Red Hat | intel

Open Tour IIIO

Plataformas com possibilidades ilimitadas

Lisboa

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Red Hat OpenShift Virtualization

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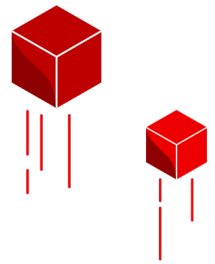


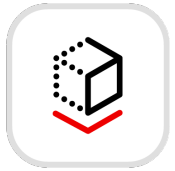
What we'll discuss today

OpenShift

Application Platform

Modern Platform for Application Development and Deployment across the hybrid cloud.

Virtualization



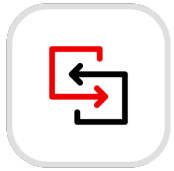
Containers and VMs

Single pane of glass.

VMs can benefit from kubernetes.

Lower barriers for modernization.

MTV



Migration Toolkit

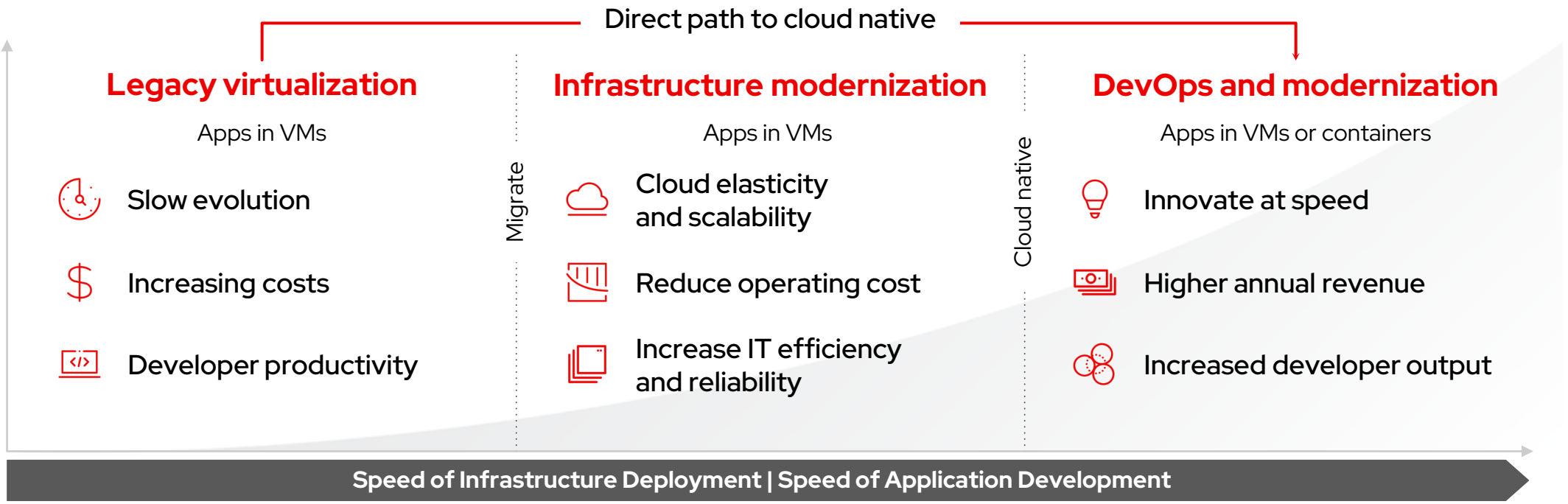
Warm migration of VMs at scale.

Network and Storage mapping.

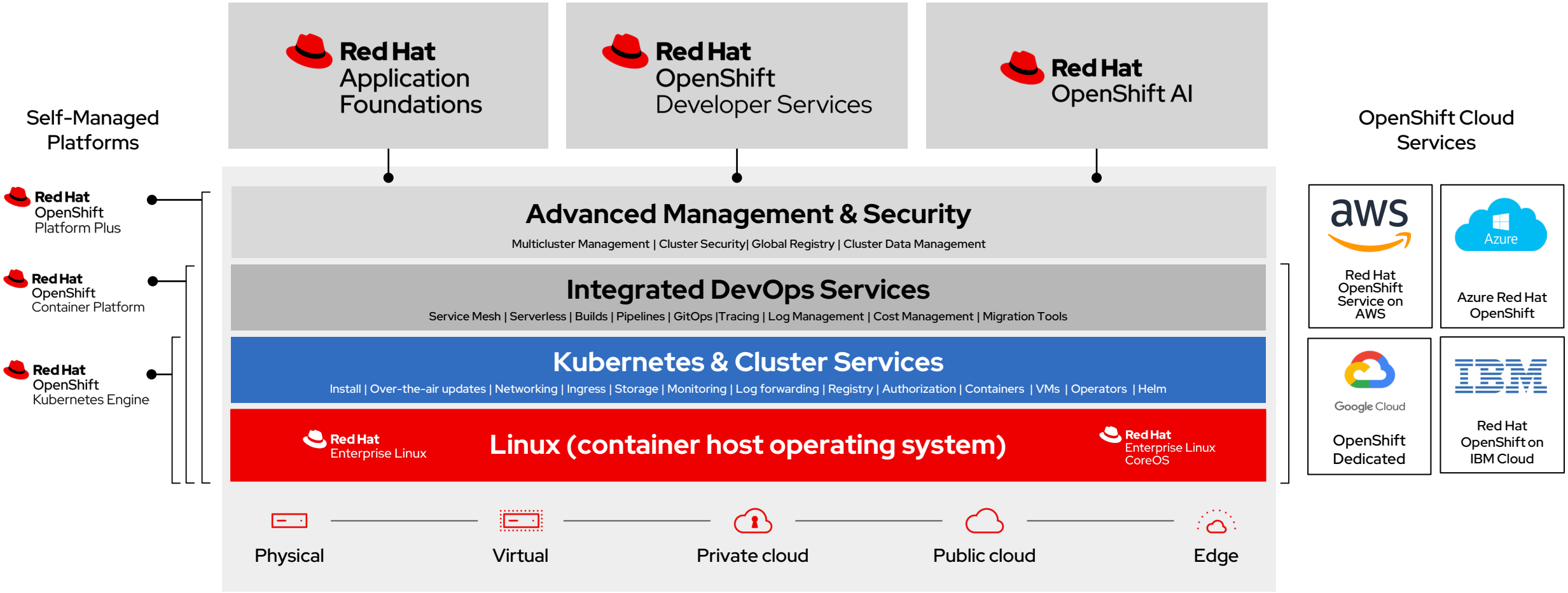
From vSphere, RHV or OpenStack.

Modernize at your own pace

(and only as much as you want)



Red Hat open hybrid cloud platform



OpenShift Virtualization

Modernize workloads, bring VMs to Kubernetes

Enterprise Virtualization Enhancements

- Windows 11, 201x and RHEL 9 Guest Support
- Intuitive UI for VM admins
- Robust applications with *RHEL High Availability*

VMs and Containers in Private/Hybrid Cloud

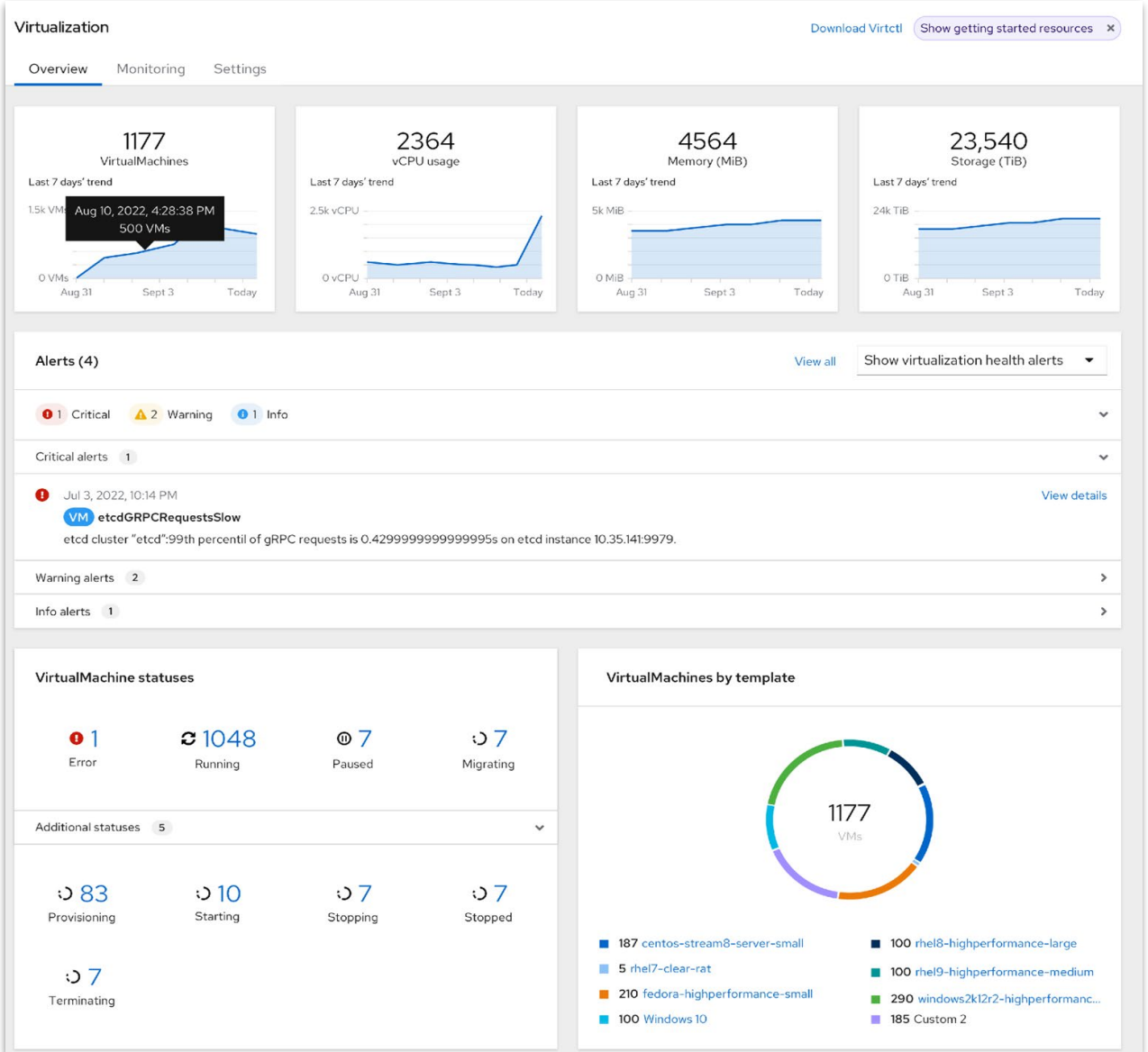
- Provide self-tuned VM instances
- RBAC control on VM templates
- Easily share vGPU w/ NVIDIA operator

Ensure continuity of business critical applications.

- OpenShift Data Foundation / ACM Metro-DR
  - Support recovery of virtual machines

Proven Performance

- Large Scale Tuning and Performance whitepaper

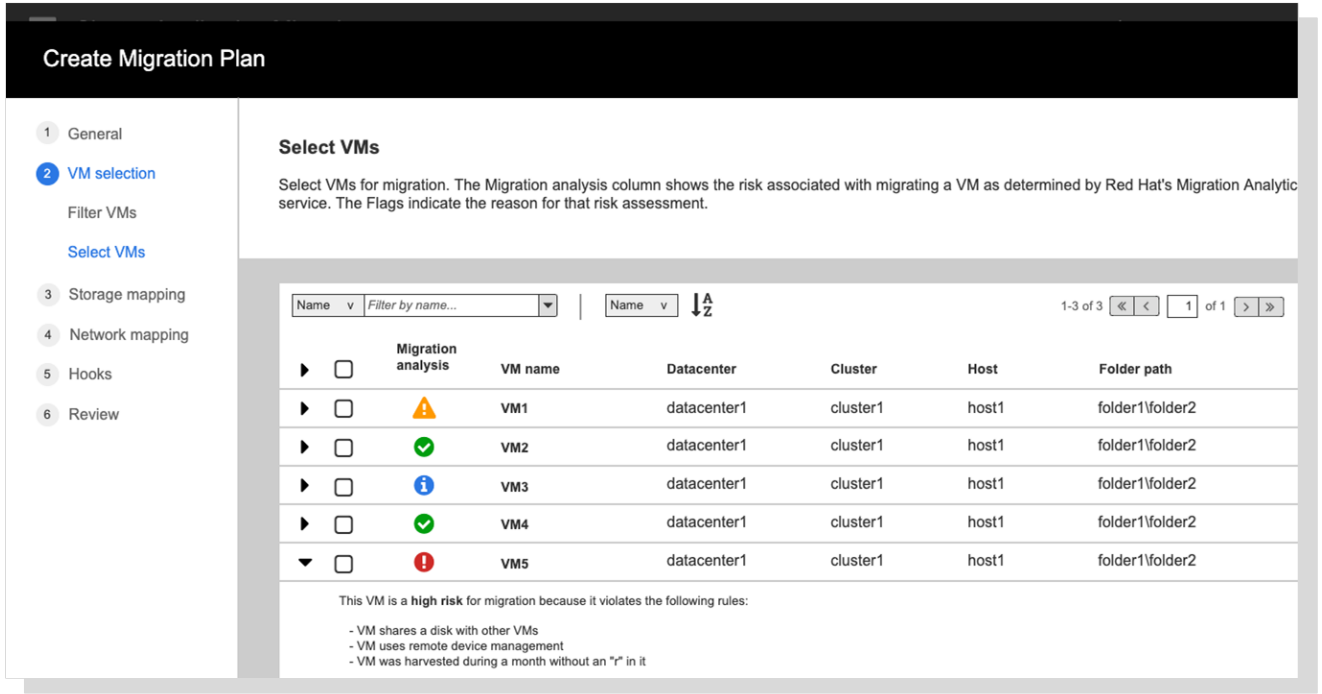


Migration Toolkit for Virtualization

Bringing traditional virtual machines into OpenShift

Migration tooling

- **Migration Toolkit for Virtualization** (MTV)
- Warm and parallel migration of VMs at scale
- VM Validation
- Network and Storage mapping
- Comes free with OpenShift Virtualization

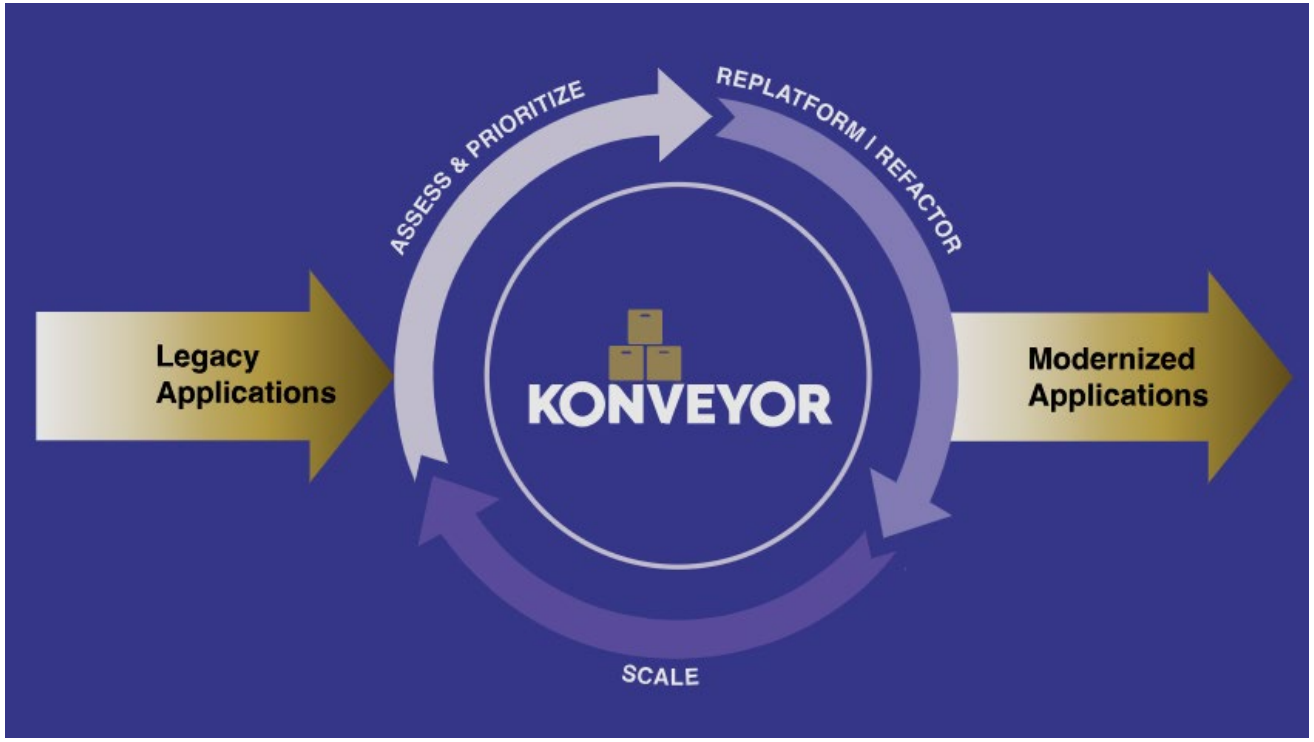


Konveyor Projects and Migration Toolkits by Red Hat

CLOUD NATIVE COMPUTING FOUNDATION

Konveyor is a CNCF Sandbox project

A community of **people** passionate about **helping others modernize** and migrate their **applications** to Kubernetes by **building tools and discovering patterns** of how to **break down monoliths, adopt containers, and embrace Kubernetes**.

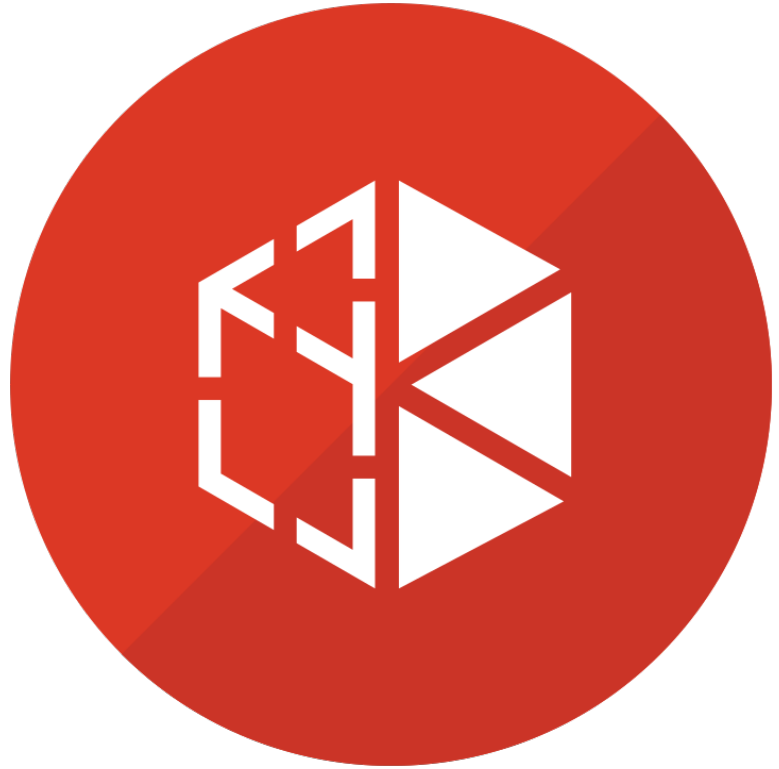


Red Hat Supported Operators

- Migration Toolkit for Applications
- Migration Toolkit for Containers
- Migration Toolkit for Virtualization

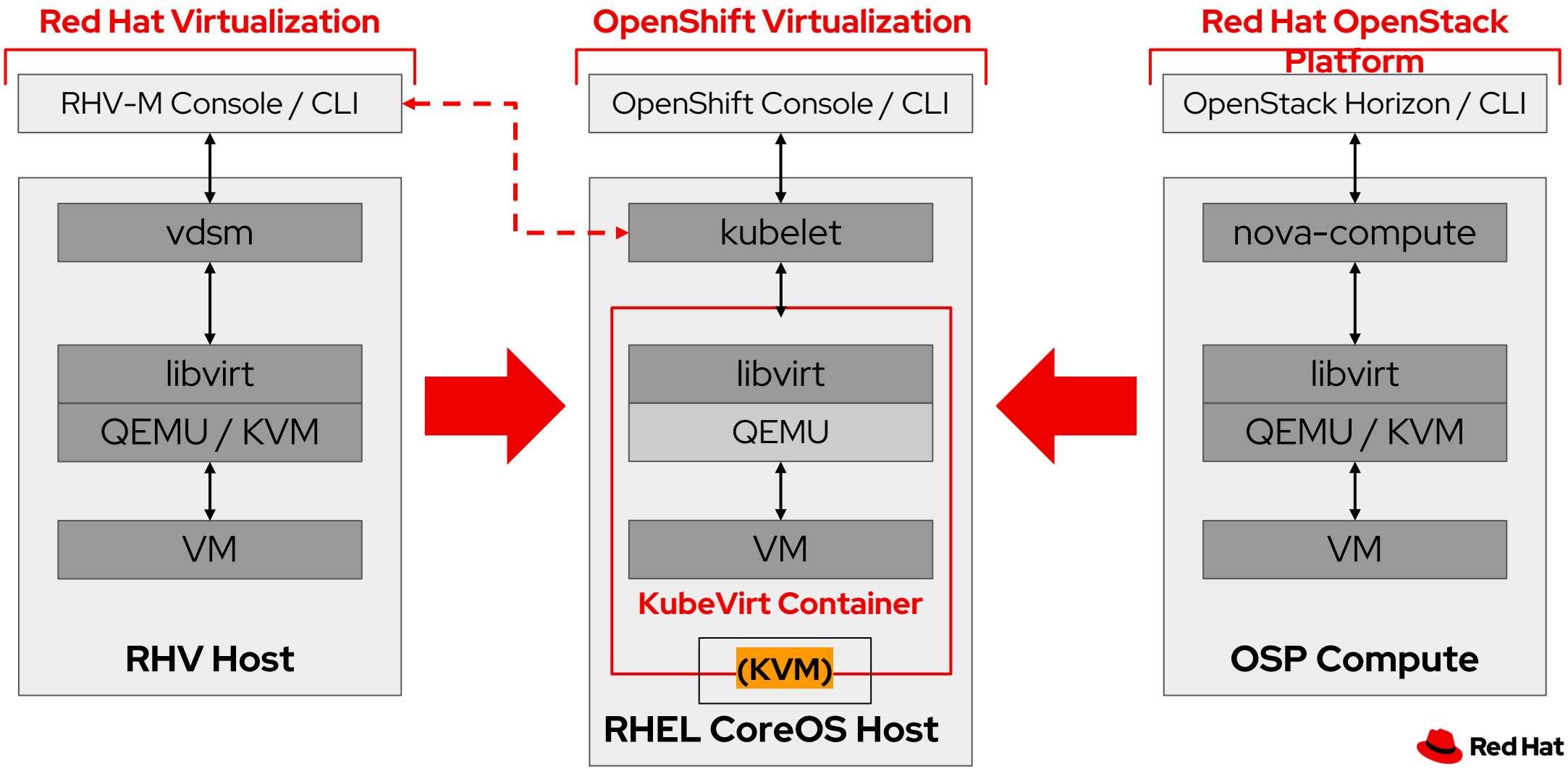
OpenShift Virtualization

- Virtual machines
  - Running in containers, managed as Pods
  - Using the KVM hypervisor
- Scheduled, deployed, and managed by Kubernetes
- Integrated with container orchestrator resources and services
  - Traditional Pod-like SDN connectivity and/or connectivity to external VLAN and other networks via multus
  - Persistent storage paradigm (PVC, PV, StorageClass)



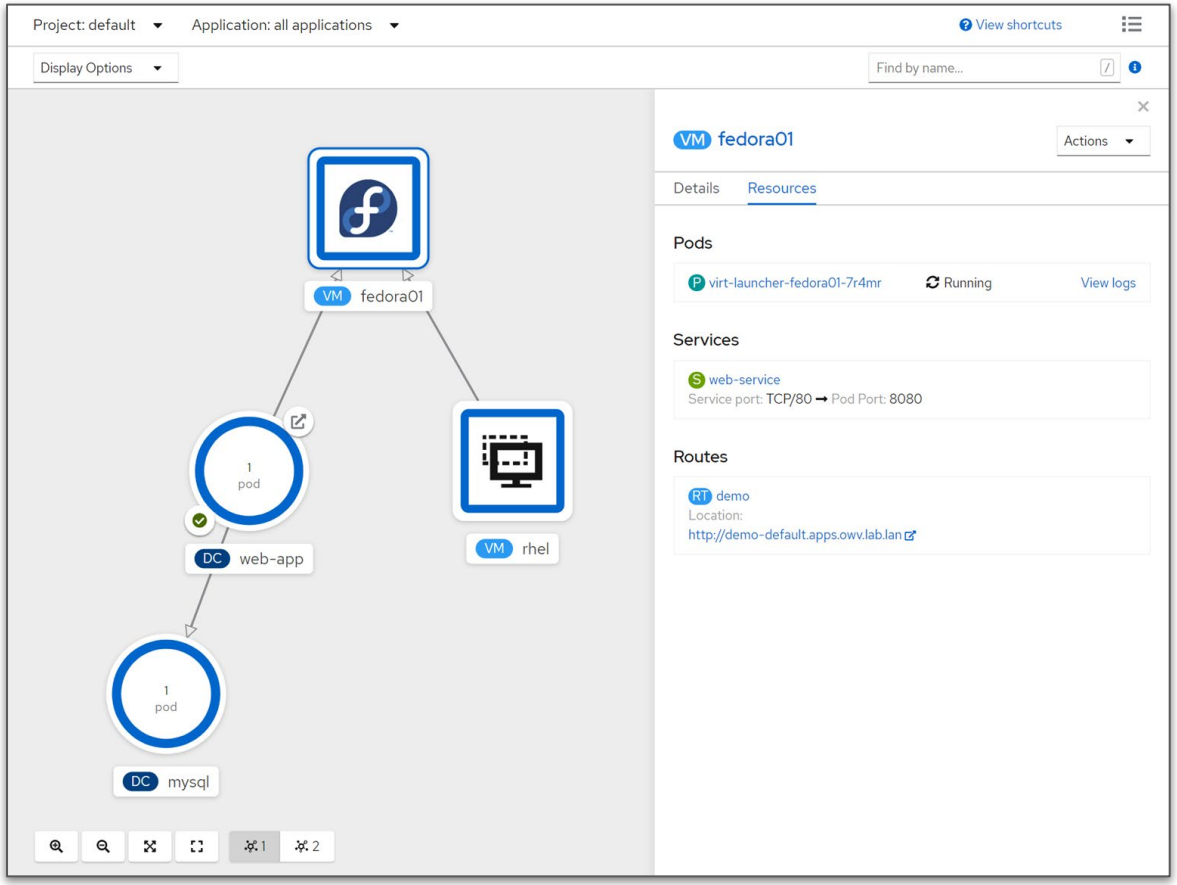
Containerizing KVM

Trusted, mature KVM wrapped in modern management and automation



Using VMs and containers together

- Virtual machines connected to pod networks are accessible using standard Kubernetes methods:
  - Service
  - Route
  - Ingress
- Network policies apply to VM pods the same as application pods
- VM-to-pod, and vice-versa, communication happens over SDN or ingress depending on network connectivity



OpenShift Virtualization - Cloud Native VMs

Modernize your operations with comprehensive lifecycle and infrastructure management

Public cloud experience for VM creation using Instance Types

- Streamlined VM creation: 3-click GUI experience, tuned for multiple purposes
- Simply specify boot source and InstanceType

Compute Exclusive

CX series

General Purpose

U series

GPU NVIDIA

GN series

Memory Intensive

M series

Ensure continuity of business critical applications.

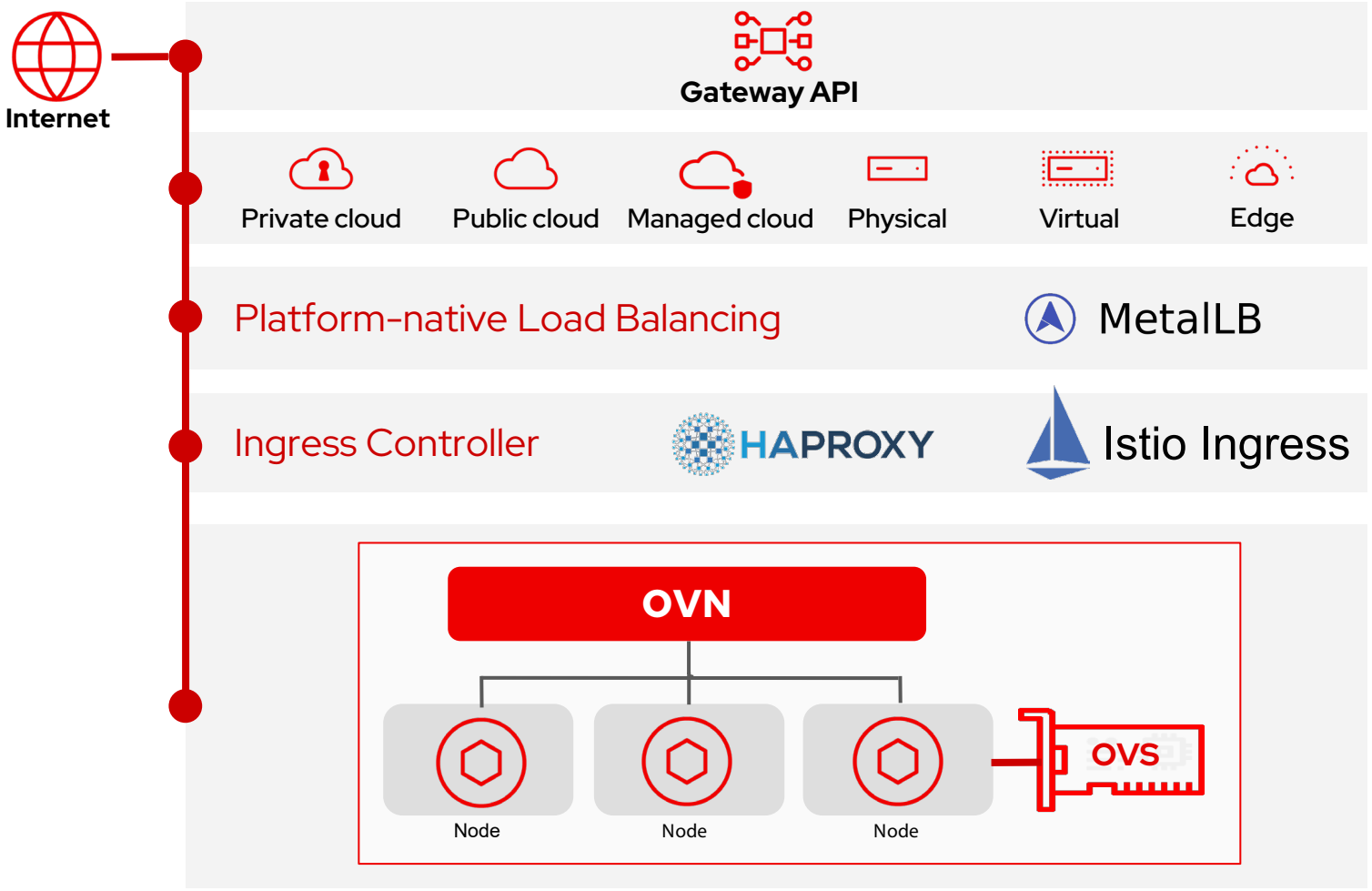
- OpenShift Data Foundation / ACM Metro-DR
  - Support recovery of declarative GitOps virtual machines

Flexibility

- Dynamic reconfiguration - Bridged and SRIOV NIC hotplug
- Micro-segmentation on secondary networks
- Workload density improvements
  - kernel same page merging (KSM)
- free page reporting (FPR) can free memory not currently in use by the VM
  - OVN-Kubernetes and ipBlock filtering policies
- Create hosted OpenShift clusters on OpenShift with Advanced Cluster Manager.

Multicluster End-to-End Networking

Supporting your most advanced workloads



- Unified traffic handling so you configure all your traffic the same way
- Any supported platform – add or swap easily, hybrid scenarios
- Flexibility to use native traffic distribution for optimal performance
- OVN for advanced traffic workloads
- IPv6 single/dual for scale
- HW Offload (OVS, IPsec, ...) for performance
- Multi-NIC support to align host networking
- BGP-advertised services (FRR)
- Observability for improved understanding
- eBPF precision traffic control
- No-overlay option

Networking Observability

Unified Experience

Network Traffic Metrics and Tracing

Whether one cluster or one hundred, developers and cluster administrators require seamless connectivity across applications.

Security Everywhere

Network Policy and Governance

Security and regulatory compliance requires governance of traffic in, around, and out of networks.

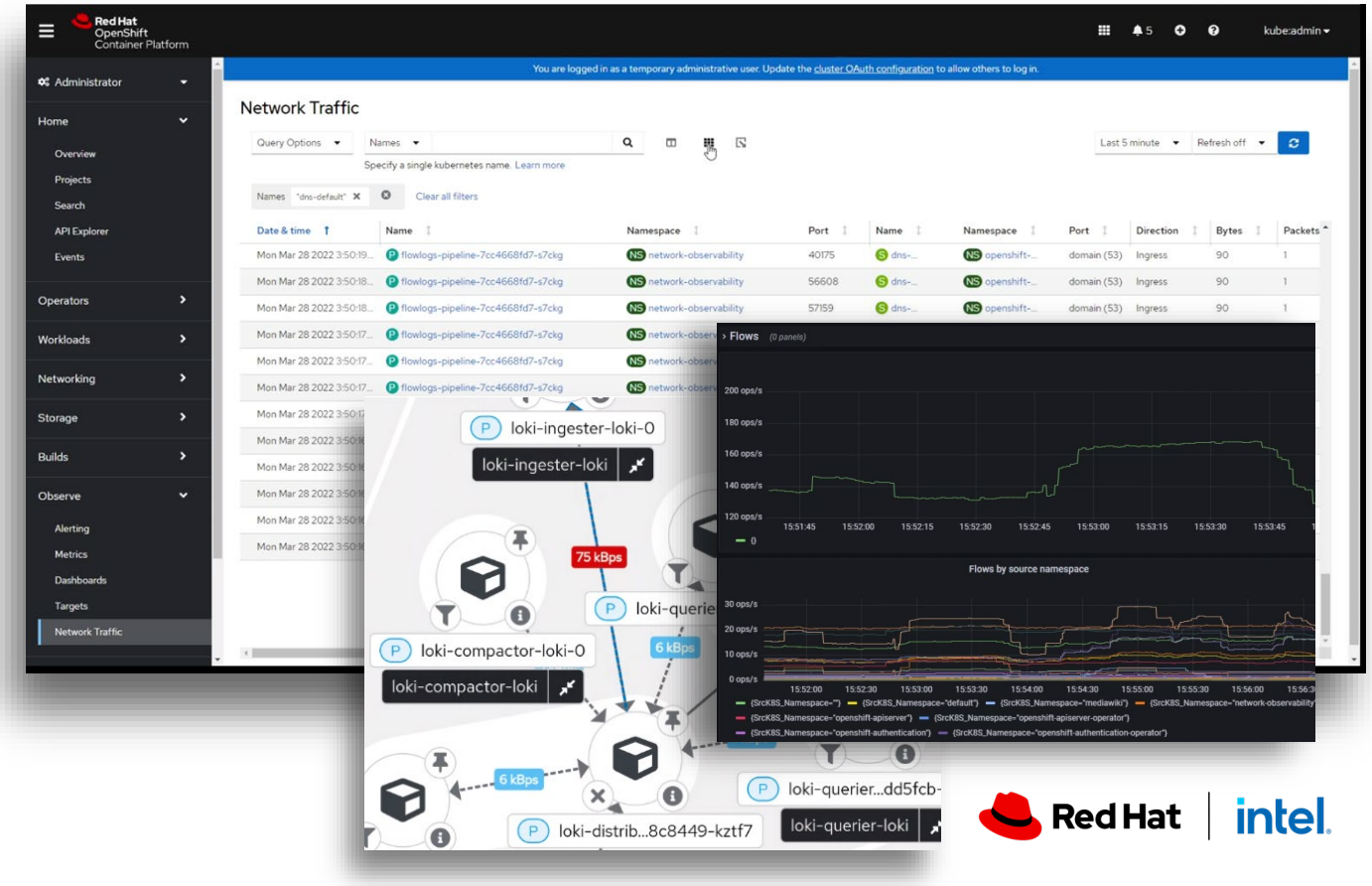
Platform Consistency

Network Traffic Flow and Topology

Developers and administrators require a common understanding of their traffic within and across cluster boundaries.

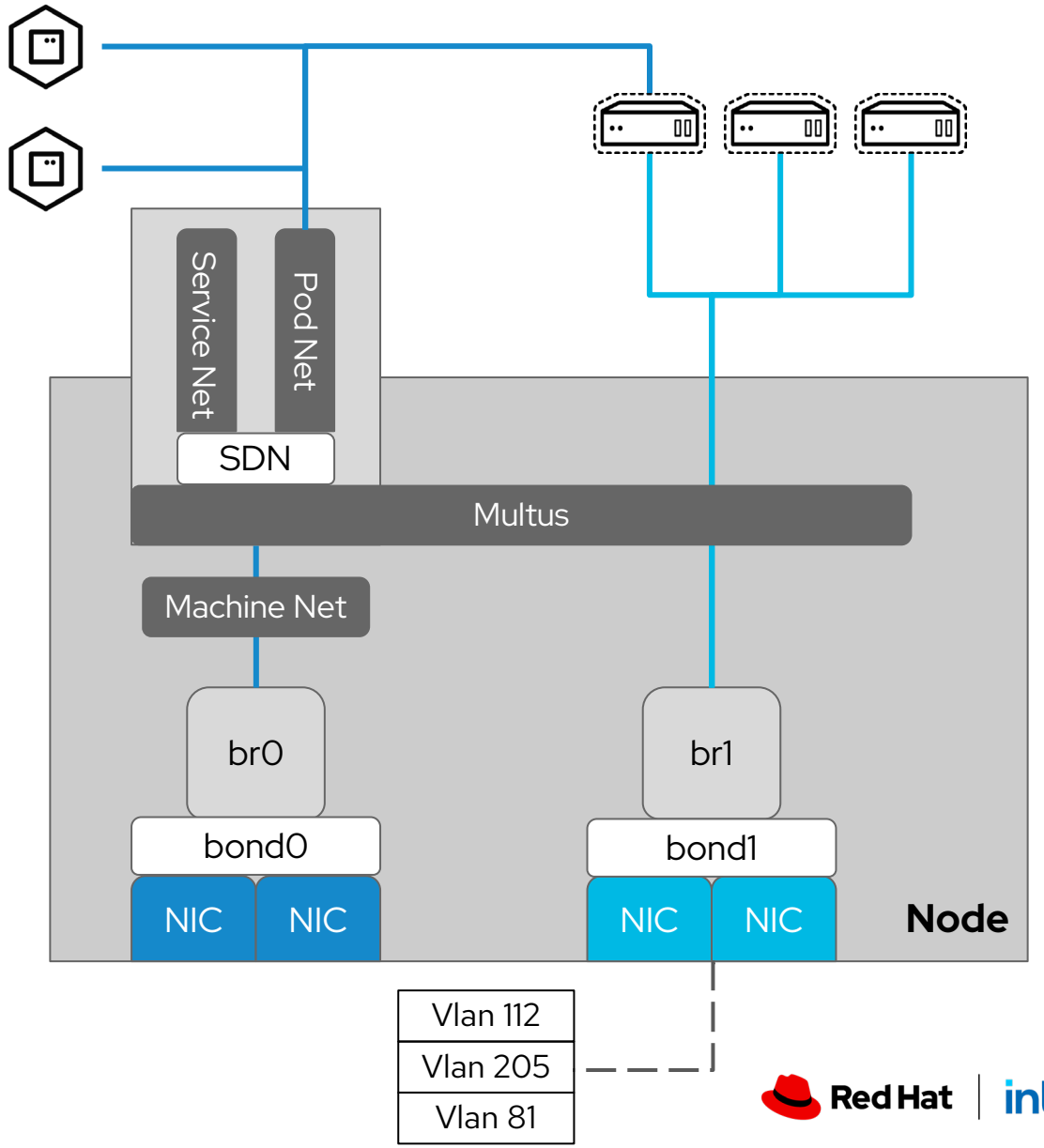
Network Flow Data – New Insight & Presentation

Tabular Netflow data, NOC Dashboard, Pod/Service/Node-specific Topology, New Metrics, Export options

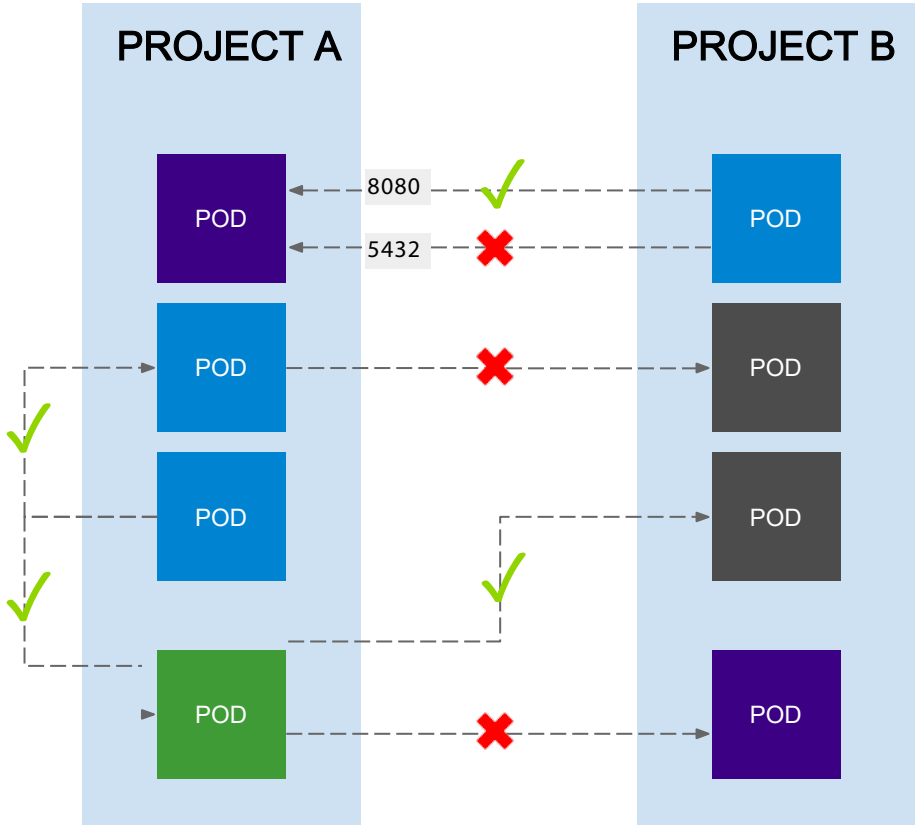


Multiple VLANs and Multus

- Pod, service, and machine network are configured by OpenShift automatically
  - Use kernel parameters (dracut) for configuration at install - `bond0` in the example to the right
- Use `kubernetes-nmstate`, via the NMstate Operator, to configure additional host network interfaces
  - `bond1` and `br1` in the example to the right
- VM pods connect to one or more networks simultaneously



Network Policy (network micro-segmentation)



Example Policies

- Allow all traffic inside the project
- Allow traffic from green to gray
- Allow traffic to purple on 8080

```
apiVersion:
extensions/v1beta1  kind:
NetworkPolicy
metadata:
  name: allow-to-purple-on-8080
spec:
  podSelector:
    matchLabels:
      color: purple
  ingress:
  - ports:
    - protocol: tcp
      port: 8080
```

MetalLB - The Problem

What Problem Are We Solving?

- Kubernetes Services of type: LoadBalancer
- On a cloud, this creates a cloud-native LB
- What about bare metal clusters?

```
apiVersion: v1
kind: Service
metadata:
  name: nginx
spec:
  ports:
  - name: http
    port: 80
    protocol: TCP
    targetPort: 80
  selector:
    app: nginx
  type: LoadBalancer
```

MetalLB L2 Support

- Solve the problem by using standard network protocols
- MetalLB has two modes to announce reachability information for load balancer IP addresses:
  - Layer 2
  - BGP
- Two components:
  - Controller - One per cluster
  - Speaker - Per Node (DaemonSet)
- L2 mode: ARP (IPv4) or NDP (IPv6) announces location of a LB'd IP address from the Speaker, then relies on Service load balancing within the cluster

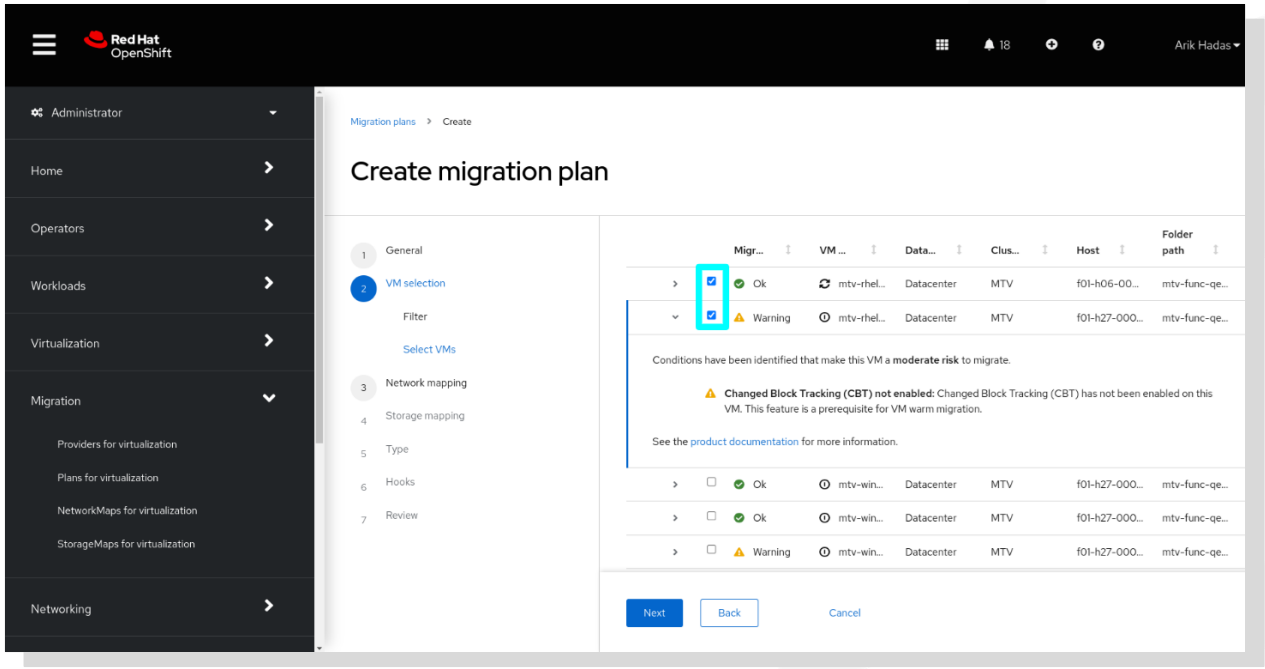
```
apiVersion: v1
kind: Service
metadata:
  name: nginx
spec:
  ports:
  - name: http
    port: 80
    protocol: TCP
    targetPort: 80
  selector:
    app: nginx
  type: LoadBalancer
```

And now... (drum rool)  ... The moment we've all been waiting for:

Migrating VM based applications with minimal disruption!

Migration tooling

- **Migration Toolkit for Virtualization** (MTV)
- Streamlined migration of virtual machines at scale
- Included with OpenShift



Red Hat

OpenShift Virtualization - Services Journey

Strategy | **Foundation** | **Expand** | **Evolve**

Training & Certs - Discounted training bundle: Managing Virtual Machines with Red Hat OpenShift Virtualization + Exam (DO317)

Strategy

Phase 1 - Virtualization Migration Assessment

- **Analyze** current VM Architecture
- **Identify** VM workloads
- **Define** integrations
- **Understand** Day 2 Ops
- **Propose** high-level design and **roadmap**
- Build **lightweight business case**

Foundation

Phase 2 - Migrate: OpenShift Virtualization Production Build + Migration Factory

- **Deploy** OpenShift cluster with optional container storage integration
- **Enable & validate** virtualization features
- **Migration** of initial VM workloads
- **Validate** strategy for scale
- **Automate** Day 2 Operations

(Optional Phase 1.5) - OpenShift Virtualization Proof of Value

- **Proof of Value** of the virtualization platform, with meaningful workloads migrated

Expand

- **Automated migration** of VM batches with Ansible Automation Platform
- **Automated configuration** of components like networking and storage with Ansible Automation Platform
- **Repeat** migration patterns
- **Validate** migration
- **Retire** legacy platform
- Measure **value realized**

Evolve

App Modernization Accelerator (Optional)

- Optional solution for customers that want to modernize apps to containers
- Onboard initial app teams to platform functionality provided by OpenShift

Ansible Automation Acceleration (Optional)

- Optional Services Map to accelerate Ansible Automation for the Enterprise

Technical Account Management - Operational guidance & advisory services from an OpenShift TAM