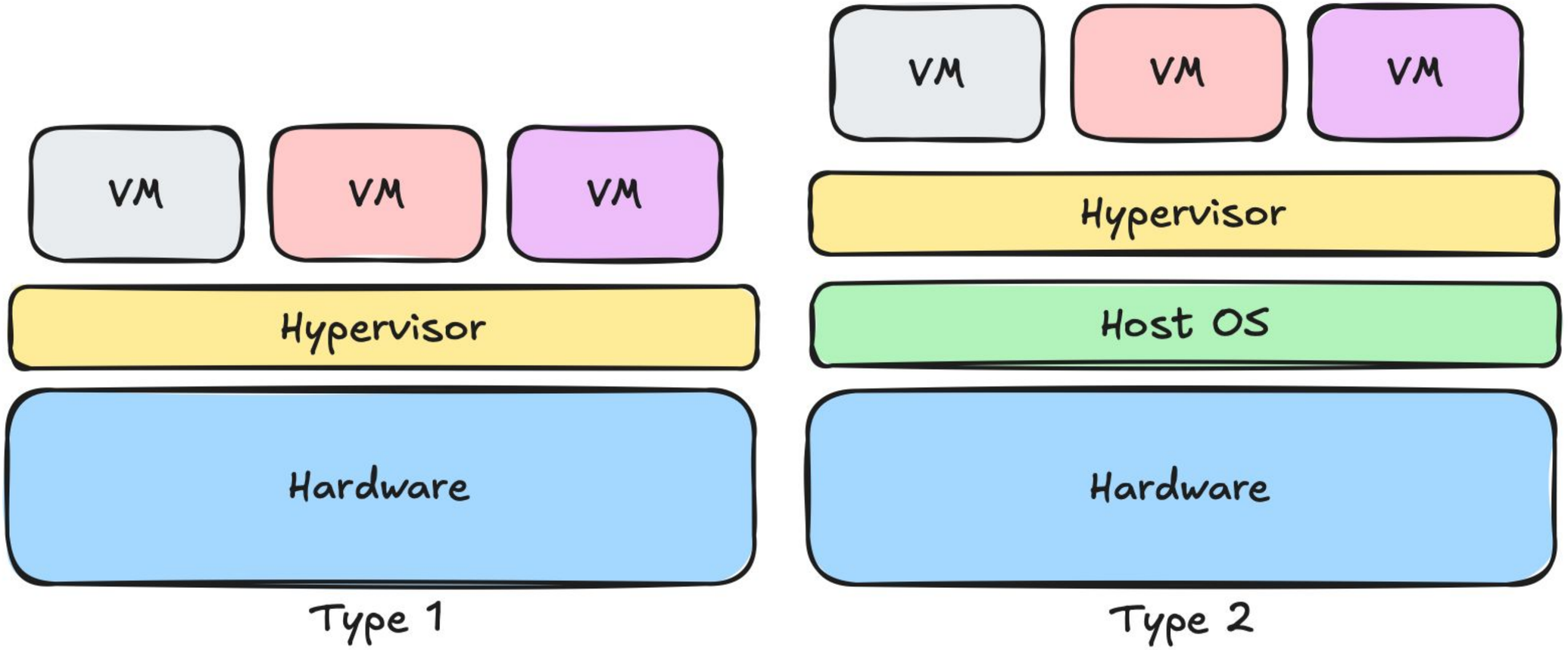


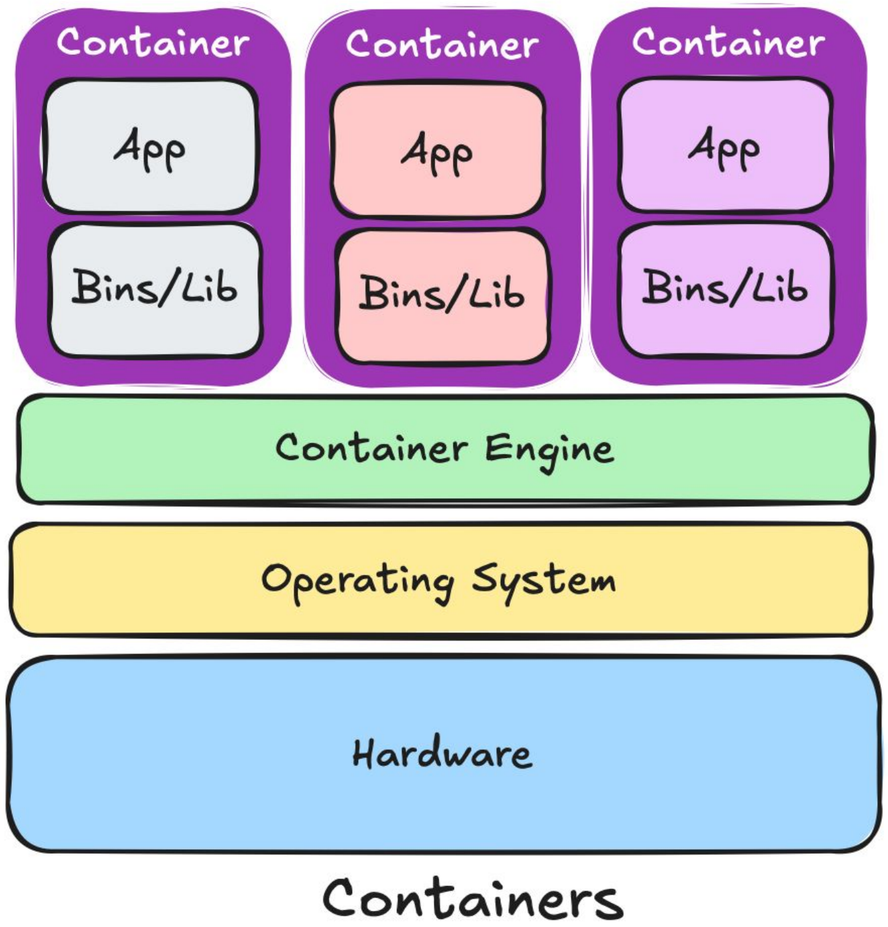
Diagram Time



Containers with Orchestration

- *Containers come as lightweight isolation*
- *Faster with less overhead*

Diagram Time



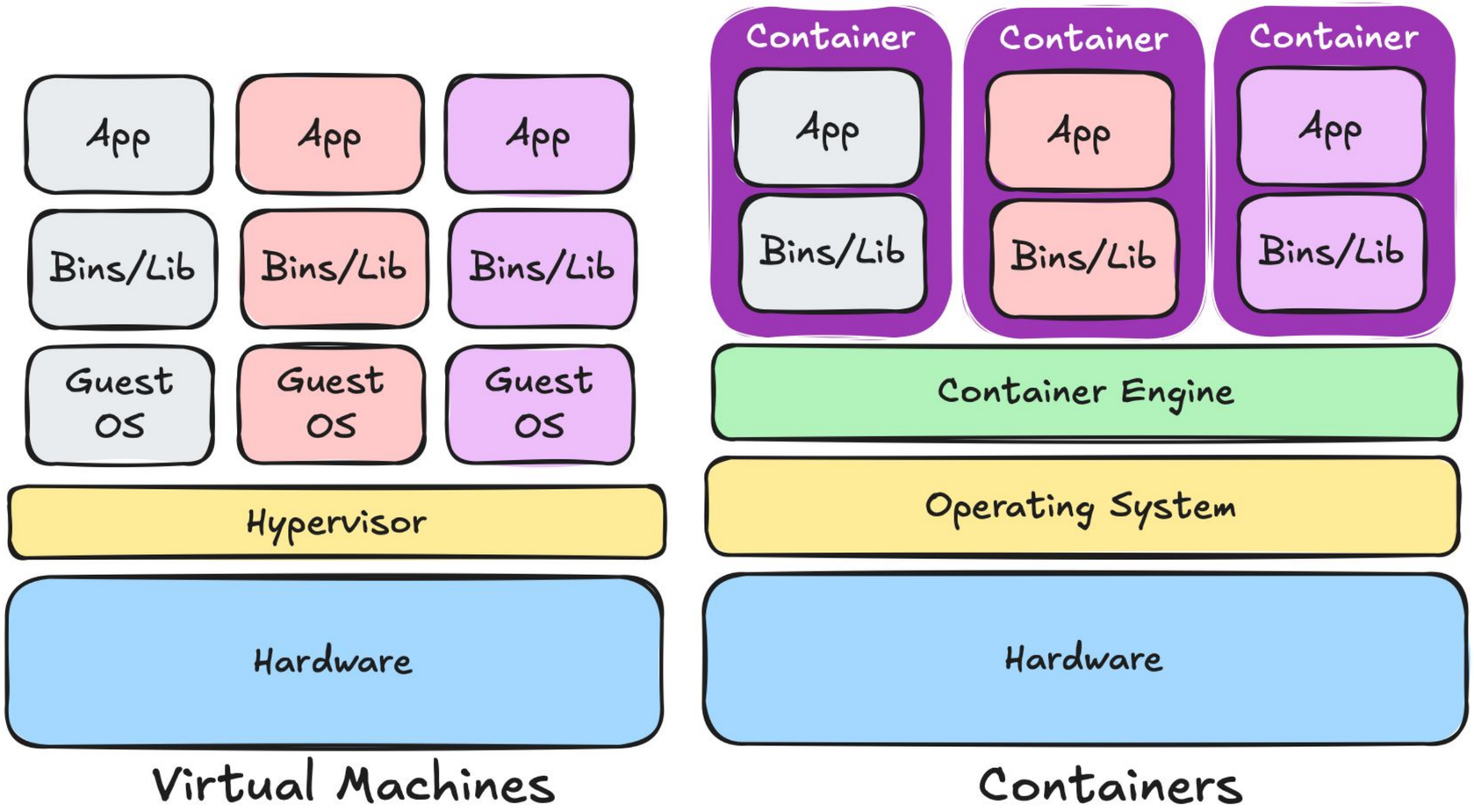
Containers with Hypervisor

- *Traditionally, Kubernetes clusters run in VMs (hypervisor layer)*
- *Each VM runs its own OS—leading to resource duplication and inefficiency*

Containers Are an Abstraction Layer: Why Need a VM Hypervisor?

- *Containers virtualize the OS, not hardware which is much more lightweight*
- *Adding VMs beneath containers increases complexity, overhead, and licensing costs*
- *Resource utilization is less efficient in VM-based architectures*

But why Hypervisor again?

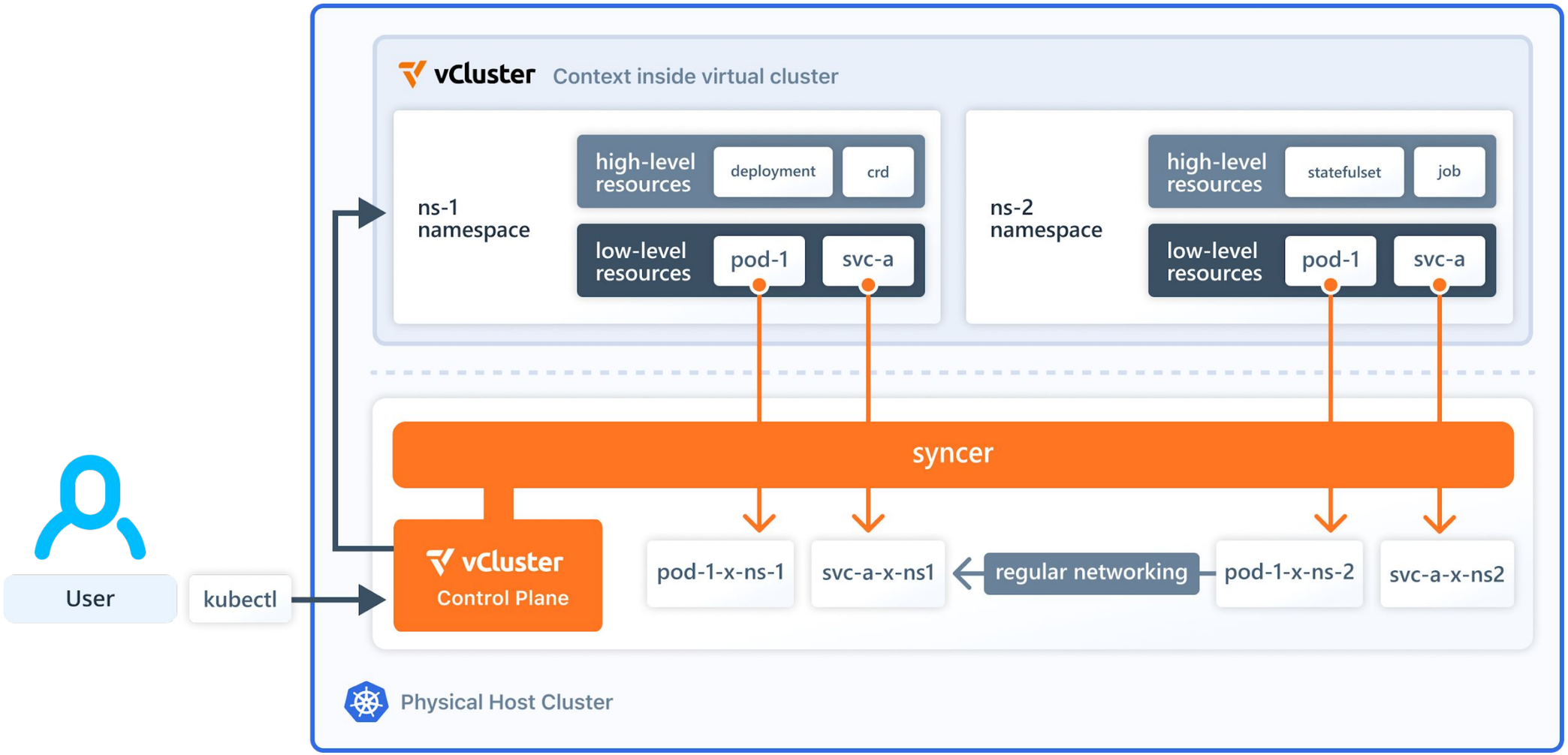


BUT What about virtualization and tenant isolation?

Virtual Cluster with vCluster

- *Open-source tool for creating virtual Kubernetes clusters inside namespaces*
- *Enables strong multi-tenancy without duplicating infrastructure*
- *Each vCluster is an isolated “cluster-in-a-namespace” with its own API server*

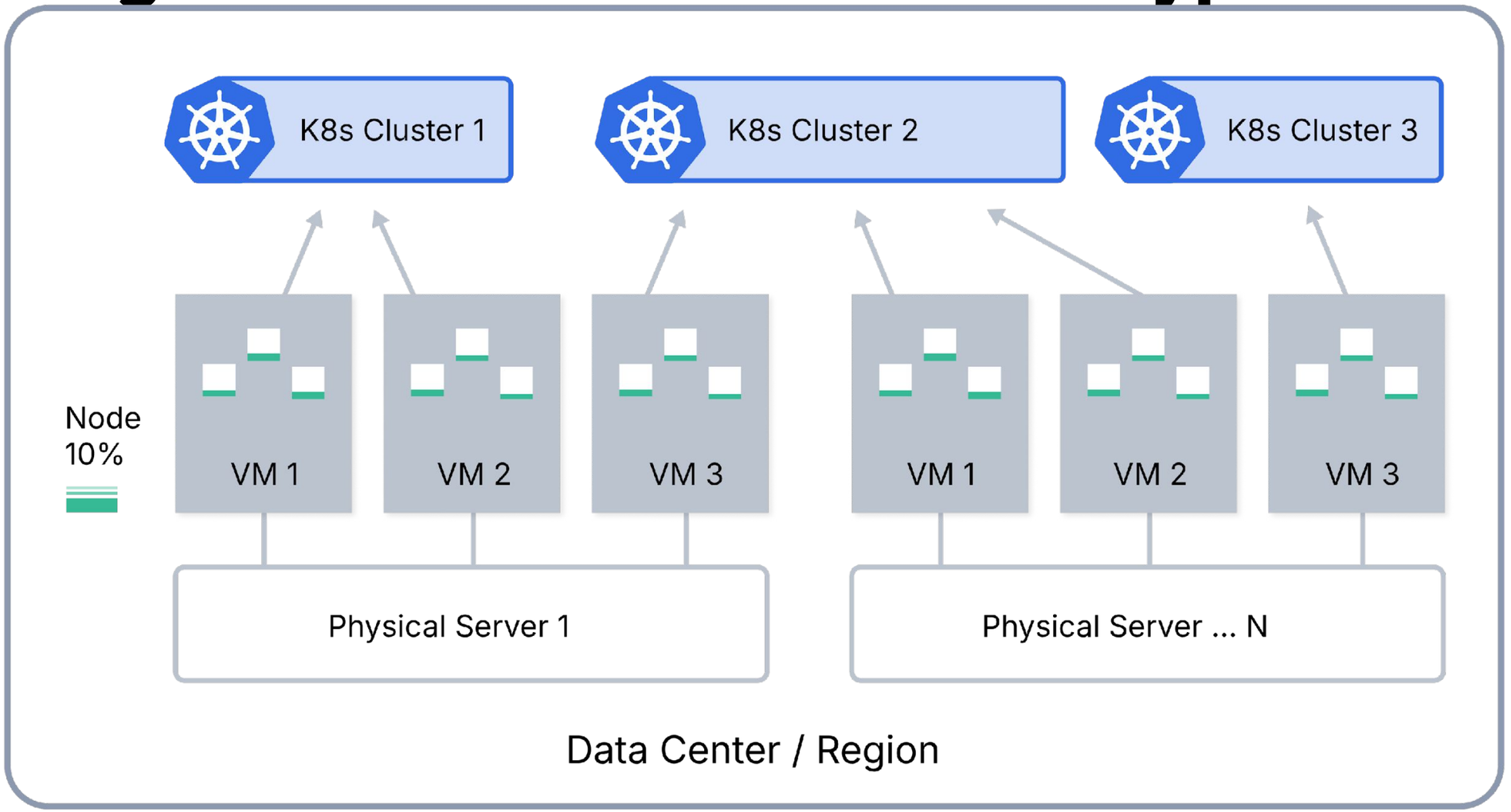
vCluster


vCluster
Context inside virtual cluster
ns-1
namespace
high-level resources
deployment
crd
low-level resources
pod-1
svc-a
ns-2
namespace
high-level resources
statefulset
job
low-level resources
pod-1
svc-a
syncer
User
kubectl
vCluster
Control Plane
pod-1-x-ns-1
svc-a-x-ns1
regular networking
pod-1-x-ns-2
svc-a-x-ns2
Physical Host Cluster

Introducing Kubernetes as the New Hypervisor

- *Kubernetes orchestrates containers across nodes, acting as an abstraction for infrastructure*
- *By running directly on bare metal, Kubernetes replaces much of what hypervisors/VMS used to do*

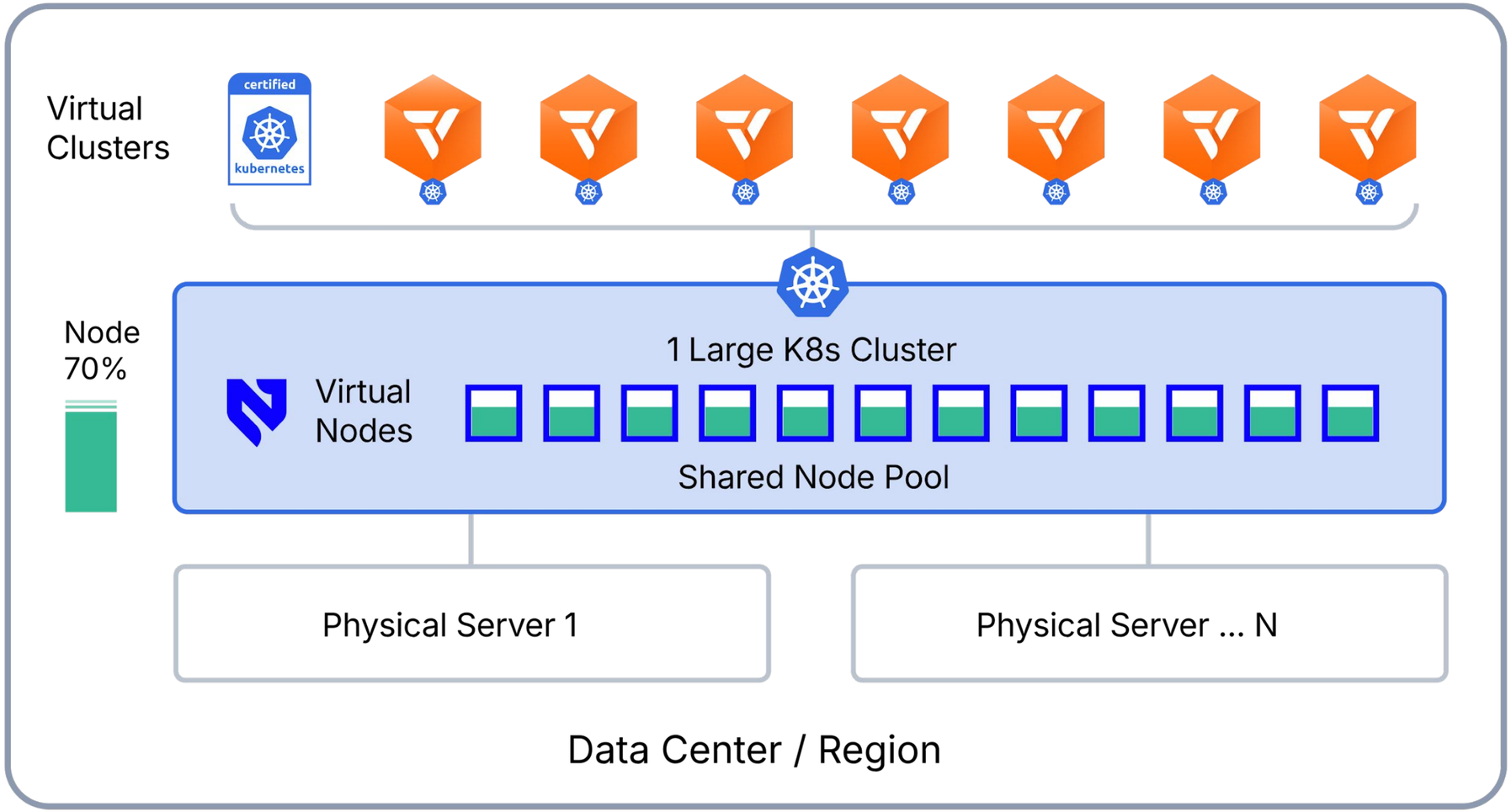
Introducing Kubernetes as the New Hypervisor



Create Virtual Clusters for New Teams

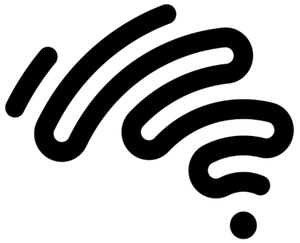
- *With vCluster, teams can get dedicated Kubernetes clusters on shared hardware*
- *No need for new VMs; provisioning is fast and cost-effective*

An Isolated Pool



Benefits

- *Complete isolation for teams and workloads*
- *Resource quotas and policies per vCluster*
- *Fast provisioning and delete times—seconds instead of minutes or hours*
- *Removes VM sprawl, simplifies platform operations*



Aussie Broadband

vCluster

99%
faster cluster provisioning

288x
faster service deployments

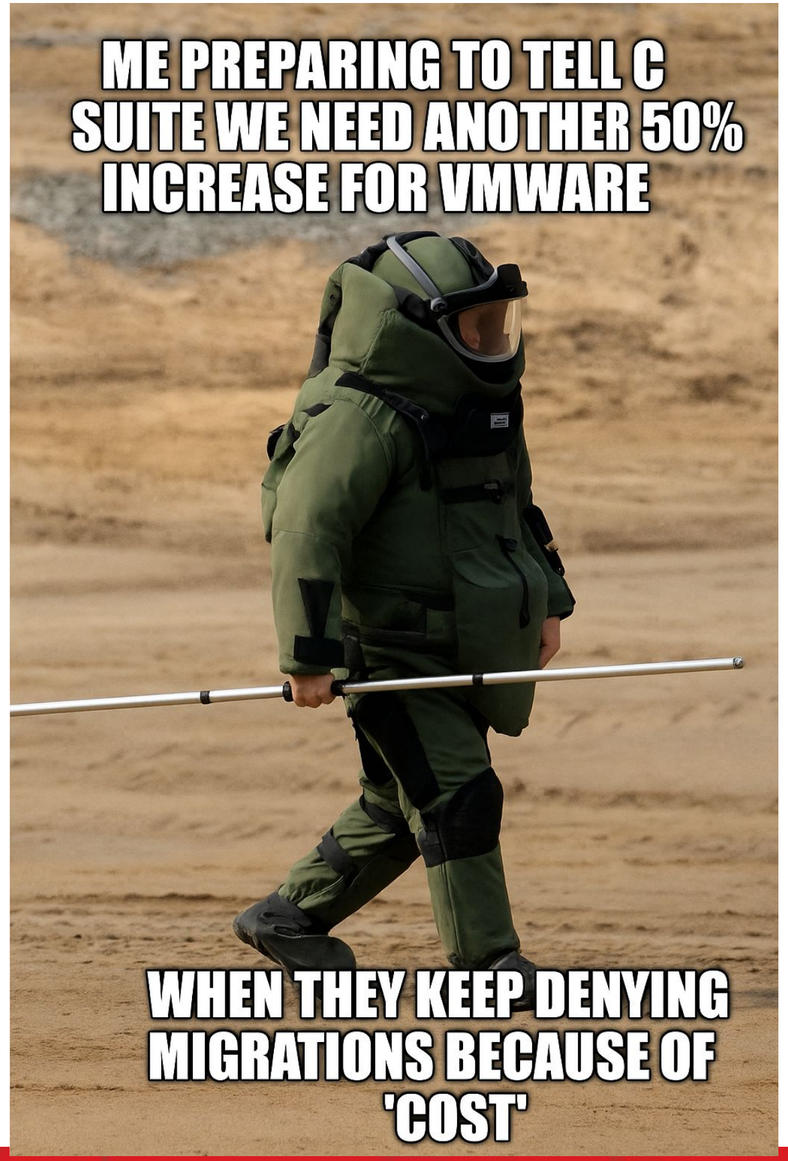
$180k
provisioning reduction cost per year

2.4k
hours of dev time saved per year

Strategic Benefits of Bare Metal Kubernetes

- *Lower operational and licensing costs (no hypervisor to license)*
- *Increased resource efficiency: direct access to hardware*
- *Enhanced application performance especially for intensive workloads and GPU consumption*

So...


ME PREPARING TO TELL C SUITE WE NEED ANOTHER 50% INCREASE FOR VMWARE
WHEN THEY KEEP DENYING MIGRATIONS BECAUSE OF 'COST'

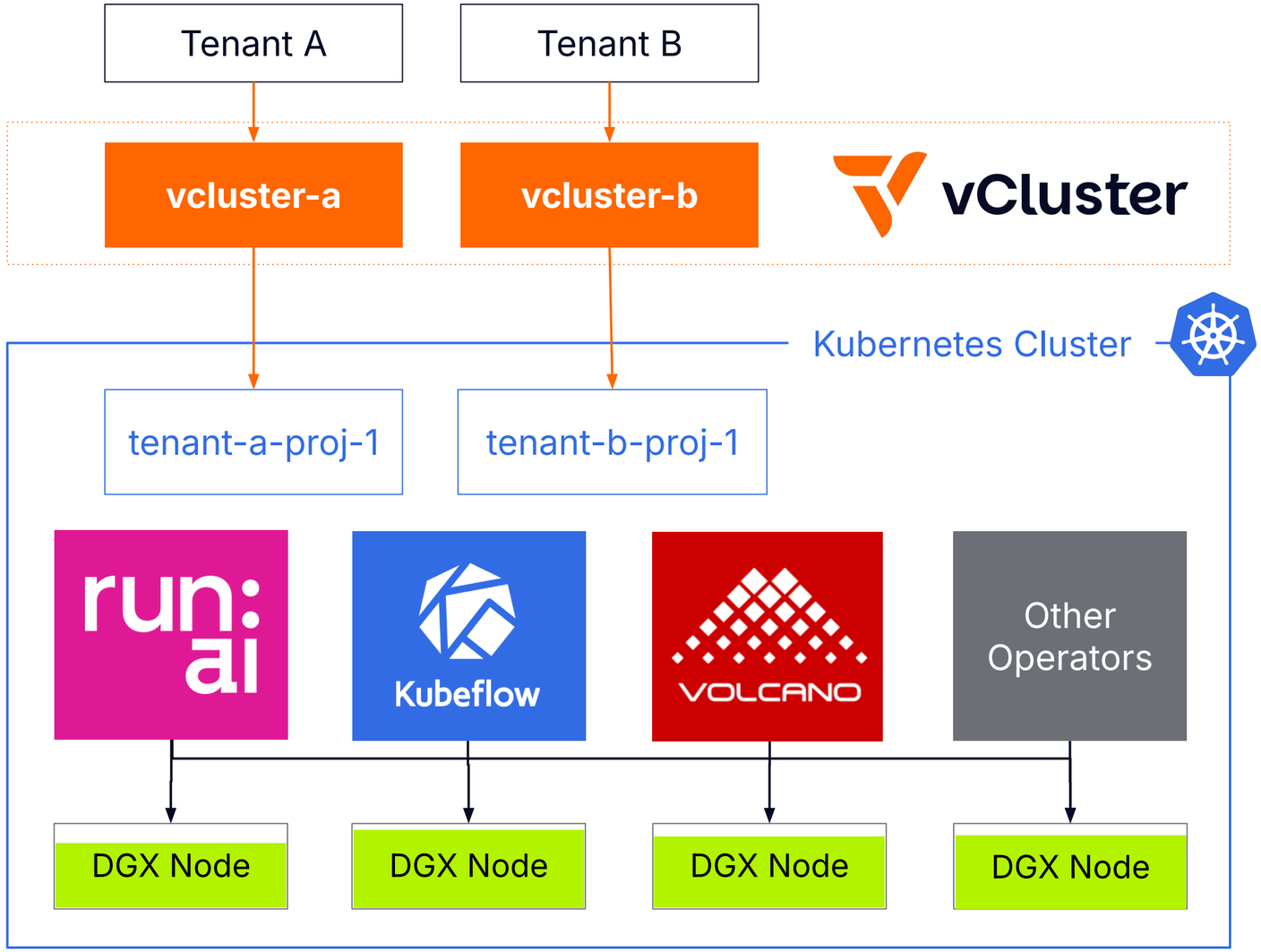
Cost Optimization

- *Licensing savings: $0 spent on VMware or hypervisors post-migration*
- *Hardware consolidation: higher utilization per node*
- *Less maintenance and fewer moving parts*

Future-Proofing Your Infrastructure

- *Your infra with k8s on bare metal scales seamlessly as needs grow*
- *Supports rapid adoption of new technologies and tools (e.g., GPUs, AI/ML workloads)*
- *Rolling out clusters is fast—future teams can spin up environments in seconds*

vCluster: multi-tenancy for current and future workloads



Final Thoughts

- *Eliminating the VMware layer unlocks efficiency, speed, and cost savings*
- *Tools like vCluster empower secure multi-tenancy*
- *Migration requires planning but delivers long-term benefits and infrastructure agility*

Join Slack (*#vCluster*)

Meet the Community

slack.loft.sh

Q&A and ME:

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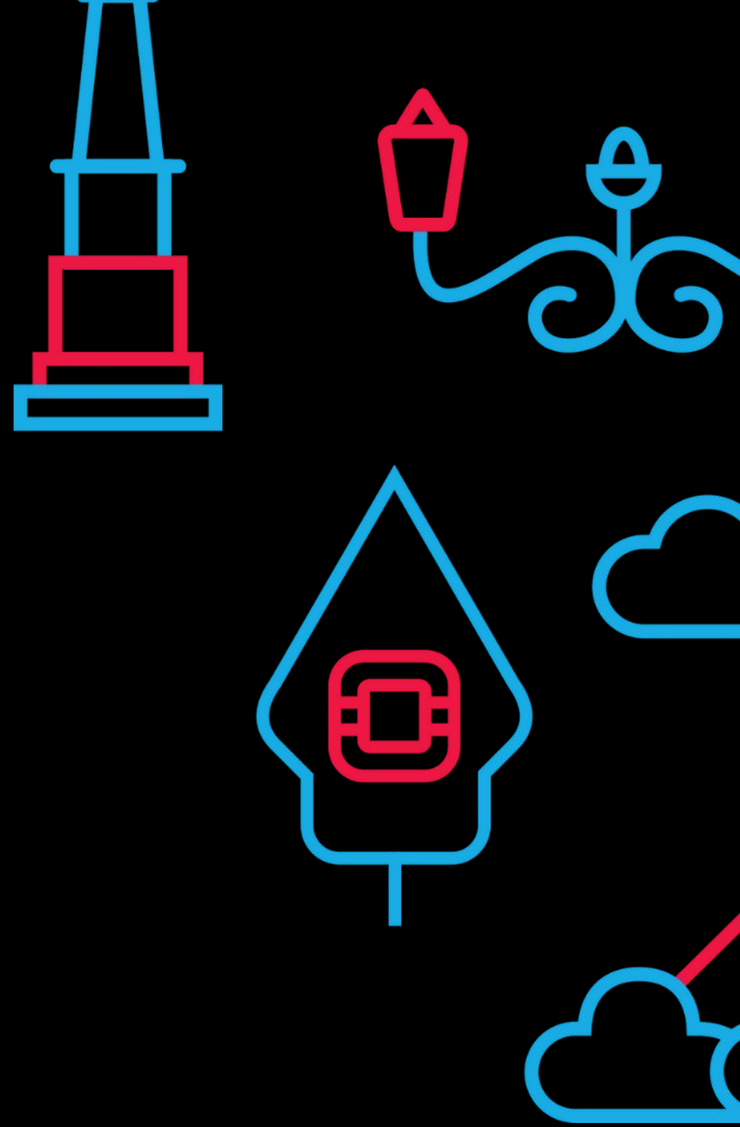
in/hrittikhere

THANK YOU



EasyStack open cloud computing

AMD

datacomm flexi WOWRACK

ZConverter Cloud

SIVALI CLOUD TECHNOLOGY

boer technology

NASHTAGROUP

nevacloud

Yogyakarta, 19 July 2025