Red Hat Summit

Connect

OpenShift sobre OpenShift Virtualization

Descubre el poder de la virtualización para escalar sin límites

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What we'll discuss today

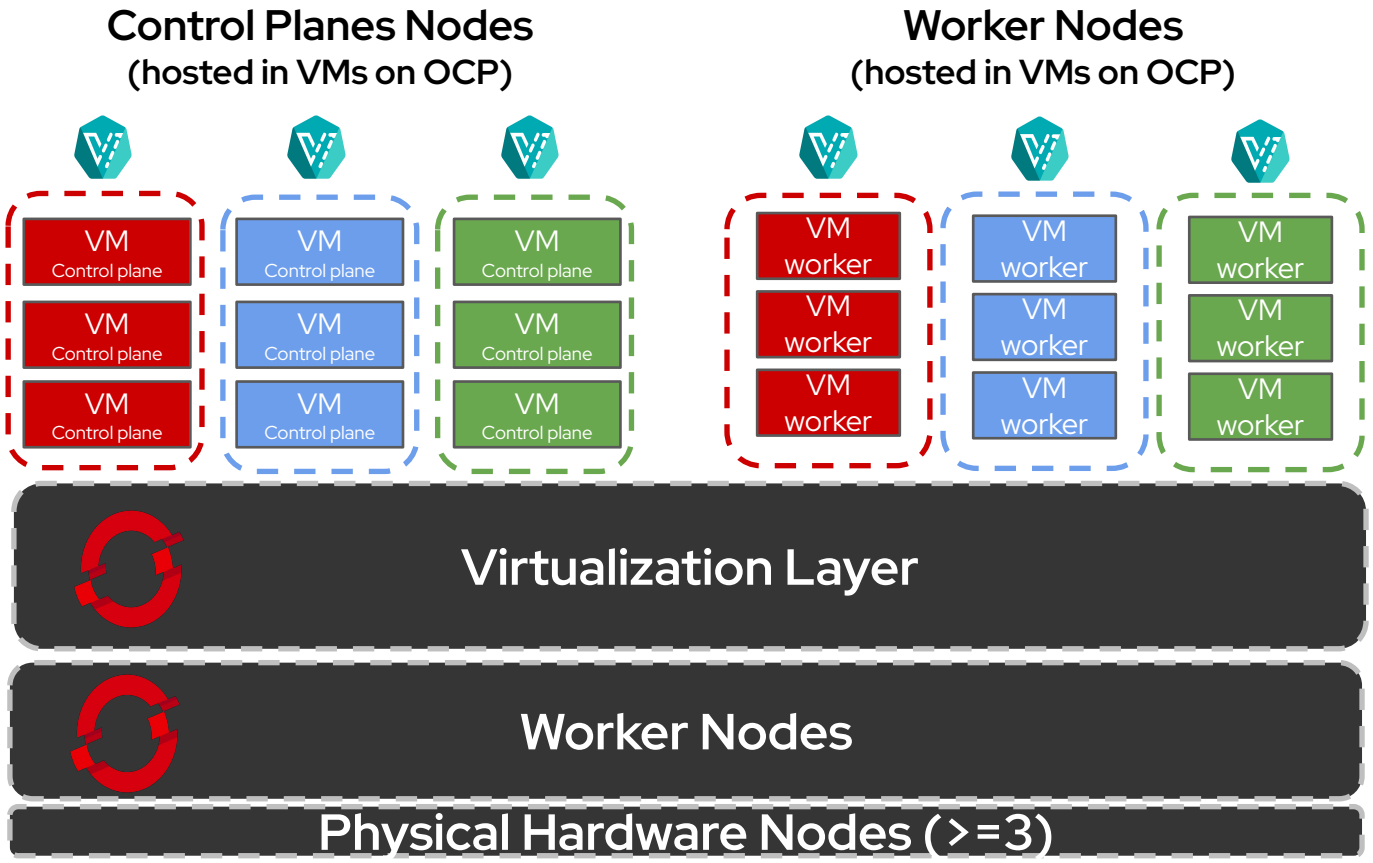
- OpenShift on OpenShift (Virtualization)
- Networking
- Storage
- Architecting your own solution
- Q&A

OpenShift on OpenShift (Virtualization)

OpenShift on OpenShift Virtualization

Standalone installation

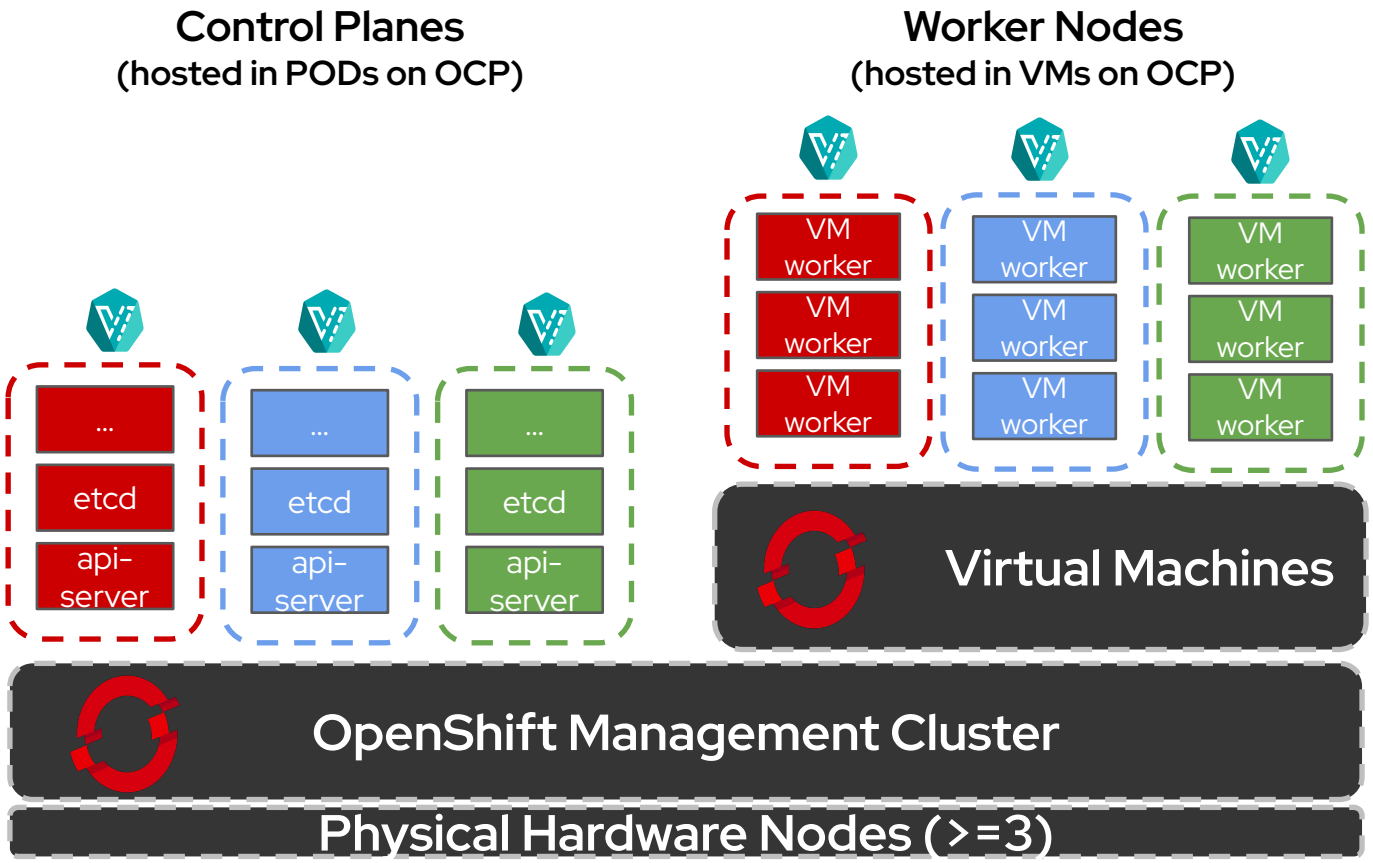
- Optimize resource usage using **virtualization** on the same bare metal cluster
- OCP can be installed platform agnostic (User Provisioned) → No IPI deployment method
- **No** storage and network **integration** with the cloud provider (OpenShift Virtualization)
  - There is no access to the bare metal cluster storage infrastructure
  - There is no integration with the bare metal cluster ingress service
- **Supported** but not recommended (KCS)



OpenShift on OpenShift Virtualization

Hosted Control Planes

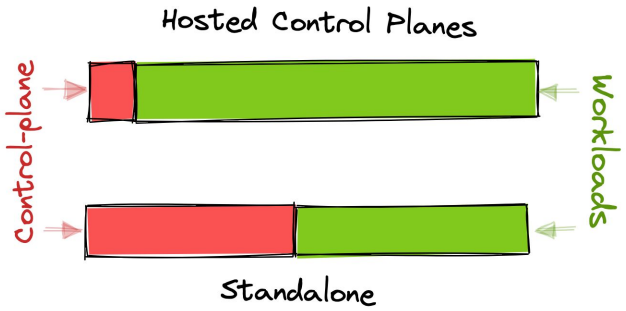
- HCP is a **cloud-native architecture** where, the control plane **is decoupled** from the data plane
- Full integration with the underlying OpenShift bare metal cluster:
  - From **hours to minutes** to get an OCP cluster up and running
  - **Simplify** multi-tenant **management**
  - Native worker **autoscaling**
- Optimize resource usage using **containerization and virtualization** on the same bare metal cluster
- **Easy** storage and network **integration** with the bare metal cluster:
  - Storage infrastructure
  - Ingress service
- **Supported** and **recommended** (KCS)



Hosted Control Planes: A true game changer

HCP

- Supported OpenShift topology
- Reduced infrastructure costs / densification
- Faster cluster creation
- Strong separation between control and workload
- Support multi-arch / multi-env
- Centralized management in a "Managed" model



OpenShift on OpenShift Virtualization

The power of virtualization (and the downsides!)

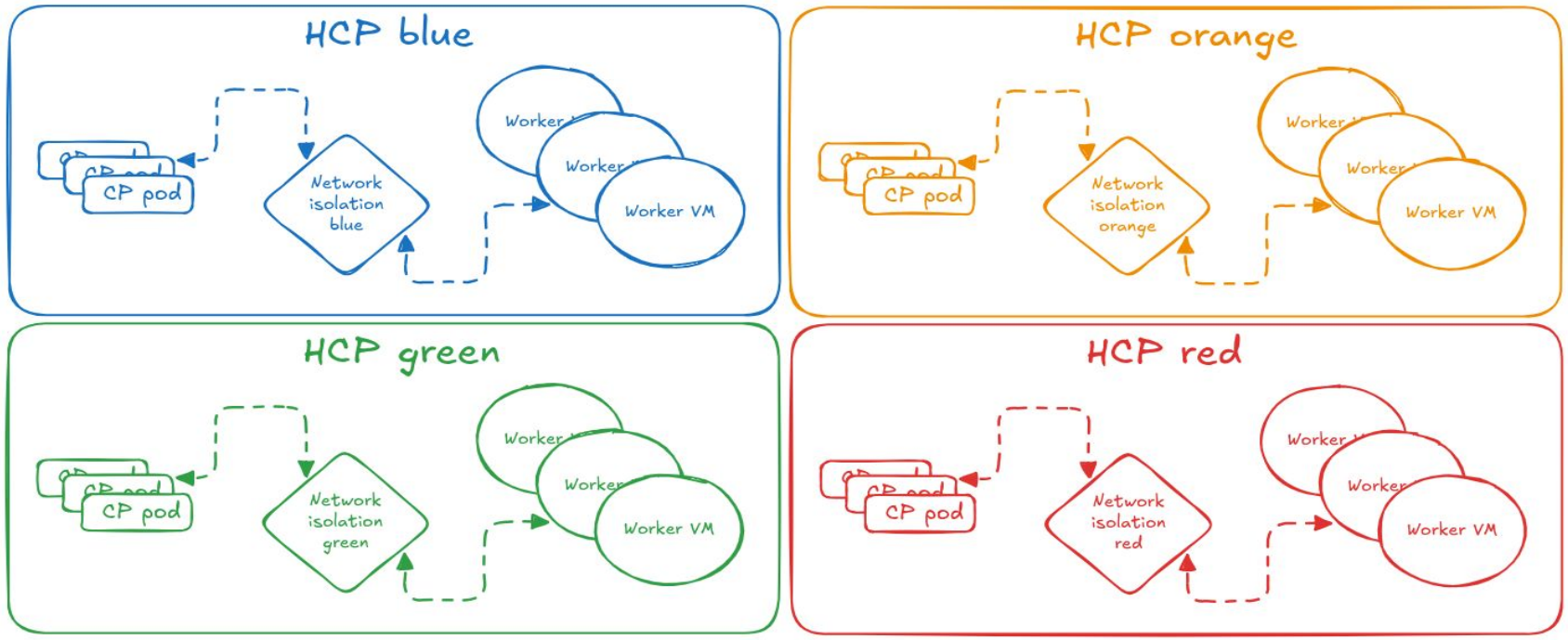
- Everyone loves virtualization capabilities:
  - Improve hardware resource usage
  - CPU and memory overcommitment
  - Live migration / VM high availability
- Best solution for several use cases but not for everything:
  - ✅ Several OpenShift clusters sharing resources
  - ✅ Multi-tenant environments
  - ✅ Ephemeral OCP clusters
  - ❌ OpenShift hosted clusters accessing underlying Fibre Channel storage arrays
  - ❌ OpenShift clusters consuming most of the hardware resources

Hosted Control Planes: Networking

Isolation between hosted clusters

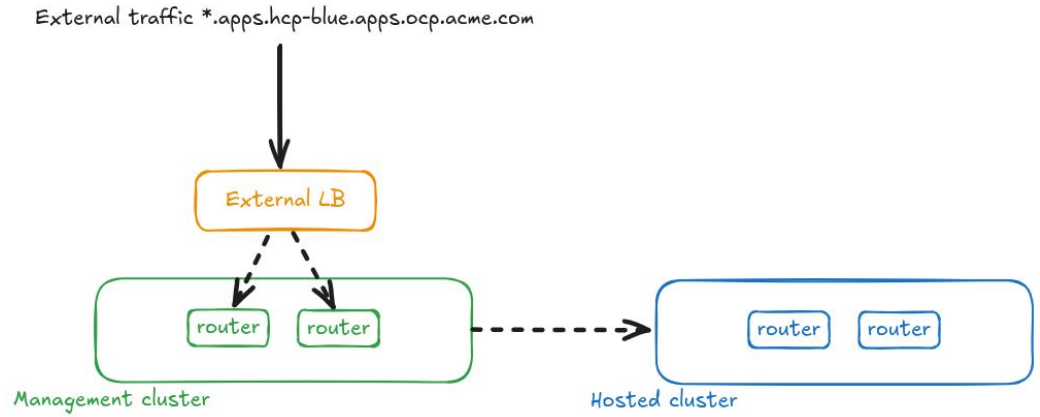
The magic of Network Policies and UDN

- Network Policy Isolation
  - Denies all network traffic by default
  - Ingress pod-to-pod communication in the same namespace (intra-tenant)
- Control-planes Pods Isolation: restricted security context constraint
- NodePools (Virtualized workers) can be executed in a different/dedicated network

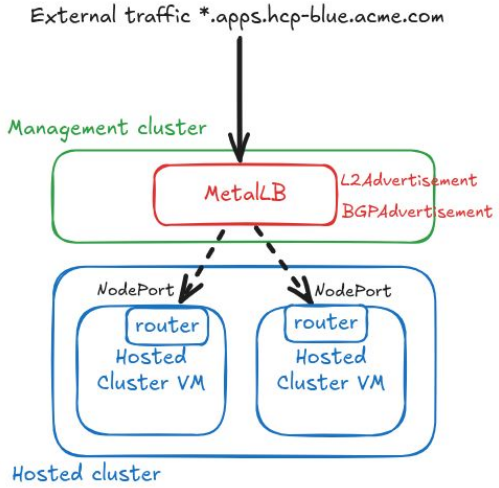


Routing ingress traffic into the hosted cluster

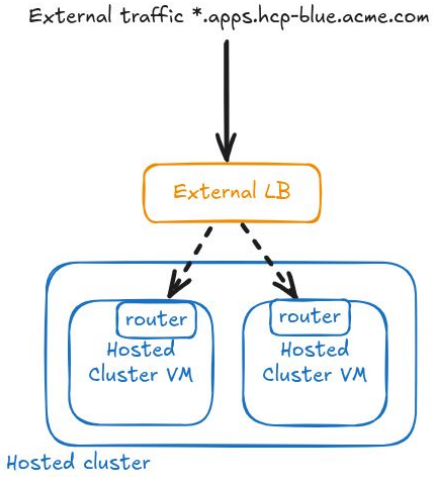
1 Cluster-based subdomains (default ingress strategy)



2 Custom external DNS + MetalLB



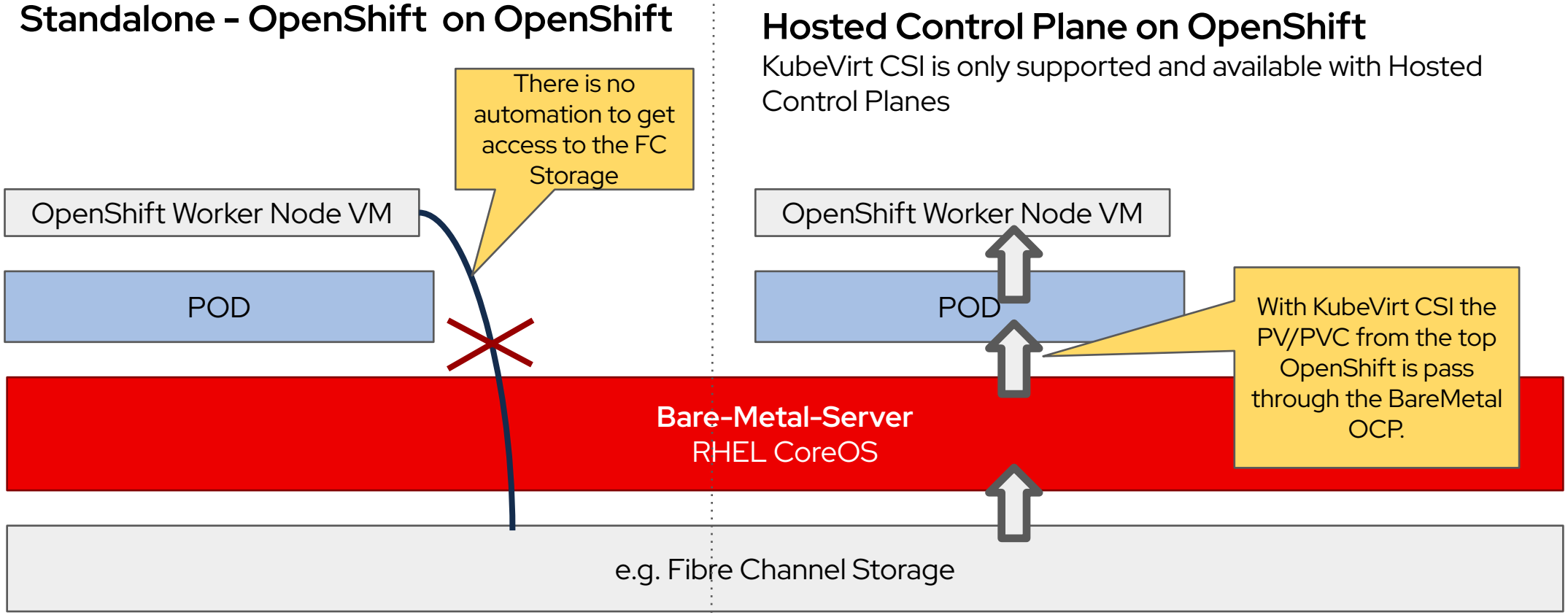
3 Custom external DNS + external Load Balancer



Hosted Control Planes: Storage

Storage for hosted clusters in OpenShift Virtualization

Kubevirt CSI driver: smooth integration



Storage for hosted clusters in OpenShift Virtualization

External storage backends: your trusted solution

Standard OpenShift approach: CSI drivers

- Supports only IP-based storage backends
  - no HBA-based protocols
- Broad RWO/RWX support
- Object storage available via OBC/COSI

Flexibility in backend choice

- Isolation of storage from infra cluster
- Scalability per hosted cluster
- Performance benefits from direct access

Independence from virtualization

- Avoid storage lock-in tied to the compute layer
- Easier integration with existing enterprise storage platforms

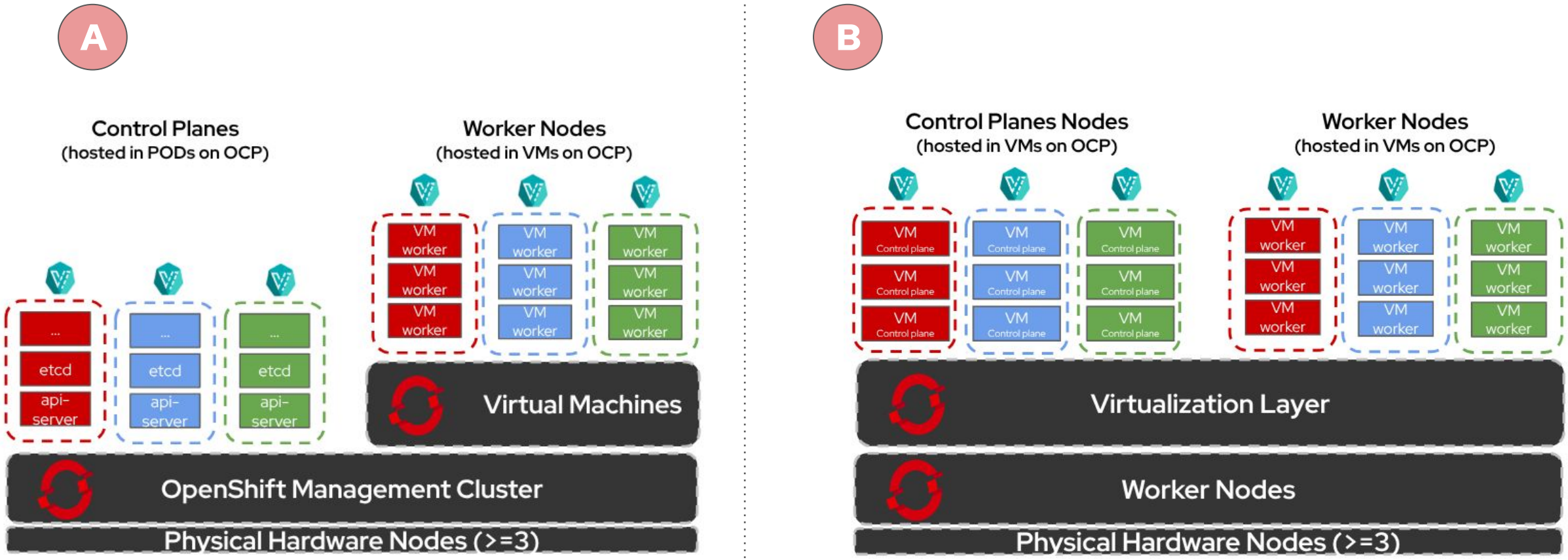
Architecting your own solution

Use Case: Acme Company – Scalable Web Application Platform

Key criteria and constraints for the solution

- **Compute efficiency:** The platform must optimize hardware use to handle dynamic workloads and provide seamless horizontal scalability.
- **Storage flexibility:** Applications should rely on a standard storage provider without requiring vendor-specific features, since most workloads will be stateless.
- **Workload profile:** The majority of applications are high-traffic, content-heavy web services. This results in significant north-south traffic and demands reliable load balancing.
- **Scalability needs:** The clusters need to handle a large number of constantly changing workloads and scale up or down quickly to keep up with customer traffic spikes and slow periods.

OpenShift standalone or Hosted Control Planes



OpenShift standalone or **Hosted Control Planes**

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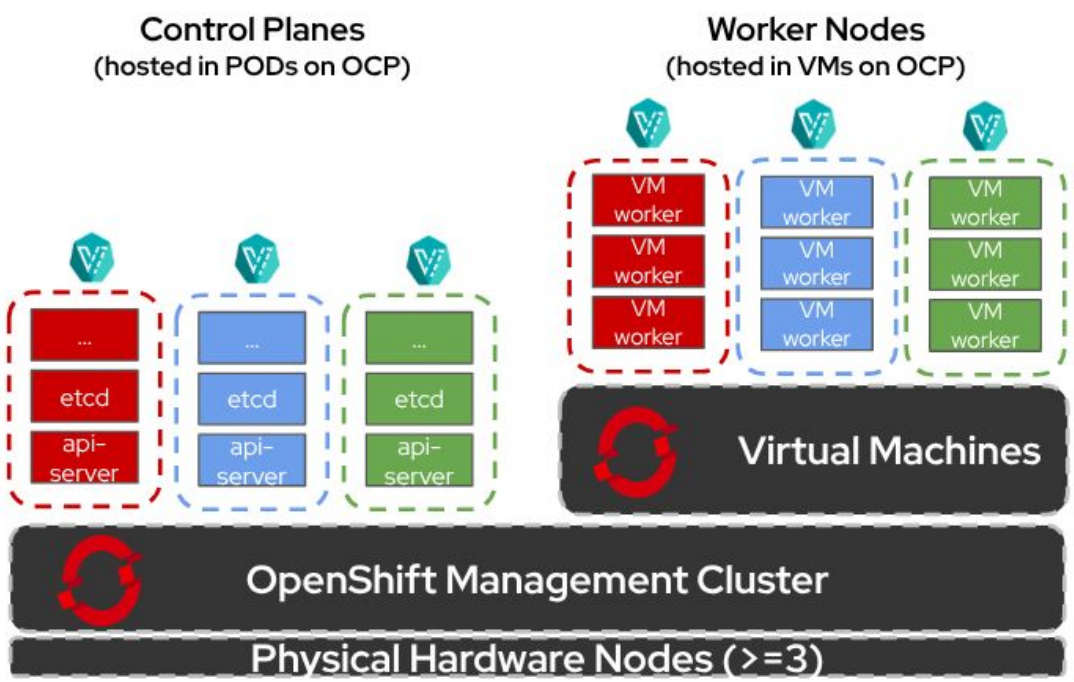


B

Storage for etcd of hosted cluster

A

External SAN

B

LVM + Local devices

Storage for etcd of hosted cluster

A

External SAN

B

LVM + Local devices

Storage for the hosted cluster

A

KubeVirt CSI

B

External SAN

Storage for the hosted cluster

A

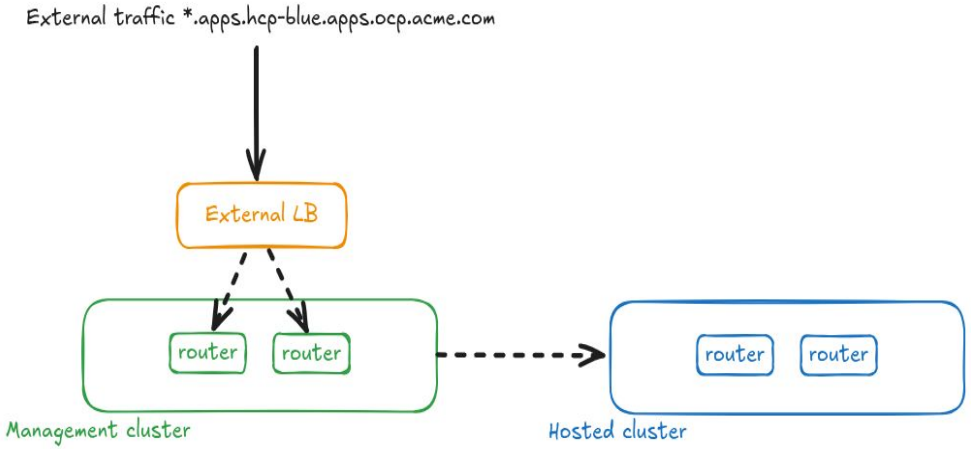
KubeVirt CSI

B

External SAN

Bringing traffic into the hosted cluster

A



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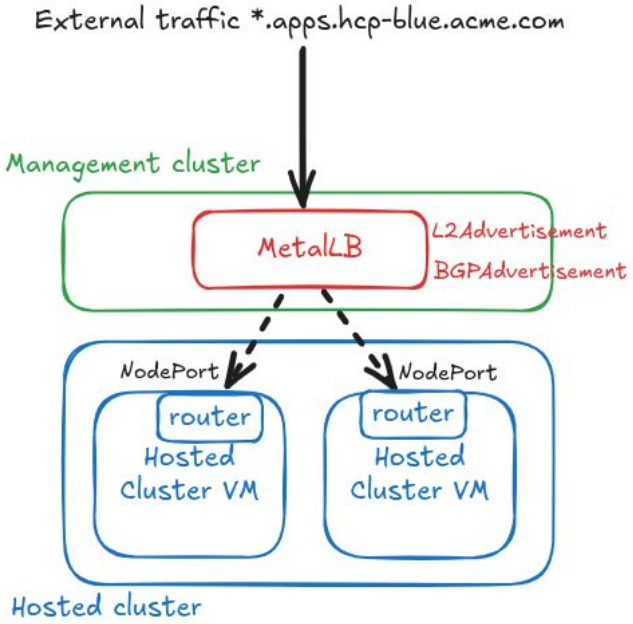

Bringing traffic into the hosted cluster

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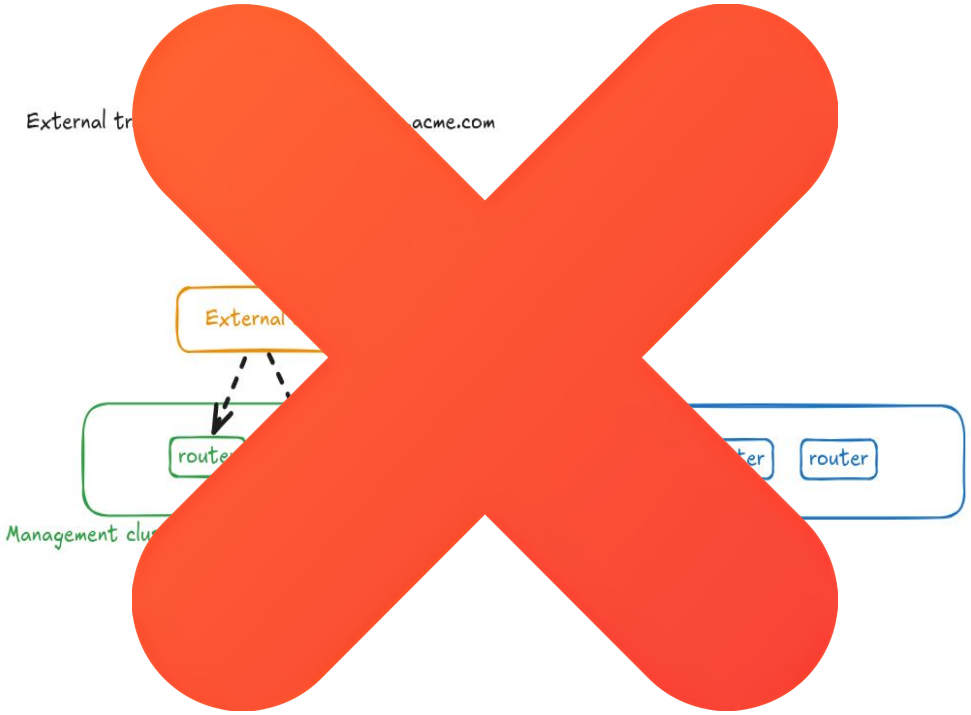

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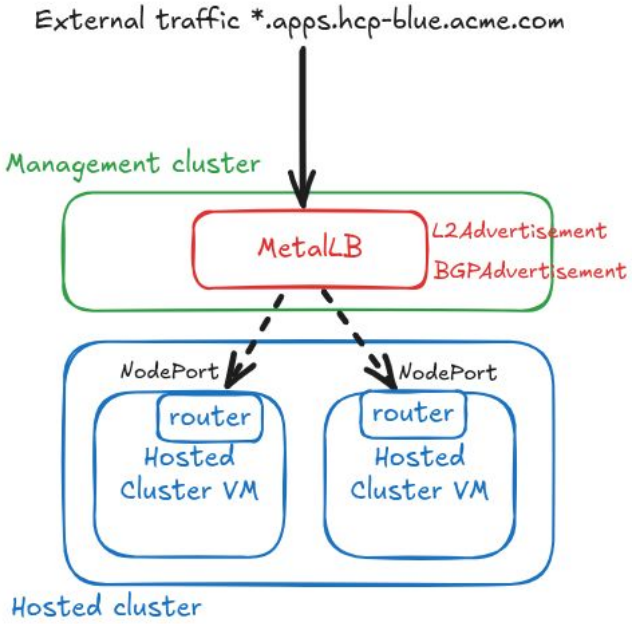

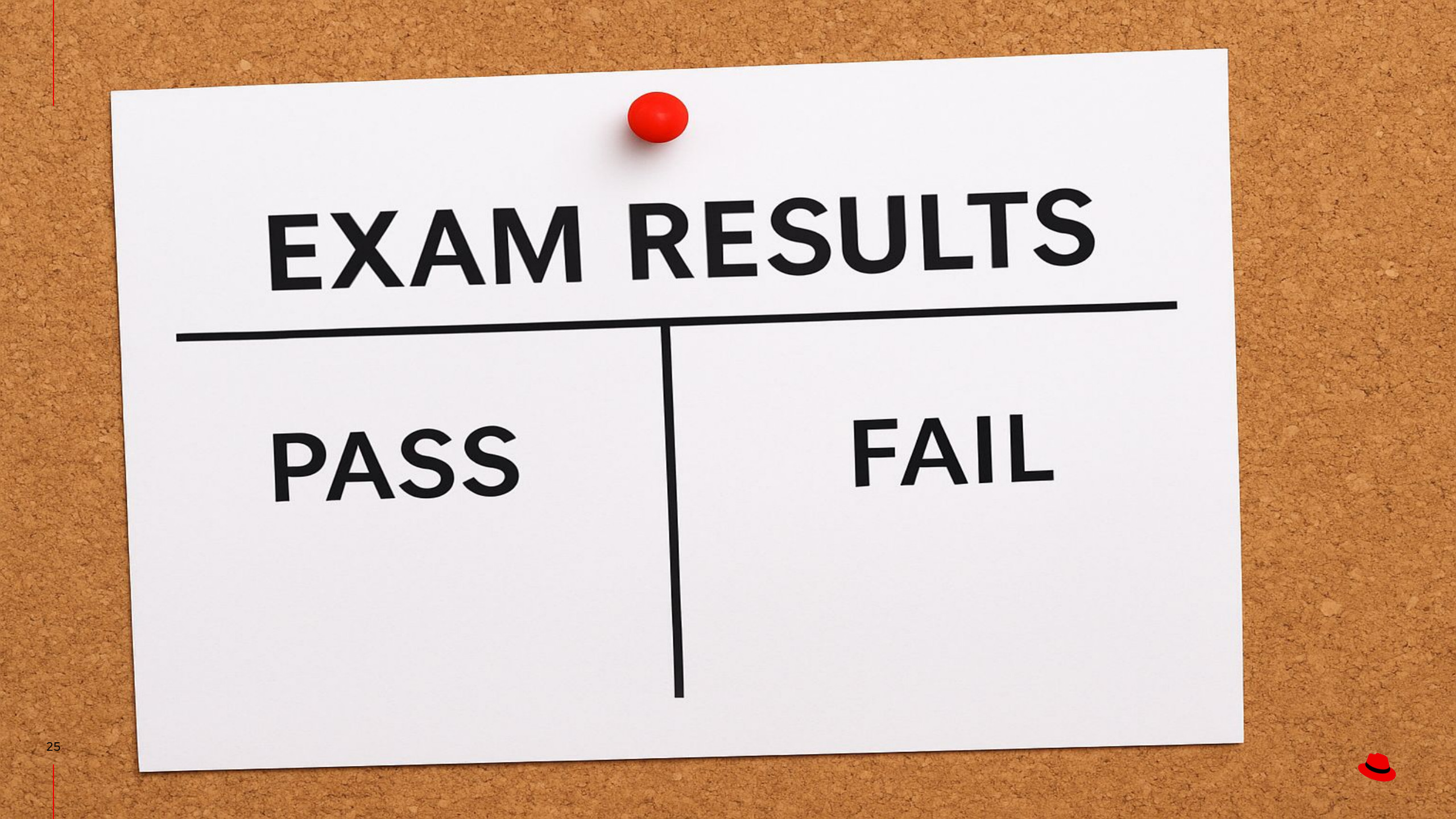
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