

Build Smart on Kubernetes

World Tour

Orquestación de contenedores
con Red Hat OpenShift

27 de Julio, 2020





Kubernetes with OpenShift

World Tour



Luis Reyes Oliva, IBM Developer Advocate





Kubernetes with OpenShift

World Tour



Mikel Díez Parra, Head of Innovation, IBM Spain, Portugal,
Greece & Israel



Kubernetes with OpenShift

World Tour

Agenda

10:00 – Bienvenida

10:10 – Keynote Innovation Tech Talk

Ponente: Mikel Díez Parra, Head of Innovation, IBM Spain, Portugal, Greece & Israel

10:30 – Introducción a Contenedores, K8s y registro en IBM

11:15 – Taller para principiantes: Introducción a Red Hat OpenShift en IBM Cloud 4.3

12:00 – Taller avanzado: Operadores en OpenShift 4.3. Desplegando un servicio Cloudant

Ponente: Luis Reyes Oliva, IBM Developer Advocate

12:30 - Preguntas y respuestas














<https://developer.ibm.com/>

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 <p>Analytics</p> <p>Uncover insights with data collection, organization, and analysis.</p>	 <p>Artificial intelligence</p> <p>Build and train models, and create apps, with a trusted AI-infused platform.</p>	 <p>Blockchain</p> <p>Start developing with the open source Hyperledger Fabric and IBM Blockchain.</p>
 <p>Containers</p> <p>Automate the deployment, scaling, and management of containerized applications.</p>	 <p>Node.js</p> <p>Use this JavaScript runtime environment to run JavaScript code outside the browser</p>	 <p>Serverless</p> <p>Run code without maintaining your own servers.</p>

 <p>Code Pattern</p> <p>Focus on data privacy with a back end for a mobile loyalty app</p> <p>April 24, 2020 →</p>	 <p>Code Pattern</p> <p>Create an app to perform intelligent searches on data</p> <p>March 5, 2020 →</p>	<p>Tutorial</p> <p>Automate model building with AutoAI</p> <p>June 23, 2020 →</p>
 <p>Code Pattern</p> <p>Build a chatbot using the Watson Assistant search skill</p>	 <p>Code Pattern</p> <p>Create a cognitive news search app</p>	<p>Tutorial</p> <p>Generate machine learning model pipelines to choose the best model for your problem</p> <p>→</p>
 <p>Video</p> <p>Getting COBOL working on Red Hat OpenShift and Kubernetes</p> <p>April 20, 2020 →</p>	<p>Webcast Wednesdays</p> <p>Video Tech Talks</p> <p>Bee Travels - Test driven development (TDD) in the Modern World</p> <p>April 17, 2020 →</p>	<p>What is Tekton?</p> <p>Video Other</p> <p>What is Tekton?</p> <p>April 7, 2020 →</p>
<p>Article</p> <p>Develop reactive microservices with Reactive Messaging</p> <p>July 22, 2020 →</p>	<p>Article</p> <p>Defining the term "reactive"</p> <p>July 20, 2020 →</p>	<p>Article</p> <p>Automate application refactoring using AI</p> <p>July 7, 2020 →</p>



<https://developer.ibm.com/es/>

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The screenshot shows the IBM Developer website interface. At the top, there's a navigation bar with icons for 'Tecnologías' and sub-categories like 'Inteligencia Artificial', 'Analytics', and 'Node.js'. Below this, there's a featured article titled '¿Cuál es la tendencia?' with IBM and Red Hat logos. A video player is overlaid on the right, showing a man speaking and the title 'Video Cloud Native Development' dated '15/07/2020'. Below the video, there's a section for 'Maratón Behind the Code América Latina' with a 'Conoce más' button. At the bottom, there are three 'Code Pattern' cards: 'Cree aplicaciones de detección de objetos en tiempo real empleando Watson Machine Learning', 'Ensamblar un diálogo de chatbot de pedidos de pizzas', and 'Construya una aplicación de banca basada en microservicios'. A large text overlay at the bottom right reads 'Cree microservicios seguros escribiendo en una base de datos consolidada'.

Code Pattern

Cree aplicaciones de detección de objetos en tiempo real empleando Watson Machine Learning

20/08/2019 →

Code Pattern

Ensamblar un diálogo de chatbot de pedidos de pizzas

19/08/2019 →

Code Pattern

Construya una aplicación de banca basada en microservicios

15/08/2019 →

Cree microservicios seguros escribiendo en una base de datos consolidada



Kubernetes with OpenShift

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10:30

Introducción a Contenedores, K8s y registro en IBM

En esta sesión, revisaremos los elementos esenciales de la tecnología de contenedores y orquestación, en particular **Docker** y **Kubernetes**, y cómo trabajan juntos para habilitar nuevos modelos de desarrollo y operación de aplicaciones

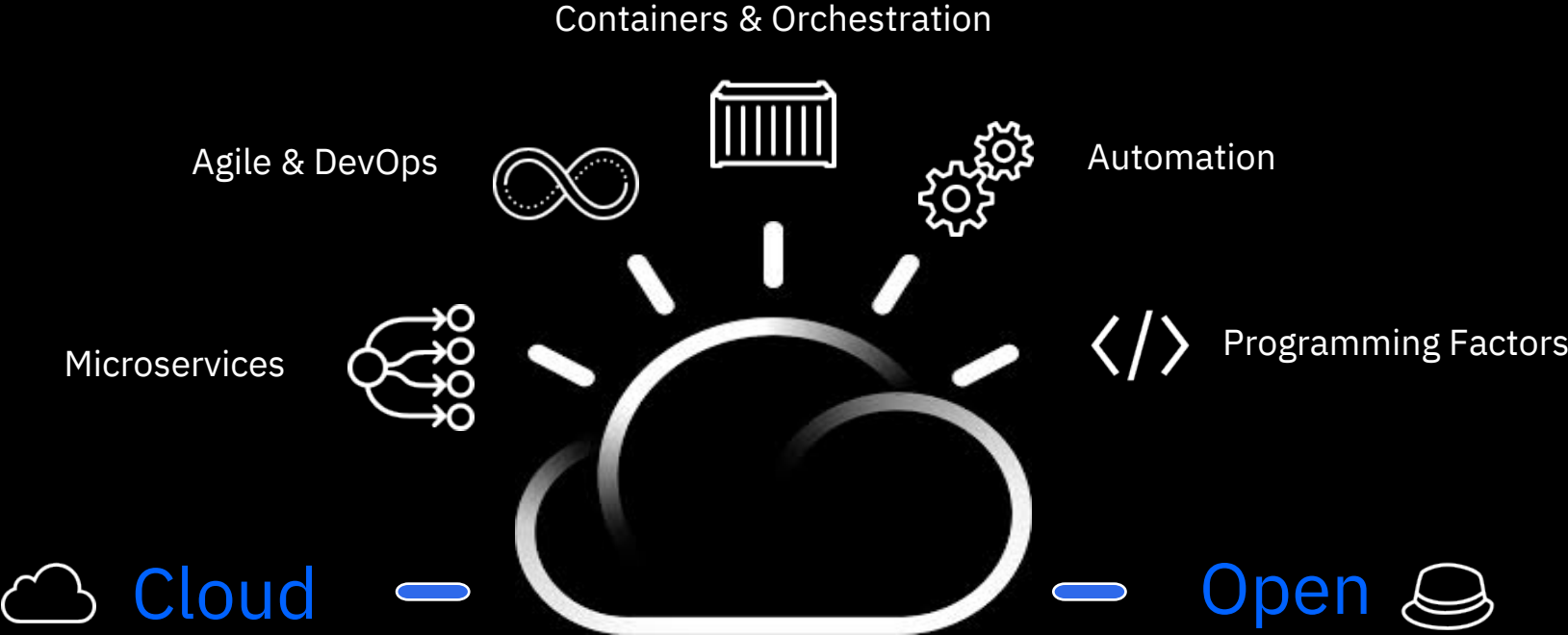
'Cloud Native Development' y la tormenta perfecta



Cloud-native development is an approach to building and running applications that exploits the advantages of the cloud computing delivery model. The Cloud Native Computing Foundation (CNCF) talks about using "... an open source software stack to deploy applications as microservices, packaging each part into its own container, and dynamically orchestrating those containers to optimize resource utilization. Cloud native technologies enable software developers to build great products faster."
(CNCF, 2019)



Cloud Native | La tormenta (perfecta)



Database

Streaming & Messaging

Application Definition & Image Build

Continuous Integration & Delivery

Platform

App Definition and Development

Orchestration & Management

Scheduling & Orchestration

Coordination & Service Discovery

Remote Procedure Call

Cloud Native Storage

Runtime

Automation & Configuration

Container Registry

Security & Compliance

Key Management



kubernetes

Observability and Analysis

Monitoring

Logging

Tracing

Chaos Engineering

Provisioning

Automation & Configuration

Container Registry

Security & Compliance

Key Management

Paas/Container Service

Kubernetes Certified Service Provider

Kubernetes Training Partner

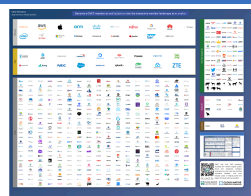


CLOUD NATIVE Landscape
CLOUD NATIVE COMPUTING FOUNDATION
Redpoint Group Amplify

This landscape is intended as a map through the previously uncharted terrain of cloud native technologies. There are many routes to deploying a cloud native application, with CNCF Projects representing a particularly well-traveled path.

l.cncf.io

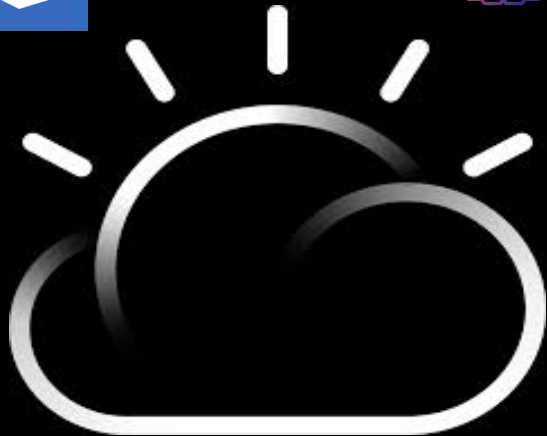
Special

Y la tormenta arrecia...



TEKTON



Kubeflow



Cloud



Open



Las frikyoskas

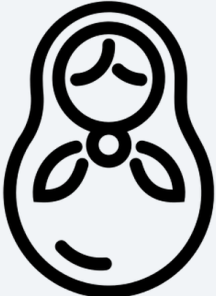
^^ Funcionalidad



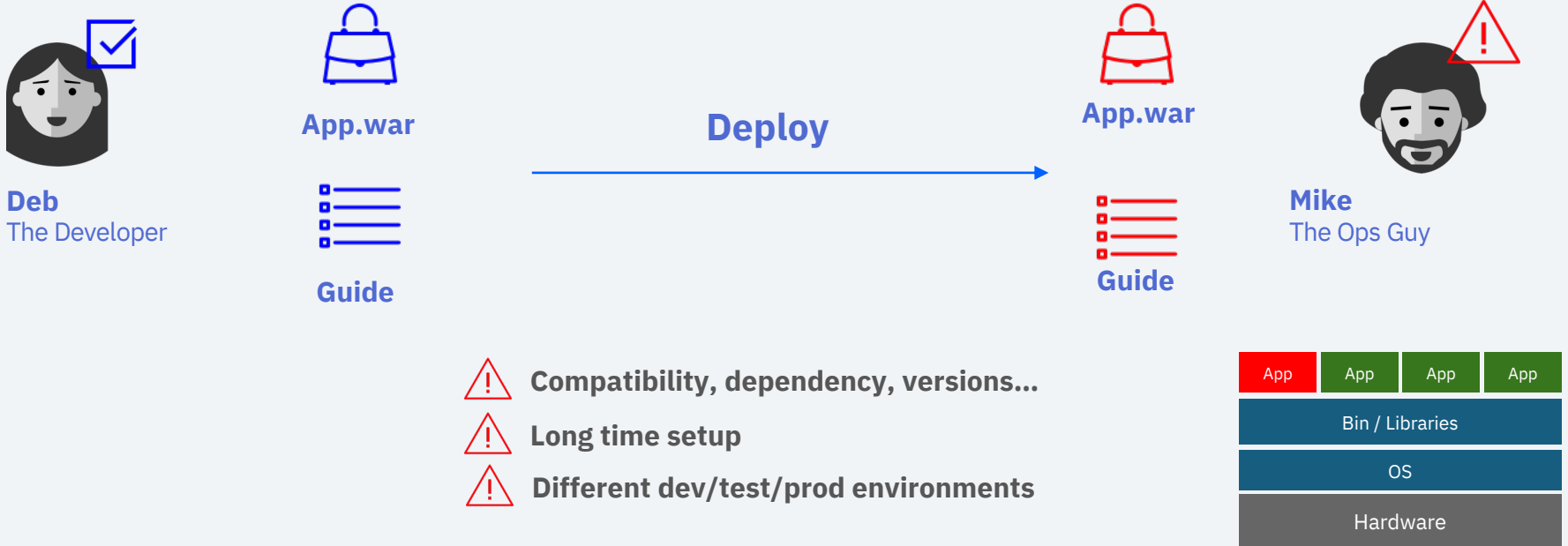
OPENSIFT



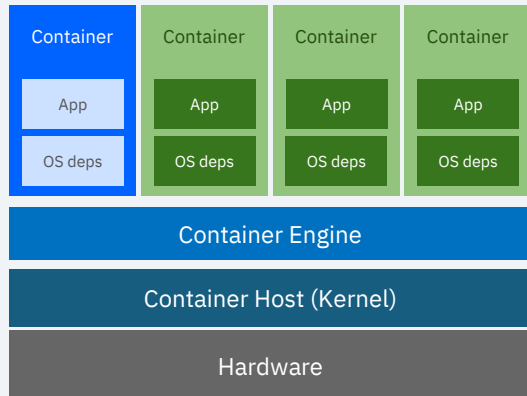
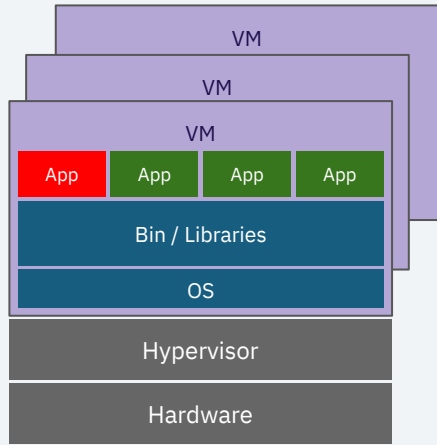
Contenedores



¿Por qué surgen los contenedores?



VMs vs Containers



- VMs are a better choice for running apps that require all of the operating system's resources and functionality when you need to run multiple applications on servers or have a wide variety of operating systems to manage.
- Containers are a better choice when your biggest priority is maximizing the number of applications running on a minimal number of servers.

VMs	Containers
Heavyweight	Lightweight
Limited performance	Native performance
Each VM runs in its own OS	All containers share the host OS
Hardware-level virtualization	OS virtualization
Startup time in minutes	Startup time in milliseconds
Allocates required memory	Requires less memory space
Fully isolated and hence more secure	Process-level isolation, possibly less secure

¿Qué es un contenedor?

A standard way to **package** an application and all its dependencies so that it can be moved between environments and **run** without changes.

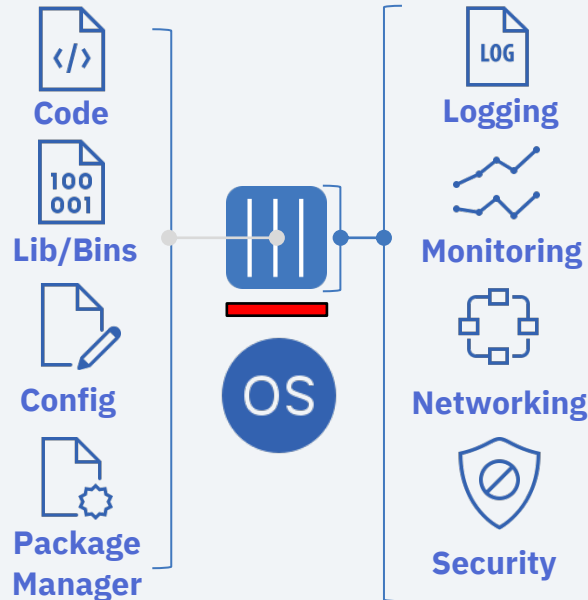
Containers work by **isolating** the differences between applications **inside** the container so that everything **outside** the container can be standardized.



Deb
The Developer

- Package apps with all dependencies
- Deploy to any environment in seconds
- Easily accessed and shared

Worries about what's
« **inside** » the container



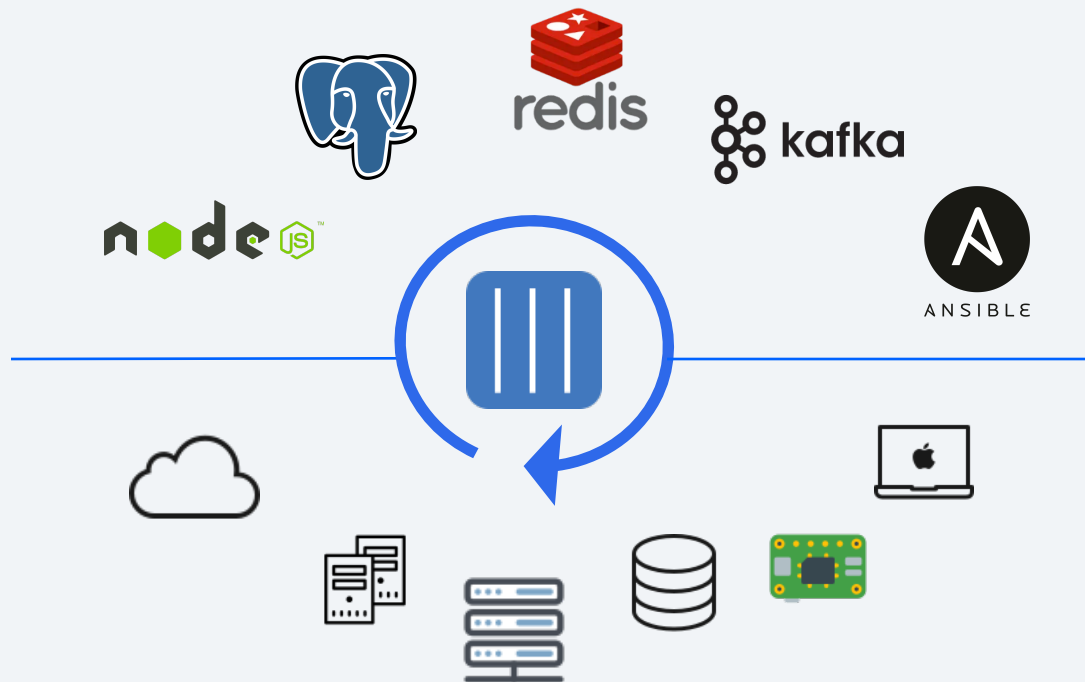
Mike
The Ops Guy

- Application processes on a shared kernel
- Simpler, lighter, and denser than VMs
- Portable across different environments

Worries about what's
« **outside** » the container

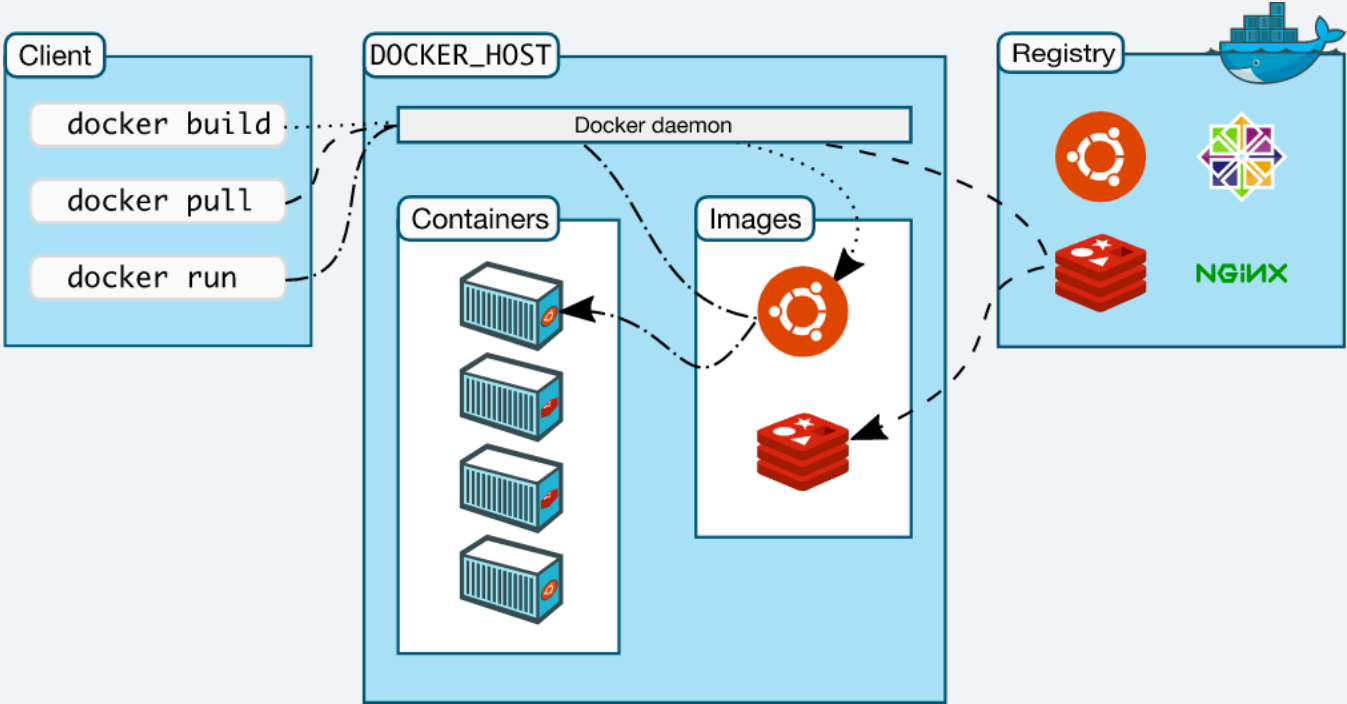
Ventajas de los contenedores

Multiplicidad del stack



- Consistencia
- Agilidad
- Portabilidad
- Eficiencia
- DevOps
- Microservicios
- Ecosistema

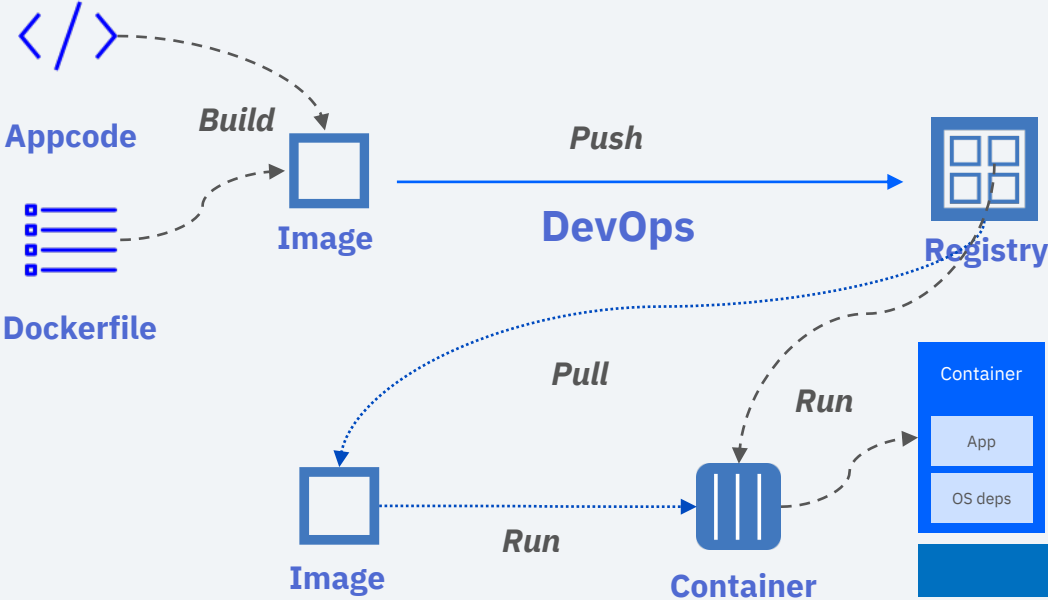
Docker architecture



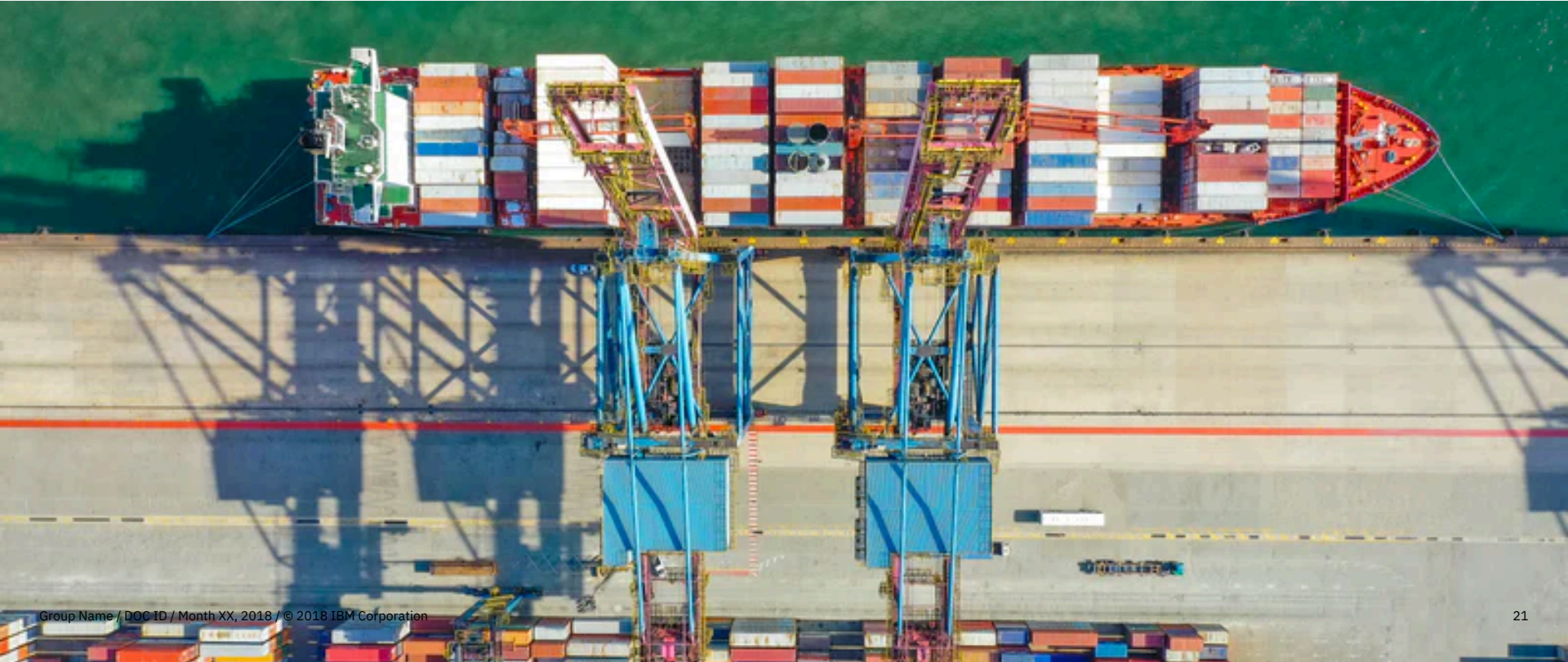
Proceso básico de despliegue



Deb
The Developer

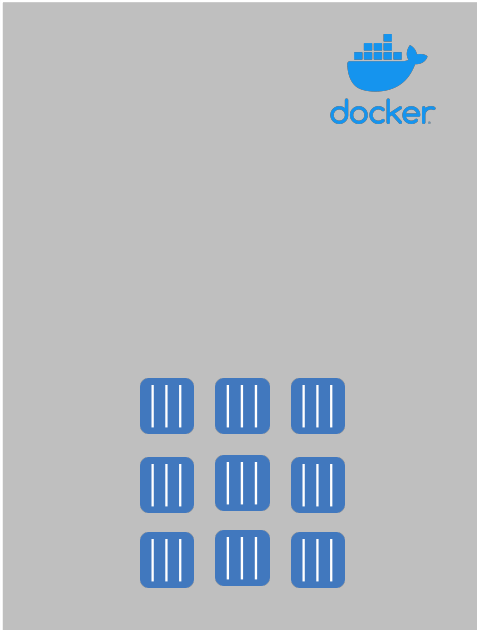


Orquestación



Unos pocos contenedores son manejables pero...

> **docker run myApp**



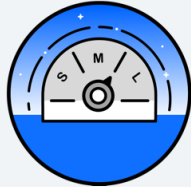
Cuando la cosa pasa a mayores...



Intelligent Scheduling



Self-healing



Horizontal scaling



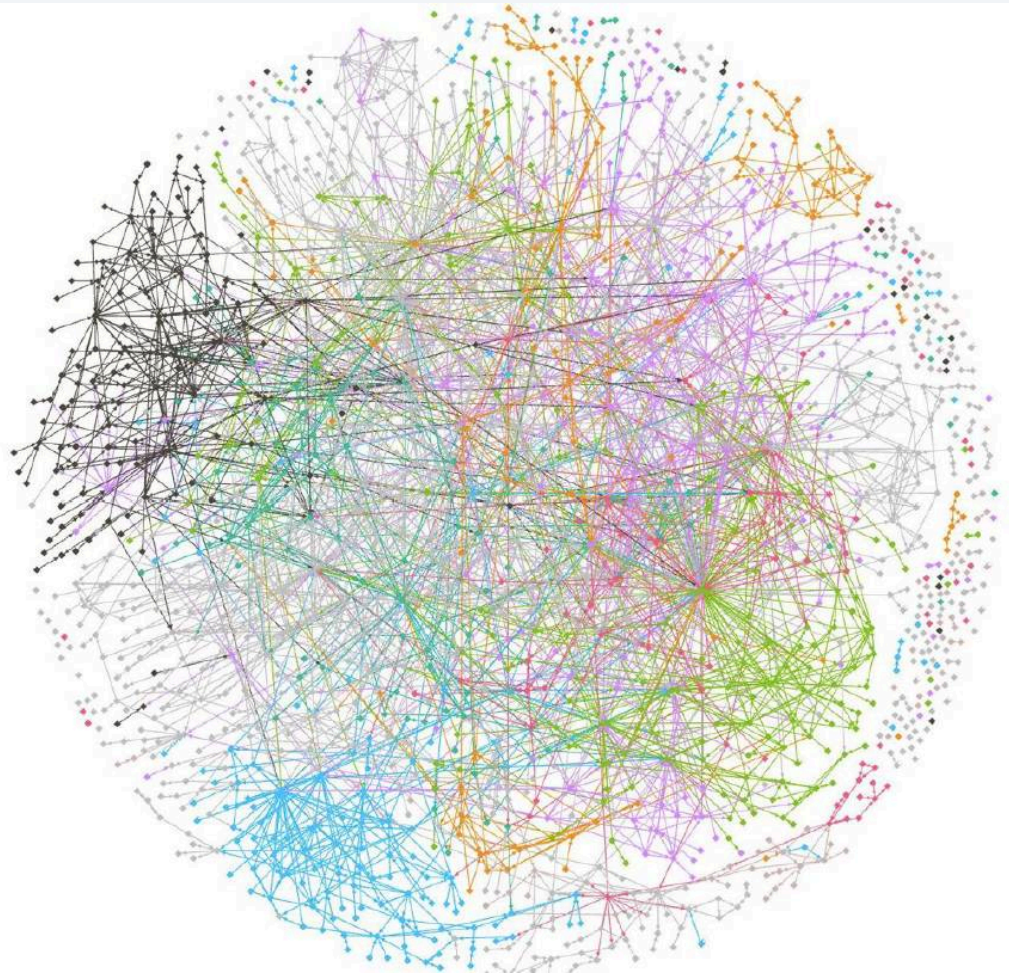
Service discovery & load balancing



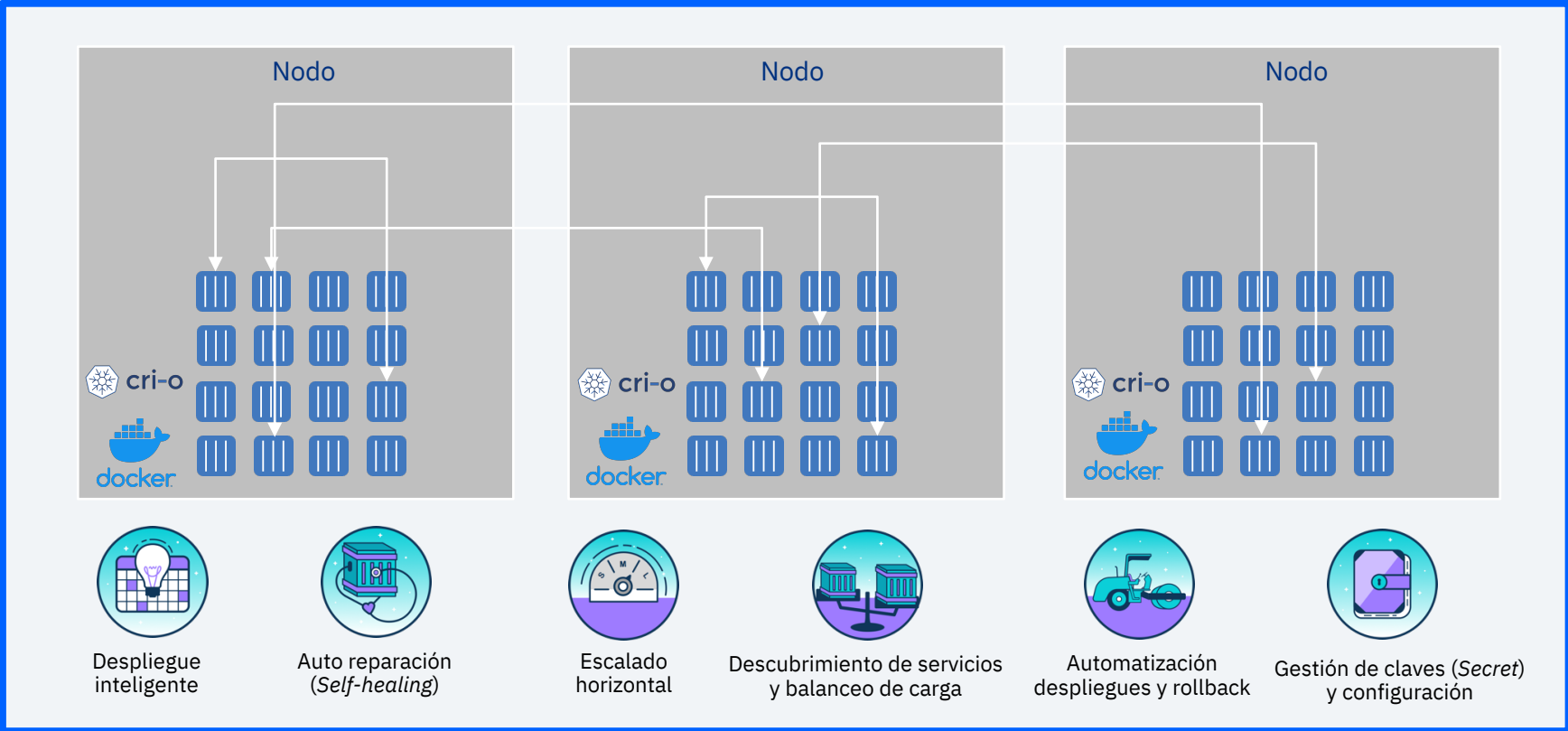
Automated rollouts and rollbacks



Secret and configuration management



Bienvenidos a Kubernetes



Otros orquestadores



Apache
MESOS™

● kubernetes

Término de búsqueda

● Mesos

Término de búsqueda

● Swarm

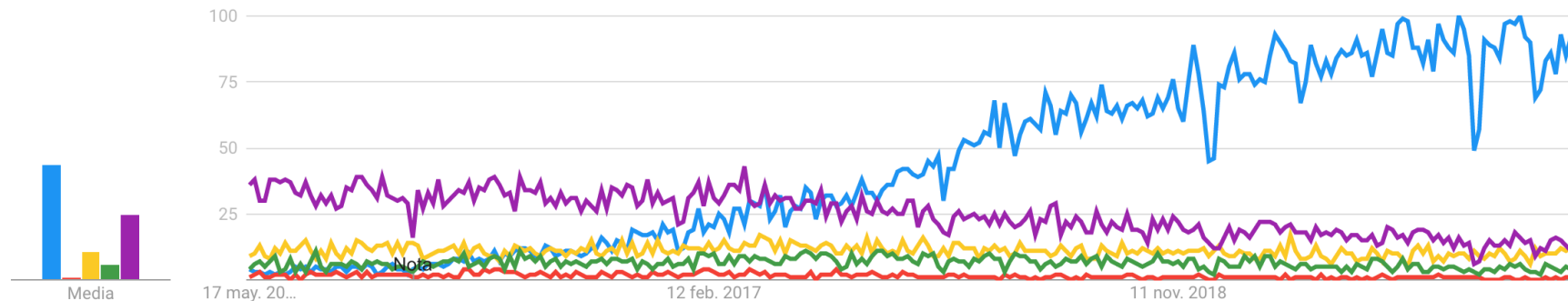
Término de búsqueda

● Cloud Foundry

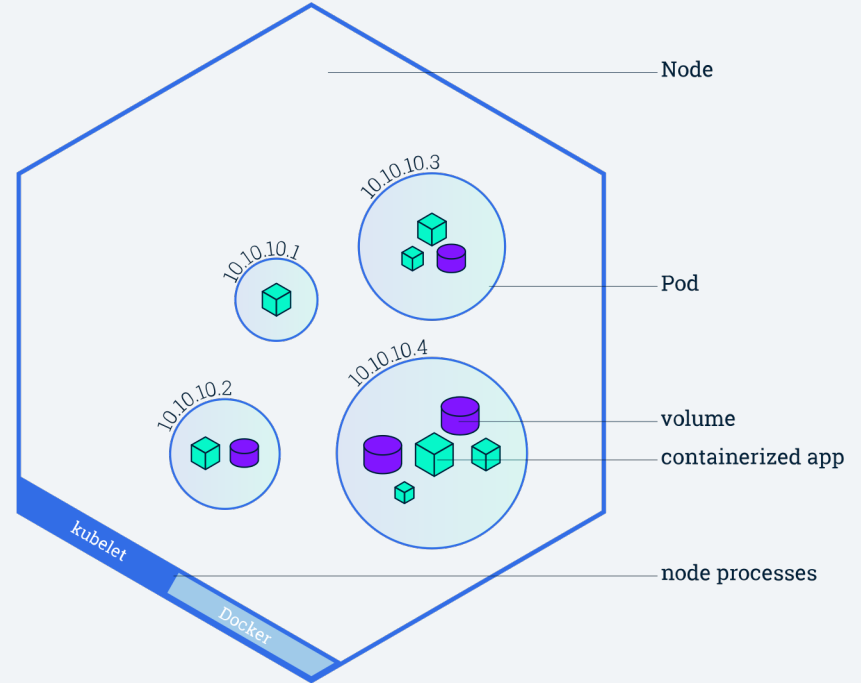
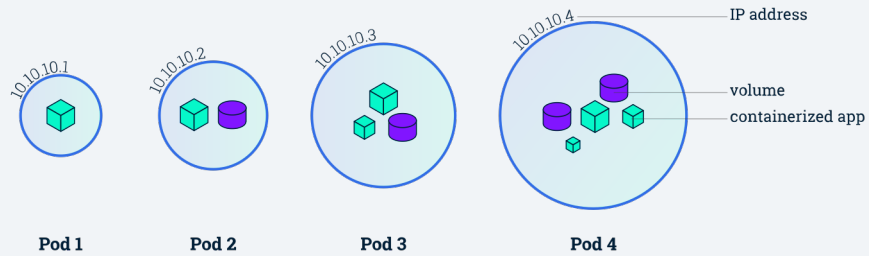
Término de búsqueda

● Openstack

Término de búsqueda

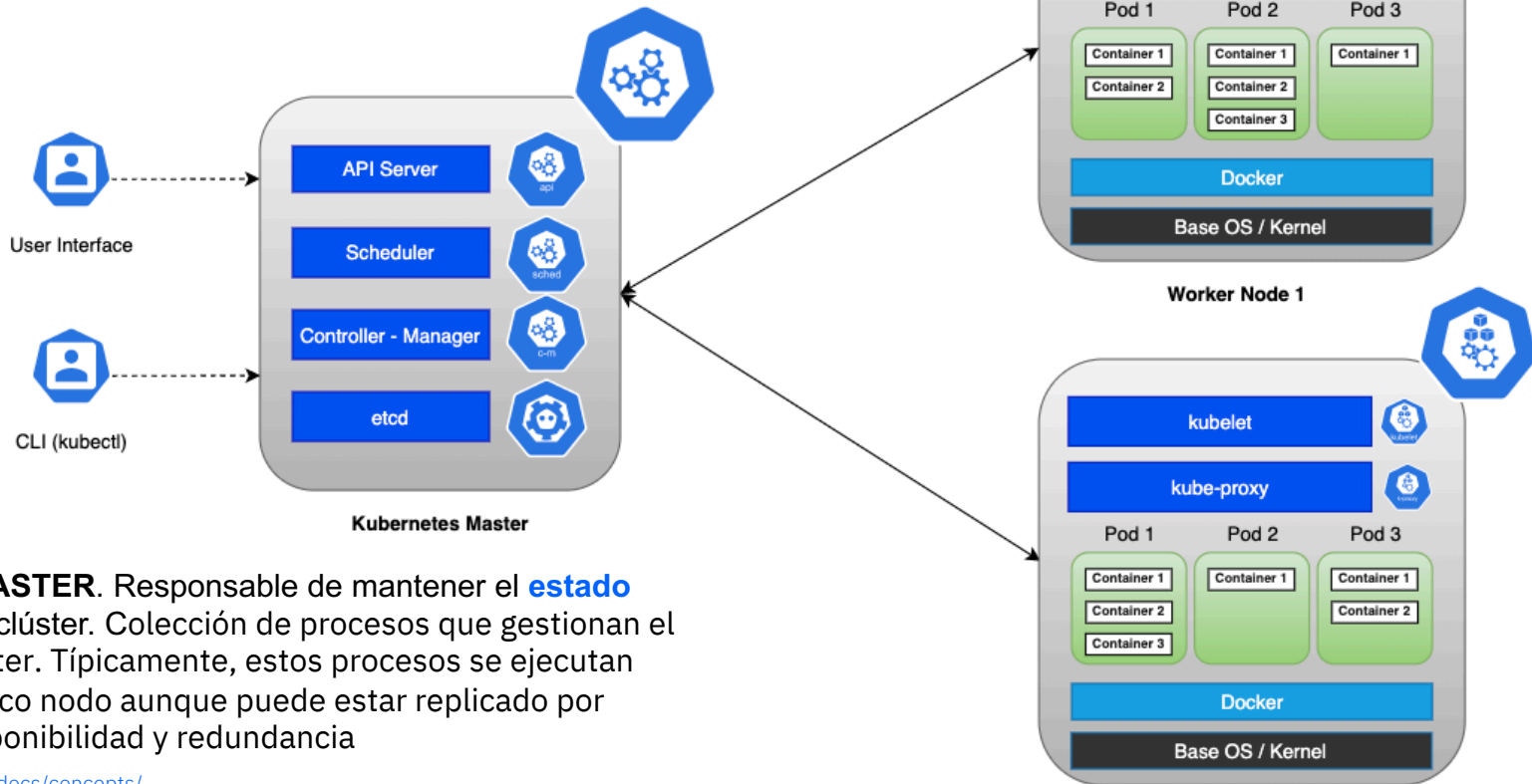


Una aplicación en Kubernetes



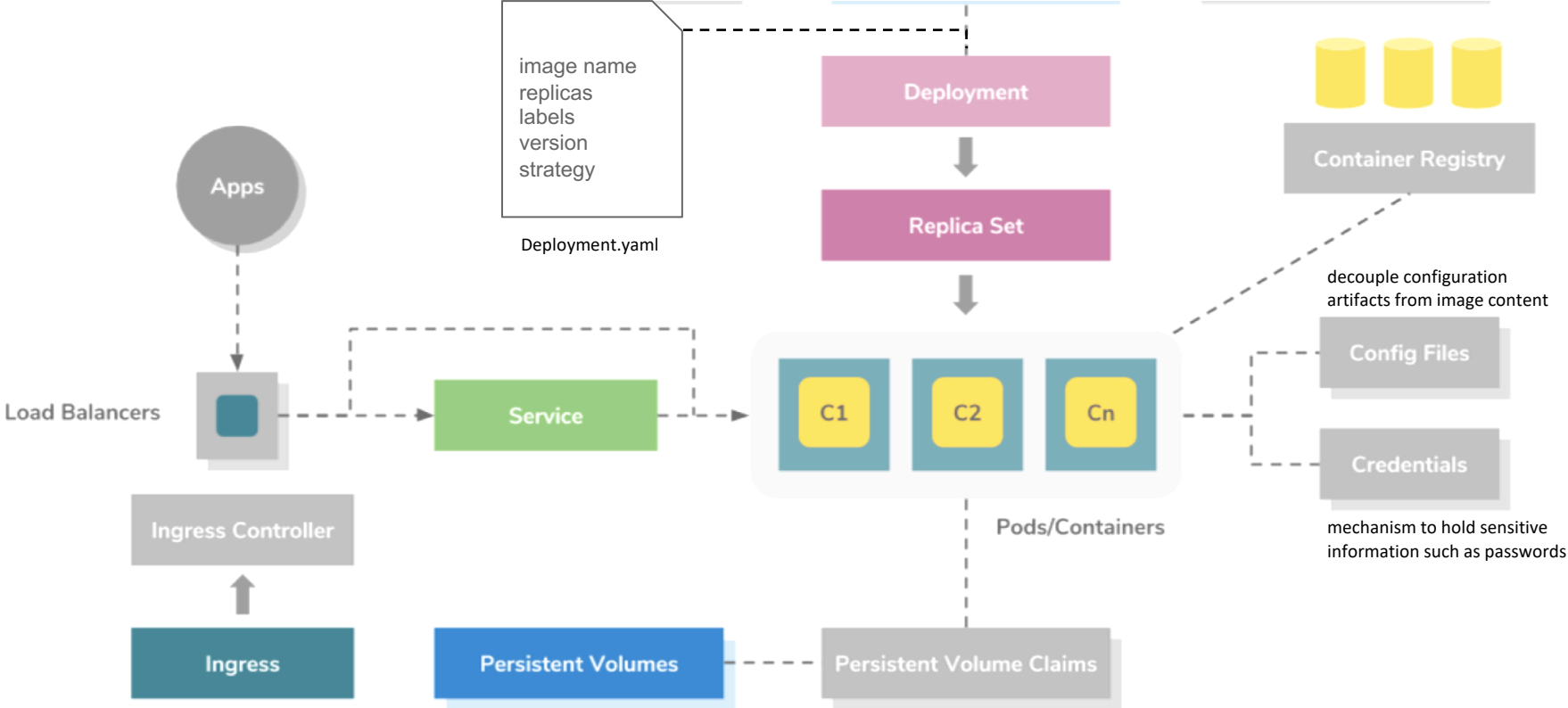
Arquitectura de Kubernetes

Nodos Worker. Son máquinas (virtuales, físicas, etc) que ejecutan tus aplicaciones y flujos de trabajo. El master de Kubernetes controla cada nodo.

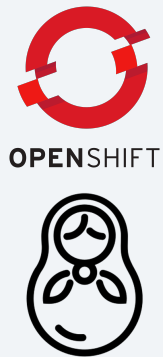


Kubernetes MASTER. Responsable de mantener el **estado deseado** de tu clúster. Colección de procesos que gestionan el estado del clúster. Típicamente, estos procesos se ejecutan todos en un único nodo aunque puede estar replicado por motivos de disponibilidad y redundancia

Componentes de Kubernetes



Red Hat OpenShift



</> Developer

⚙ Administrator

</> Developer

Topology

Builds

Pipelines

Advanced

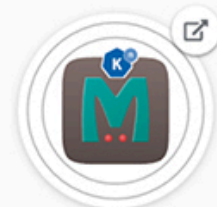
Projects

Events

Search

Project: adevconsole1

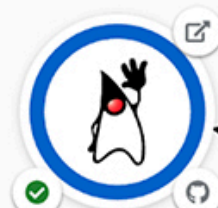
Application: all application



D caching-service...



D caching-servi...



DC backend

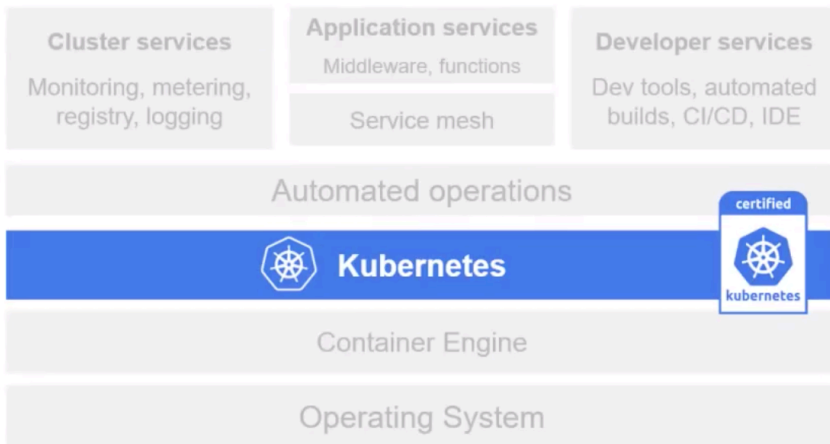


D frontend-b

Kubernetes vs Openshift

¿Qué necesita Kubernetes para ponerlo en producción?

- Sistema Operativo
- Runtime de Contenedores
- Registro de imágenes
- Networking avanzado
- Gestión de Logs
- Métricas y monitorización
- ...



The customer (or third-party) must configure, integrate, operate and support additional components to be fully operational.

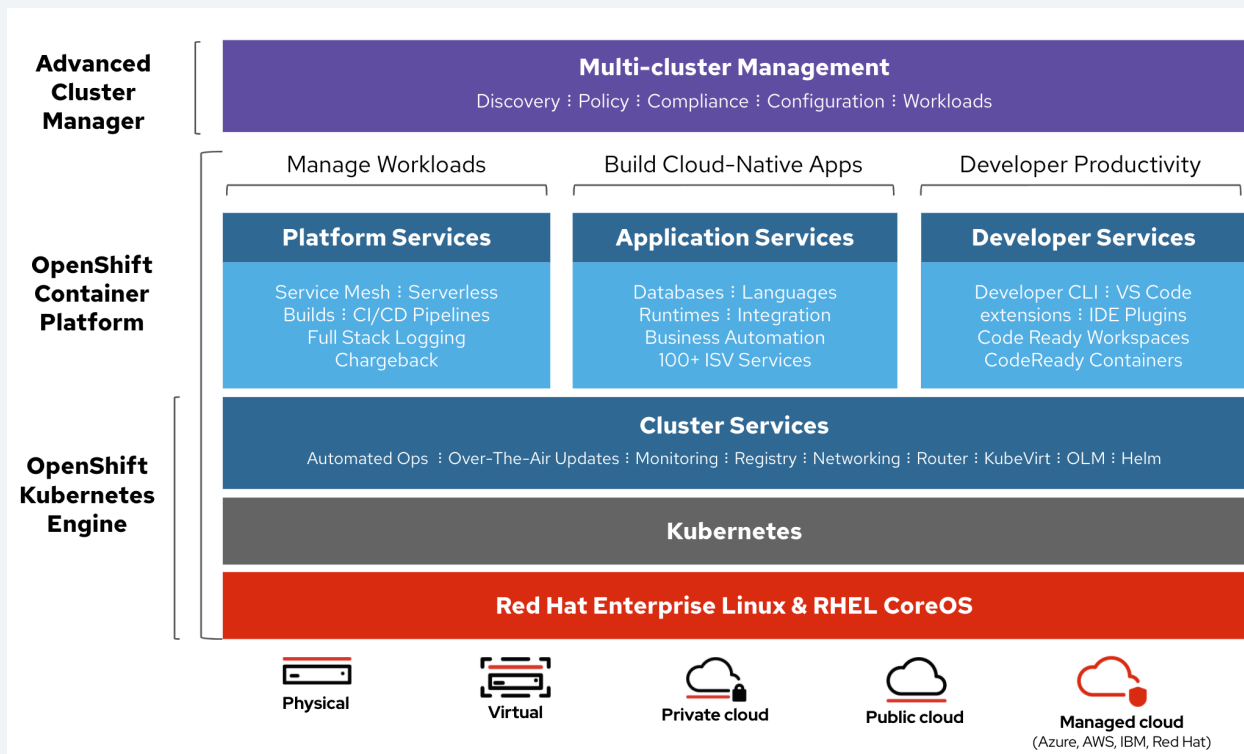


¿Qué es Red Hat OpenShift?

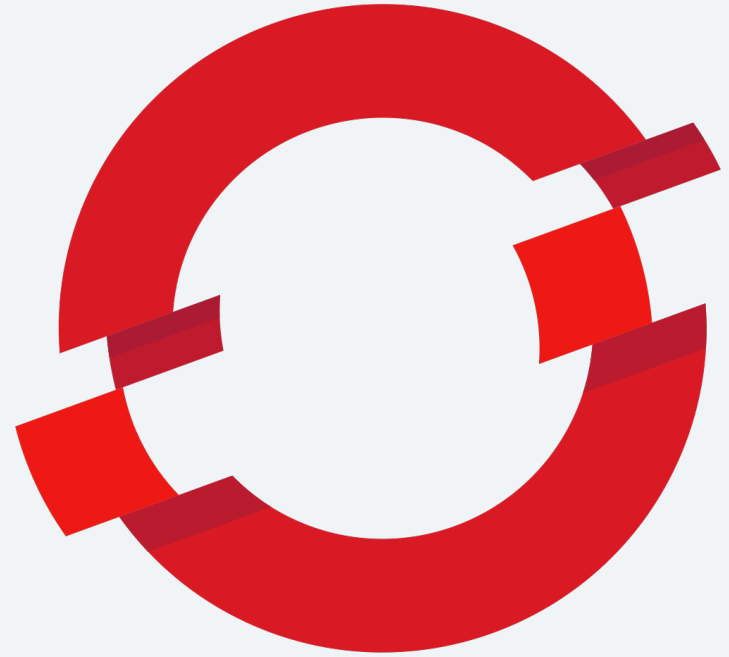
Red Hat OpenShift es Kubernetes para empresas, en modalidad Hybrid Cloud

Valor de OpenShift

- Plataforma certificada
- Soporte & SLA
- Seguridad
- Instalación Full Stack
- Automatización
- Ciclo de vida del producto
- Colaboración
- Catálogo
- Hybrid, Multi-Cluster Management
- Operator Framework
- OpenShift Service Mesh (Istio)
- OpenShift Serverless (Knative)
- CodeReady Workspaces (Che)



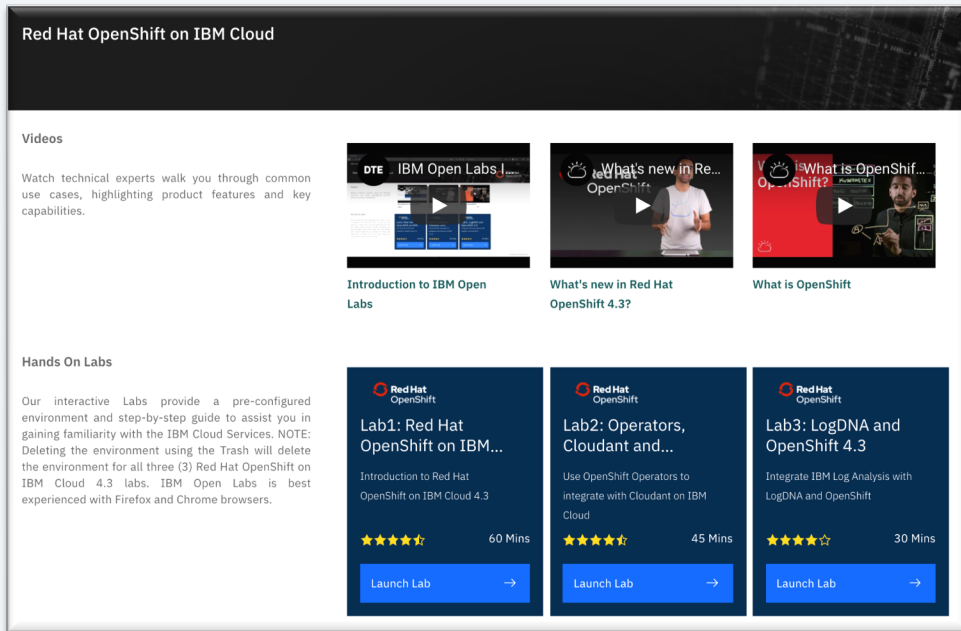
Registro en IBM Cloud y OpenShift Openlabs



OPENSSHIFT

Manos a la obra!

1. Regístrate en IBM Cloud <https://ibm.biz/devopenshift>
2. Accede a los laboratorios (cluster de OpenShift gratuito –sandbox–)



Red Hat OpenShift on IBM Cloud

Videos

Watch technical experts walk you through common use cases, highlighting product features and key capabilities.

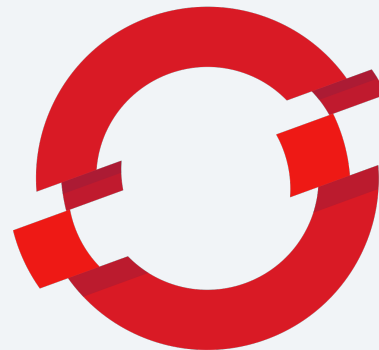
- Introduction to IBM Open Labs** (60 Mins)
- What's new in Red Hat OpenShift 4.3?** (45 Mins)
- What is OpenShift?** (30 Mins)

Hands On Labs

Our interactive Labs provide a pre-configured environment and step-by-step guide to assist you in gaining familiarity with the IBM Cloud Services. NOTE: Deleting the environment using the Trash will delete the environment for all three (3) Red Hat OpenShift on IBM Cloud 4.3 labs. IBM Open Labs is best experienced with Firefox and Chrome browsers.

- Lab1: Red Hat OpenShift on IBM...** (60 Mins)
- Lab2: Operators, Cloudant and...** (45 Mins)
- Lab3: LogDNA and OpenShift 4.3** (30 Mins)

<https://developer.ibm.com/openlabs/openshift>




OPENSSHIFT

Crea tu cuenta IBM Cloud...

<https://ibm.biz/devopenshift>

IBM Cloud Catalog



Already have an IBM Cloud account? [Log in](#)

Create an account

1. Account information

Email

Password

Next ↓

2. Verify email

3. Personal information

Build for free on IBM Cloud

Develop for free, no credit card required
Apps, AI, analytics, and more. Build with 40+ Lite plan services at no cost to you - ever.

Access the full catalog at your fingertips
Upgrade your account and unlock 190+ unique offerings, plus get a \$200 credit to use with any offering you want. [Learn more.](#)

...y accede a un amplio catálogo de servicios

Service Type

IBM Service

Third Party Service

Status

New Service (2019)

Service Refresh (2019)

(Plan Add)



AI

Watson Assistant
Watson Studio
Compare and Comply
Discovery
Knowledge Catalog
Knowledge Studio
Language Translator
Machine Learning
Natural Language Classifier
Natural Language Understanding

Personality Insights
Speech to Text
Text to Speech
Tone Analyzer
Visual Recognition
[Voice Agent with Watson](#)
Watson OpenScale
PowerAI



Analytics

Analytics Engine
DB2 Warehouse on Cloud
IBM Cognos Dashboard
Master Data Management
SQL Query
Streaming Analytics
Weather Company Data
[AccountScore](#)



Security & Identity

App ID
Certificate Manager
Cloud HSM
FortiGate Security Appliance
Hardware Firewall
Hardware Firewall (Dedicated)
Hyper Protect Crypto Services
[Hyper Protect Virtual Servers](#)
Internet Services
Key Protect



Dev Tools

Availability Monitoring
Continuous Delivery
DevOps Insights
Cloud Event Management
Globalization Pipeline
Monitoring
[Schematics](#)
Toolchain
[IBM Cloud Activity Tracker with LogDNA](#)

[IBM Cloud Monitoring with Sysdig](#)
[IBM Log Analysis with LogDNA](#)
[Pager Duty](#)



VPC

Block Storage for VPC
Load Balancer for VPC
Virtual Private Cloud
Virtual Server for VPC
VPN for VPC



Web & Mobile

Mobile Foundation
Push Notifications
[Email Delivery, powered by Sendgrid](#)
[Bitbar Testing Cloud](#)
[Esri ArcGIS for Developers](#)
[Nexmo](#)
[Phunware Location Based Services](#)
[Phunware Mobile Marketing Automation](#)
[SPLICE Pre-CAT Insurance Notifications](#)

[Telstra Messaging API](#)
[Twilio Programmable SMS](#)
[Twilio Programmable Video](#)
[Twilio Programmable Voice](#)



Web & App

Apache Spark
Consult with IBM Garage
Information Server
Managed Financial Data API
Simulated Instruments Analytics API
Accem-API
[Network ACL for VPC](#)
[Subnet for VPC](#)
[Alloy](#)
[Bondevalue-API](#)

[CloudAMQP](#)
[Difttek](#)
[Dwolla](#)
[ElephantSQL](#)
[Envestnet | Yodlee](#)
[FundingShield – Wire Accounts](#)
[Verification Service \(WAVS\)](#)
[HazardHub Property Risk Data API](#)
[Health Score](#)
[Hydrogen](#)

[Morningstar](#)
[Natural Language Generation APIs](#)
[Payeezy](#)
[Plaid](#)
[Powerlytics Behavior/Propensity Model API](#)
[Powerlytics Consumer Income API](#)
[Powerlytics Investable Assets & Wealth API](#)
[Quovo](#)
[Rainbow](#)
[RelSci](#)

Risk Engine
SizeUp Small Business Intelligence
Strands Business Financial Management
Totum Risk
Tradelt
uCloud Multitenant Core Platform for VMware
WealthEngine API
Xignite Market Data APIs
Ylabs



IoT

IoT Platform
Weather Company Data
[AT&T Flow Designer](#)
[AT&T IoT Data Plans](#)
[Bosch IoT Rollouts](#)
[Car Diagnostic API](#)
[Precision Location](#)
[Unification Engine](#)



Starter Kits

Custom Vision Model for Core ML with Watson
Internet of Things Platform Starter
Java Microservice with MicroProfile and Java EE
Java Microservice with Spring
Java Web App with Spring
Mobile Basic
Node.js Microservice with Express.js

Node.js Web App with Express.js
Python Microservice Flask
Python Web App with Django
Python Web App with Flask
Watson Assistant Basic
Watson Natural Language Understanding Basic
Watson Visual Recognition Basic
Node-RED Starter



Databases

Blockchain Platform
Cloudant
Databases for PostgreSQL
Databases for Redis
Databases for Elasticsearch
Databases for MongoDB
Messages for RabbitMQ
Databases for etcd
Compose Enterprise
Compose for RethinkDB

Db2
Db2 Hosted
Db2 Warehouse
[Hyper Protect DBaaS for MongoDB](#)
[Hyper Protect DBaaS for PostgreSQL](#)
Informix
SQL Query
[GEO Web Services](#)
[InfluxCloud](#)



Storage

Block Storage
Block Storage for VPC
File Storage
IBM Cloud Backup
Object Storage
[OSNEXUS Software Defined Storage for Bare Metal](#)
[Actifio GO](#)
[box](#)



Network

Load Balancers
Content Delivery Network
Direct Link Connect
Direct Link Dedicated
Direct Link Dedicated Hosting
Direct Link Exchange
Domain Name Service
FortiGate Security Appliance

Gateway Appliance
Internet Services
IPSec VPN
Load Balancer for VPC
Subnets/IPs
Virtual Private Cloud
VLAN
VPN for VPC



Integration

API Connect
APP Connect
Lift CLI
MQ
Secure Gateway
[Rocket Mainframe Data](#)
[SPLICE Pre-Cat Insurance](#)
Notifications



Compute

Bare Metal Server
Cloud Foundry Enterprise Environment
HPaaS from Rescale
[Power System Virtual Server](#)
Virtual Server
Virtual Server for VPC
WebSphere Application Server
VMware vCenter Server on IBM Cloud

VMware vSphere on IBM Cloud
NetApp ONTAP Select
Single-node Trial for Migration and App Modernization
Single-node Trial for Data Protection & Disaster Recovery
Caveon RiskForecast on IBM Cloud
F5 on IBM Cloud
FortiGate Security Appliance on IBM Cloud
FortiGate Virtual Appliance on IBM Cloud

[HCX on IBM Cloud](#)
HyTrust CloudControl on IBM Cloud
HyTrust CloudControl on IBM Cloud
HyTrust DataControl on IBM Cloud
HyTrust KeyControl on IBM Cloud
IBM Cloud Private Hosted
IBM Cloud Secure Virtualization
IBM SPECTRUM Protect Plus on IBM Cloud
KMIP for VMware on IBM Cloud

[Veeam Availability Suite for Virtual Server](#)
Veeam on IBM Cloud
[VMware vRealize Operations and vRealize Log Insight on IBM Cloud](#)
Mission Critical VMware on IBM Cloud
Managed Services from IMI
Managed Services for Veeam on IBM Cloud
Managed Services for Zerto on IBM Cloud
IBM Cloud Backup

[OSNEXUS Software Defined Storage for Bare Metal](#)
[Plesk Onyx Linux Unlimited for Virtual Server](#)
[Red Hat Enterprise Linux OS for Virtual Server](#)

Liberty for Java
SDK for Node.js
ASP.NET Core
Runtime for Swift
Go
PHP
Python
Ruby
Tomcat

[Red Hat OpenShift Cluster](#)
Kubernetes Service
Container Registry

<https://ibm.biz/devopenshift>



Join the public Slack channel

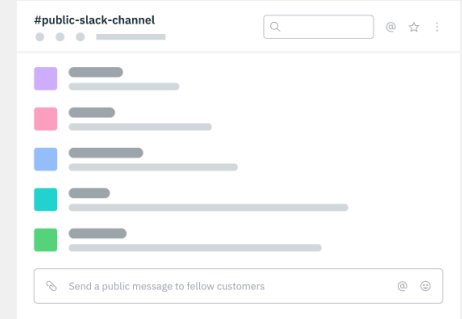


Join the public IBM Cloud
Kubernetes Service on Slack

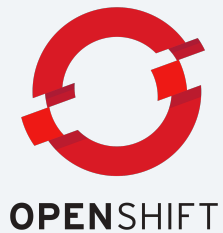
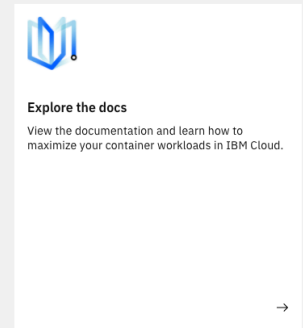
You can join a community of customers and IBM employees where you can ask questions or discuss Kubernetes releases.

[Request to join Slack](#)

or [sign in to Slack](#)



View the documentation



<https://cloud.ibm.com/kubernetes/overview>

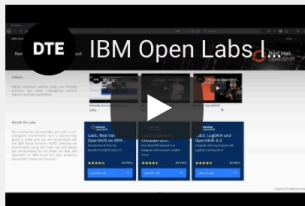
<https://developer.ibm.com/openlabs/openshift>

Red Hat OpenShift on IBM Cloud

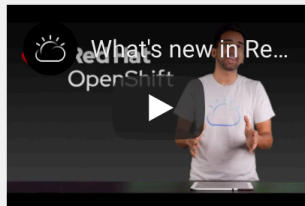


Videos

Watch technical experts walk you through common use cases, highlighting product features and key capabilities.



Introduction to IBM Open Labs




What's new in Red Hat OpenShift 4.3?



What is OpenShift

Hands On Labs

Our interactive Labs provide a pre-configured environment and step-by-step guide to assist you in gaining familiarity with the IBM Cloud Services. NOTE: Deleting the environment using the Trash will delete the environment for all three (3) Red Hat OpenShift on IBM Cloud 4.3 labs. IBM Open Labs is best experienced with Firefox and Chrome browsers.




Lab1: Red Hat OpenShift on IBM...

Introduction to Red Hat OpenShift on IBM Cloud 4.3

★★★★☆ 60 Mins

[Launch Lab](#) →




Lab2: Operators, Cloudant and...

Use OpenShift Operators to integrate with Cloudant on IBM Cloud

★★★★☆ 45 Mins

[Launch Lab](#) →



Lab3: LogDNA and OpenShift 4.3

Integrate IBM Log Analysis with LogDNA and OpenShift

★★★★☆ 30 Mins

[Launch Lab](#) →



Kubernetes with OpenShift

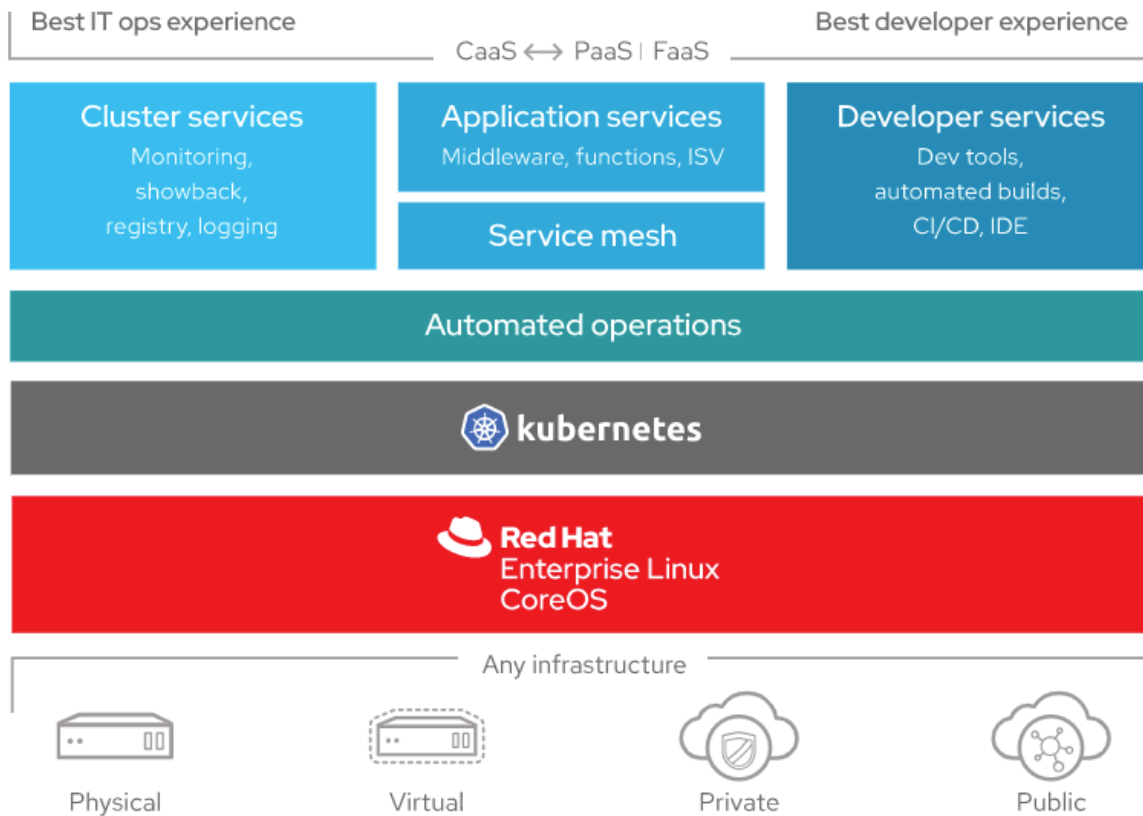
World Tour

En esta sesión aprenderemos los elementos principales en los que se basa la tecnología de **OpenShift** sobre **IBM Cloud**, y realizaremos un laboratorio para explicar escenarios típicos, por ejemplo, cómo desplegar aplicaciones, implementar un entorno de CI/CD, usar la línea de comandos (CLI), etc.

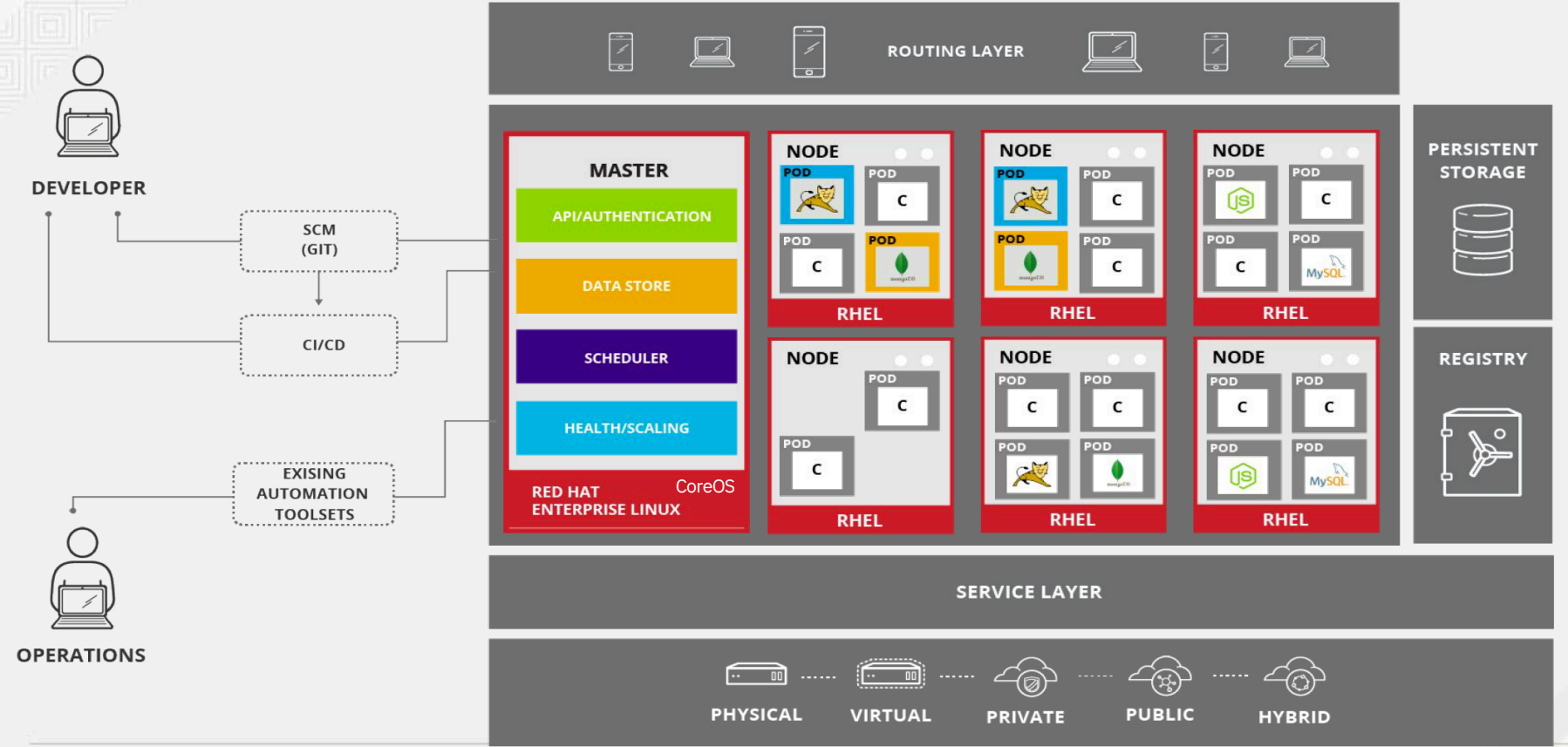
Taller para principiantes:
Introducción a Red Hat OpenShift en IBM Cloud 4.3

¿Qué es Red Hat OpenShift?

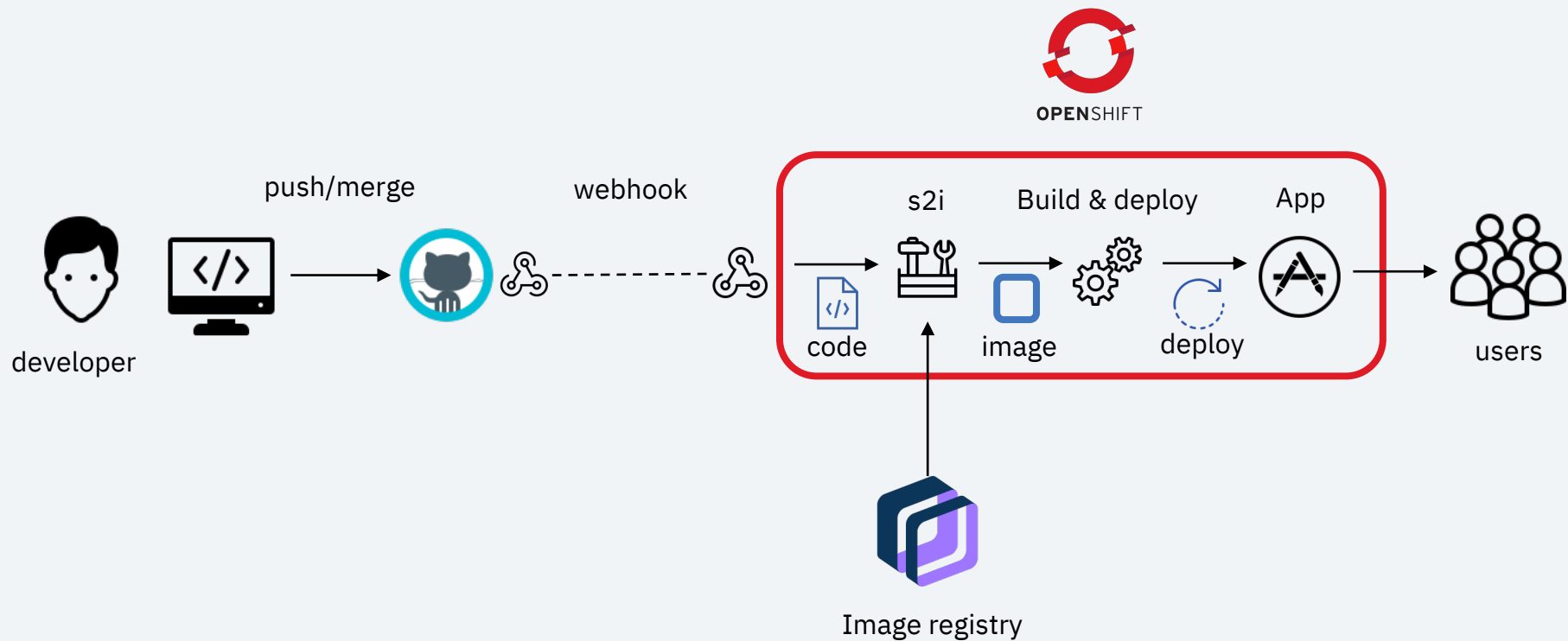
Red Hat OpenShift es Kubernetes para empresas, en modalidad Hybrid Cloud



OpenShift Architecture



Ejemplo de CI/CD en OpenShift (s2i)



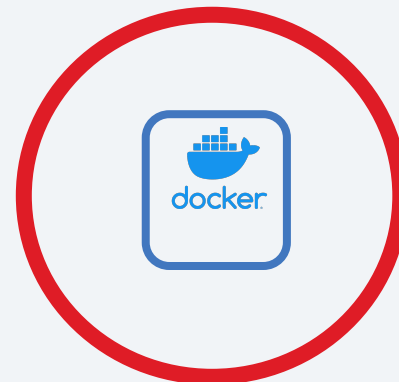
Modalidades de build & deploy en OpenShift



**DEPLOY YOUR
SOURCE CODE WITH
SOURCE-TO-IMAGE (S2I)**

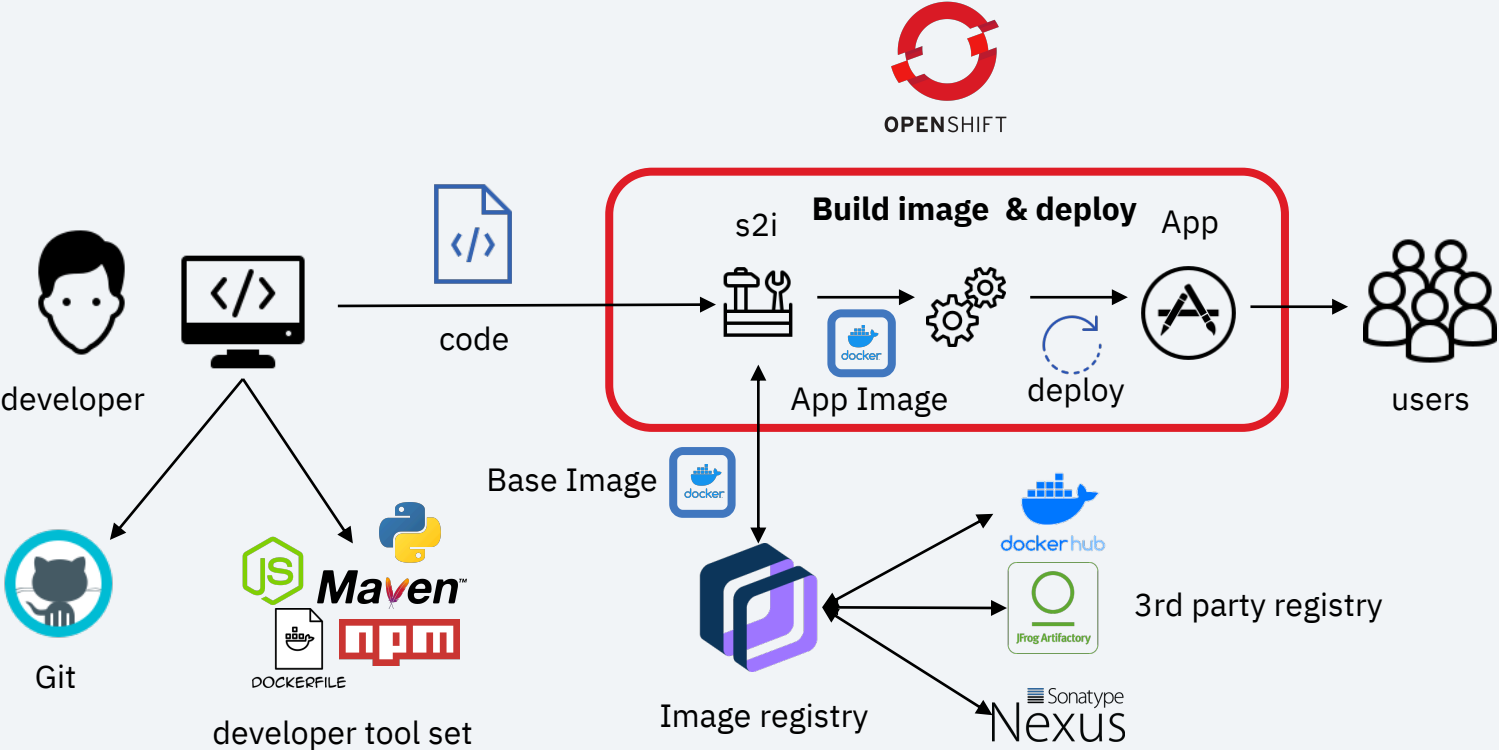


**DEPLOY YOUR
APP BINARY WITH
SOURCE-TO-IMAGE (S2I)**

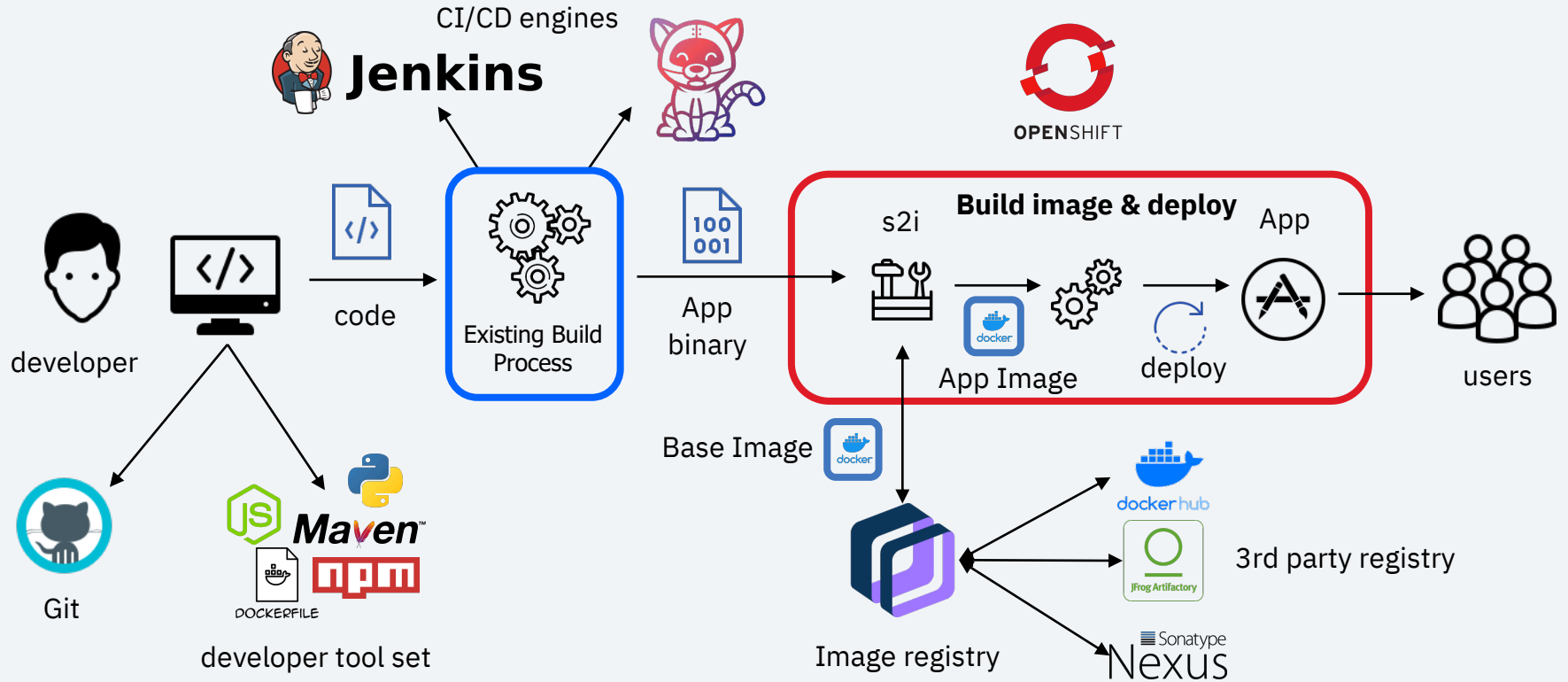


**DEPLOY YOUR
DOCKER IMAGE**

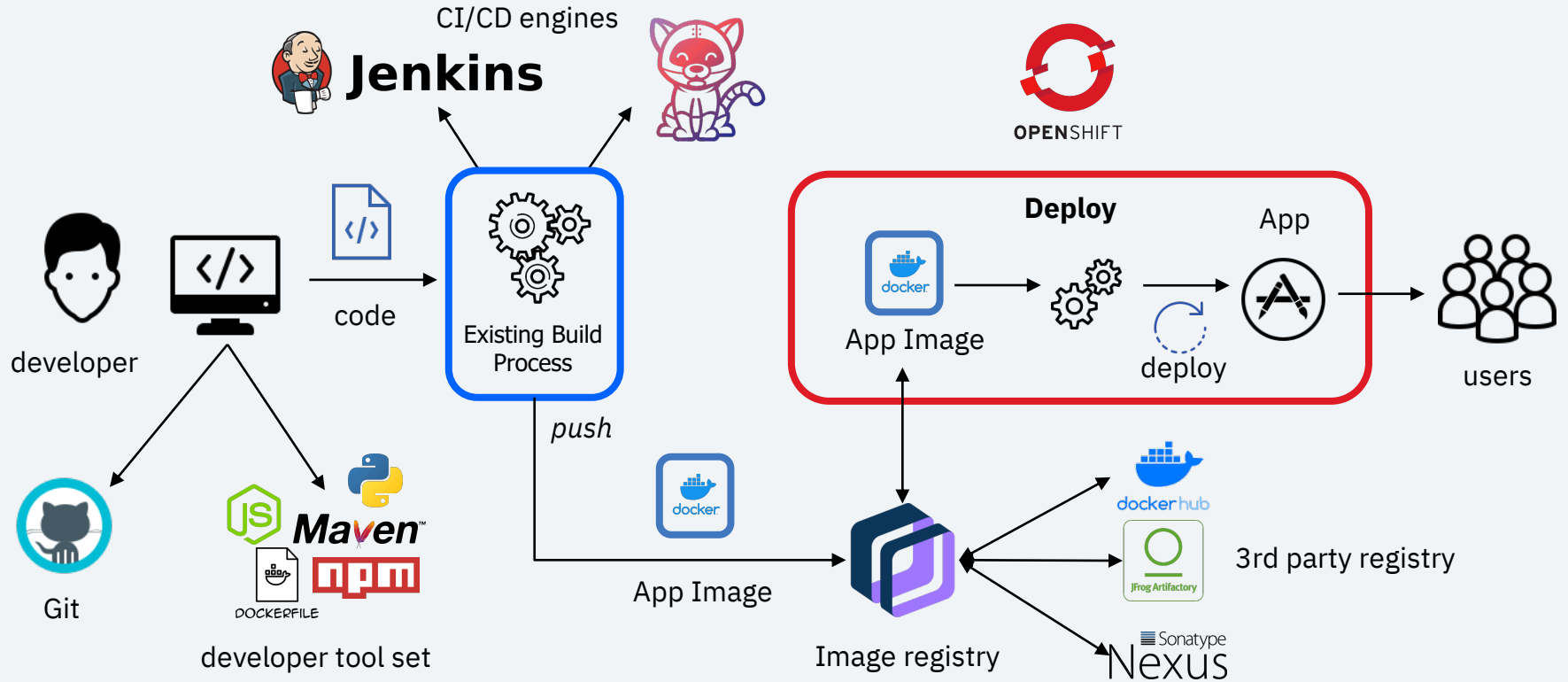
Deploy source code with S2I



Deploy app binary with S2I

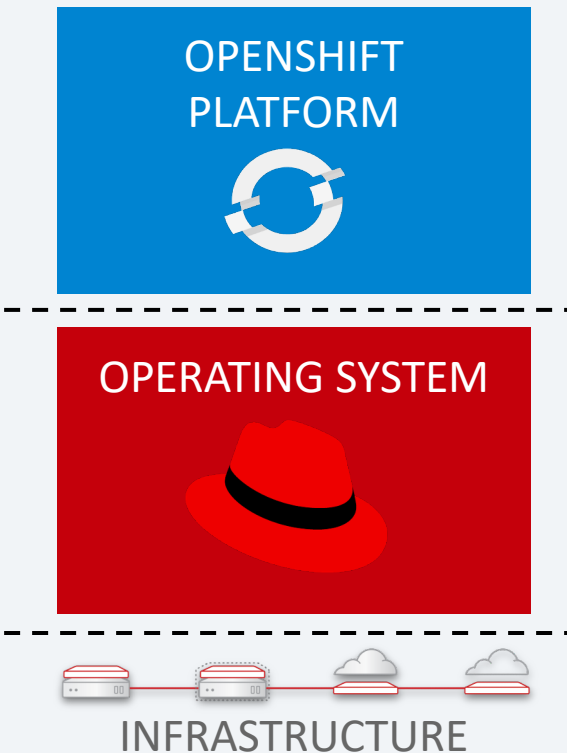


Deploy Docker Image

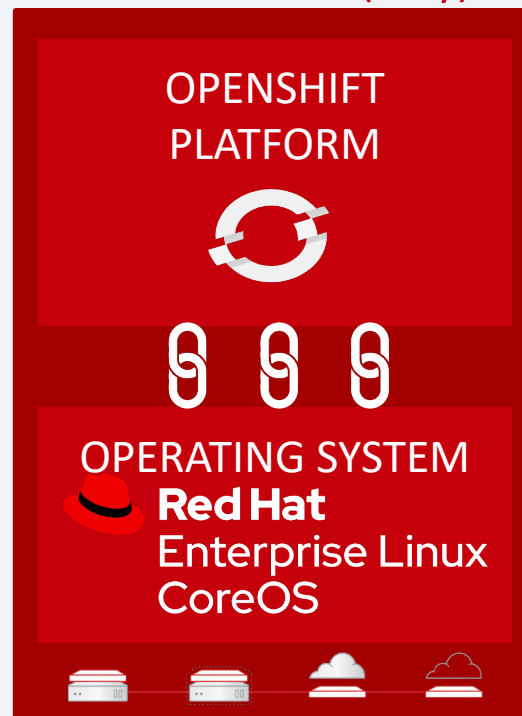


OpenShift Full-stack automated install

OPENSIFT 3 & 4



OPENSIFT 4 (only)





cri-o

A lightweight, OCI-compliant container runtime

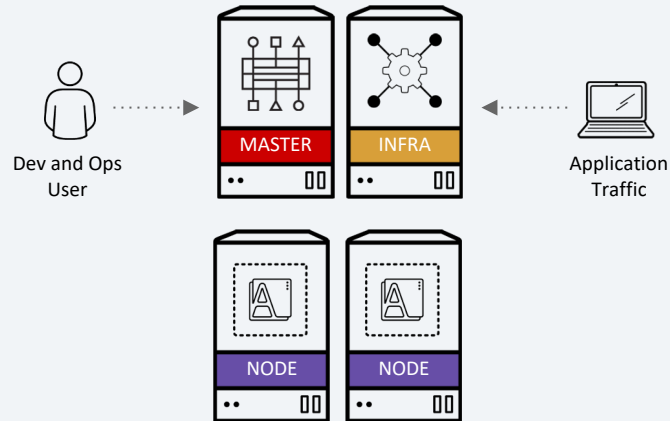
Minimal and Secure
Architecture

Optimized for
Kubernetes

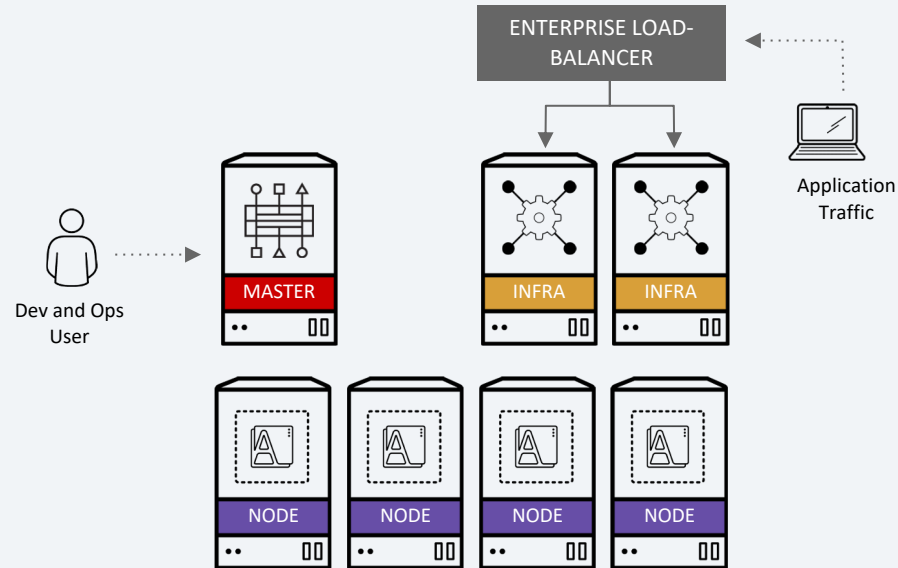
Runs any OCI-compliant
image (including docker)

PROOF-OF-CONCEPT ARCHITECTURE

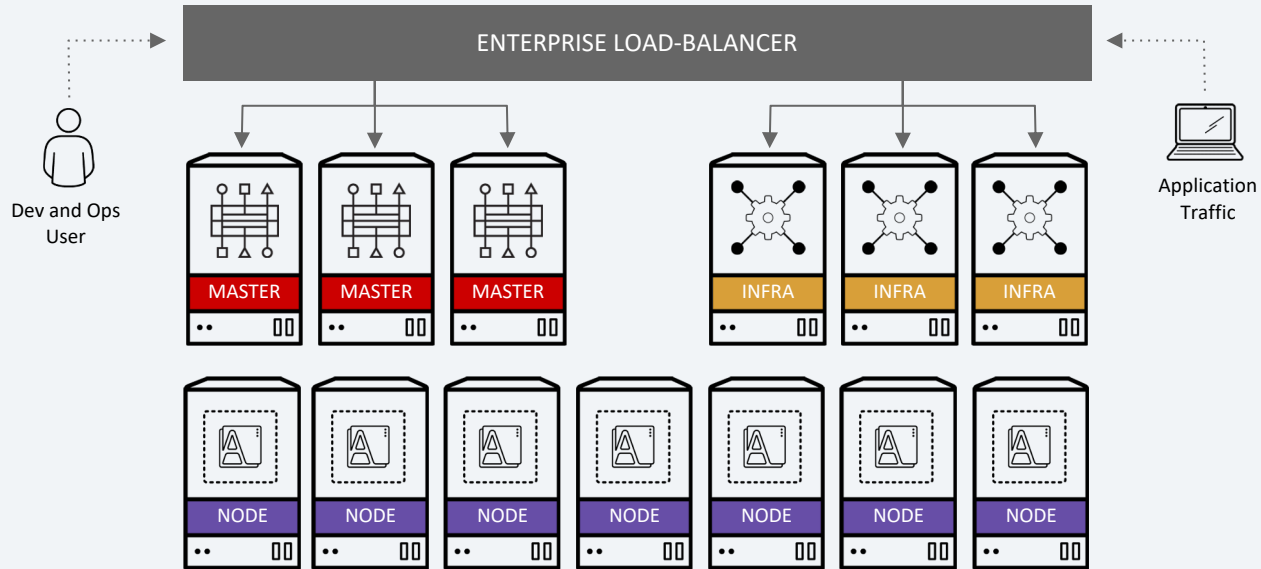
An infrastructure node is a node that is dedicated to infrastructure pods such as router, image registry, metrics, and logs



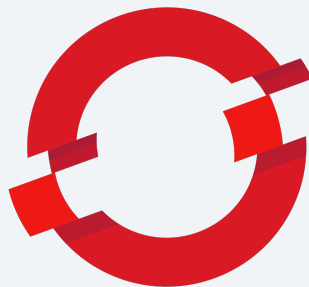
APP HIGH-AVAILABILITY ARCHITECTURE



FULL HIGH-AVAILABILITY ARCHITECTURE



Resumen del lab



OPENS SHIFT



CI/CD



CLI



Logging



Monitoring



AutoScale

IBM



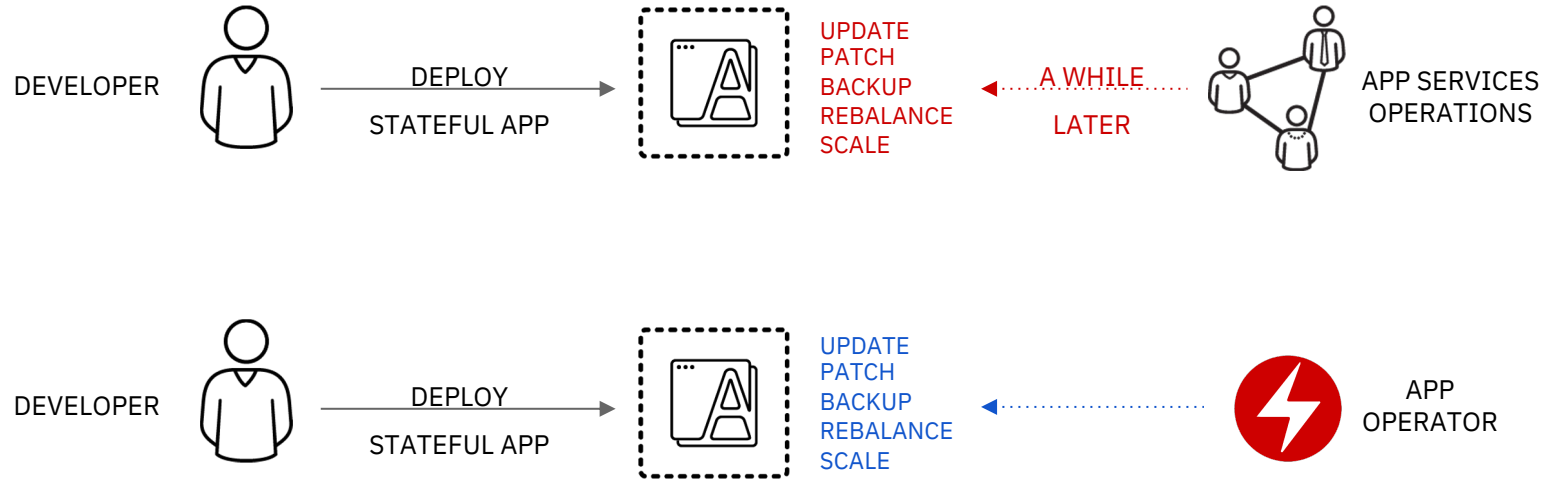
Kubernetes with OpenShift

World Tour

En esta práctica de laboratorio, veremos aspectos adicionales de administración de aplicaciones en **OpenShift** como por ejemplo, usar el concepto de Operador para integrar nuestra aplicación en OpenShift con una base de datos **Cloudant** desplegada y configurada como un servicio de **IBM Cloud** a partir de un Custom Resource Definition (CRD)

Taller avanzado:
Operadores en OpenShift 4.3. Desplegando un servicio Cloudant

Why Operators?



Operators codify operational knowledge and workflows to automate life-cycle management of containerized applications with Kubernetes

What is an Operator ?



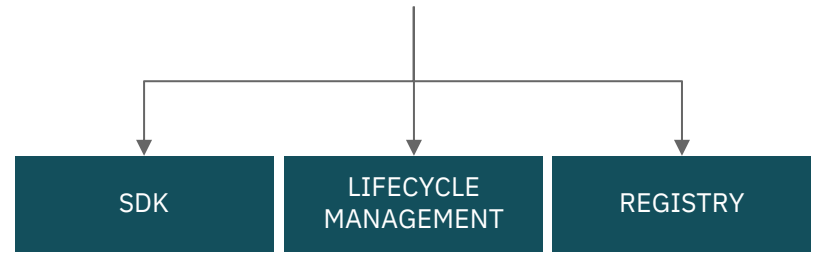
'Operators are software extensions to Kubernetes that make use of custom resources to manage applications and their components. Operators follow Kubernetes principles, notably the control loop'.

—[Kubernetes Documentation](#)

An Operator is an automation application that deals with the Kubernetes API and Custom Resources to create/operate new Resources.

It's an intelligent piece of software that embed the templating to deploy your resources.

The Operator watch events on the Kubernetes API and react (ex : re-create a pod, change Labels, update a Secret, Remove a Service, backup DB ...)



Operator Framework



Operator Framework

The Operator Framework is an open source toolkit to manage Kubernetes native applications, called Operators, in an effective, automated, and scalable way.

<https://operatorhub.io/> Verified

Repositories 27 Packages People 25 Projects 1

Pinned repositories

[operator-sdk](#)

SDK for building Kubernetes applications. Provides high level APIs, useful abstractions, and project scaffolding.

Go 3.7k 1k

[operator-lifecycle-manager](#)

A management framework for extending Kubernetes with Operators

Go 804 333

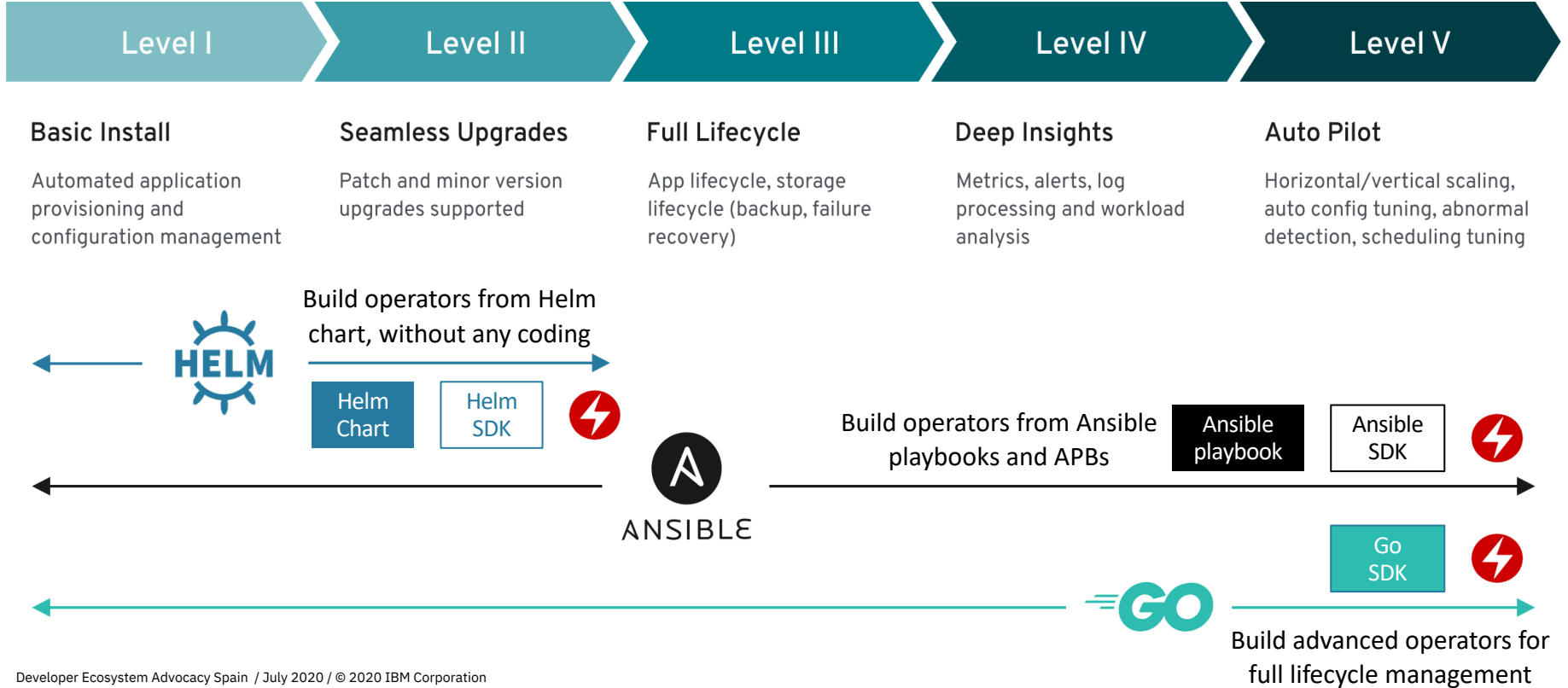
[operator-registry](#)

Operator Registry runs in a Kubernetes or OpenShift cluster to provide operator catalog data to Operator Lifecycle Manager.

Go 70 91

<https://github.com/operator-framework>

Type of Operators

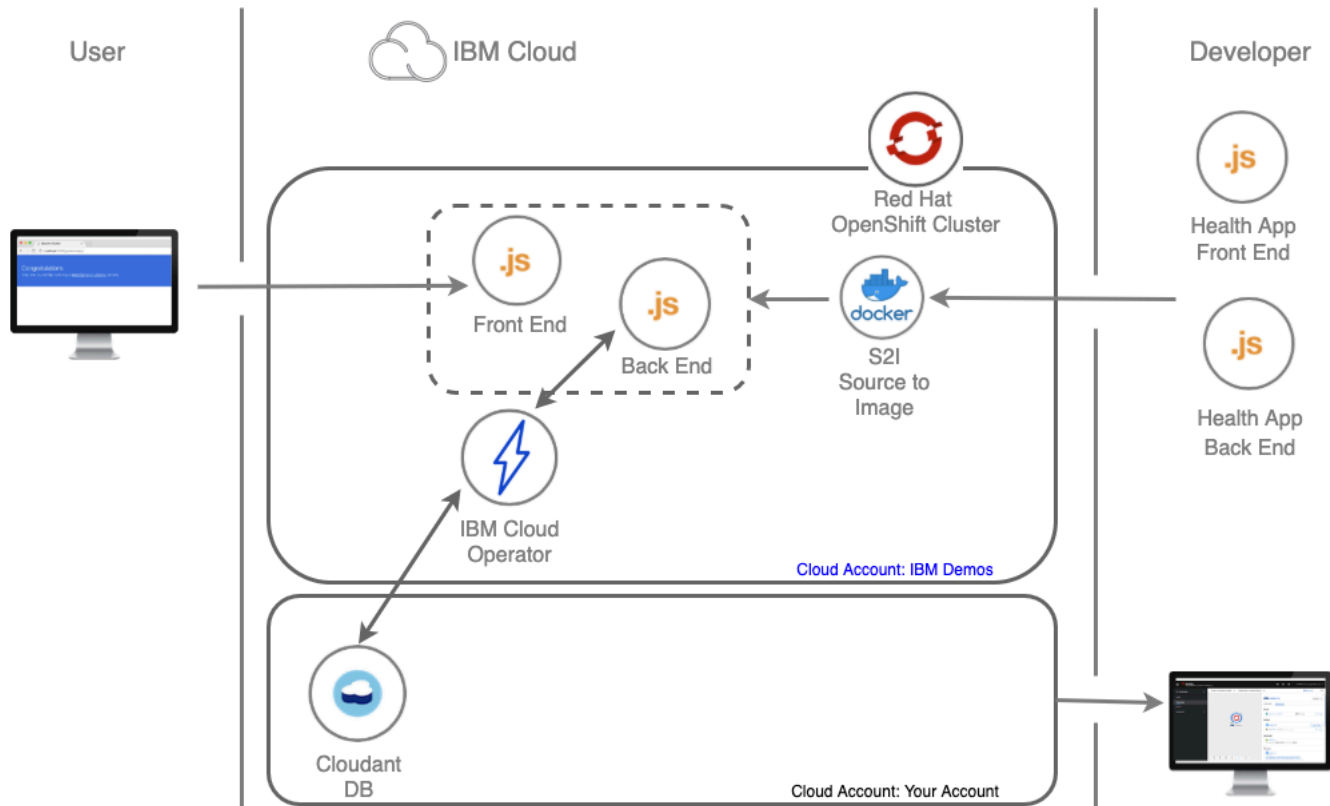


THE INDUSTRY IS ALIGNING BEHIND THE KUBERNETES OPERATOR FRAMEWORK

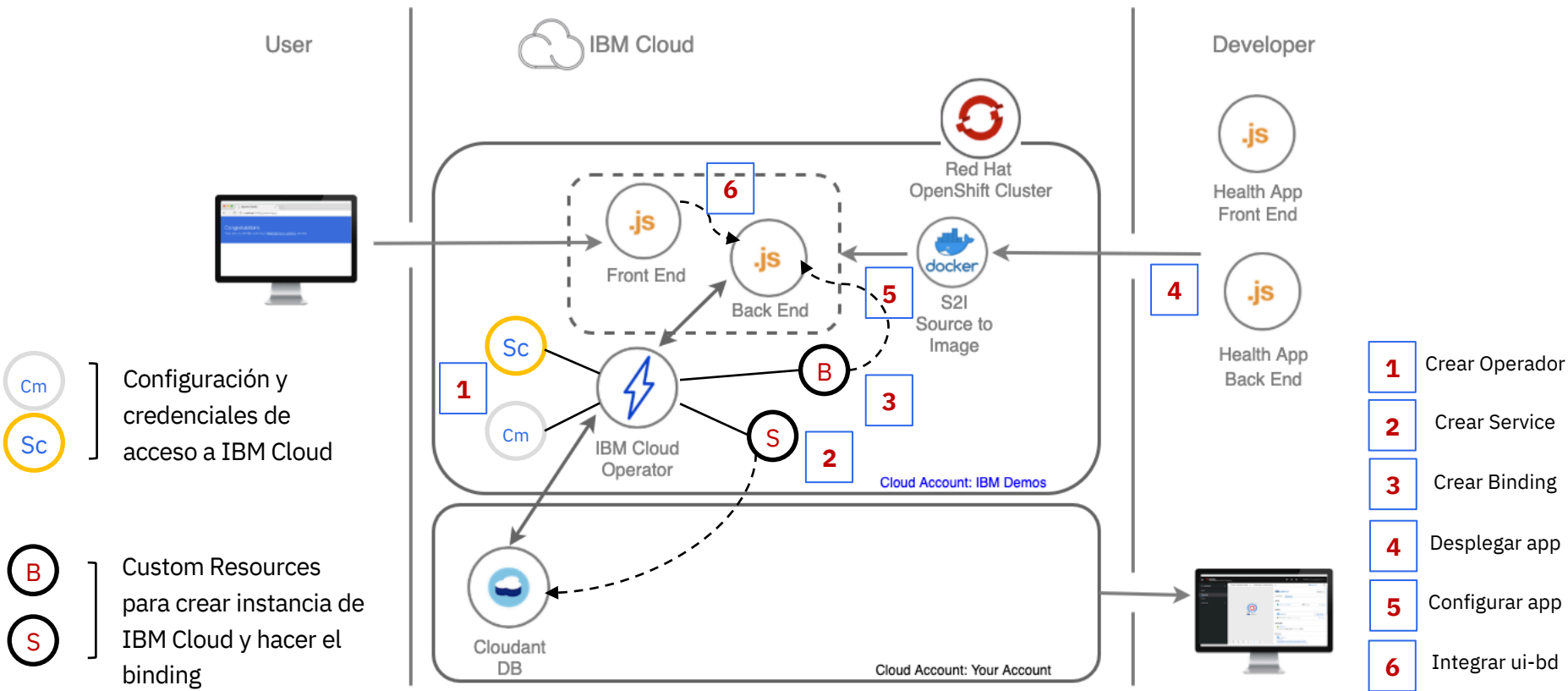


60+ Certified ISV Operators in Red Hat Early Access Program

Arquitectura de la Aplicación



Resumen del lab



IBM