

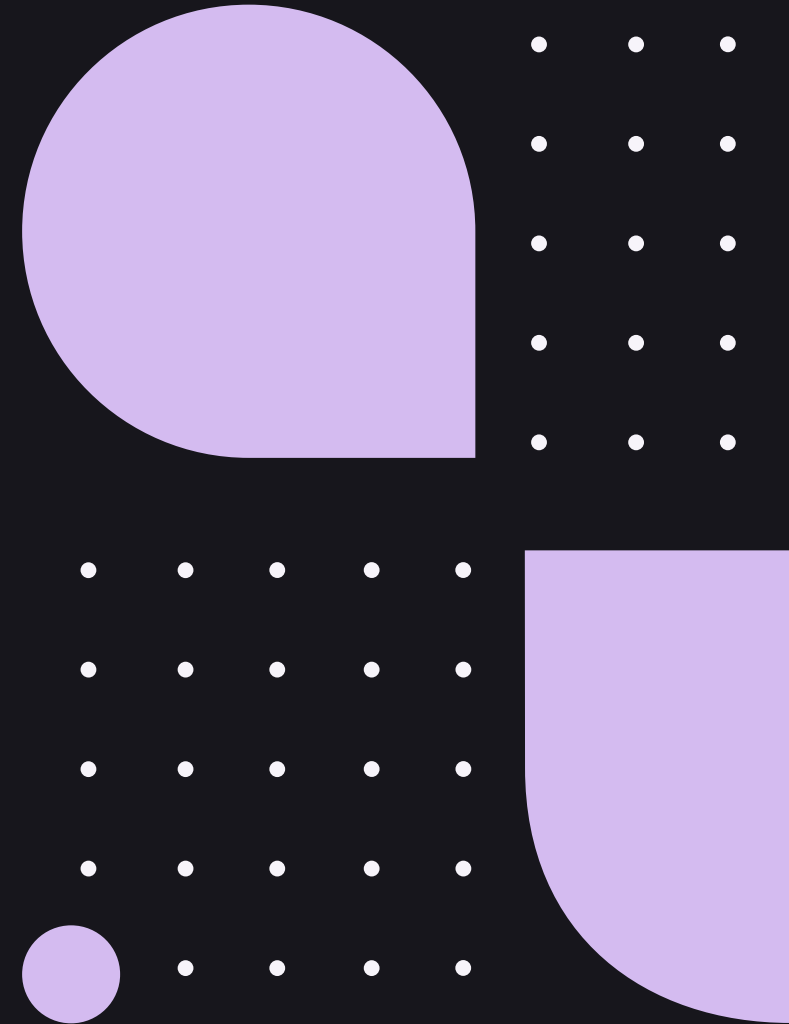
# IBM zCX Foundation for Red Hat OpenShift

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# Heute

**Was ist noch gleich zCX?**

**Was ist OpenShift?**

**IBM zCX Foundation for Red Hat OpenShift**

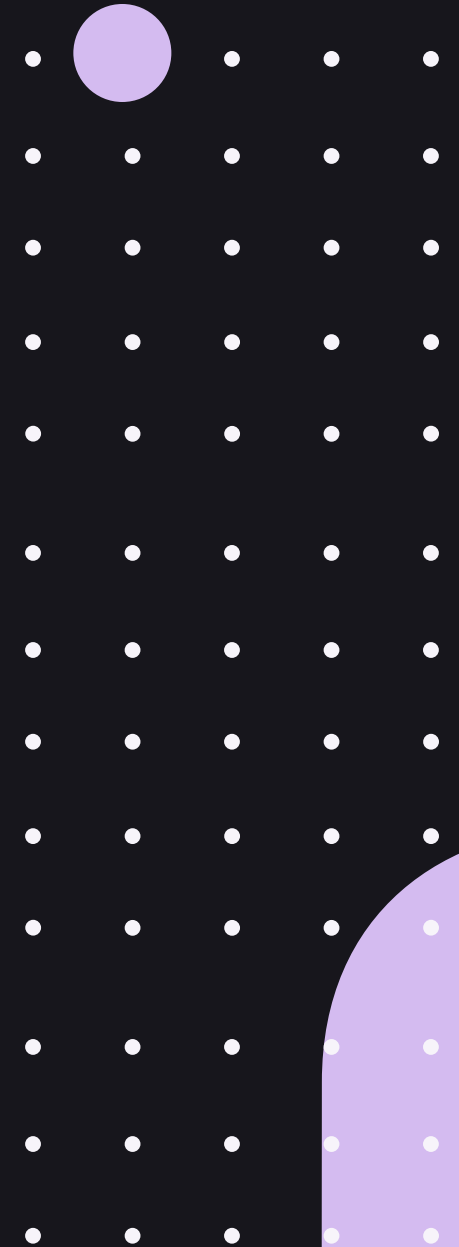
**Was ändert sich?**

**Mehrwerte und Use Cases**

**Set Up und Systemanforderungen**

**Erfahrungen aus dem zCX for OCP Alpha Programm**

**Ressourcen**





# z/OS Container Extensions (zCX)

ab V2.4

## Linux Docker Appliance

Maintenance und IBM Support, Provisionierung durch z/OSMF Workflows

## Standard Docker Interfaces

Jede Software, die als Docker Image auf Linux auf zSystems verfügbar ist // IBM zSystems Registry

Kommunikation mit native z/OS Applikationen über high speed virtual IP network  
Keine z/OS Skills für Entwicklung und Deployment von Docker Containern

## Keine Linux Admin Skills notwendig

Interfaces auf Docker CLI limitiert, kein Zugriff auf Linux Kernel

## Gemanaged als z/OS Prozess

Mehrere Instanzen in einem z/OS System  
zCX Workloads sind zIIP eligible



# OpenShift

- **Anwendungsplattform auf Basis von Kubernetes**

Aufbau verteilter, skalierender Anwendungs- und Entwicklungsumgebungen

- **Management des Anwendungs-Lifecycles, inklusive Entwicklung, Rollout, Betrieb und Wartung**

- **OpenShift basiert auf einem Software-Stack**

Linux Betriebssystem (Red Hat Core OS), Kubernetes, Operatoren, Container-Registry (Quay), Cri-o, Control- und Compute Nodes

- **Für langlebige Projekte großer Organisationen**

Komplexität und Ressourcen

# IBM zCX Foundation for Red Hat OpenShift



## zCX meets OpenShift

IBM zCX Foundation for Red Hat OpenShift that provides enterprise-level container orchestration and management capabilities around containerized software.

Clients can extend and modernize their native z/OS ecosystem through an agile and flexible deployment of Linux on IBM Z applications in a self-contained Red Hat OpenShift cluster on z/OS while exploiting z/OS Quality of Service.



**z/OS System  
Programmer**



**OpenShift  
Administrator**



**OpenShift  
Application  
Developer**

# Vergleich

## zCX for Containers

zCX Virtualization that is part of z/OS

Provisioned using z/OSMF workflows

zCX 1st Boot Loader brings up the instance

**Linux/Docker is part of z/OS (Shipped with zCX)**

**zCX is SMP/E installed and maintained**

Service call starts with IBM

## zCX for OCP

zCX Virtualization that is part of z/OS

Provisioned using z/OSMF workflows

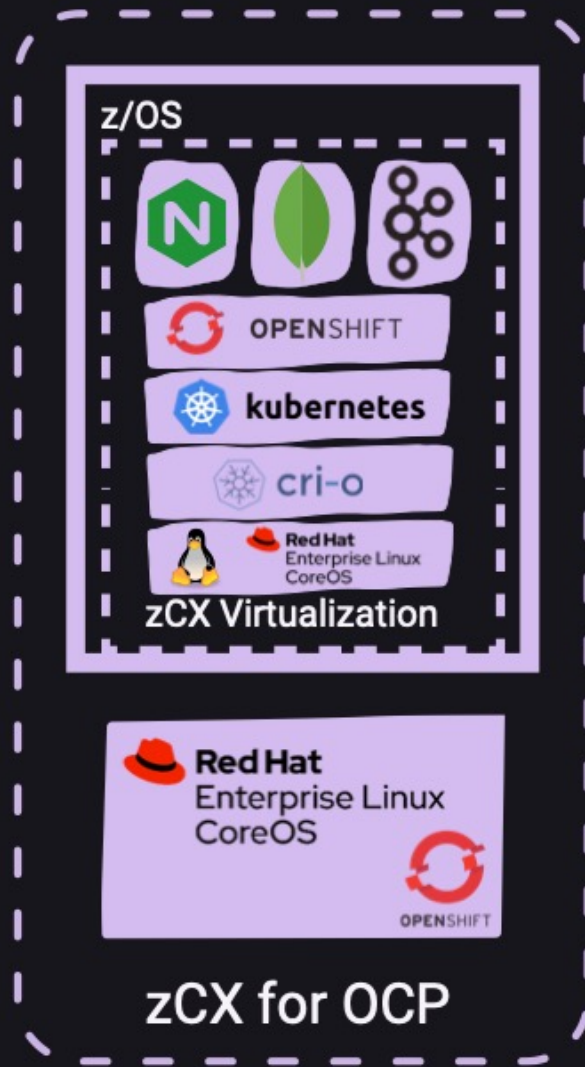
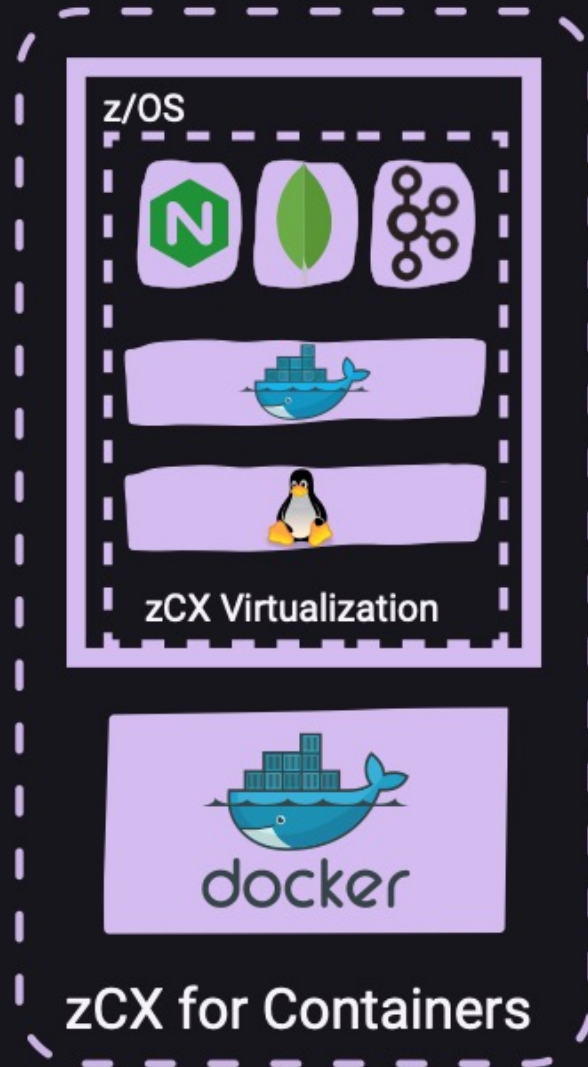
zCX 1st Boot Loader brings up the instance

**Red Hat OCP is separate from z/OS (Binaries are obtained from Red Hat)**

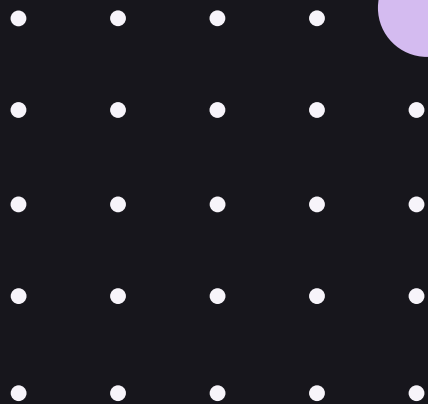
**Red Hat OCP install artifacts, maintenance and upgrades are done using OCP process**

Service call starts with IBM

# Vergleich



# Mehrwerte



## Workload Modernization

- Enable existing or new z/OS applications to use services that are not currently available under z/OS
- Access a large ecosystem of open source and Linux on IBM Z workloads, co-located on the z/OS platform with no porting required

## IBM Z QoS

Co-location offers advantages and enables operational control and exploitation of z/OS platform benefits and z/OS QoS:

- Scalability
- Availability
- Integrated disaster recovery with GDPS
- Workload Manager
- Integration with z/OS Pervasive Encryption

## Operational Efficiency

- Improved time to value with less effort versus native porting
- Get more out of existing hardware investments by enabling optimal utilization
- Overcome cross platform cultural and operational challenges to enable resource efficiency





# Use Cases

## **z/OS Software Ecosystem Expansion**

Co-locate Non-SQL databases, latest microservices, and analytics frameworks within native z/OS without compromising on performance and security

## **z/OS Software Exploitation**

Co-locate applications and workloads within z/OS to exploit mission critical workloads and data, thus gaining accessibility and proximity to key resources

## **Systems Management**

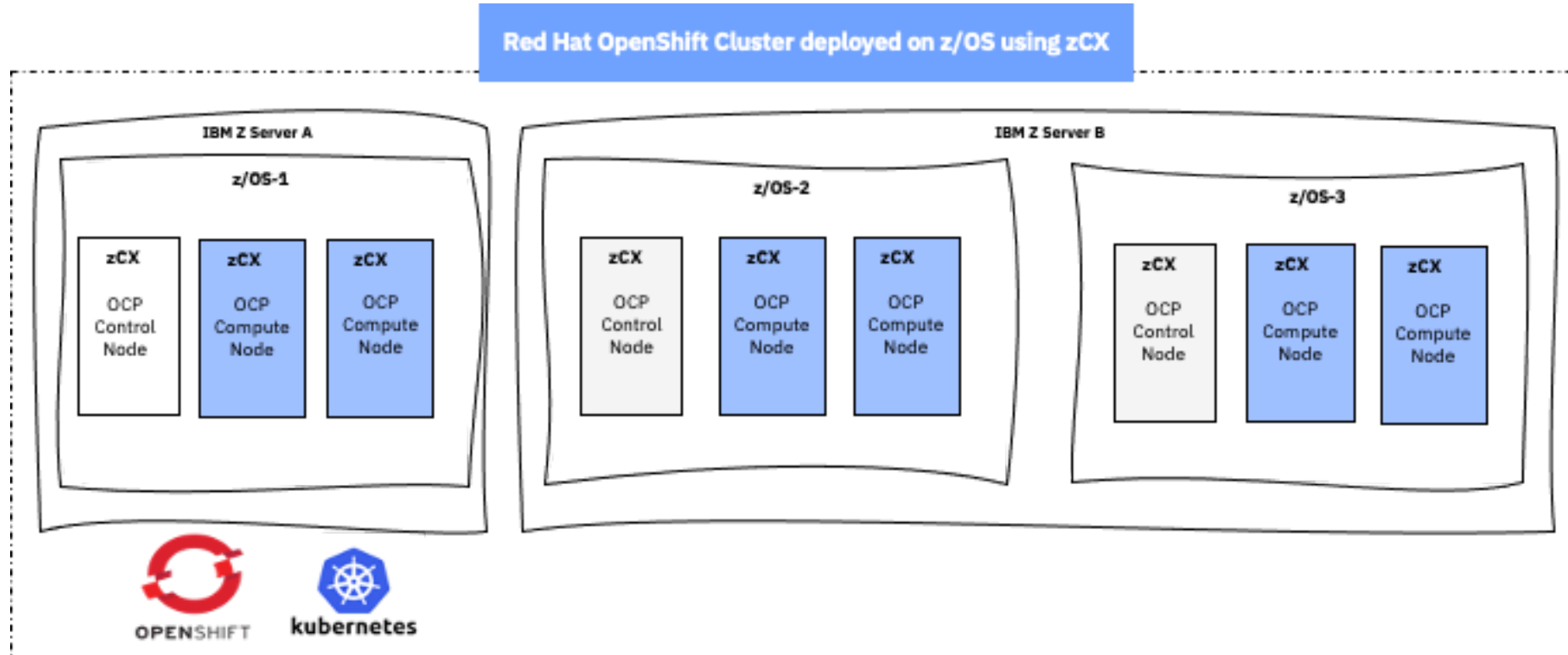
Centralized database and UI portals for management products, less burden on Operations and Dependency Management

## **DevSecOps**

Access to open-source applications and Linux based development tools within z/OS environment, attract and exploit new talent, improve time to market, and provide a cloud-native experience on z/OS

**Checkout Red Hat Marketplace for s390x use cases to run in zCX:  
<https://marketplace.redhat.com/>**

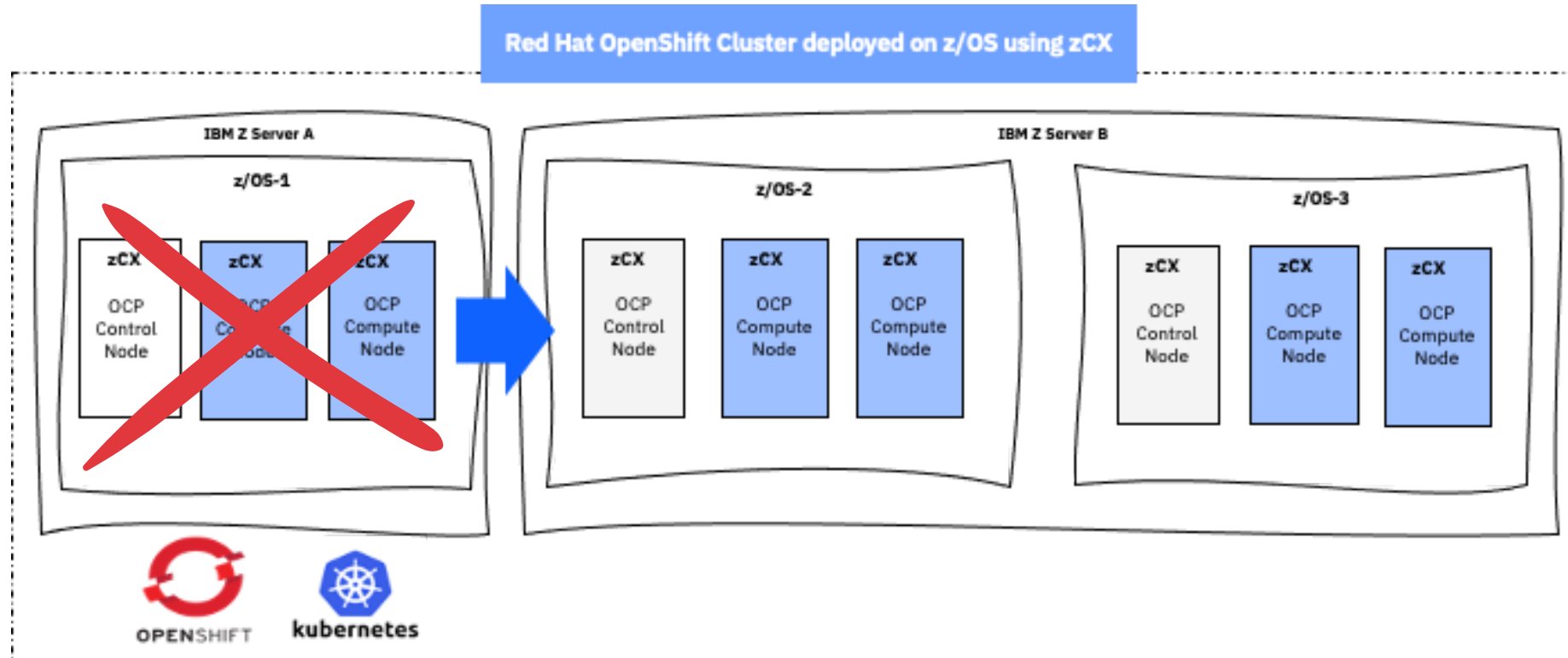
# Set Up und Systemanforderungen



Red Hat Recommended HA Configuration




# Set Up und Systemanforderungen



**Red Hat Recommended HA Configuration**

# OpenShift Benutzeroberfläche

kube:admin

You are logged in as a temporary administrative user. Update the [cluster OAuth configuration](#) to allow others to log in.

- Administrator
- Home
  - Overview
  - Projects
  - Search
  - API Explorer
  - Events
- Operators
- Workloads
  - Pods
  - Deployments
  - DeploymentConfigs
  - StatefulSets
  - Secrets
  - ConfigMaps
  - CronJobs
  - Jobs
  - DaemonSets
  - ReplicaSets
  - ReplicationControllers
  - HorizontalPodAutoscalers

## Overview

[Show getting started resources](#)

### Cluster

#### Details

[View settings](#)

**Cluster API address**  
https://api.ocpeco.pok.stglabs.ibm.com:6443

**Cluster ID**  
632a3f71-3a9a-4bc5-a215-0c36566f2d69  
[OpenShift Cluster Manager](#)

**Provider**  
None

**OpenShift version**  
4.10.0-rc.8

**Service Level Agreement (SLA)**  
Self-support, 60 day trial  
**59 days remaining**  
[Manage subscription settings](#)

**Update channel**  
stable-4.10

#### Status

[View alerts](#)

✓ Cluster ✓ Control Plane ✓ Operators ⚠ Insights  
2 issues found

#### Cluster utilization

Filter by Node type | 1 hour

Resource	Usage	3:30 PM	3:45 PM	4:00 PM	4:15 PM
<b>CPU</b> 17.63 available of 20	2.37				
<b>Memory</b> 48.79 GiB available of 78.12 GiB	29.33 GiB				
<b>Filesystem</b> 75.53 GiB available of 121.9 GiB	46.41 GiB				
<b>Network transfer</b>	2.29 MBps in 2.88 MBps out				
<b>Pod count</b>	168				

#### Cluster inventory

- 5 Nodes
- 221 Pods
- 0 StorageClasses
- 0 PersistentVolumeClaims

#### Activity

[View events](#)

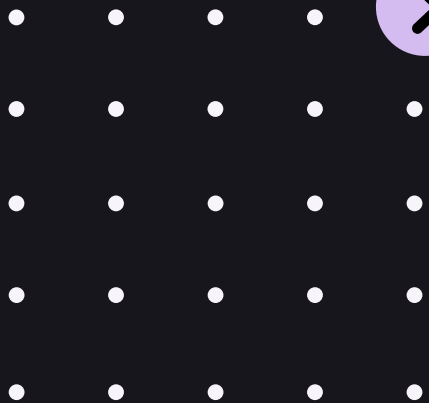
Ongoing

There are no ongoing activities.

Recent events [Pause](#)

- Server has stopped listening
- All non long-running request(s) in-flight have drained
- Received signal to terminate, becoming unready, but kee...
- All non long-running request(s) in-flight have drained
- Received signal to terminate, becoming unready, but kee...
- All pre-shutdown hooks have been finished
- The minimal shutdown duration of 10s finished
- readyz=true
- HTTP Server has stopped listening
- The minimal shutdown duration of 1m10s finished
- The minimal shutdown duration of 1m10s finished
- All pre-shutdown hooks have been finished
- Received signal to terminate, becoming unready, but kee...
- HTTP Server has stopped listening
- All pre-shutdown hooks have been finished
- All non long-running request(s) in-flight have drained

# System- anforderungen



## Hardware:

IBM z14 or z15

## Software:

z/OS v2R4 or higher with recommended maintenance level

Red Hat OpenShift release – 4.10 (Red Hat account required to obtain binaries)

## Processors:

4 virtual CPUs for bootstrap zCX OCP instance (Temporary)

4 virtual CPUs for each Control Plane zCX OCP Instances (3)

2 virtual CPUs for each compute node zCX OCP Instances (2)

1 z/OS system with 6 zIIPs\* and SMT-2 enabled – NO HA

### Recommended:

3 LPARs(z/OS) preferably on multiple Z CPCs - For HA

2 compute node and 1 control node instances per LPAR

6 zIIPs per LPAR\* - This is currently recommended by Red Hat

## Memory:

80 GB of z/OS fixed memory for minimum OCP Cluster plus base z/OS memory requirements

16GB of fixed memory for bootstrap zCX OCP instance (Temporary)

16GB of fixed memory for each control plane zCX OCP instances (3)

8GB of fixed memory for each compute node zCX OCP instances (2)

# System- anforderungen



## Network:

6 z/OS TCP/IP DVIPA addresses for zCX OCP Instances

Network connectivity between zCX OCP instances and OCP Infrastructure services

Existing z/OS network adapters (OSAs) should be sufficient (assuming enough spare bandwidth)

## Disks:

Extended Format VSAM Linear Data Sets on EAV volumes required (allocated with zCX z/OSMF workflows)

600GB of total disk space required: 100GB of disk space for each zCX OCP Instances/nodes (6)

Note: This does not include persistent storage requirements for Cluster image registry, containers/workloads data

## zCX z/OSMF Workflows:

Usage of zCX z/OSMF workflows to provision, de-provision and reconfigure zCX OCP cluster nodes

Must be using Red Hat Enterprise Linux Core OS for all zCX OCP nodes (Part of Red Hat OpenShift binaries)

# System- anforderungen

## OCP Persistent Storage:

Used to store container images, containers/workloads data, and to host cluster image registry

Local (emptydir) can be used for non-production/Prototype use

Creates data affinity to specific zCX OCP nodes and no HA

## For GA:

External NFS server (z/OS or non-z/OS)

Local volumes backed by VSAM LDS and LSO

## Beyond GA:

Red Hat OpenShift Data Foundation (ODF) and IBM Spectrum Scale being evaluated

## Internet access to retrieve OCP installation components:

Access to quay.io to obtain required installation packages (trusted images)

Access to OCM – OpenShift Cluster Manager

Telemetry service – Runs by default - Provides metrics about cluster health to OCM

## Restricted network access requirements:

Need to setup a mirror registry to host OCP installation images:

[https://docs.openshift.com/container-platform/4.10/installing/install\\_config/installing-restricted-networks-preparations.html#installing-restricted-networks-preparations](https://docs.openshift.com/container-platform/4.10/installing/install_config/installing-restricted-networks-preparations.html#installing-restricted-networks-preparations)

Mirror registry can be your existing image registry in your installation

# Beschaffung

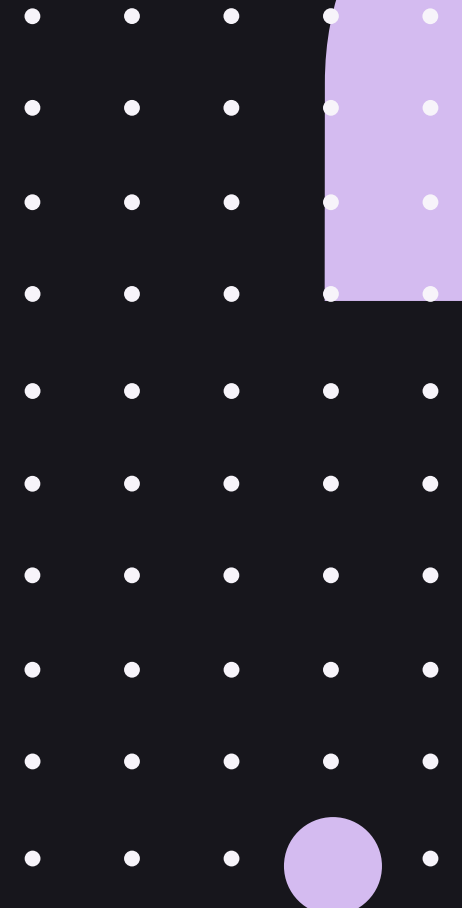
## Key takeaways:

- The license for Red Hat OpenShift on z/OS (via zCX) is non-transferable between zCX and Linux on IBM Z
- Committed Term License options (1,3, and 5 years)
- Price is based on zIIPs (not IFLs, as zCX and zCX for OpenShift do not run on IFLs)
- Priced per core (this is comparable to OpenShift on Linux on IBM Z)
  
- Testphase 60 Tage
- Bastion Node und OCP Services für zCX for Containers
- IBM Statement: Sales Play (Ressourcen)

## Part Nummer/ PID:

5655-ZCX / IBM zCX Foundation for Red Hat OpenShift

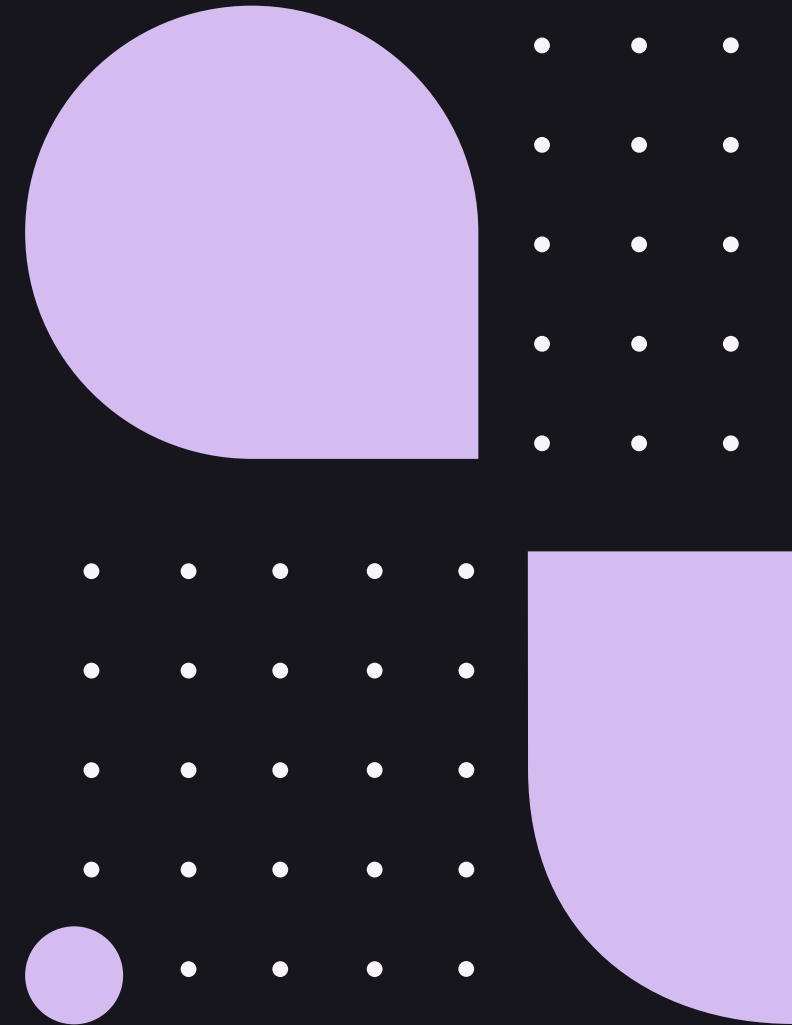
5655-ZCY / IBM zCX Foundation for Red Hat OpenShift S&S



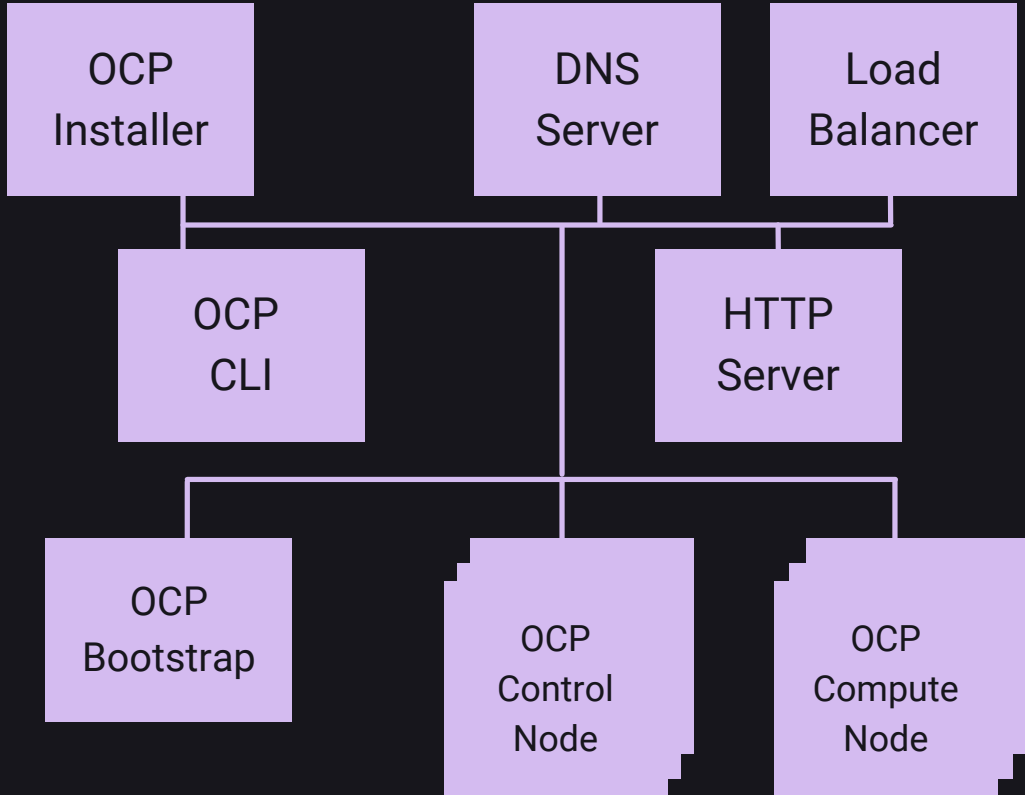


# Erfahrungen aus dem zCX for OCP Alpha Programm

Architektur, Installation, Fazit



# Architektur / Vorbereitung



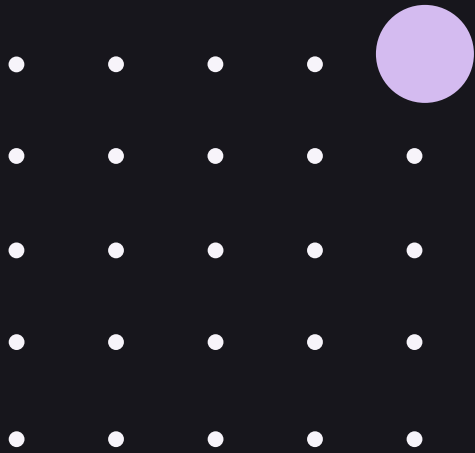
**DNS-Server, Load Balancer und HTTP Server**

**Bootstrap zum Starten des Clusters**

**Control Nodes zum Verwalten**

**Compute Nodes zum Ausführen von Programmen**

# Installation



## z/OSMF Workflows

Ähnlich wie zCX for Containers (Name + \_OCP), Start/Stopp automatisierbar / automatisch nach Parametereingabe

## Cluster

Bootstrap starten

Control Nodes starten

Compute Nodes starten

Bootstrap stoppen

CLI / UI

# Fazit

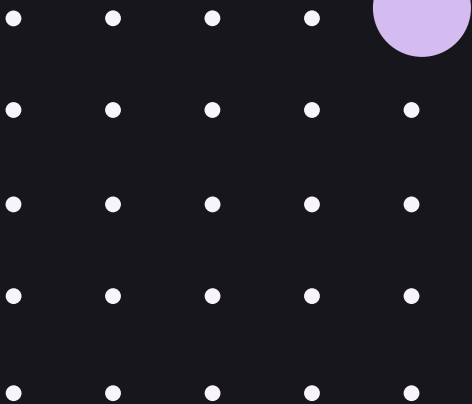
**OpenShift Wissen von großem Vorteil / z/OS  
Wissen so gut wie nicht benötigt**

**z/OSMF Workflows und zCX wie bisher**

**2-3 zIIPs im Leerlauf**

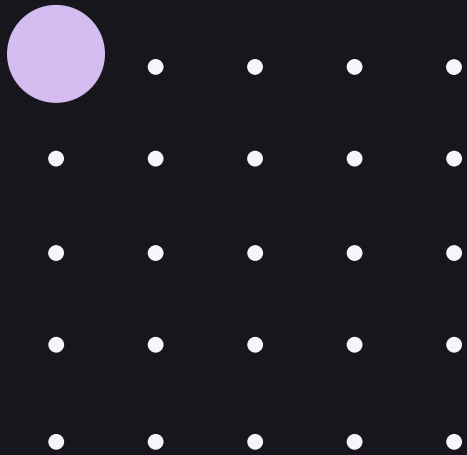
**Anzahl der zugewiesenen vCPUs werden geprüft**

**Testphase relativ kurz**



# Ressourcen

- > **zCX for OpenShift content solution page**
- > **zCX Community Page**
- > **Upcoming Redbook**



**DANKE!**

