Red Hat OpenShift

Technical Overview

Alfred Bach

Principal Learning and Development Instructor

Red Hat | Hewlett Packard Enterprise

Red Hat - A brief overview

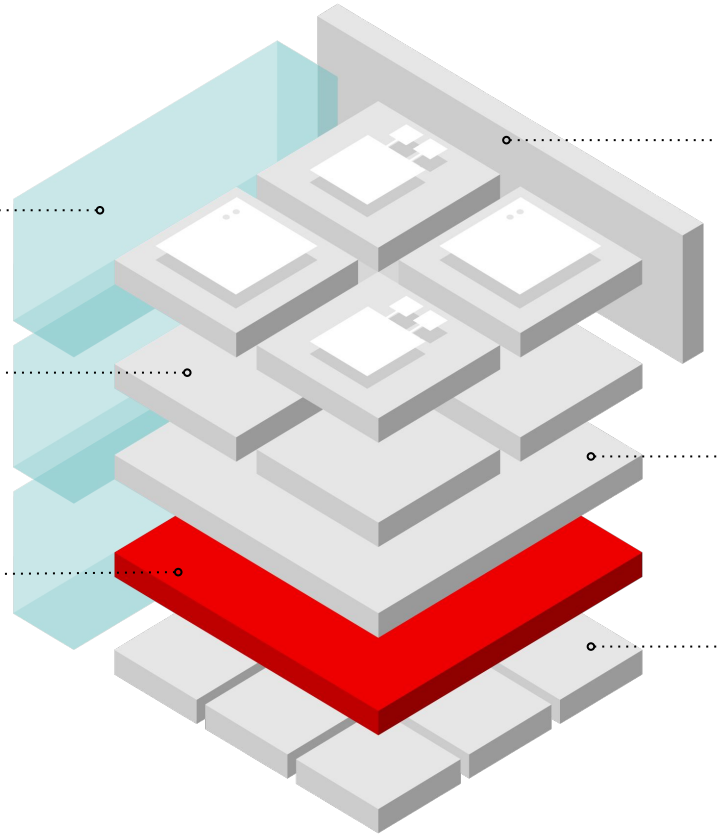
Company and products

Our broad portfolio tackles customer challenges

Red Hat Ansible Automation Platform
Red Hat Advanced Cluster Management for Kubernetes
Red Hat Advanced Cluster Security for Kubernetes
Red Hat Insights
Red Hat Satellite

Red Hat Application Foundations
Red Hat OpenShift AI

Red Hat Enterprise Linux
Red Hat Enterprise Linux AI



Red Hat OpenShift Local
Red Hat OpenShift Dev Spaces
Red Hat Service Interconnect
Dependency analytics

Red Hat OpenShift

Bare metal
Virtual environments
Private clouds
Public clouds
Edge environments

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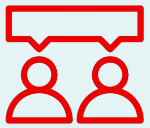
A **comprehensive portfolio** of technologies—from the datacenter to the edge—with one simplified, consistent experience



An **open way of working** that harnesses tech complexity and improves strategic agility through dedicated support

A robust **ecosystem of strategic global partnerships** that delivers options across environments and vendors

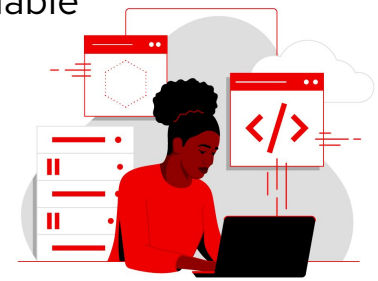
A **unique vendor approach** that aligns our trusted tech expertise with your big picture and best interests

Red Hat OpenShift – Architectural overview

Security, manageability and consistency across the hybrid cloud.

Why Red Hat Enterprise Linux CoreOS?

- Automatic updates
  - No interaction for administrators
  - Staying up to date → security fixes applied
- Centrally configured infrastructure
  - Need a change? Update configs and re-provision.
- User software runs in containers
  - Host updates are more reliable



RED HAT® ENTERPRISE LINUX CoreOS

An operating system for containers

- Container based packaging
- Kubernetes cluster based management
- Delivered and updated with OpenShift
- Industry standard RHEL security & compliance
- Certified Red Hat Container ISV ecosystem

Linux (container host OS)

Physical — Virtual — Private cloud — Public cloud — Edge

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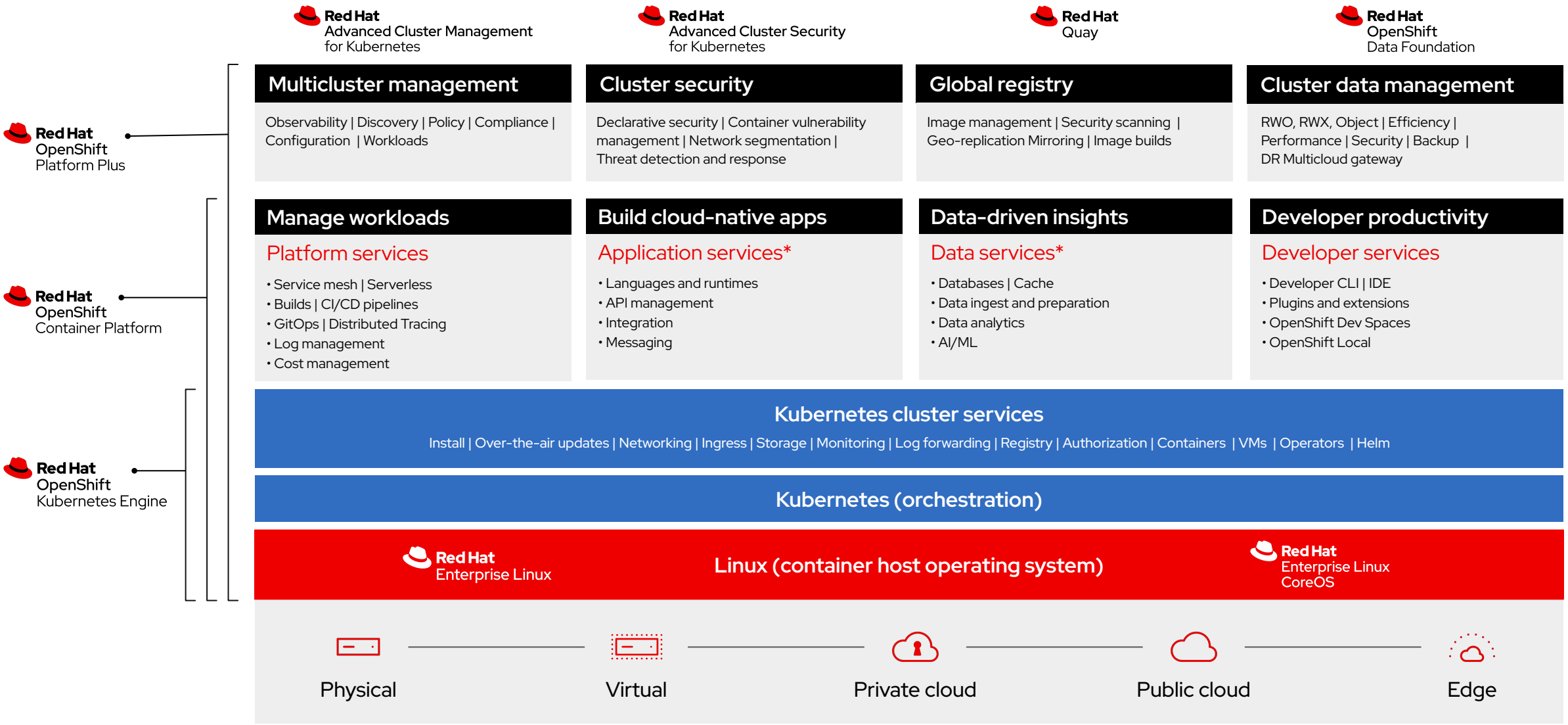
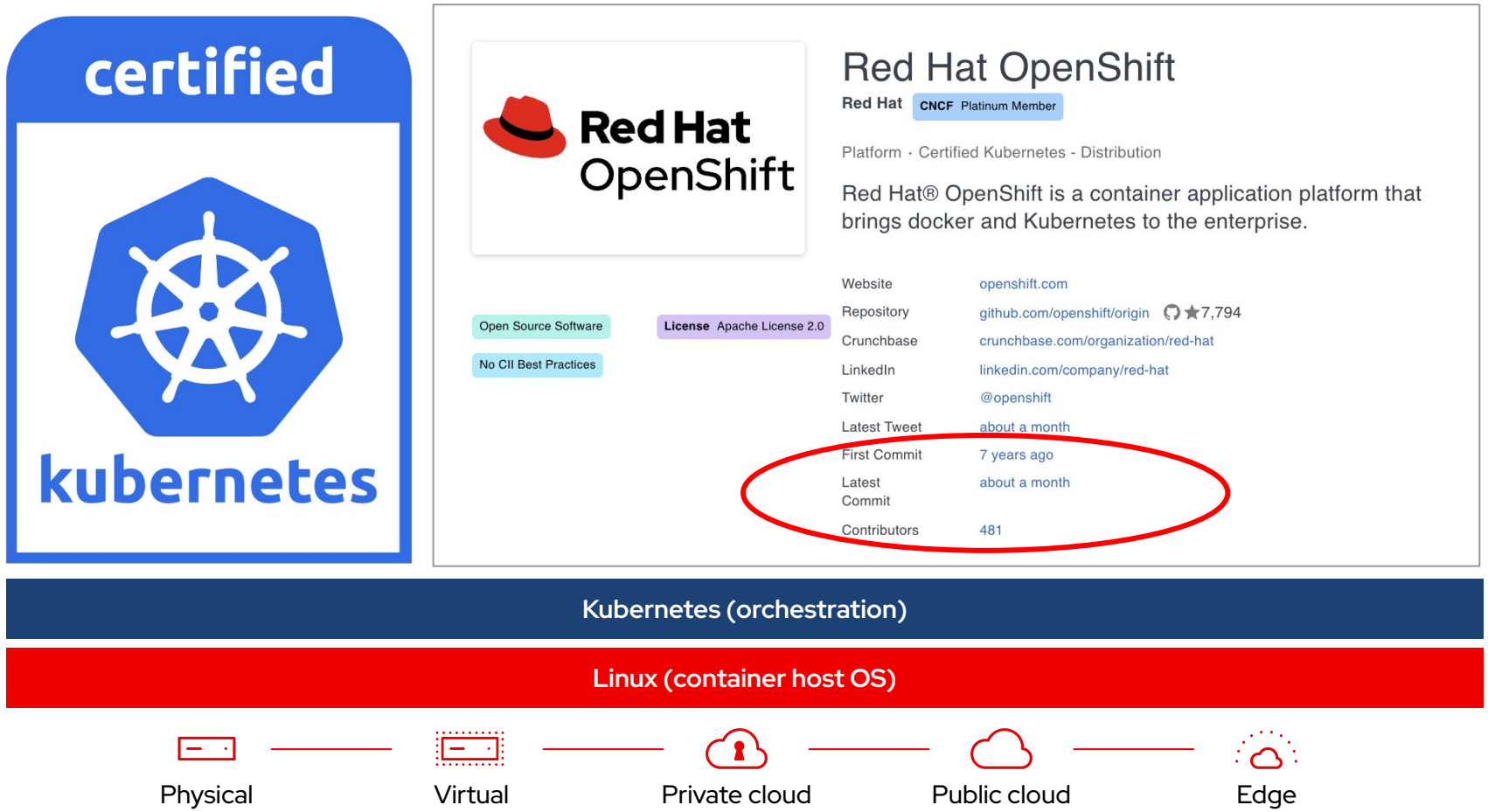
Red Hat open hybrid cloud platform



* Red Hat OpenShift® includes supported runtimes for popular languages/frameworks/databases. Additional capabilities listed are from the Red Hat Application Services and Red Hat Data Services portfolios.

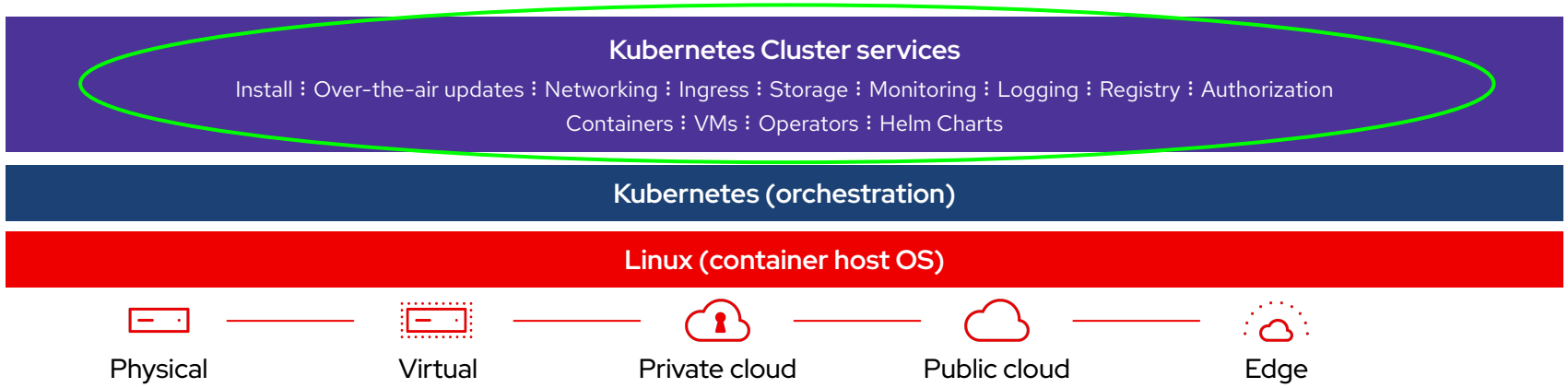
** Disaster recovery, volume and multicloud encryption, key management service, and support for multiple clusters and off-cluster workloads requires OpenShift Data Foundation Advanced

Kubernetes is the core of Red Hat OpenShift



OpenShift – Enterprise Containerization

- Fully automated OpenShift installer provisioned infrastructure
- Immutable over the air or air gapped updates with telemetry
- Integrated OpenShift SDN (OVS/OVN), ingress & CNI plugins
- Kubernetes native storage (Ceph/Rook) & certified CSI plugins
- Deploy and manage both Containers & VMs (Kubevirt)
- Prometheus monitoring and alerts for to manage your clusters
- Log collection & forwarding to external log management systems
- Built in OpenShift Registry to securely manage container images
- Integrated authentication, authorization & deployment policies
- Leverage Kubernetes Operators & Helm Charts to manage deployments



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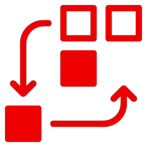
OpenShift Installation Experiences

aws · Microsoft Azure · Azure Stack Hub · Alibaba Cloud · Bare Metal · Google Cloud · VMware vSphere

IBM Cloud · IBM Power Systems · IBM Z · NUTANIX · RED HAT OPENSTACK PLATFORM · RED HAT VIRTUALIZATION



Full Stack Automation

Installer Provisioned Infrastructure

- Auto-provisions infrastructure
- *KS like
- Enables self-service

Pre-existing Infrastructure

User Provisioned Infrastructure

- Bring your own hosts
- You choose infrastructure automation
- Full flexibility
- Integrate ISV solutions

Interactive – Connected

Assisted Installer

- Hosted web-based guided experience
- Agnostic, bare metal, and vSphere only
- ISO Driven

Interactive – Disconnected

Agent Installer (Dev Preview)

- Disconnected bare metal deployments
- Automated installations via CLI
- ISO driven

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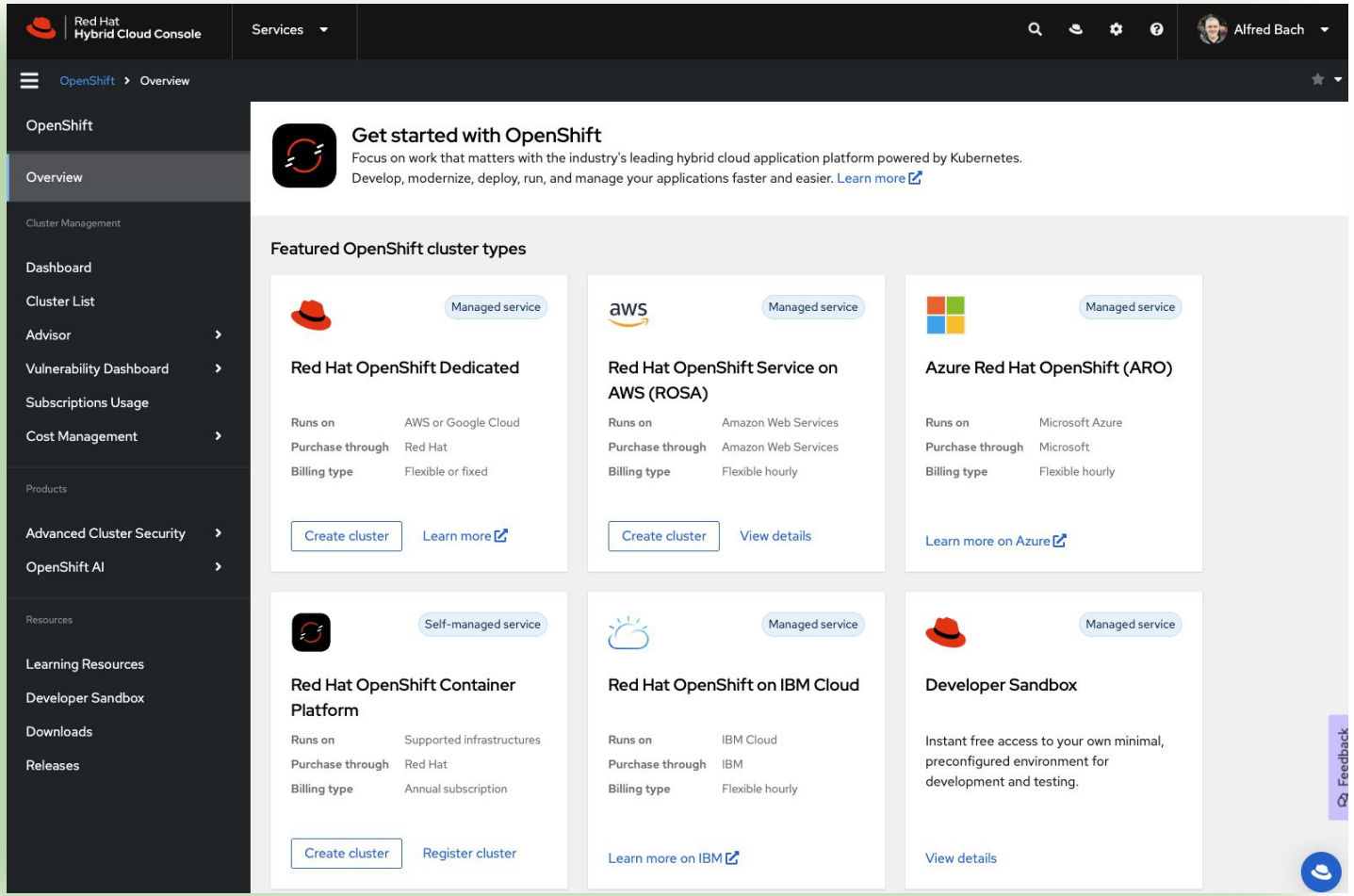
Installation Live



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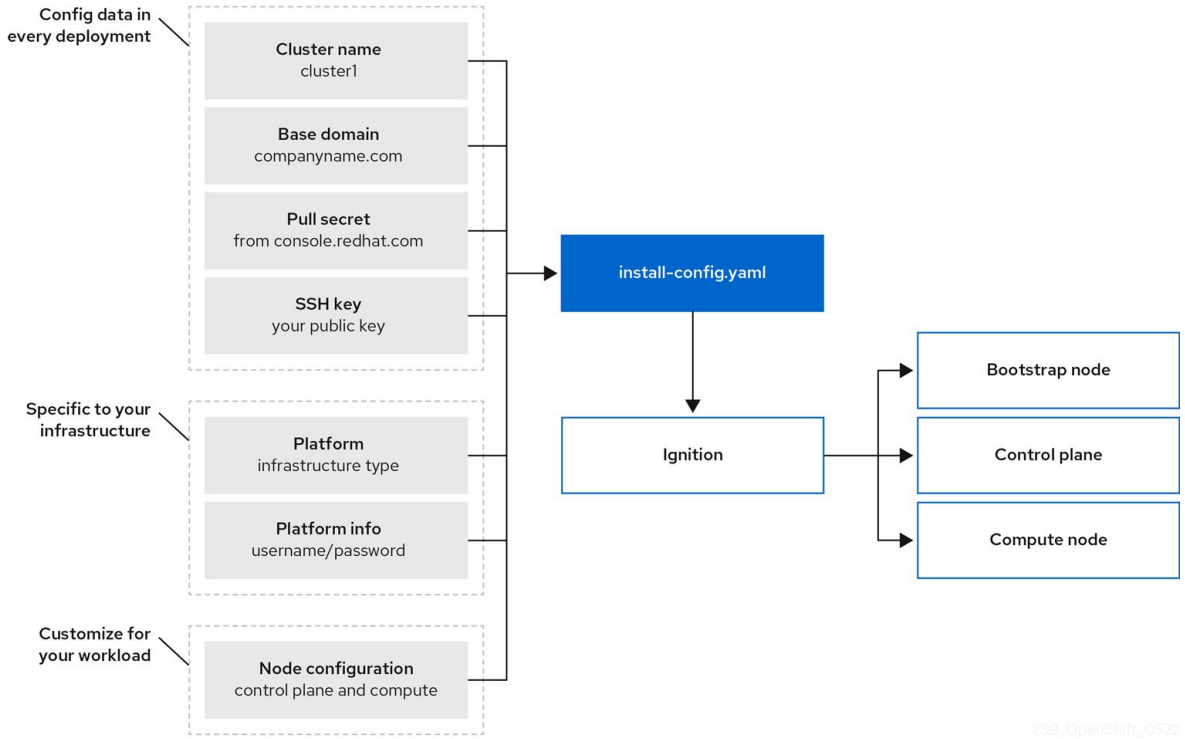
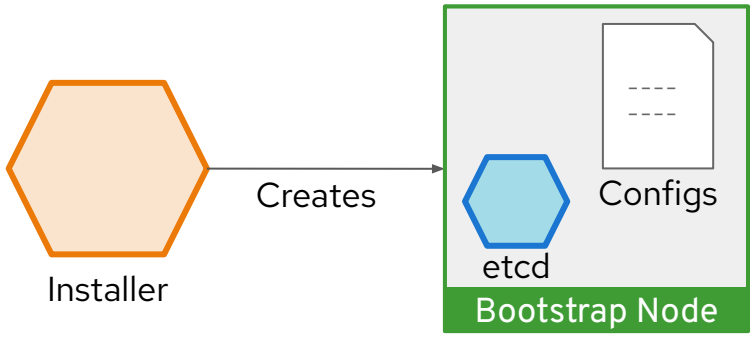
OpenShift Bootstrap Process: Self-Managed Kubernetes

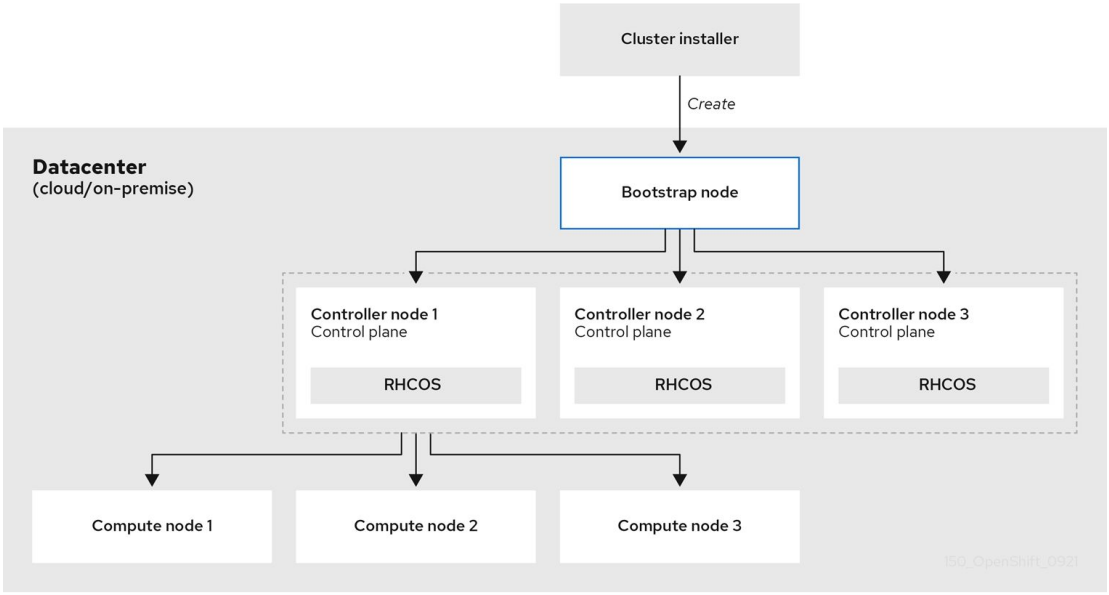
How to boot a self-managed cluster:

- OpenShift 4 is unique in that management extends all the way down to the operating system
- Every machine boots with a configuration that references resources hosted in the cluster it joins enabling cluster to manage itself
- Downside is that every machine looking to join the cluster is waiting on the cluster to be created
- Dependency loop is broken using a bootstrap machine, which acts as a temporary control plane whose sole purpose is bringing up the permanent control plane nodes
- Permanent control plane nodes get booted and join the cluster leveraging the control plane on the bootstrap machine
- Once the pivot to the permanent control plane takes place, the remaining worker nodes can be booted and join the cluster



OpenShift Bootstrap Process: Step by Step





Bootstrapping process step by step:

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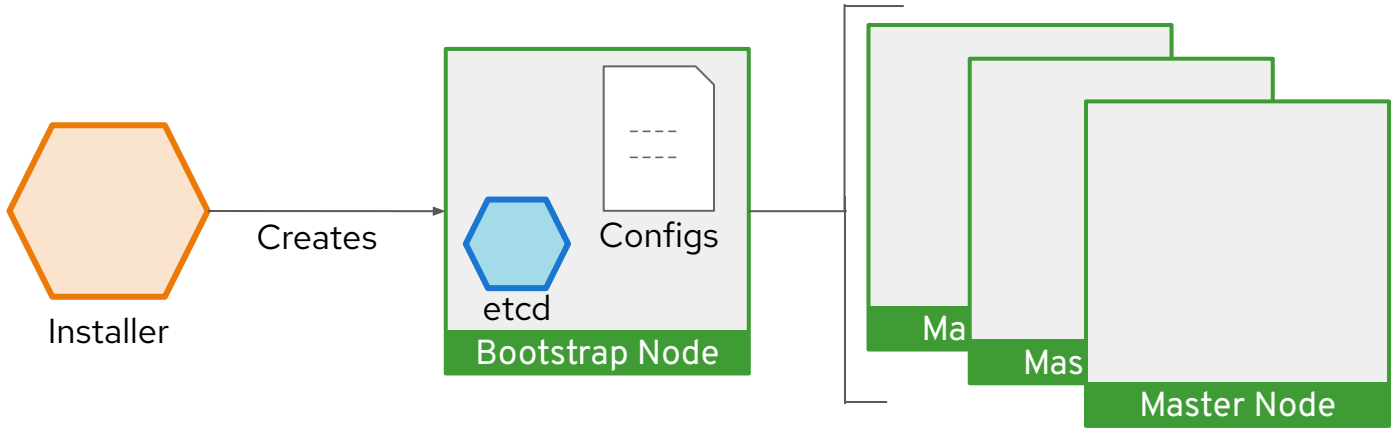

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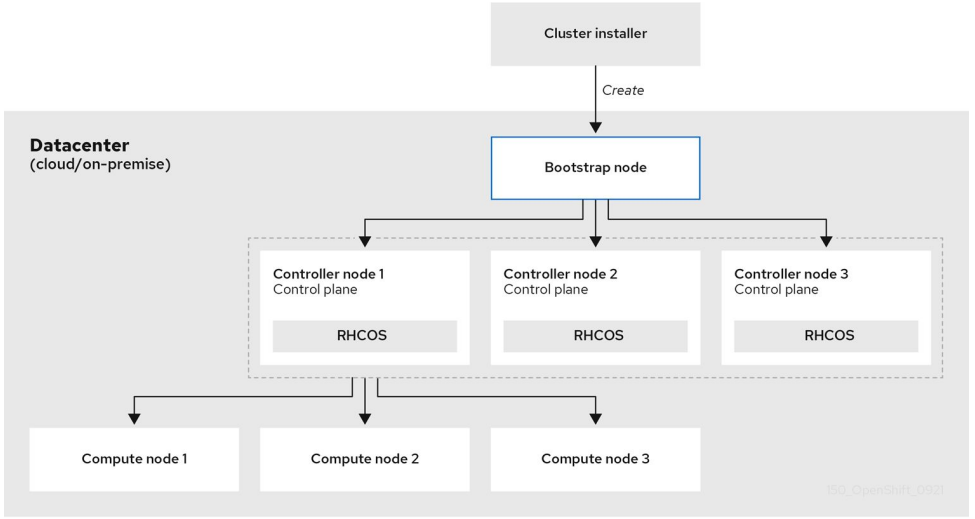

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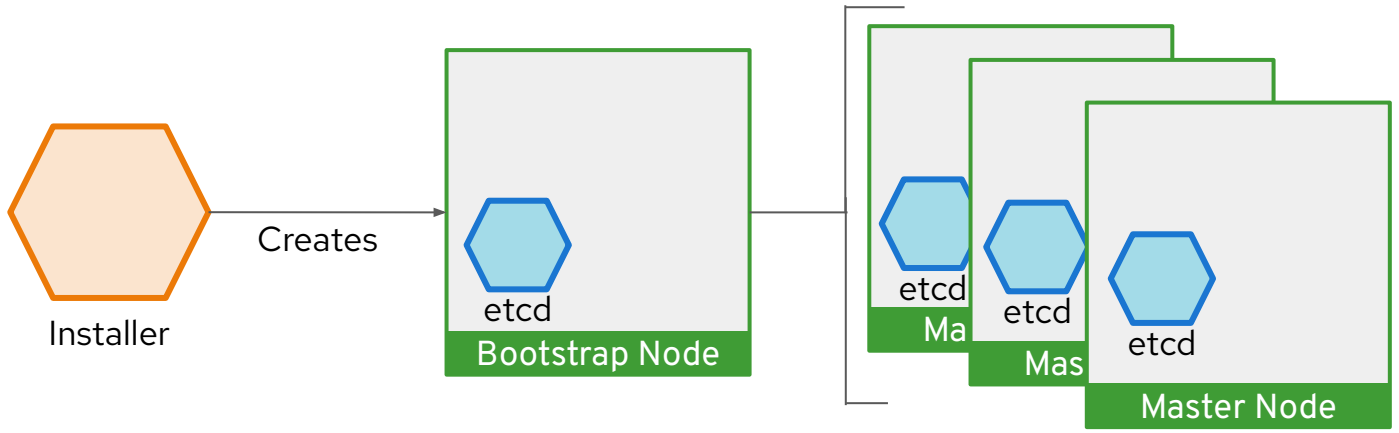

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2. Master machines fetch the remote resources from the bootstrap machine and finish booting.
3. Master machines use the bootstrap node to scale the etcd cluster to 4 total instances.

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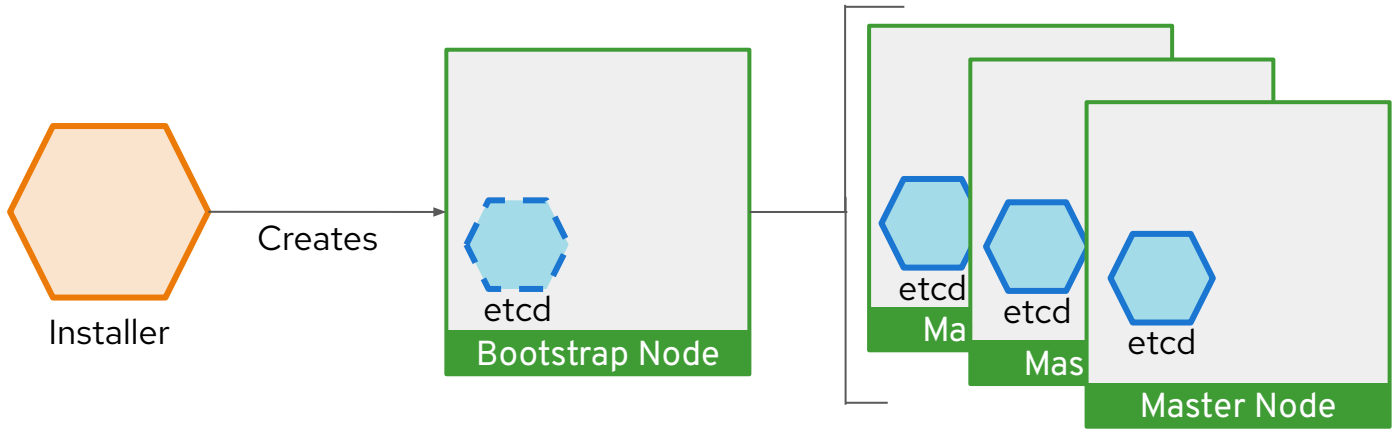

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4. The Etcd operator scales itself down off the bootstrap node, leaving the etcd instance count to 3

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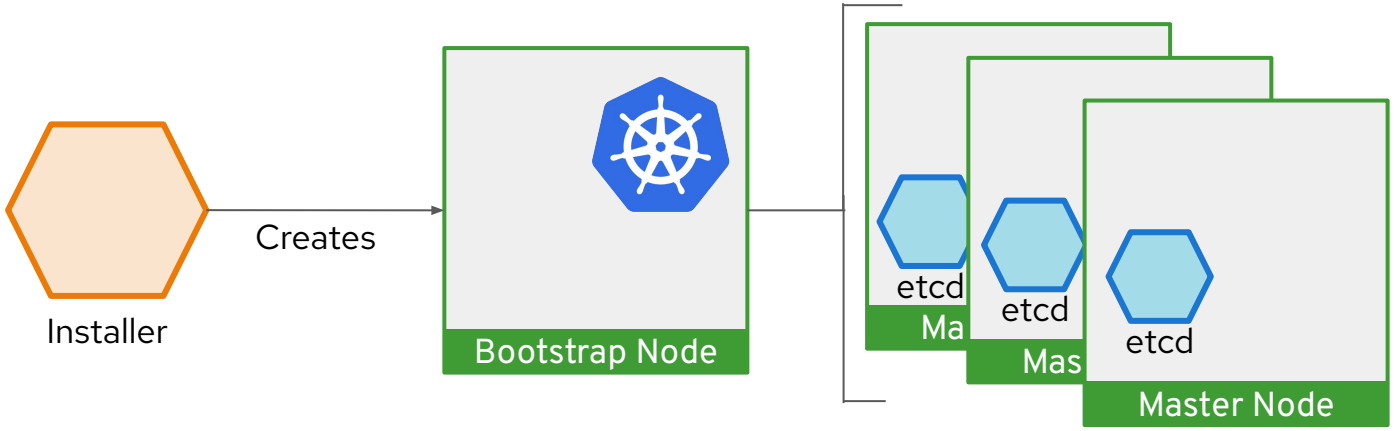

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3. Master machines use the bootstrap node to scale the etcd cluster to 3 instances.
4. The Etcd operator scales itself down off the bootstrap node, then scales back up to 3; all on the Masters
5. Bootstrap node starts a temporary Kubernetes control plane using the newly-created etcd cluster.

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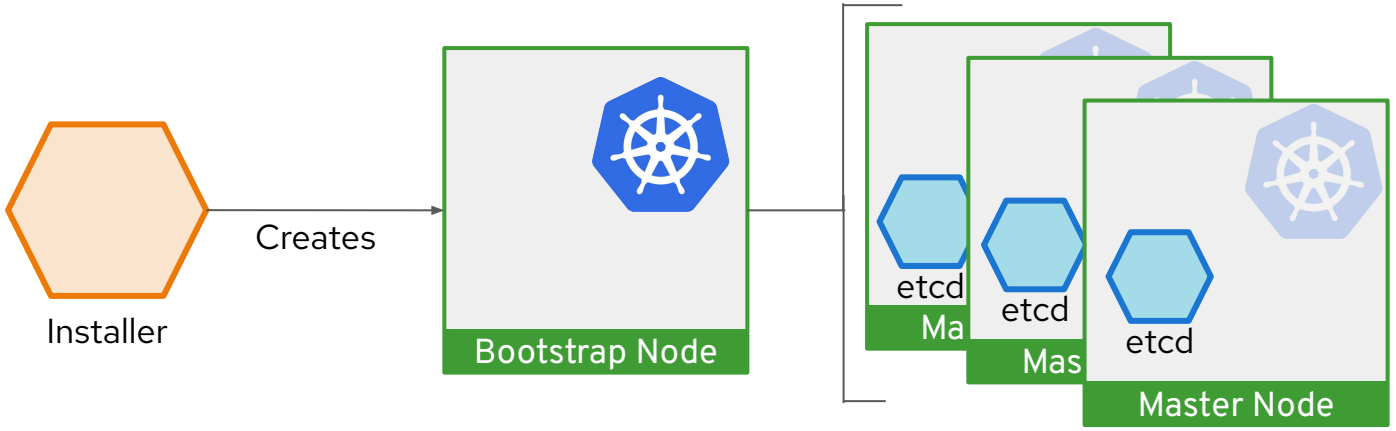

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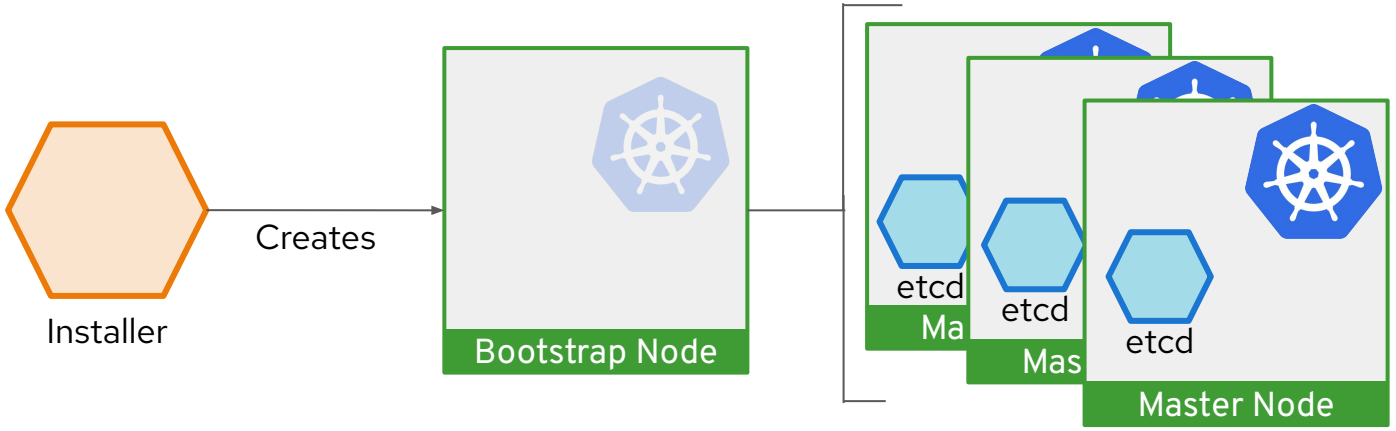

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7. Temporary control plane shuts down, yielding to the production control plane.

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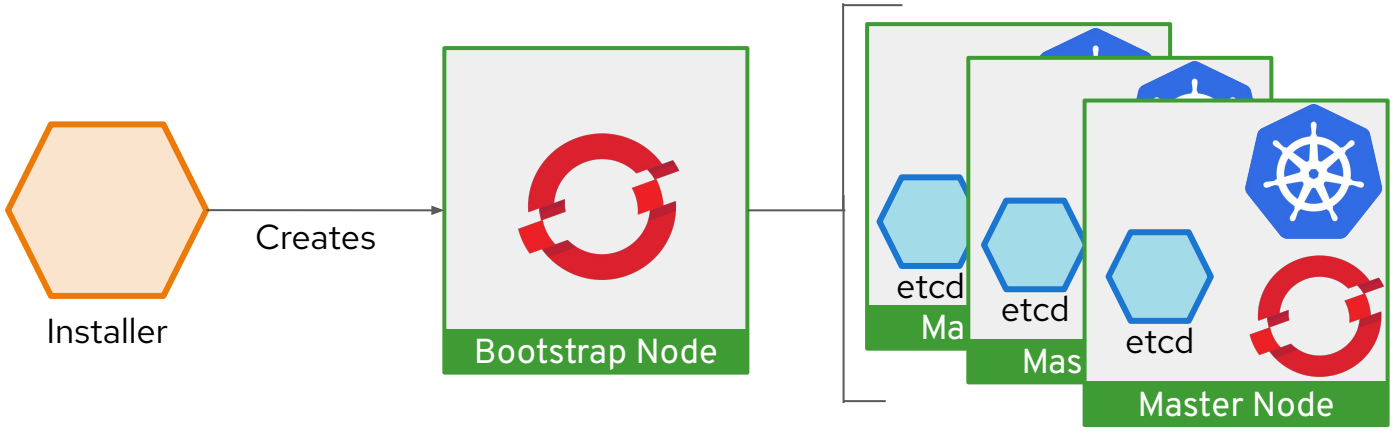

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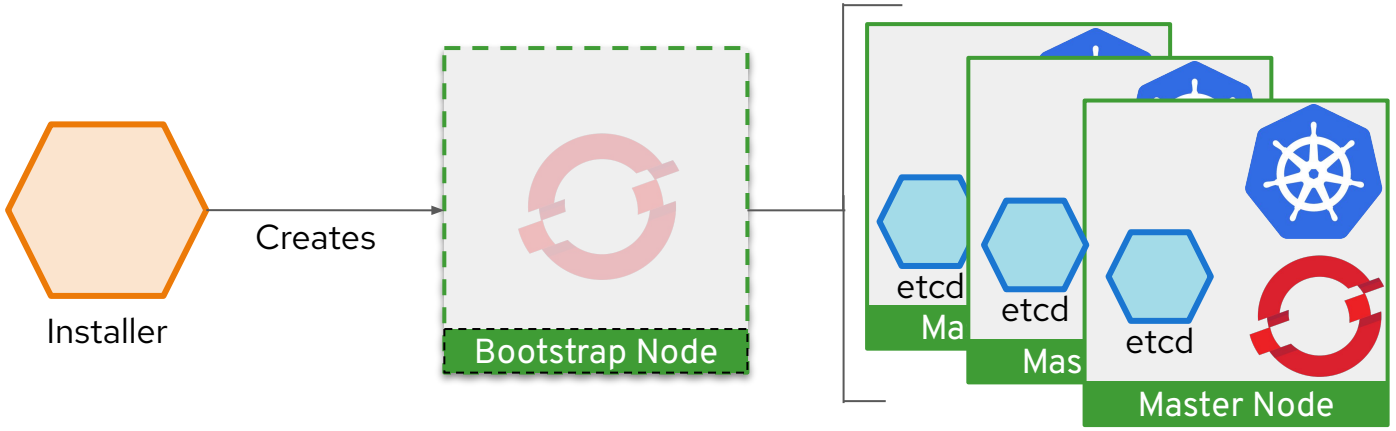

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9. Installer then tears down the bootstrap node or if user-provisioned, this needs to be performed by the administrator.

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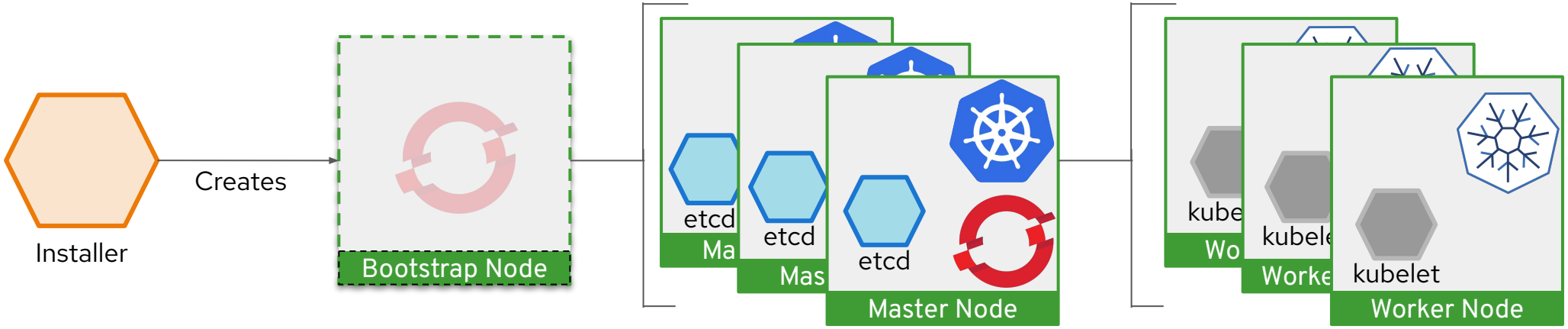

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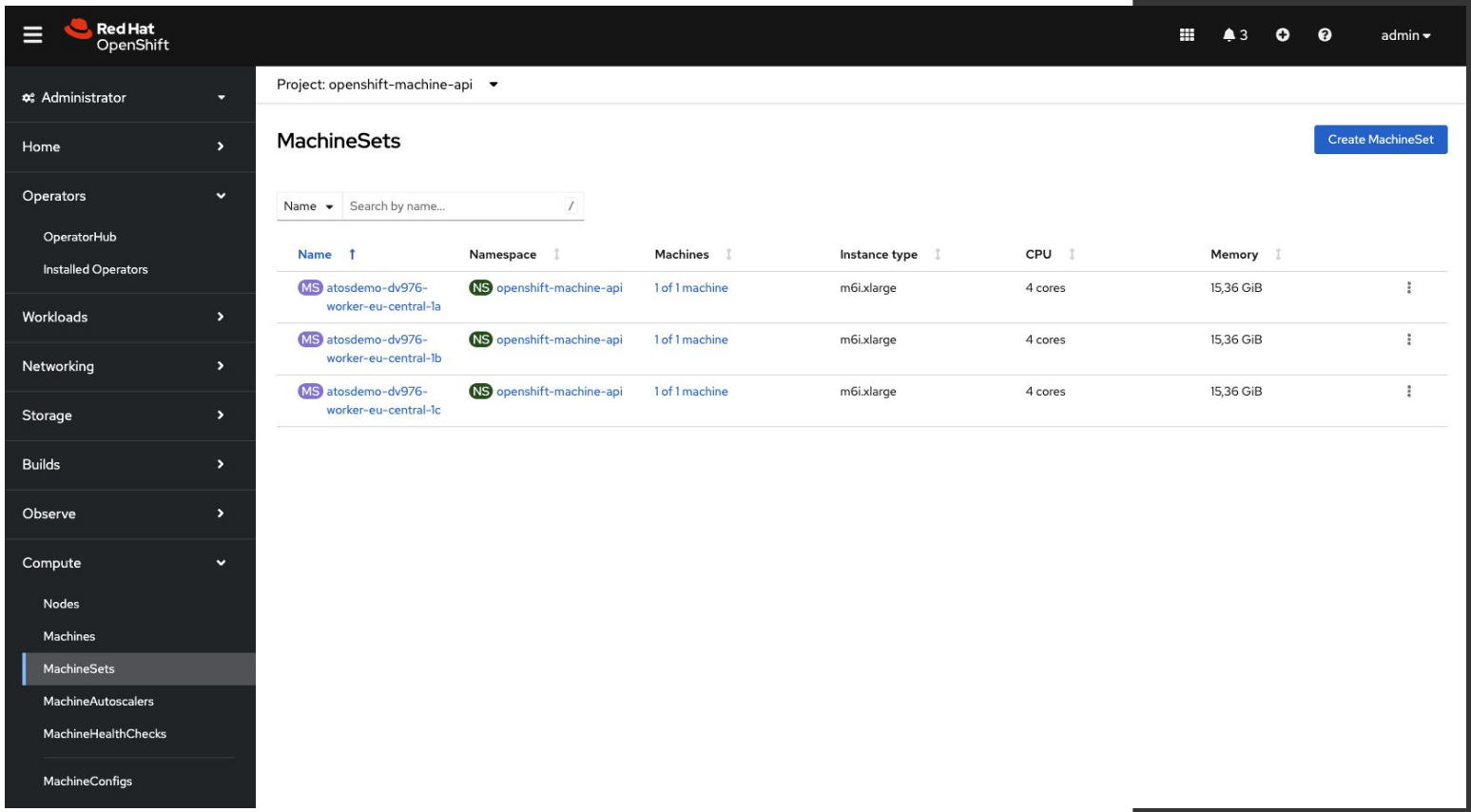
9. Installer then tears down the bootstrap node or if user-provisioned, this needs to be performed by the administrator.
10. Worker machines fetch remote resources from masters and finish booting.

Scaling



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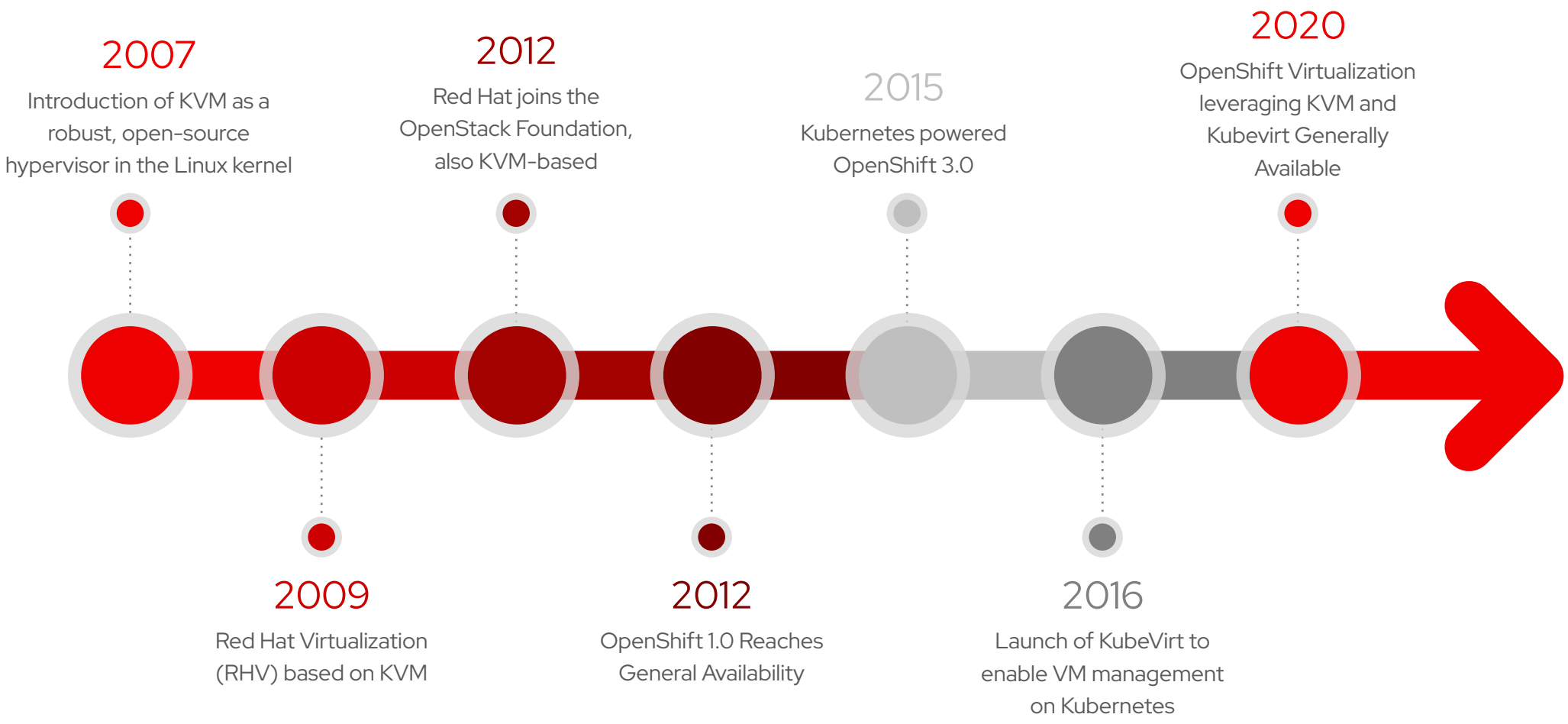
Red Hat OpenShift Virtualization

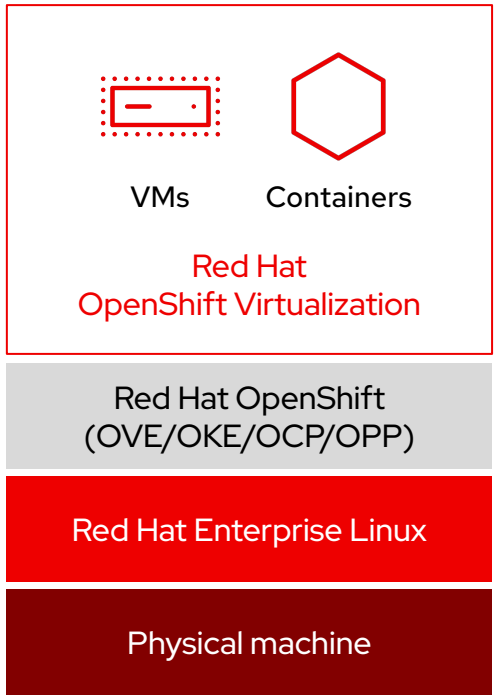
Security, manageability and consistency across the hybrid cloud.

Red Hat has a long history with Virtualization



Red Hat OpenShift Virtualization

The modern option for general purpose virtualization



- **Unified platform**
  for virtual machines and containers*
- **Consistent management**
  tools, interfaces, and APIs incl. ACM and AAP integrations
- **Performance and stability**
  of Linux, KVM, and qemu
- **Healthy open source community**
  the KubeVirt project is a top 10 CNCF active project, with 200+ contributing companies
- **Diverse ecosystem**
  of Red Hat & partner operators
- **Included feature**
  of all OpenShift subscriptions (OVE/OKE/OCP/OPP)
- **Includes Red Hat Enterprise Linux**
  guest entitlements*
- **Supports Microsoft Windows**
  guests through Microsoft SVVP
- **Inbound guest migration**
  using Ansible Automation Platform + Migration Toolkit for Virtualization, Training and Consulting
- **Virt admin focused training**
  DO316, EX316

*excluding OVE which is virtual machines only and includes no RHEL guest entitlements

Red Hat

Bring traditional virtual machines into OpenShift

Traditional VM behavior in a modern platform

- Administrator concepts and actions
- Network connectivity
- Live migration

Use existing VM roles and responsibilities

- Migrate traditional VMs easily with a set of comprehensive tools
- Maintain application components that are business critical
- Modernize application workloads and skill sets over time

Red Hat

OpenShift Virtualization Engine

Opening the door to virtualization and modernization

Unlimited VMs

Run as many VMs as you need, maximizing the value of your hardware. Purchase RHEL subscriptions, virtualized OpenShift for container-based applications, or upgrade to other bare metal OpenShift editions if needed.

128 core bare metal scale

Get bare metal scale with 128 cores per subscription - run more VMs on less hardware, optimizing your infrastructure efficiency.

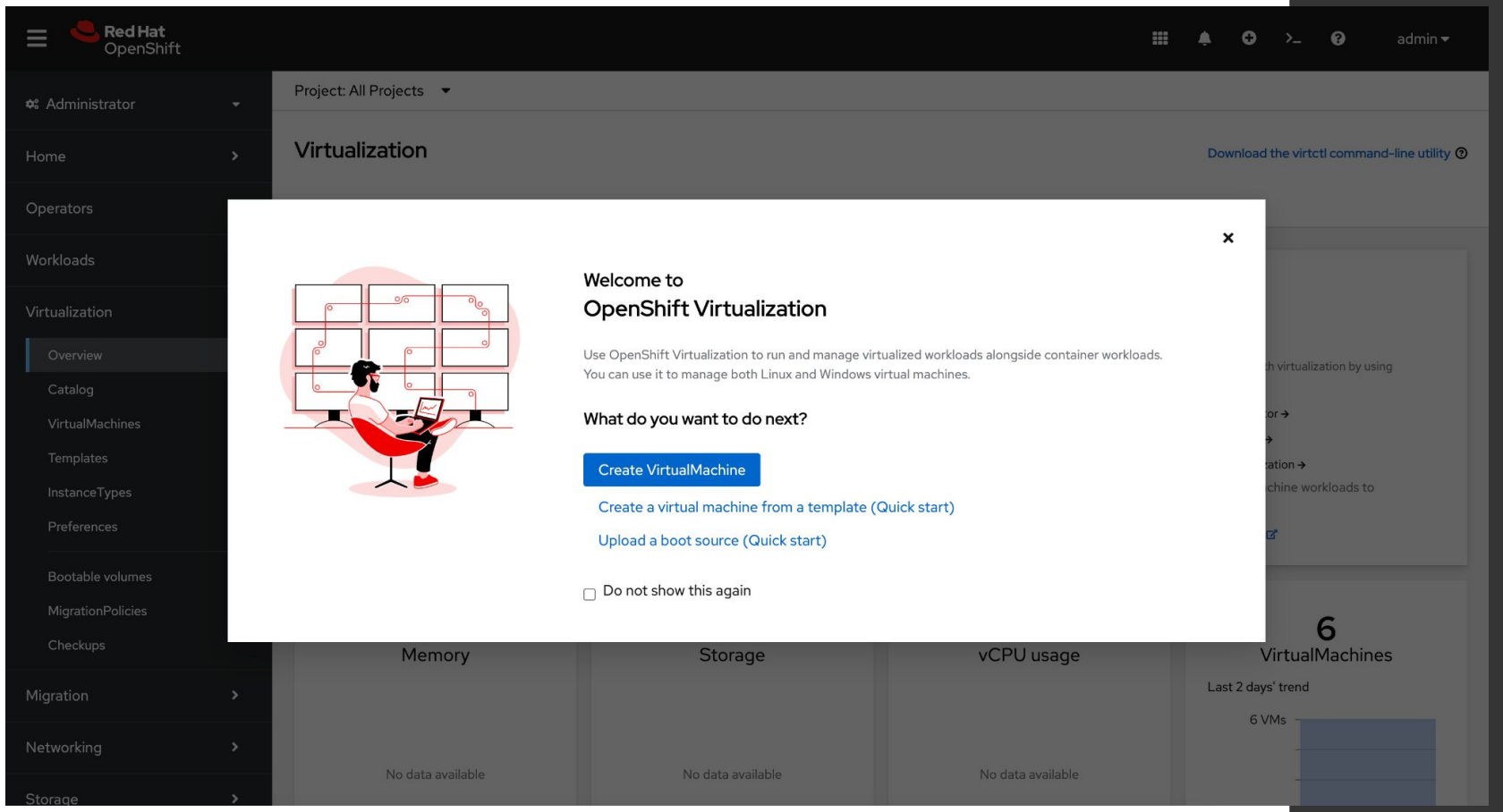
Optional Advanced Cluster Management for Virtualization

Scale as big as you can; add Advanced Cluster Management for Virtualization to make management of thousands of nodes as easy as managing a single rack.

Workload monitoring and platform logging

Keep tabs on and track your environment with a preconfigured, preinstalled, and self-updating stack then stay in command with the included OpenShift GitOps operator to leverage Kubernetes-powered orchestration for VMs.

OpenShift Virtualization



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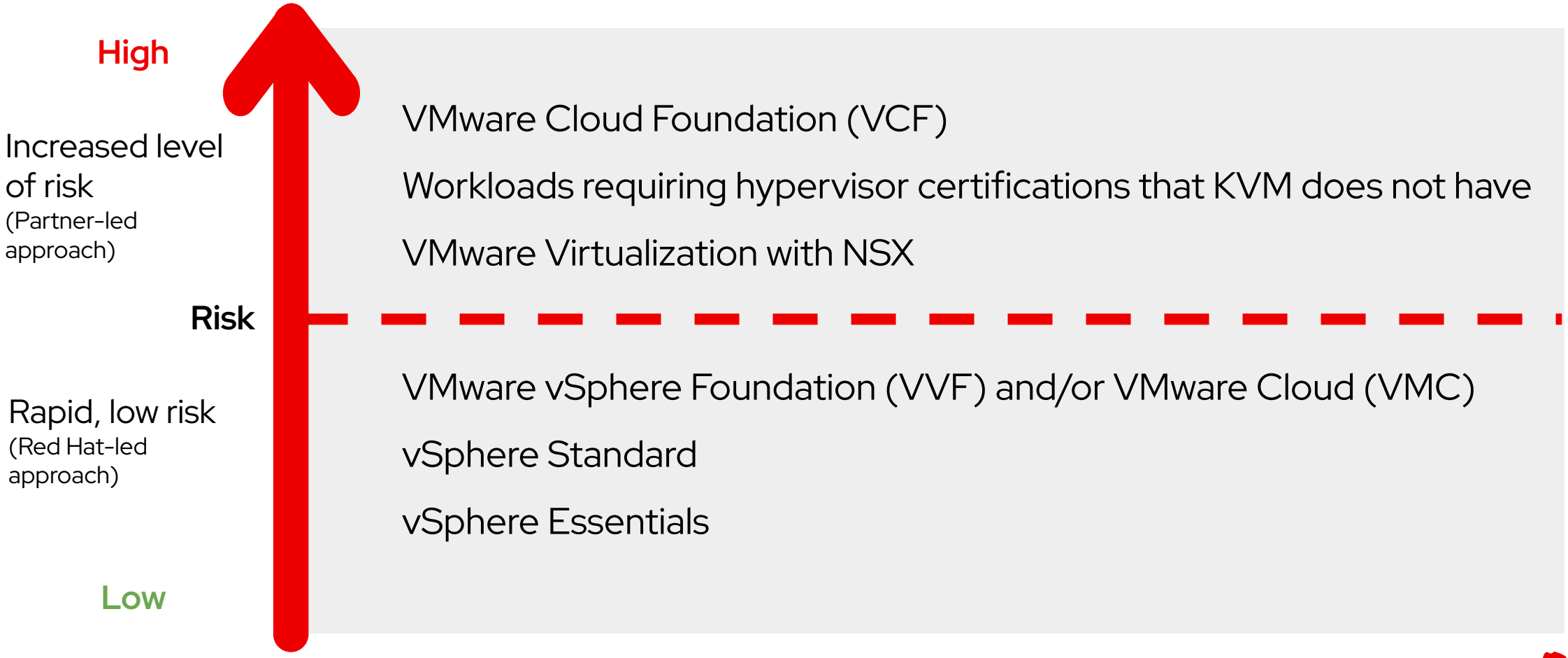
Customers have varying levels of investment in VMware



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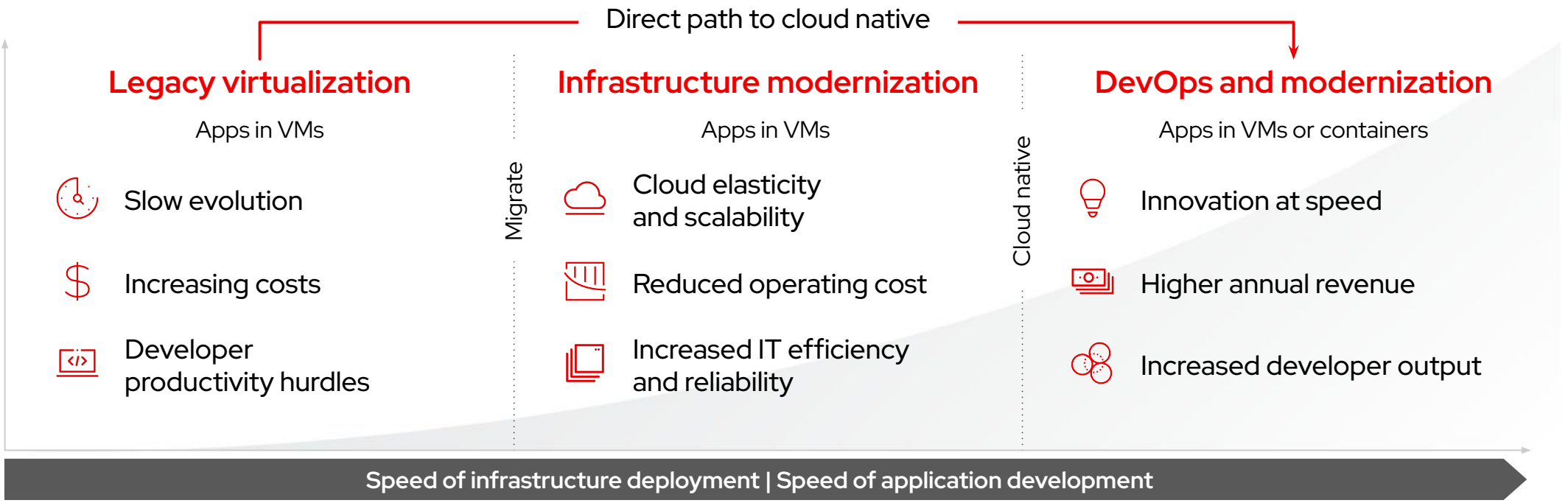
Modernize at your own pace



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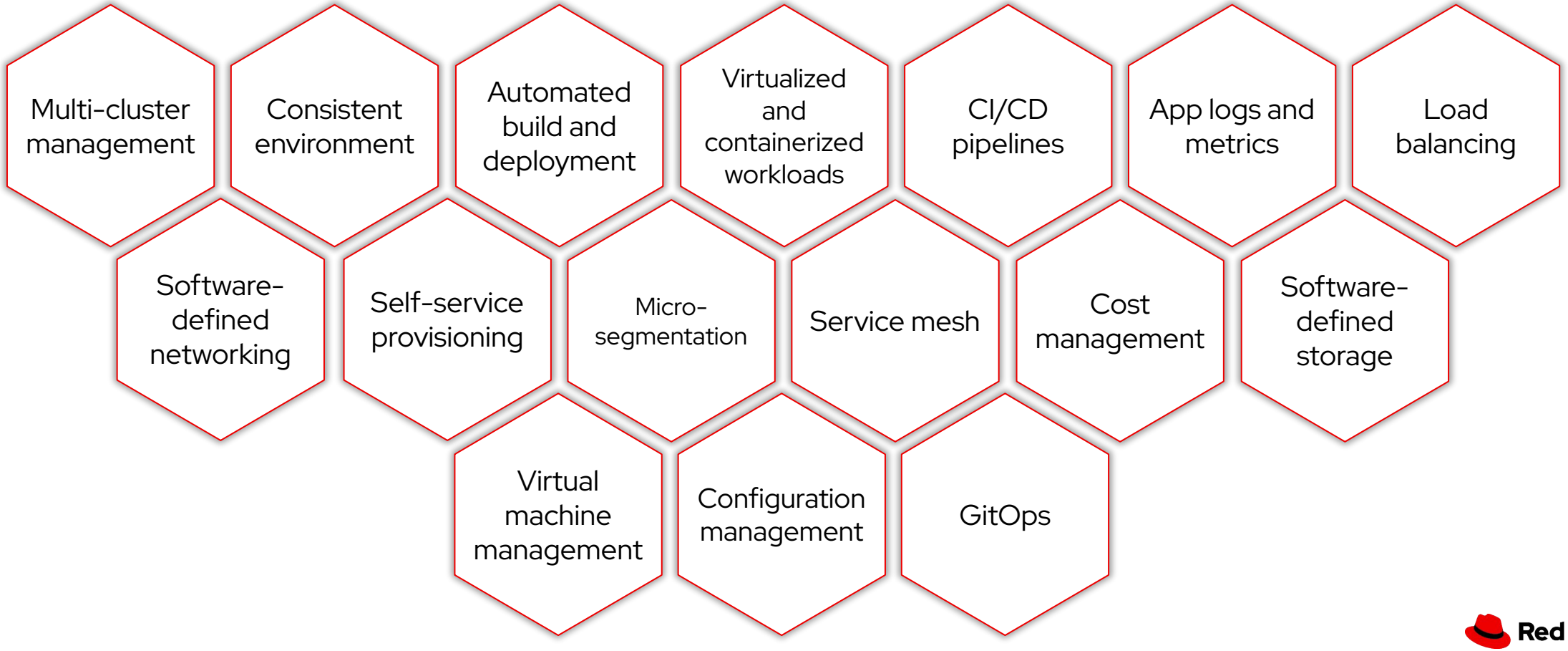
A Modern application platform with comprehensive lifecycle and infrastructure management



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Thank you

Red Hat is the world's leading provider of enterprise open source software solutions. Award-winning support, training, and consulting services make Red Hat a trusted adviser to the Fortune 500.

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