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News on
Red Hat
OpenShift on IBM Z® & LinuxONE

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Product Owner
RHOCP on Z/LinuxONE – Differentiation & Client Advocacy

IBM Germany Research & Development GmbH

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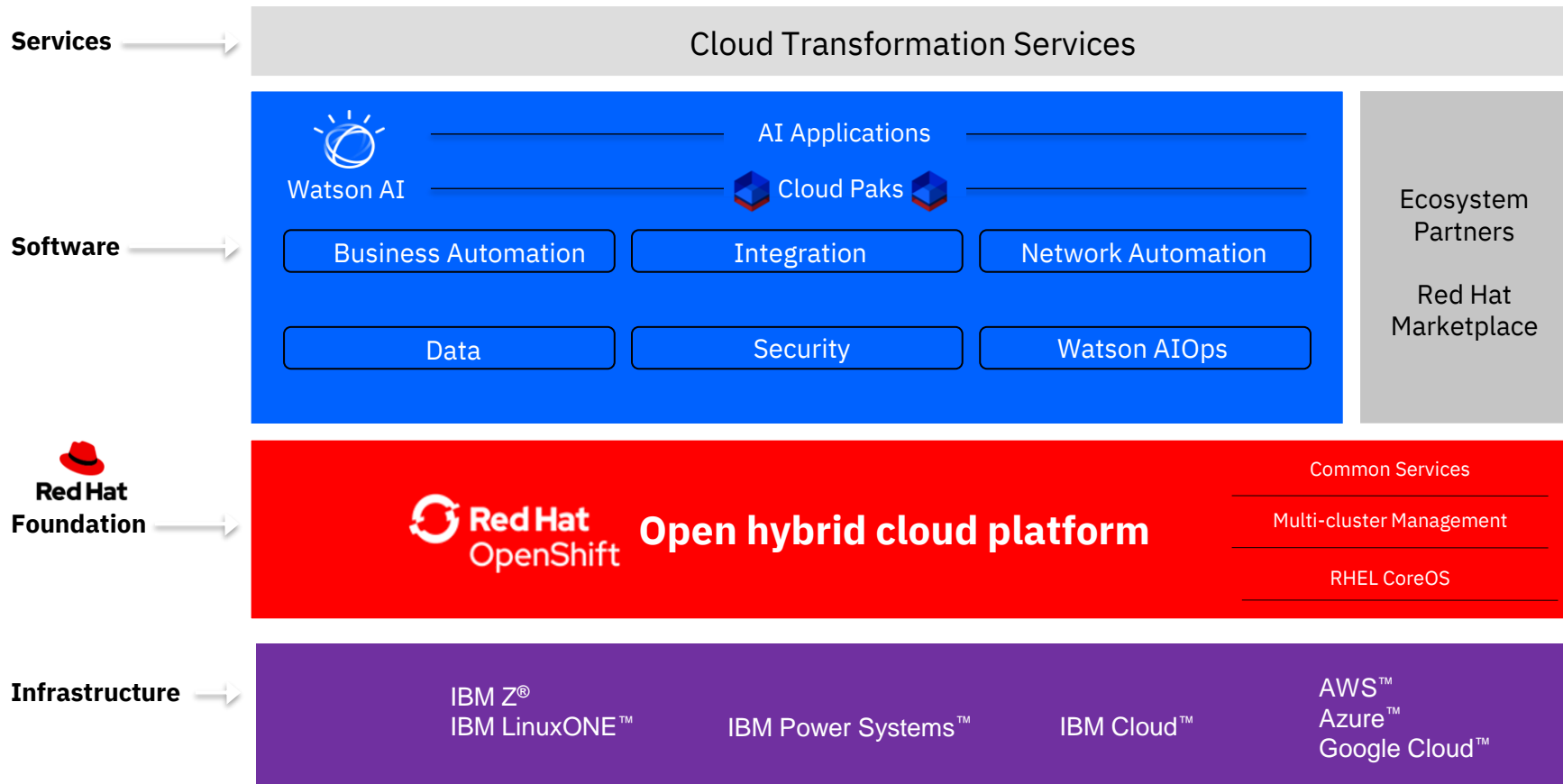# This talk is about…

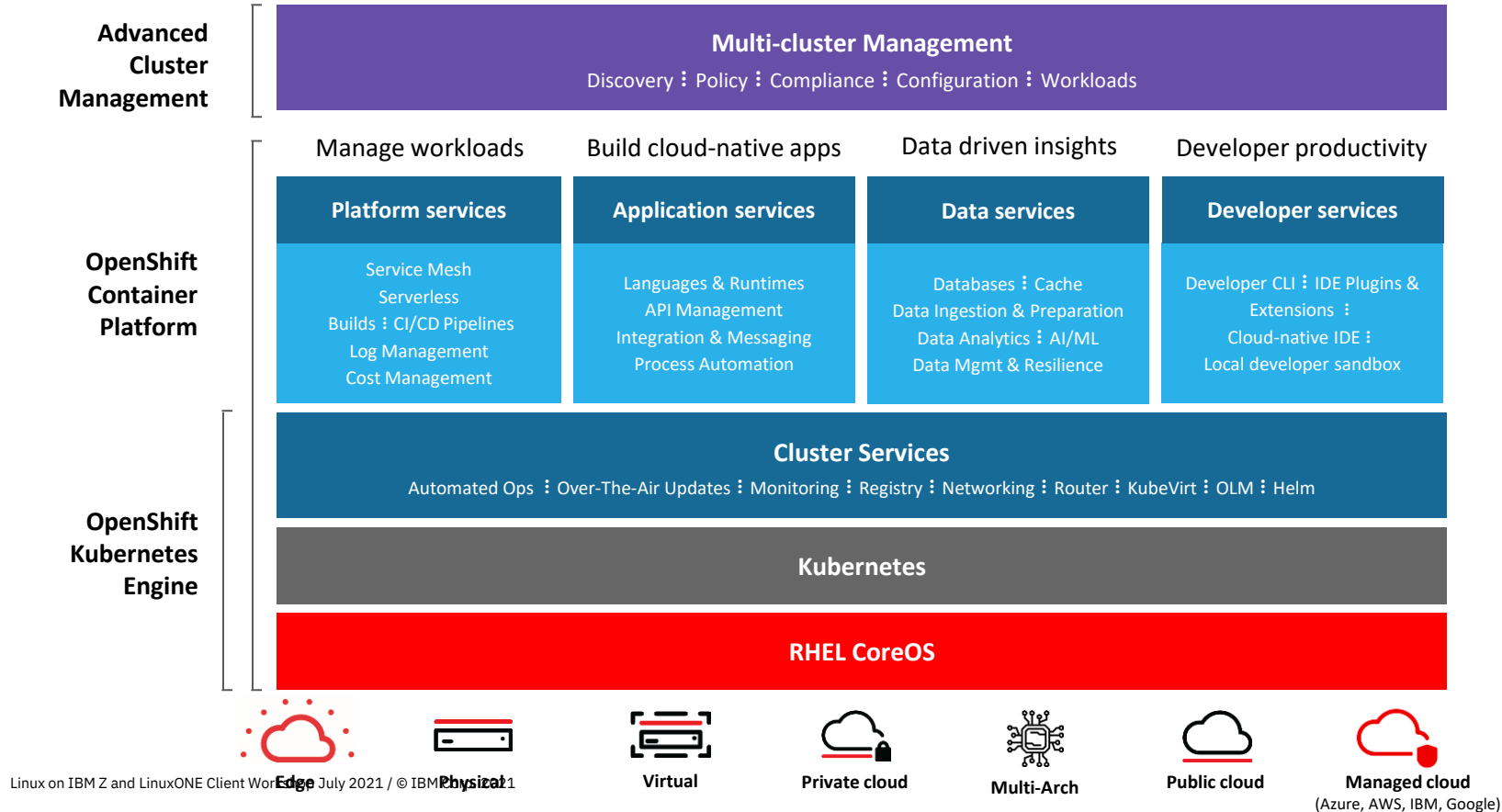| Introduction	**Frame** your **main** cloud-native environment with RHOCP	What's new?	**What's next?**

Hybrid Multicloud Strategy

IBM hybrid cloud is the future architecture for enterprise IT

Services → Cloud Transformation Services

Software →

AI Applications

Watson AI — Cloud Paks —

| Business Automation | Integration | Network Automation |
| Data | Security | Watson AIOps |

Ecosystem Partners

Red Hat Marketplace

Red Hat Foundation →

Red Hat OpenShift **Open hybrid cloud platform**

Common Services

Multi-cluster Management

RHEL CoreOS

Infrastructure →

IBM Z®
IBM LinuxONE™

IBM Power Systems™

IBM Cloud™

AWS™
Azure™
Google Cloud™

Red Hat OpenShift Container Platform – Architecture

Advanced Cluster Management

Multi-cluster Management
Discovery ⋮ Policy ⋮ Compliance ⋮ Configuration ⋮ Workloads

OpenShift Container Platform

Manage workloads | Build cloud-native apps | Data driven insights | Developer productivity

Platform services

Service Mesh
Serverless
Builds ⋮ CI/CD Pipelines
Log Management
Cost Management

Application services

Languages & Runtimes
API Management
Integration & Messaging
Process Automation

Data services

Databases ⋮ Cache
Data Ingestion & Preparation
Data Analytics ⋮ AI/ML
Data Mgmt & Resilience

Developer services

Developer CLI ⋮ IDE Plugins &
Extensions
Cloud-native IDE
Local developer sandbox

OpenShift Kubernetes Engine

Cluster Services
Automated Ops ⋮ Over-The-Air Updates ⋮ Monitoring ⋮ Registry ⋮ Networking ⋮ Router ⋮ KubeVirt ⋮ OLM ⋮ Helm

Kubernetes

RHEL CoreOS

Edge | Physical | Virtual | Private cloud | Multi-Arch | Public cloud | Managed cloud
(Azure, AWS, IBM, Google)

Frame your **main** cloud-native environment with RHOCP

Where can you download RHOCP?

try.openshift.com
cloud.redhat.com

Full support
- **RHOCP 4.7 on Z was released on 02/24/21**

Maintenance
- RHOCP 4.6 on Z was released on 10/27/20 (EUS)
- RHOCP 4.5 on Z was released on 7/30/20
- RHOCP 4.4 on Z was released on 6/22/20

End of life
- RHOCP 4.3 on Z was released on 4/30/20
- RHOCP 4.2 on Z was released on 2/11/20

https://access.redhat.com/support/policy/updates/openshift
https://docs.openshift.com/container-platform/4.7/release_notes/ocp-4-7-release-notes.html
https://docs.openshift.com/container-platform/4.7/installing/installing_ibm_z/installing-ibm-z.html

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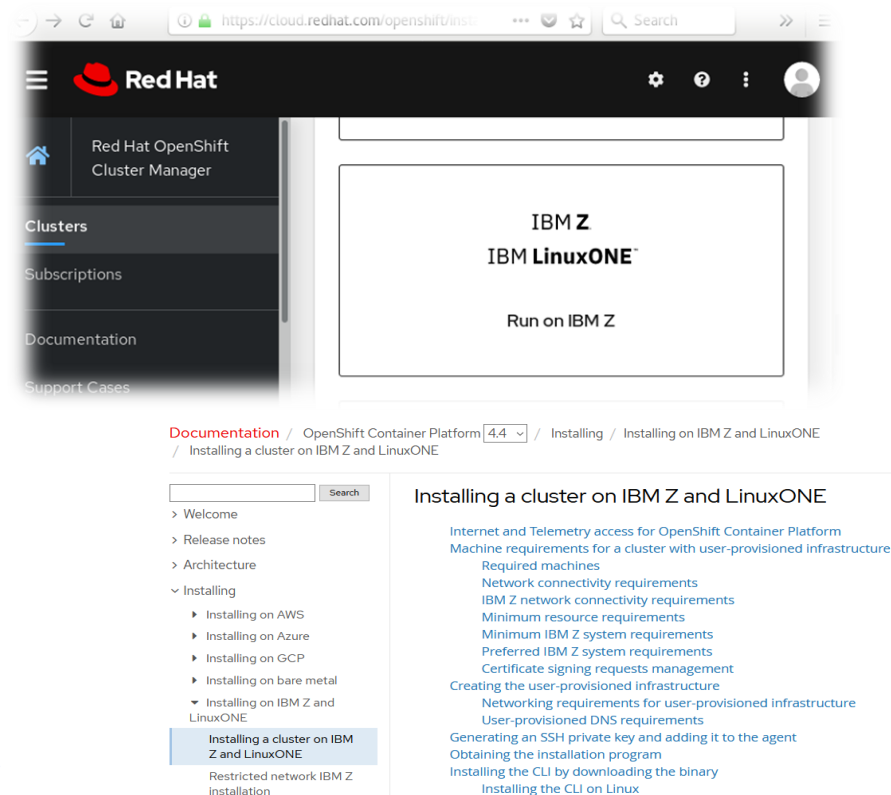
No access to IBM Z / LinuxONE ?
Try the **LinuxONE Community Cloud**

The IBM LinuxONE Community Cloud provides

- Free access for developers, students, and entrepreneurs

- Virtual servers and services for testing and piloting emerging applications for evaluation purposes

- Fast Start Guides
  https://www.ibm.com/community/z/linuxone-cc/faststart

Try OpenShift Container Platform on the LinuxONE Community Cloud

https://www.ibm.com/community/z/linuxone-cc/request-oc

https://developer.ibm.com/components/ibm-linuxone/gettingstarted/

Red Hat OpenShift Container Platform *on IBM Z/LinuxONE*

Day 1 – Installation and Setup

Planning & Installation tasks

User-Provisioned Infrastructure (UPI) – Platform administrator has to pre-provision infrastructure components

- Planning for required infrastructure services
- Planning for cluster network
- Planning for storage

Day 2 – Operation and Management

Operational tasks

- (Optionally) Setting up infrastructure nodes
- Establishing etcd backup procedure
- Adding additional compute nodes
- Configuring monitoring and logging
- Integrating and authenticating with LDAP

Operator Framework

Demystifying RHEL CoreOS (RHCOS)

RHCOS is an immutable operating system that is

- **Comprised of latest RHEL 8 contents**

- **Versioned with RHOCP**
  RHCOS is tested and shipped in conjunction with the OpenShift Container platform. RHOCP becomes an appliance.

- **Managed by the RHOCP cluster**
  The operating system is operated as part of the cluster, with the configuration for components managed by the Machine Config Operator (MCO).

- **Secured and tailored to run containers**
  Ignition technology tailors the RHCOS instance and RHCOS isolates with name spaces (containers) and SELinux

RHCOS admins are responsible for:

Nothing. 😃 🙌

Red Hat OpenShift Container Platform
v4.7

Red Hat Enterprise Linux CoreOS
v4.7
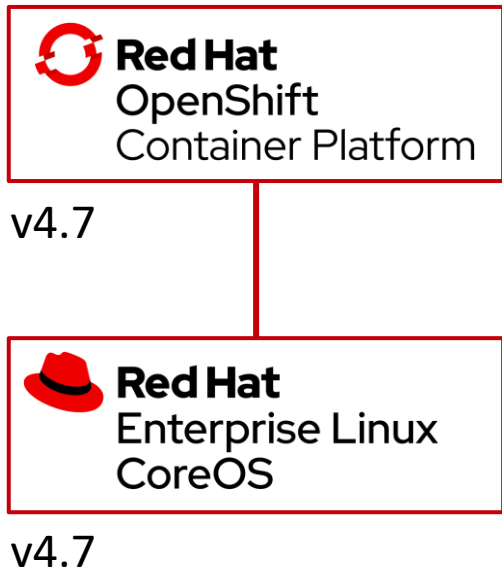
What does
Red Hat OpenShift Container Platform on IBM Z & LinuxONE
look like?

Fact Sheet for
RHOCP 4.x on Z & LinuxONE

Overview

- User-provisioned Infrastructure (UPI) with support of disconnected / air-gapped installation

- Shared persistent container storage options
  - Red Hat OpenShift Data Foundation
  - IBM Spectrum Scale Container Native Storage Access

- RHOCP add-ons
  - CodeReady Workspaces & OpenShift do
  - Red Hat OpenShift Pipelines, Serverless, and Service Mesh

- **Reference Architecture for RHOCP on Z**
  https://lnkd.in/dpdpz8V

Basic System Requirements

- IBM z13/z13s and later or IBM LinuxONE

- z/VM 7.1+ or RHEL 8.3+ KVM (RHOCP 4.7)

- FICON or FCP attached disk storage

- OSA, RoCE, z/VM VSwitch networking

Minimum Installation Scenario

- RHOCP cluster in a single hypervisor instance

Preferred Installation Scenario for High-Availability

- RHOCP cluster and its 3 control planes are spanned over 3 hypervisor instances (and hardware)

Minimum Installation Scenario

RHOCP Cluster

RHOCP Control Plane — CoreOS
RHOCP Control Plane — CoreOS
RHOCP Control Plane — CoreOS
RHOCP Compute Node — CoreOS
RHOCP Compute Node — CoreOS

Data Warehouse

Hypervisor

LPAR 1

LPAR 2

IBM Z or IBM LinuxONE

Cores (IFLs)   Network (OSA, RoCE)   I/O (FICON / FCP)

FCP/SCSI   Shared FS   ECKD/DASD

Preferred Installation Scenario

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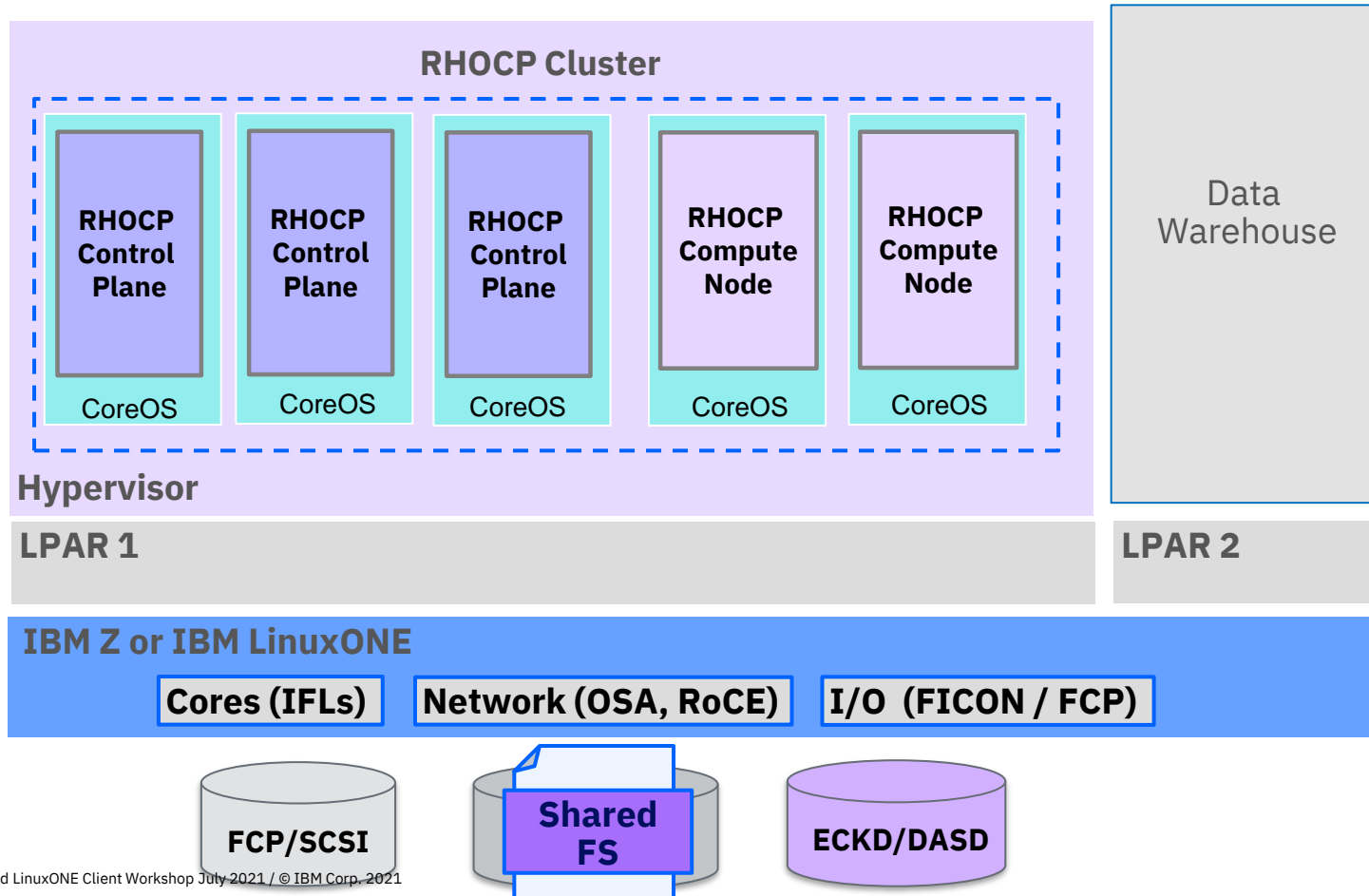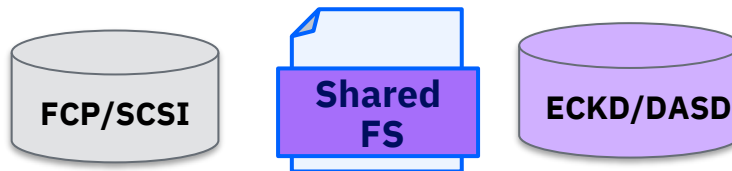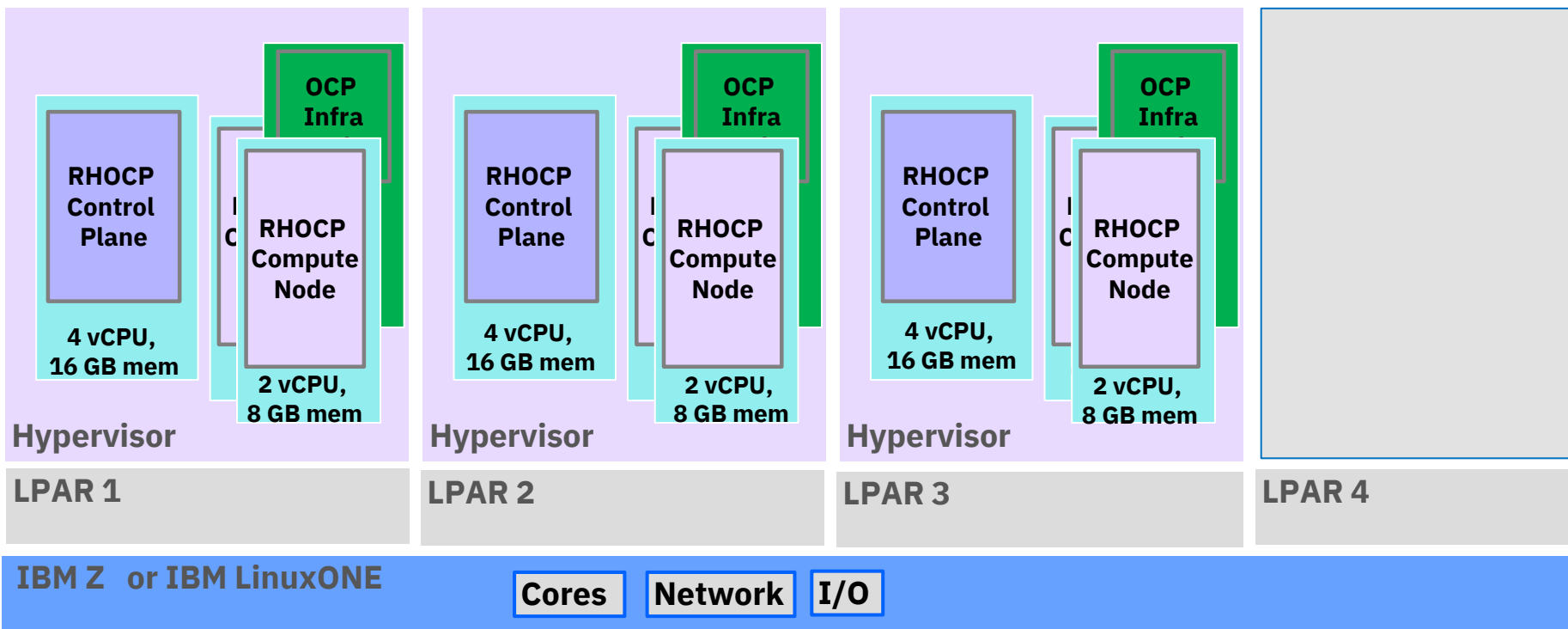
Use Case Overview for RHOCP on IBM Z

Linux on Z

Data:
- Data Warehouse
- Oracle
- Analytics / AI

Services integration:
- Ansible Automation
- Web integration
- Mobile Integration
- Omnibus/Integr.

OpenShift cluster

OPERATING SYSTEM
Red Hat Enterprise Linux CoreOS

z/OS

Container Interaction — zCX

Data

Services

Management — z/OSMF

REST — z/OS Connect

IMS

transactional services

CICS

Data — DB2

Hypervisor (z/VM, KVM)

Hypervisor (z/VM / KVM)

Ansible automation

LPAR 1

LPAR 2

LPAR 3

IBM Z

Security   Network   I/O

FCP/SCSI

-NFS
-CNSA (Spectrum Scale attachment)
-RHODF

ECKD/DASD

What are the
storage options for RHOCP?

Persistent storage options for RHOCP on Z/LinuxONE

There are two different storage categories:

- Storage that hosts the hypervisor and the guests, e.g., RHOCP cluster nodes

- Container storage which hosts the data that the RHOCP container workload uses as persistent storage
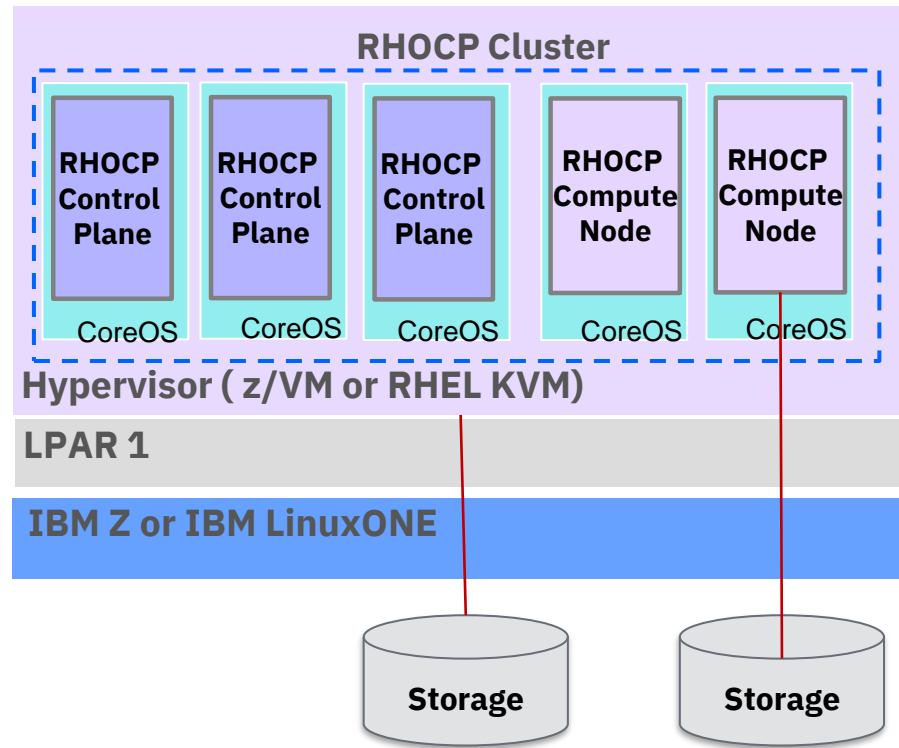
Persistent container storage options for RHOCP on Z/LinuxONE

Local Storage on a single node

- Contains all storage types attached to a single Node and is not shared among any other Node.
- Use for persistent data for pods, but only locally reachable. Pods must run on that exact Node.

Shared Storage between nodes

- Contains all storage types which are shared among Nodes and are available cross nodes.
- Allow pods to be restarted on other nodes and have access to the same data.

Persistent container storage options for RHOCP on Z/LinuxONE

Local Storage on a single node

- Contains all storage types attached to a single Node and is not shared among any other Node.
- Use for persistent data for pods, but only locally reachable. Pods must run on that exact Node.

Supported options

- Local Storage Operator (LSO) with SCSI-over-FCP and DASD-ECKD/FBA volumes

- iSCSI

- Fibre Channel

- IBM Block Storage CSI driver

Shared Storage between nodes

- Contains all storage types which are shared among Nodes and are available cross nodes.
- Allow pods to be restarted on other nodes and have access to the same data.

Supported options

- Network File System (NFS)

- Red Hat OpenShift Container Storage (RHOCS)

- IBM Spectrum Scale Container Native Storage Access (CNSA)

Red Hat OpenShift Data Foundation (RHODF)

RHODF 4.7 is available (formerly called Red Hat OpenShift Container Storage)

- Software Defined Storage (SDS) for running *stateful* containerized applications in hybrid clouds

- Dynamic, shared, and highly scalable, production-grade persistent storage applications

- Developed, released, and deployed in lock-step with Red Hat OpenShift Container Platform

- Rook simplifies storage deployment and enables you to provision storage directly from RHOCP

- Ceph and its RADOS technology enables for data-intensive workloads supporting file, block, object storage for enterprise Kubernetes users

- Noobaa offers an S3 compatible multicloud gateway acting as single persistent repository by abstracting storage being stored in different places

Platform, Application, and Developer Services
for RHOCP on Z / LinuxONE

Release overview of Red Hat OpenShift on Z/LinuxONE
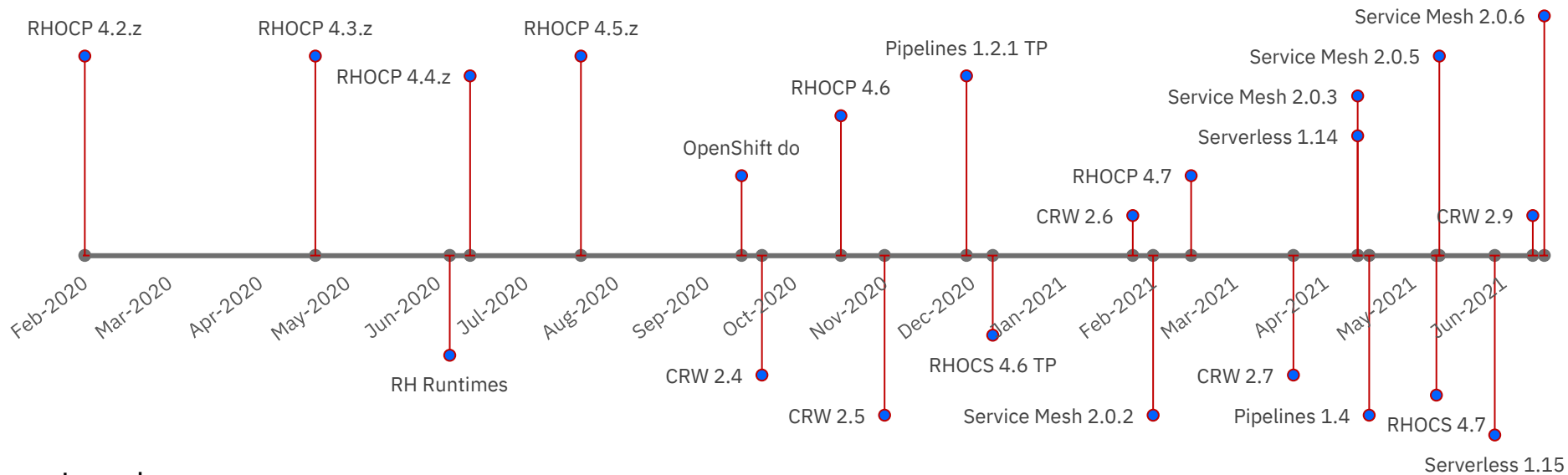
Legend
RHOCP – Red Hat OpenShift Container Platform
RHOCS – Red Hat OpenShift Container Storage
RHODF – Red Hat OpenShift Data Foundation
CRW – CodeReady Workspaces
TP – Technical Preview (not for production use)

Cloud-native Development Readiness with RHOCP on Z & LinuxONE

Red Hat Runtimes

Lightweight middleware runtimes and frameworks for developing cloud-native applications on RHOCP

https://catalog.redhat.com/software/containers/search?p=1&architecture=s390x
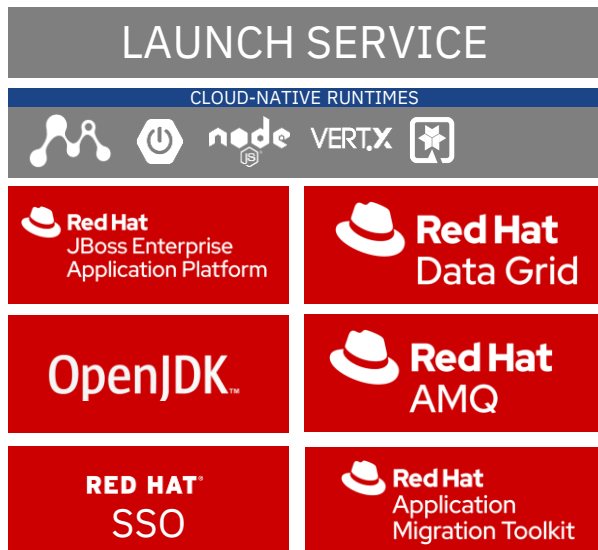
Developer CLI – OpenShift do (odo)

- Developer focused tool for building/deploying of RHOCP applications

CodeReady Workspaces 2.9

- Kubernetes-native development solution with in-browser IDE for rapid cloud application development
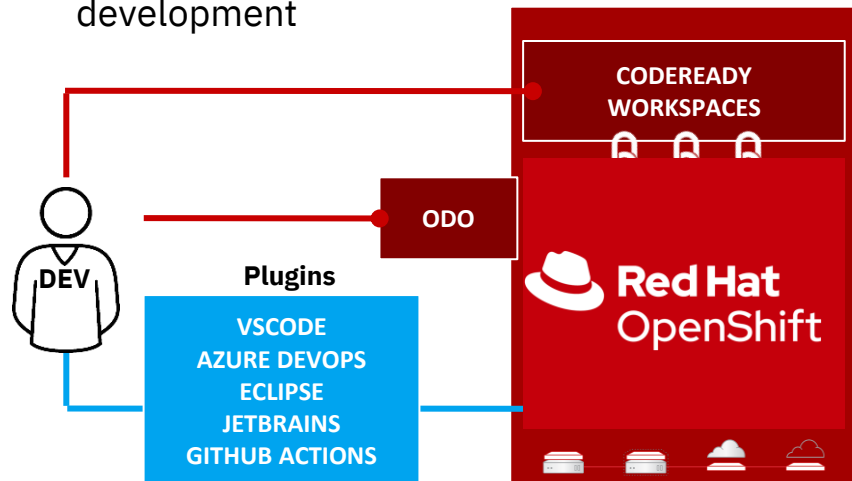
Red Hat OpenShift Pipelines Technology (GA) 1.4
Enabling Kubernetes-native declarative and serverless CI/CD pipelines with Tekton

- Seamlessly integrate RHOCP into a customers DevOps and CI/CD environments

- Designed with microservices and distributed teams in mind

- Foster agile and cloud-native development processes

Traditional CI/CD	Cloud-Native CI/CD
Designed for Virtual Machines	Designed for Containers and Kubernetes
Require IT Ops for CI engine maintenance	Pipeline as a service with no Ops overhead
Plugins shared across CI engine	Pipelines fully isolated from each other
Plugin dependencies with undefined update cycles	Everything lifecycled as container images
No interoperability with Kubernetes resources	Native Kubernetes resources
Admin manages persistence	Platform manages persistence
Config baked into CI engine container	Configured via Kubernetes ConfigMaps

https://docs.openshift.com/container-platform/4.7/cicd/pipelines/op-release-notes.html#op-release-notes-1-4_op-release-notes

What are the benefits of
Red Hat OpenShift Service Mesh?

Service Mesh provides capabilities to

- Secure the communication between the micro services

- Visualize the topology and traffic metrics between the micro services

- Connect and route requests from one micro service to the next

- …

without requiring any changes to the service source code.

Service Mesh 2.0.6 now on RHOCP 4.7

Services *without* **Service Mesh**

Services *with* **Service Mesh**

Service

Security Code

Metrics & Tracing Code

Failure Handling Code

Traffic Management Code

…and more boilerplate code.

RHOCP

Service

Service Mesh

RHOCP

https://docs.openshift.com/container-platform/4.6/service_mesh/v2x/ossm-vs-community.html
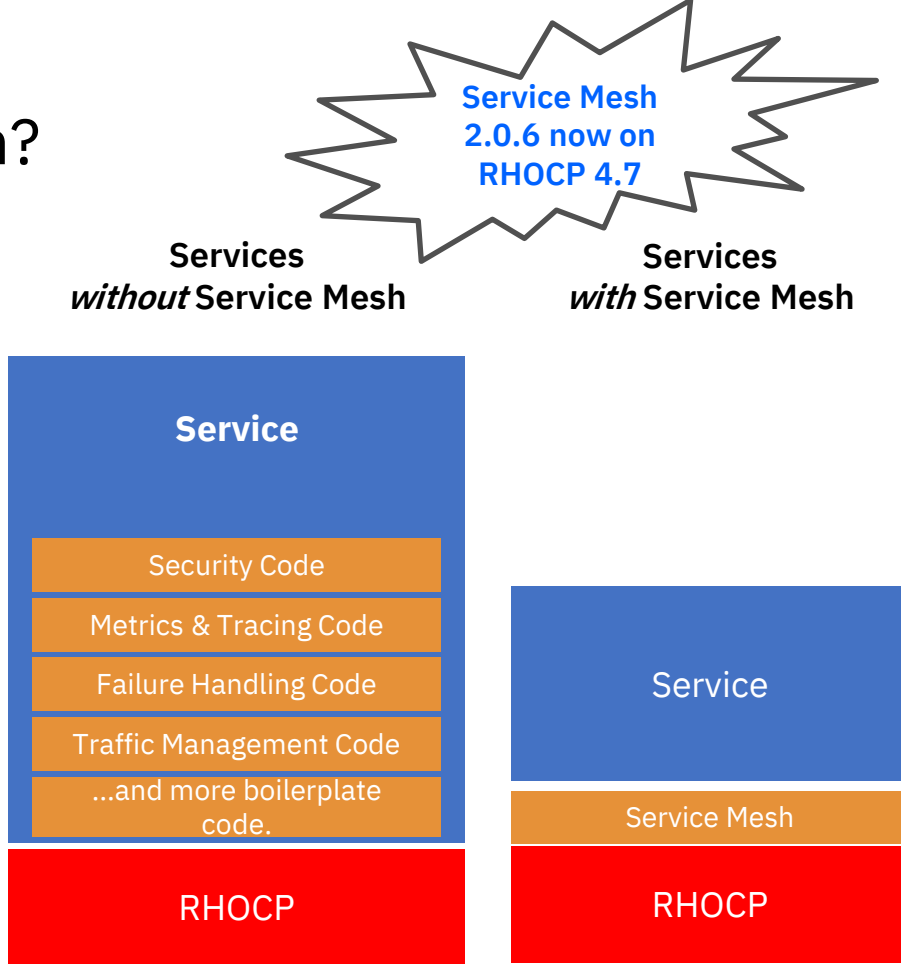
Why Red Hat OpenShift Serverless?

Serverless is a deployment model that allows you to build and run applications without requiring deep insight into the underlying infrastructure.

Serverless 1.15 now GA on RHOCP 4.7 on Z/LinuxONE

- Does your application have an unpredictable or bursty number of requests?

- Are you trying to build event-driven, loosely coupled systems?

- Do you want to perform A/B testing or canary deployments for your applications?

https://www.redhat.com/en/resources/451-research-red-hat-openshift-serverless

Why Red Hat OpenShift Serverless?
"Serverless" patterns – Scaling

Does you application have an unpredictable or bursty number of requests?
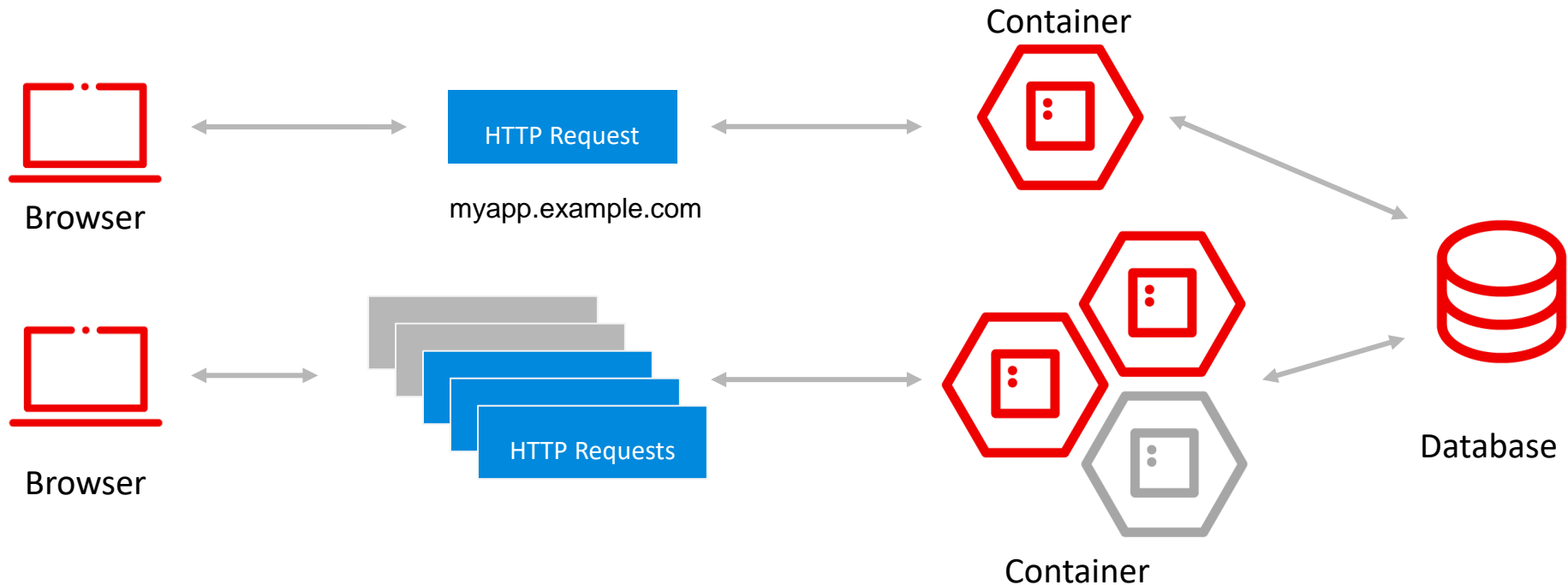
Why Red Hat OpenShift Serverless?
"Serverless" patterns – Eventing

Event Source

kn source
kn source create
kn source list

Configuration

Traffic splitting

Revision 1

Revision 2

Revision 3

Directs traffic

Routes

https://cloudevents.io/
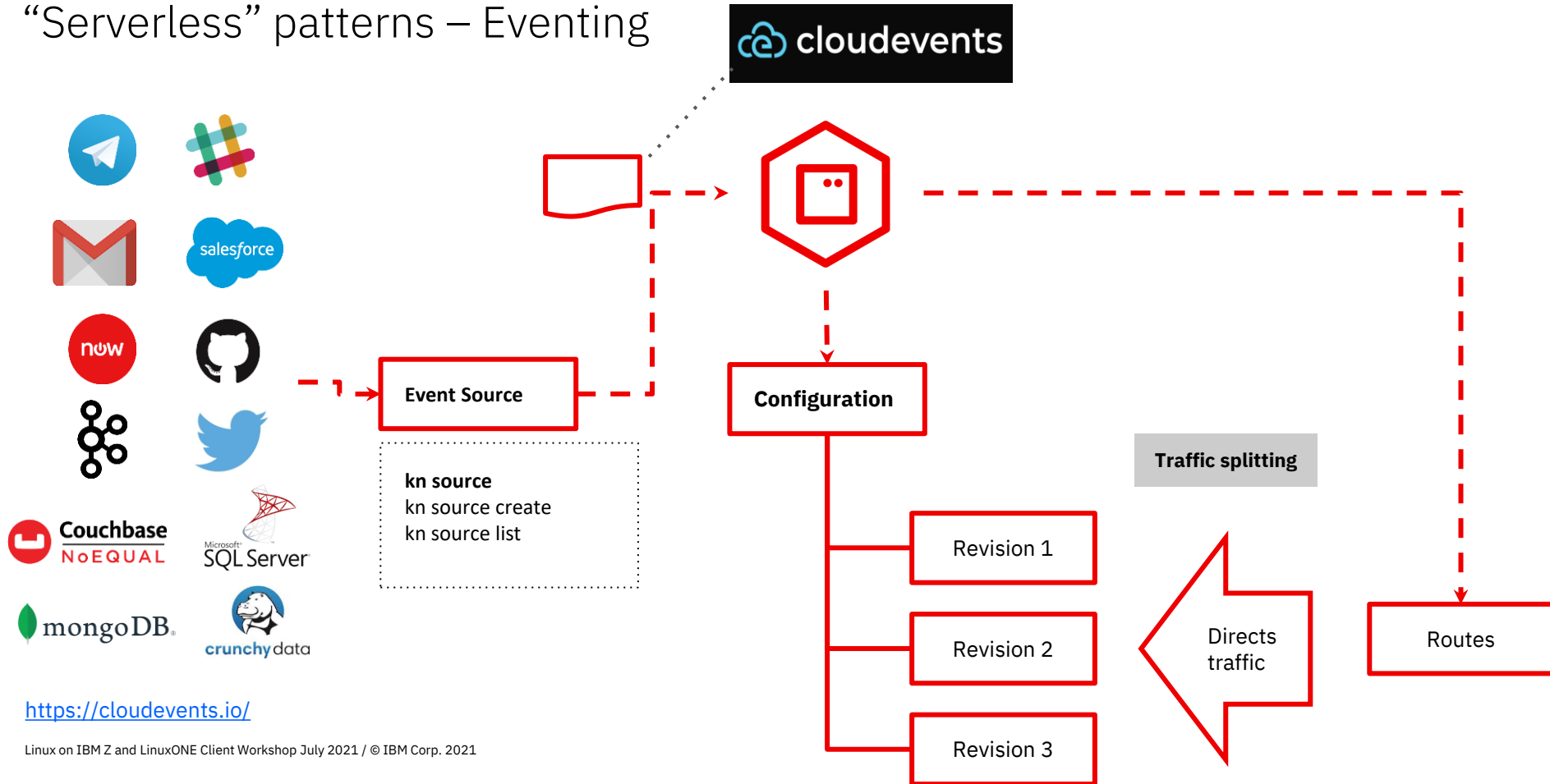
What's next?

What's New on RHOCP 4.7 on Z/LinuxONE

KVM hypervisor support

- RHOCP UPI installation on KVM guests based on RHEL KVM 8.3 or later
  https://docs.openshift.com/container-platform/4.7/installing/installing_ibm_z/installing-ibm-z-kvm.html

Network

- Support for OVN-Kubernetes

New storage support

- Multi-path for SCSI-over-FCP

- z/VM Emulated Devices (EDEVICES) for SCSI

- Persistent storage using Fibre Channel

- Raw block volume support

What's beyond RHOCP 4.7? *

Upcoming topics

- Cluster log forwarding API

- Encryption of etcd data

- Three-node cluster support

- Helm CLI

- IBM CryptoExpress Support for Kubernetes
  PODs/Container Workloads on RHOCP

- RHOCP on z/OS Container Extensions (zCX)

- …

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Questions?

Thank you

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Red Hat Partner Engineer for RHEL and RHOCP on Z & LinuxONE

More Information

- IBM LinuxONE Community Cloud – Free access to virtual servers and RHOCP on LinuxONE https://developer.ibm.com/components/ibm-linuxone/gettingstarted/
- RHOCP Release Notes for IBM Z and LinuxONE - https://docs.openshift.com/container-platform/4.7/release_notes/ocp-4-7-release-notes.html#ocp-4-7-ibm-z
- RHOCP on IBM Z and LinuxONE - Reference Architecture and Performance tips – https://www.ibm.com/docs/en/linux-on-systems?topic=linuxone-red-hat-openshift

Articles, blogs, and more
- RHOCP installation on IBM Z and LinuxONE
  https://www.openshift.com/blog/installing-ocp-in-a-mainframe-z-series
  https://www.openshift.com/blog/red-hat-openshift-installation-process-experiences-on-ibm-z-linuxone

- RHOCP add-ons for IBM Z and LinuxONE
  Understand Openshift do – https://community.ibm.com/community/user/ibmz-and-linuxone/blogs/xiao-mei-zheng/2021/07/05/red-hat-openshift-do-on-ibm-system-zlinuxone
  Services Mesh - Installation – https://community.ibm.com/community/user/ibmz-and-linuxone/blogs/cheryl-fillekes1/2021/05/10/openshift-service-mesh-on-ibm-system-zlinuxone-1
  Service Mesh – Using bookinfo - https://community.ibm.com/community/user/ibmz-and-linuxone/blogs/cheryl-fillekes1/2021/05/11/openshift-service-mesh-on-ibm-system-zlinuxone-p2
  Serverless Components – https://community.ibm.com/community/user/ibmz-and-linuxone/blogs/rahul-arora1/2021/04/26/openshift-serverless-components-on-ibm-z-linuxone
  Latest Open Source DevOps – https://community.ibm.com/community/user/ibmz-and-linuxone/blogs/javier-perez1/2021/05/12/the-latest-on-open-source-devops-for-s390x?CommunityKey=64d1d1bd-66bc-4ecb-b9e8-0372b18c5bcb

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