

# INTRODUCTION TO KUBERNETES AND OPENSIFT

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# SESSION ROADMAP

1

Evolution of cloud  
and containerized  
workloads  
(Microservices)

2

What is  
Kubernetes?

3

What is OpenShift  
Container Platform  
(OCP)?

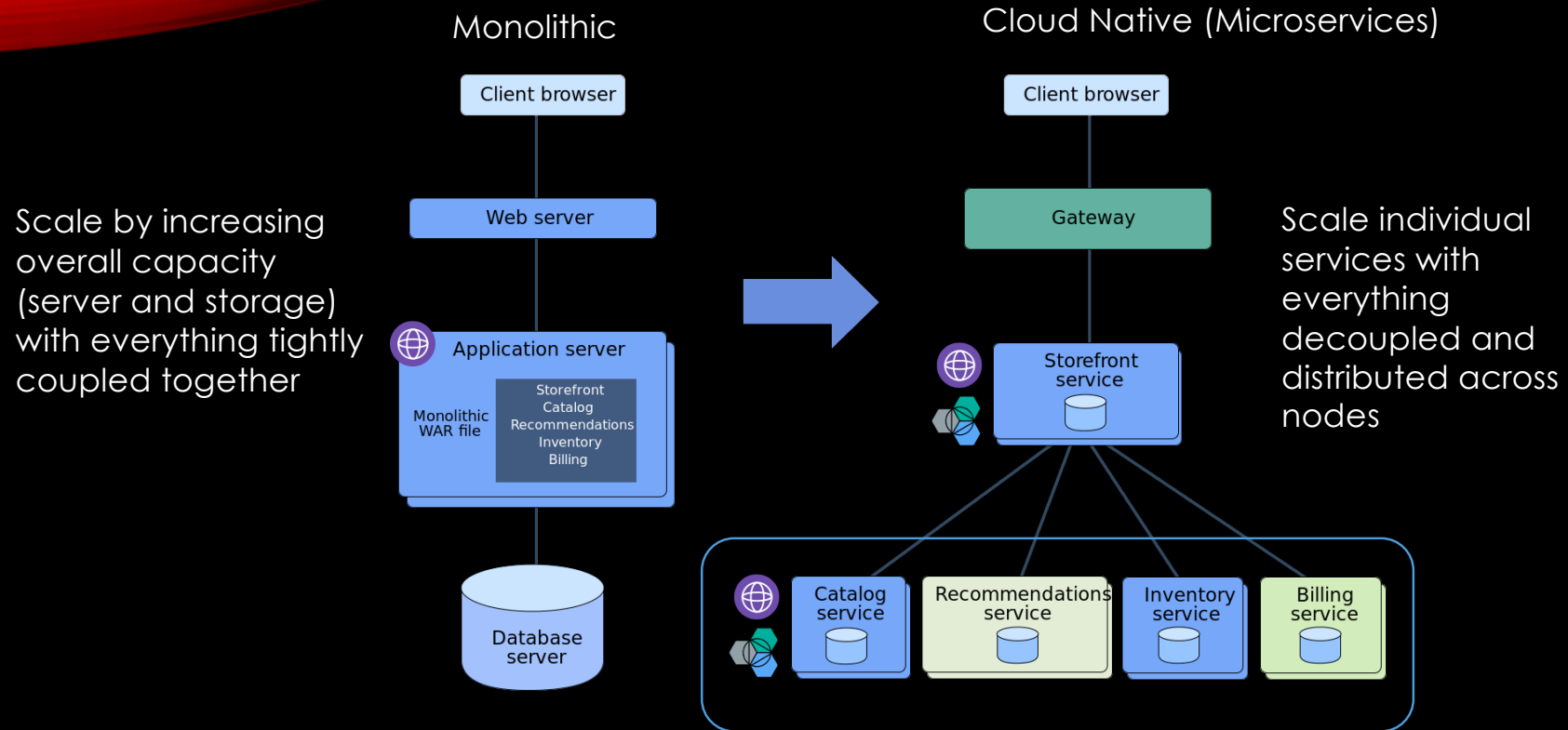


# 1. EVOLUTION OF CLOUD AND CONTAINERIZED WORKLOADS (MICROSERVICES)

## According to NIST cloud is



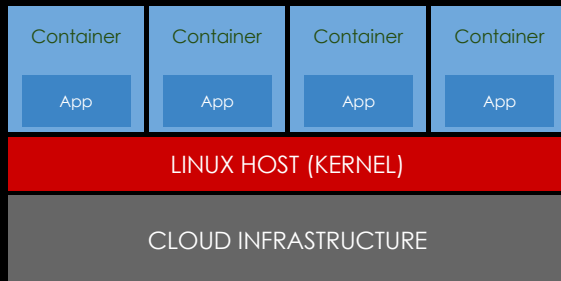
# Need Apps to match scalability and speed of cloud ...



# ... and Containers to enable this

## Consistent Tools for Both Developers and IT Operations

### CONTAINERS



Integrated in Linux OS  
Fully Open Source  
Secure Isolation of Applications  
Eliminates need for VM Hypervisor  
Runs on Any Cloud Platform

### DEVELOPERS

- Cloud-Native Applications
- Simplify Packaging
- Simplify Testing

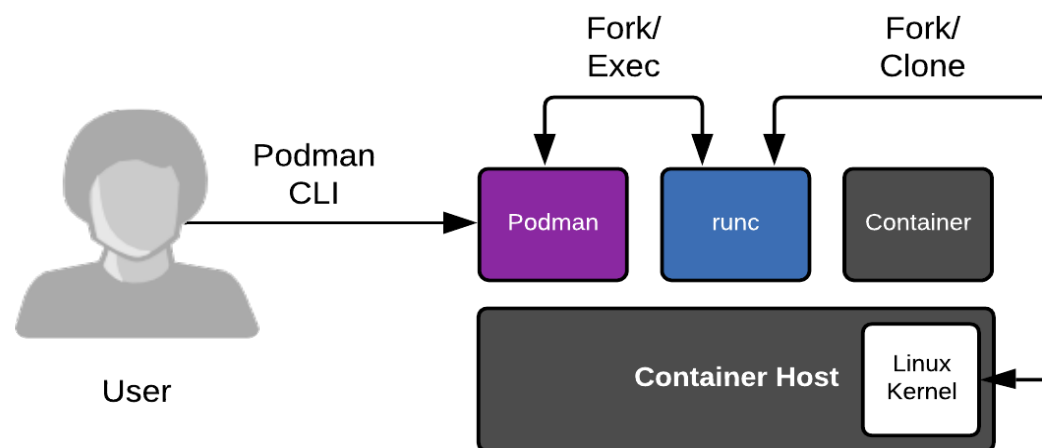
### IT OPERATIONS

- Consistent Application Deploys
- Automated Application Deploys
- Improved Application Performance
- Multi-Cloud Consistency

### BUSINESS LEADERS

- Enable DevOps Culture
- Enable Hybrid Multi-Cloud
- Reduce VM Licensing Costs
- Accelerate App-Dev Cycles

# HOW DOES A CONTAINER RUN (USING PODMAN)



How containers run with a container engine

See [Red Hat blogpost](#) and [Podman website](#)



# WHY ORCHESTRATION (SHORT)





# WHY ORCHESTRATION (LONG) ?

Scaling Out Containers (especially for microservices) leads to management issues

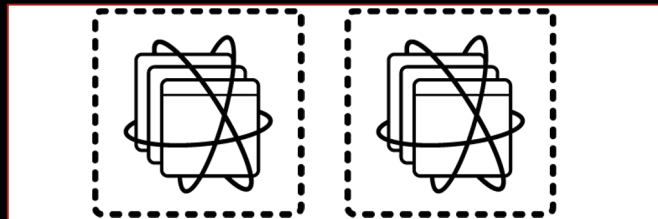
- What happens when a container dies? (recovery)
- How do I rollout new versions of my application?
- How do I expose containers to the outside world (port conflicts become a problem if using one host)?
- How do I scale my application and load-balance calls to it?
- How do I secure access to my containers?
- How do I manage credentials for my applications?
- How can I manage my containers across nodes (machines / vms in my datacenter or cloud) from one control plane to better utilize resources (resource pooling -> improved scheduling -> improved utilization)?

....



## 2. WHAT IS KUBERNETES?

# Why do Containers need Kubernetes?



CONTAINERIZED  
APPLICATIONS



Manage Containers  
Securely

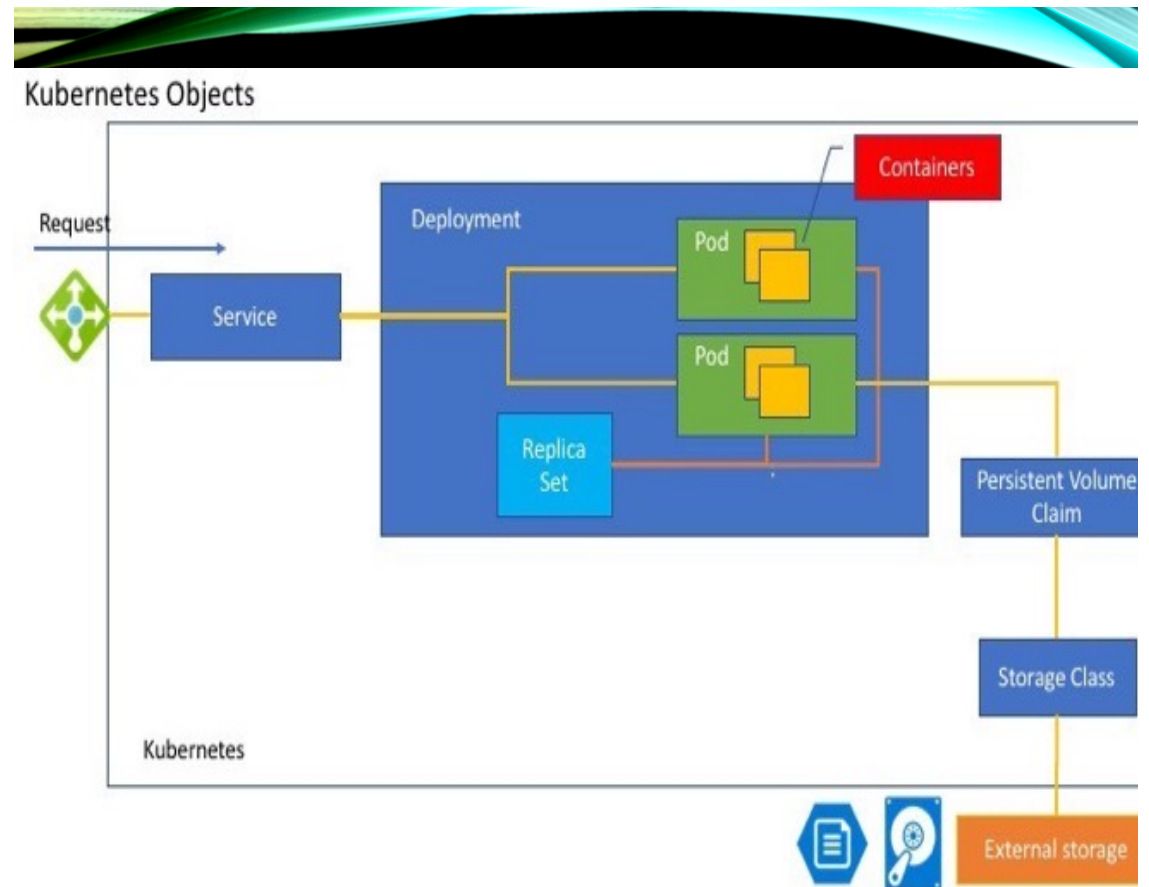
Manage Containers  
At Scale

Integrate IT Operations

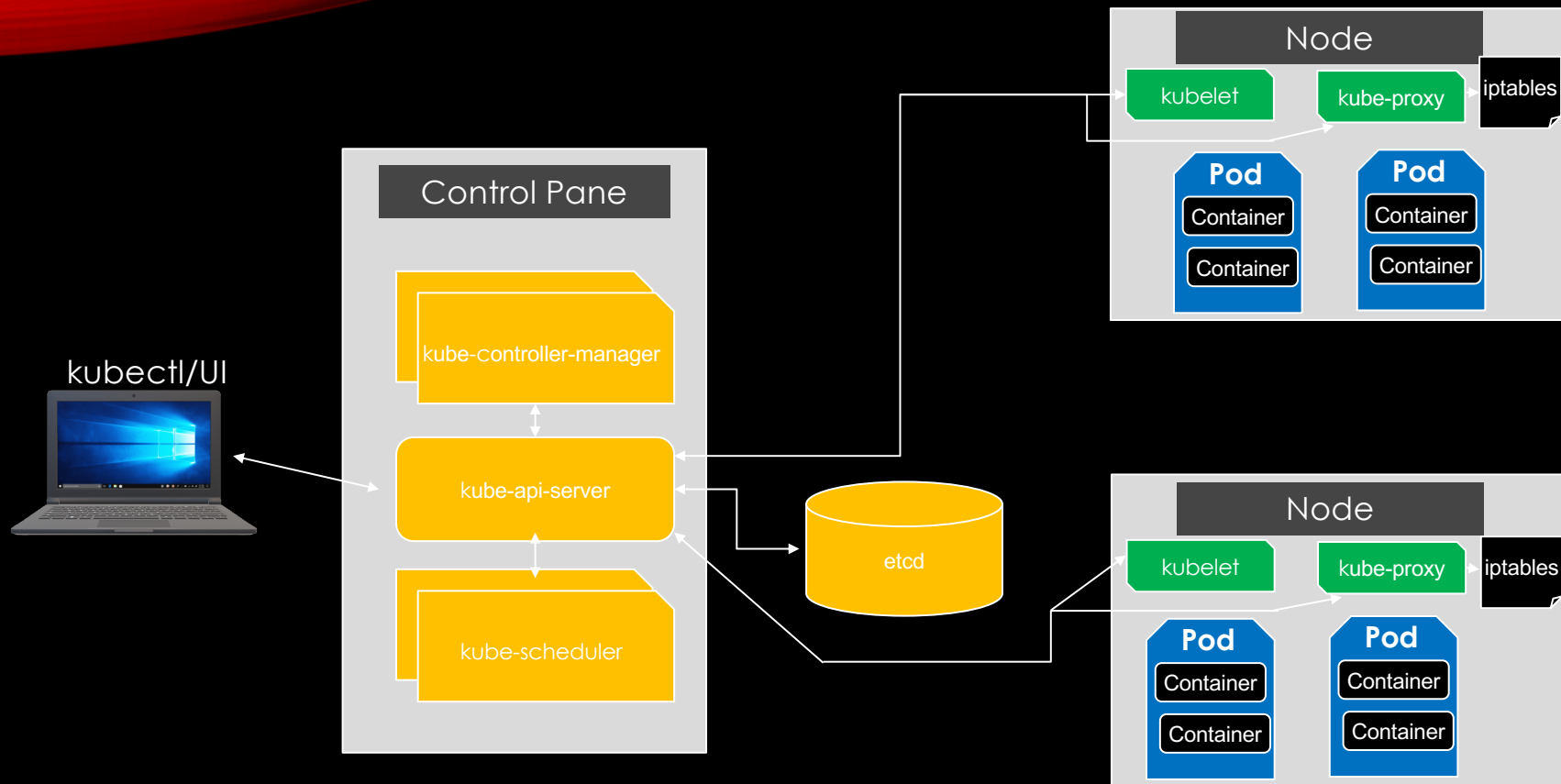
Enable Hybrid Multi-Cloud

# KUBERNETES— PUTTING THE PIECES TOGETHER

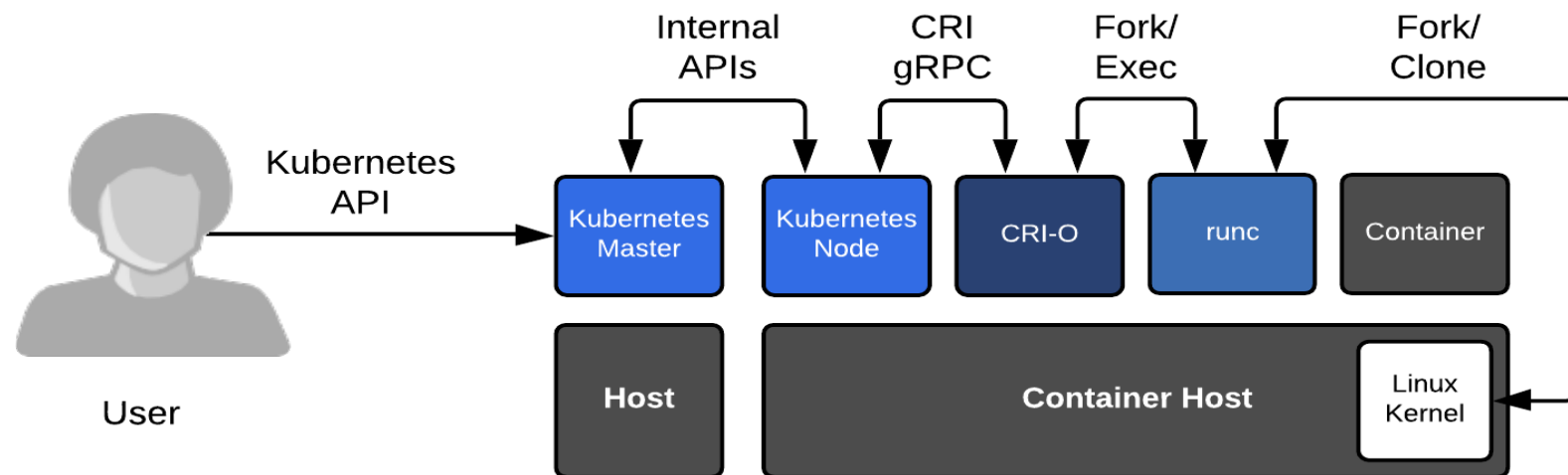
- Pod – Set of containers running in same execution environment/context (smallest unit in kubernetes)  
[containers in pod share some Linux namespaces (Network, IPC, and PID if enabled) but each have own cgroup]
- ReplicaSet – makes sure correct number and types of pods are available
- Deployment –Manages replica sets for ease of new app version rollout.
- Service – Provides access point for pods/deployment as well as load balancing
- Persistent Volume Claim – provides storage volumes to container runtime (i.e. docker) by binding to persistent volumes
- Storage Class – groups storage so that it can be dynamically selected and provisioned
- Persistent Volume - Set of external storage defined to kubernetes



# BASIC “PHYSICAL” KUBERNETES CLUSTER ARCHITECTURE



# PATH TO RUNNING CONTAINER IN KUBERNETES



How containers run in a Kubernetes cluster

[Red Hat blogpost](#)

[CRI-O homepage](#)



### 3. WHAT IS RED HAT OPENSIFT CONTAINER PLATFORM?

# CONTAINER CHALLENGES

## Container security

Image scanning, patching, and compliance

## Day 2 management

Installations, upgrades, and maintenance  
Integration of existing enterprise technology

## Application delivery

Monitoring, metering, and management  
Integration of existing developer tools



## Trusted enterprise Kubernetes

Continuous security, world-class support and services, and deep expertise to confidently run any application

## A cloud-like experience, everywhere

Full-stack automated operations on a consistent foundation across on-premises or hybrid cloud infrastructure

## Empowerment for developers to innovate

Ability to get applications to production sooner with a wide range of technologies and streamlined workflows





# Red Hat OpenShift - Hybrid Multi-Cloud platform



# How does Red Hat create OpenShift?

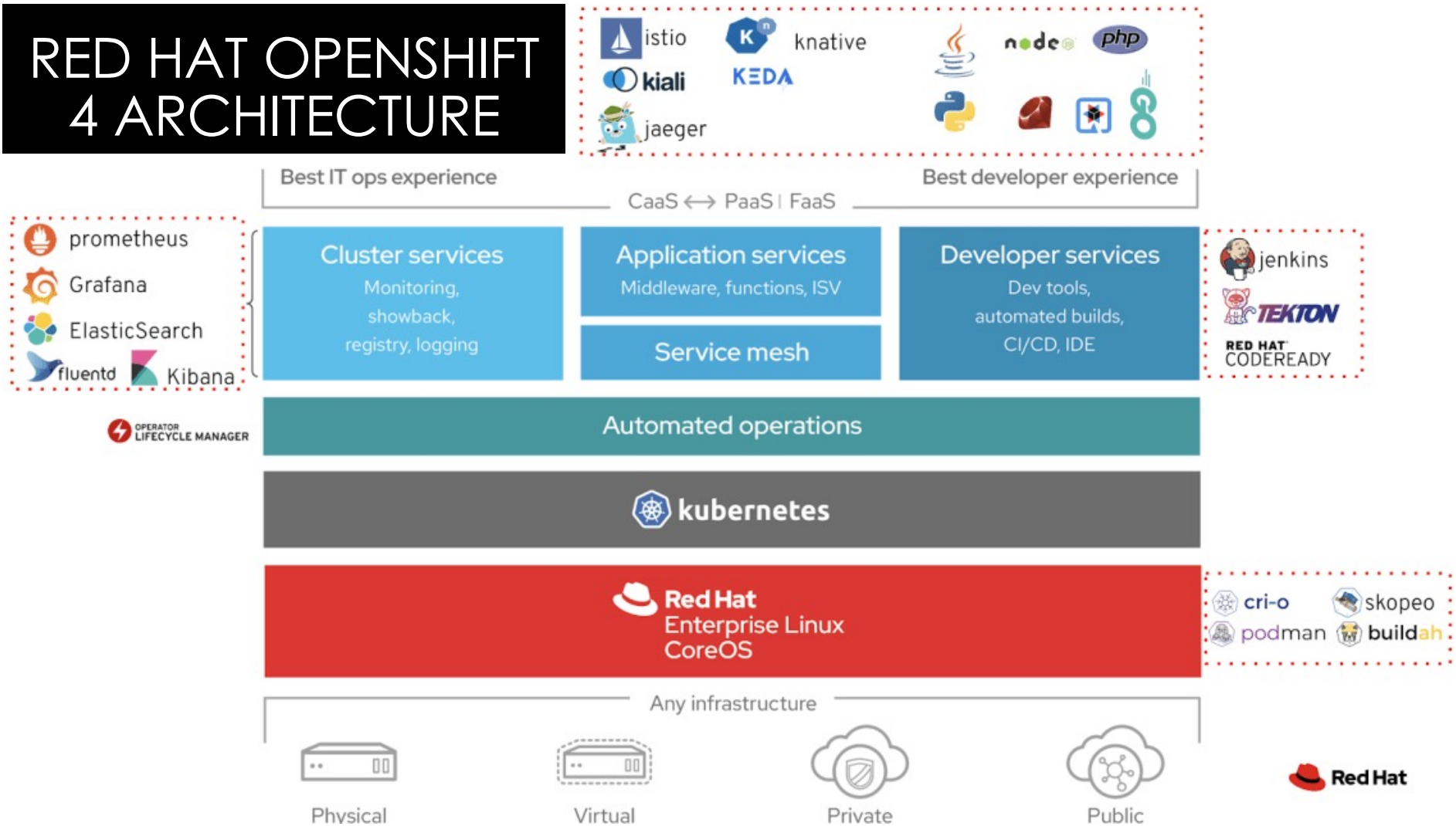


- OKD – Upstream Open Source Software (OSS)
- Integrate additional OSS projects
- 100+ Integrations
- Validated OSS Innovation
- Partner Integration Platform



**CONTAINER PLATFORM**

# RED HAT OPENSIFT 4 ARCHITECTURE



# OPENSIFT PROJECTS

- Virtual clusters all connected to the same “physical” cluster
- Maps to Kubernetes namespaces along with additional metadata
- End user sees the cluster via current project (`oc get pods` will show pods in current project)
  - Divide cluster resources between different users
  - Resources (i.e., pods, replicaset, etc.) scoped by project (resource names unique within namespace)
  - Projects beginning with *openshift-* and *kube-* are critical projects for OpenShift and can only be created by a cluster administrator
- Make and view projects
  - `oc new-project hi` [makes new project named hi]
  - `oc get project hi` [returns project “hi”]
  - `oc get projects` [returns all projects on the “physical” cluster]



# TRY IT YOURSELF!

1. Learn OpenShift for free on the [Interactive Learning Portal](#) with tutorials that spin up an OpenShift cluster for you to go through the exercises hands-on
2. [Try CodeReady Containers locally \(with free Red Hat online account\)](#) which lets you manage your own OpenShift cluster using minishift to develop things on your local workstation
3. [Install on Linux on IBM Z with trial](#)
4. [Installing OpenShift Container Platform on Linux on IBM Z Documentation](#)
5. [Try OpenShift on the LinuxONE Community Cloud](#)