

z/OS 3.1 IBM Education Assistant

Solution Name: zCX OpenShift Cluster Support

Solution Element(s): z/OS Container Extensions

July 2023



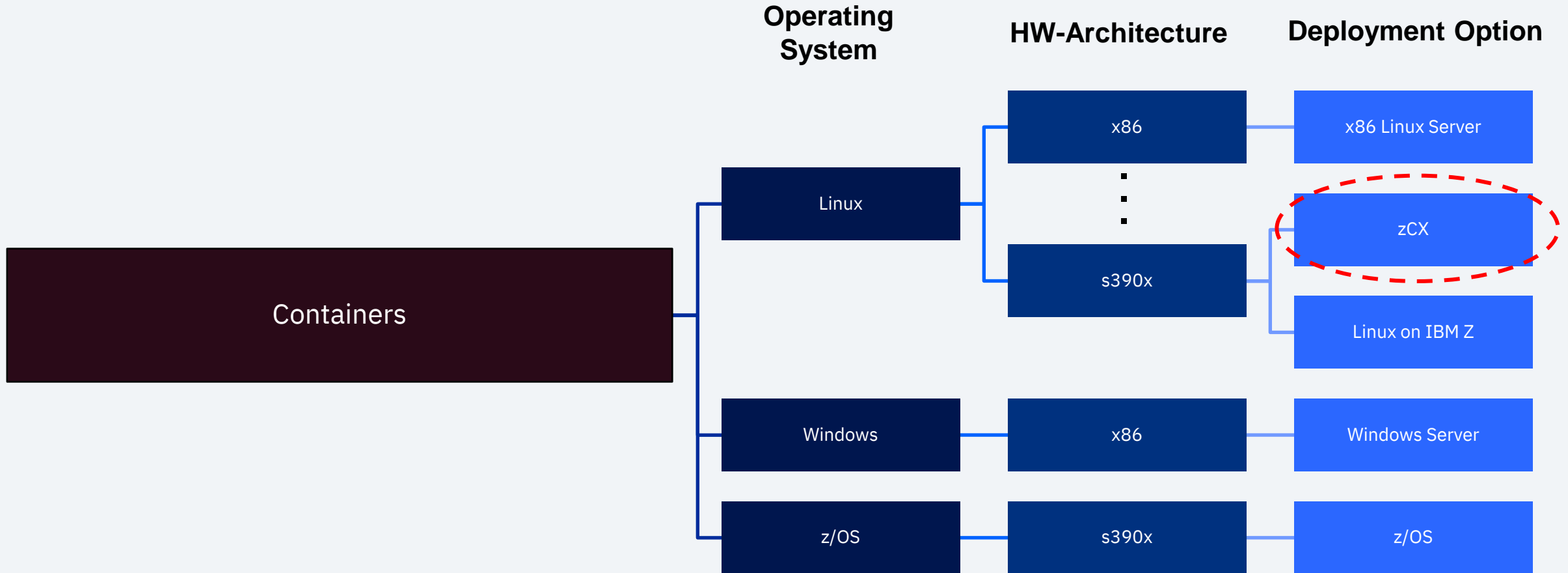
Agenda

- Trademarks
- Overview
- Product Install and Trial
- Requirements
- Installation & Configuration
- Usage & Invocation
- Interactions & Dependencies
- Upgrade & Coexistence Considerations
- Summary
- Reference

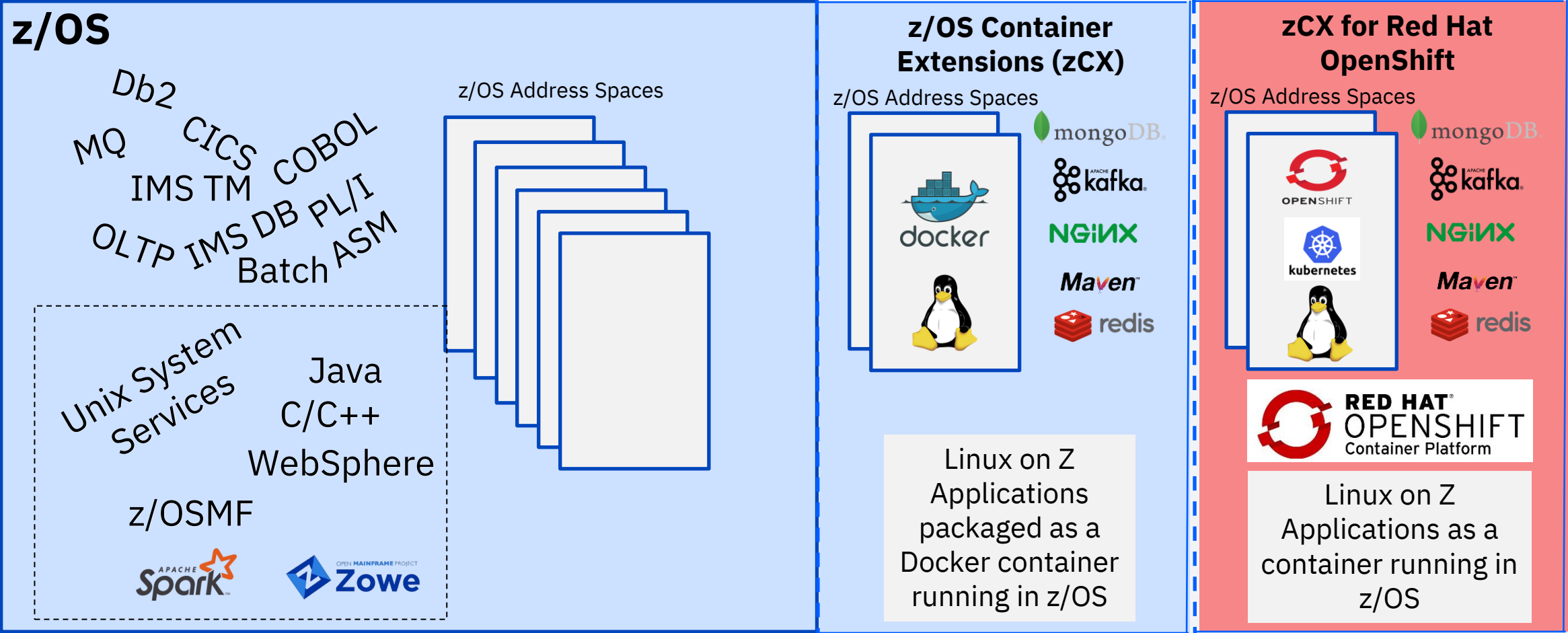
Trademarks

- See url <http://www.ibm.com/legal/copytrade.shtml> for a list of trademarks.
- Additional Trademarks:
 - Red Hat, Red Hat OpenShift, OCP, OpenShift Container Platform

Types of containers



z/OS Container Extensions (zCX): expanding the z/OS Software Ecosystem



GA: September 2019

GA: March 2022

IBM zCX Foundation for Red Hat OpenShift

Bringing Red Hat OpenShift Benefits to z/OS

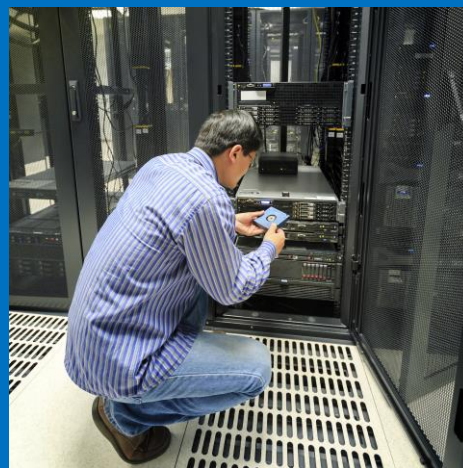
- IBM zCX Foundation for Red Hat OpenShift that provides enterprise-level container orchestration and management capabilities around containerized software.
- Clients can extend and modernize their native z/OS ecosystem through an agile and flexible deployment of Linux on Z applications in a self-contained Red Hat OpenShift cluster on z/OS while exploiting z/OS Quality of Service.

z/OS Systems Programmer



A z/OS Systems Programmer will find that provisioning a Red Hat OpenShift cluster on zCX is the same as provisioning other z/OS middleware components

OpenShift Administrator



An OpenShift Administrator will find that using a Red Hat OpenShift cluster on zCX is the same as any other platforms

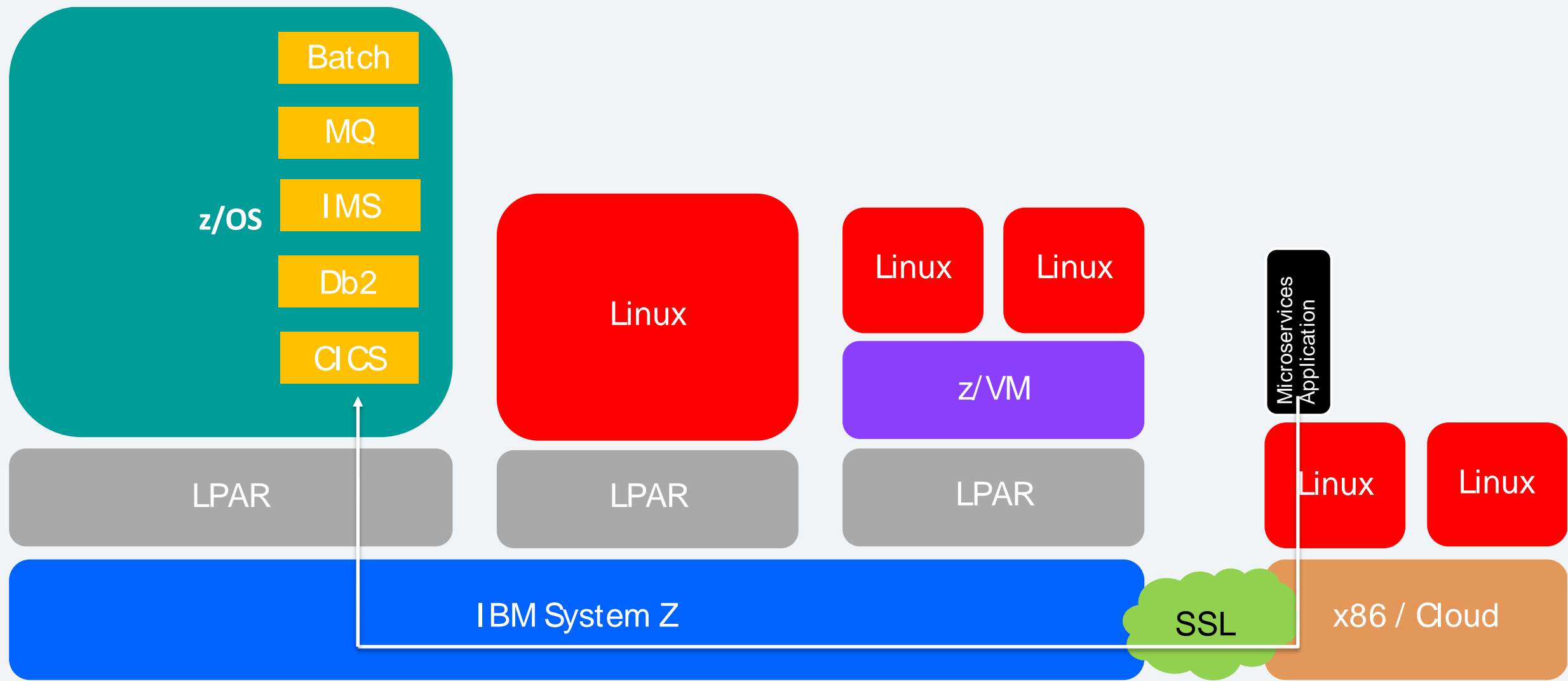
OpenShift Application Developer



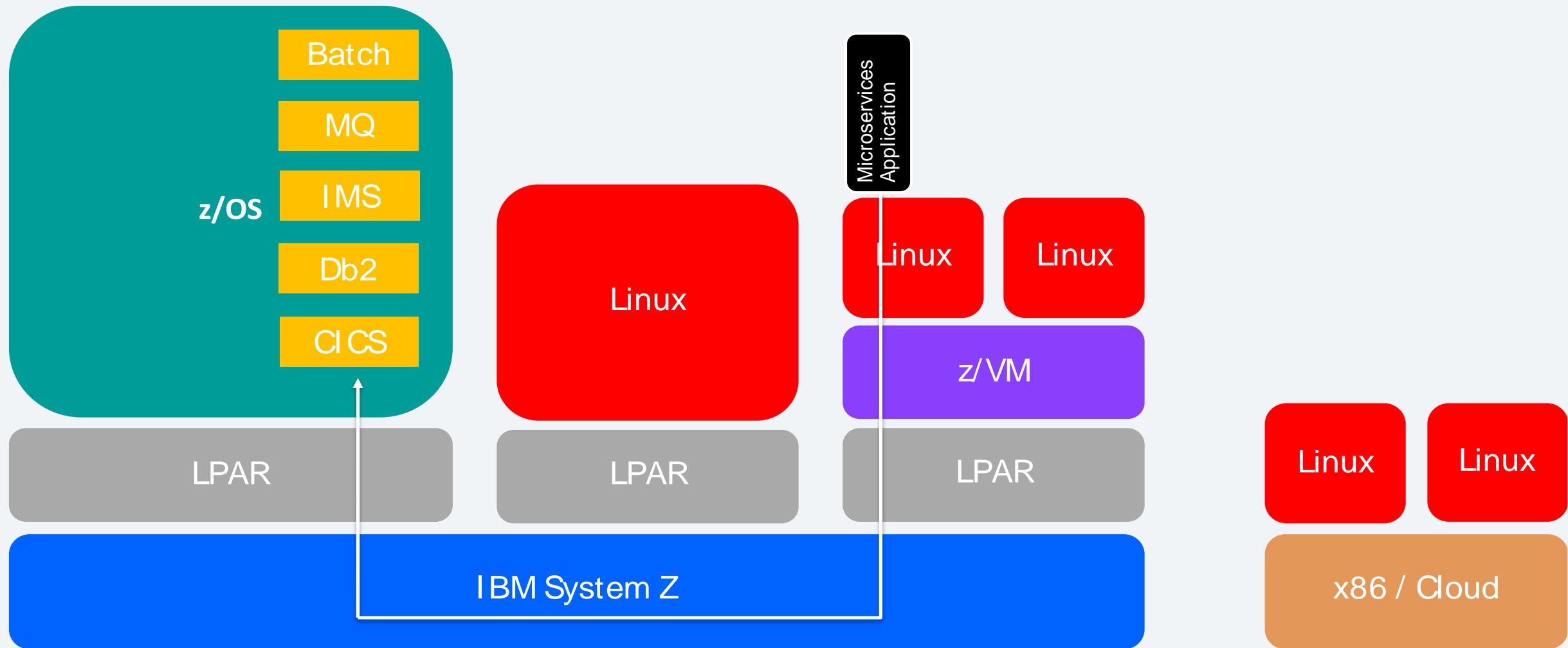
An OpenShift Application Developer will find that developing applications for Red Hat OpenShift on zCX is the same as other platforms



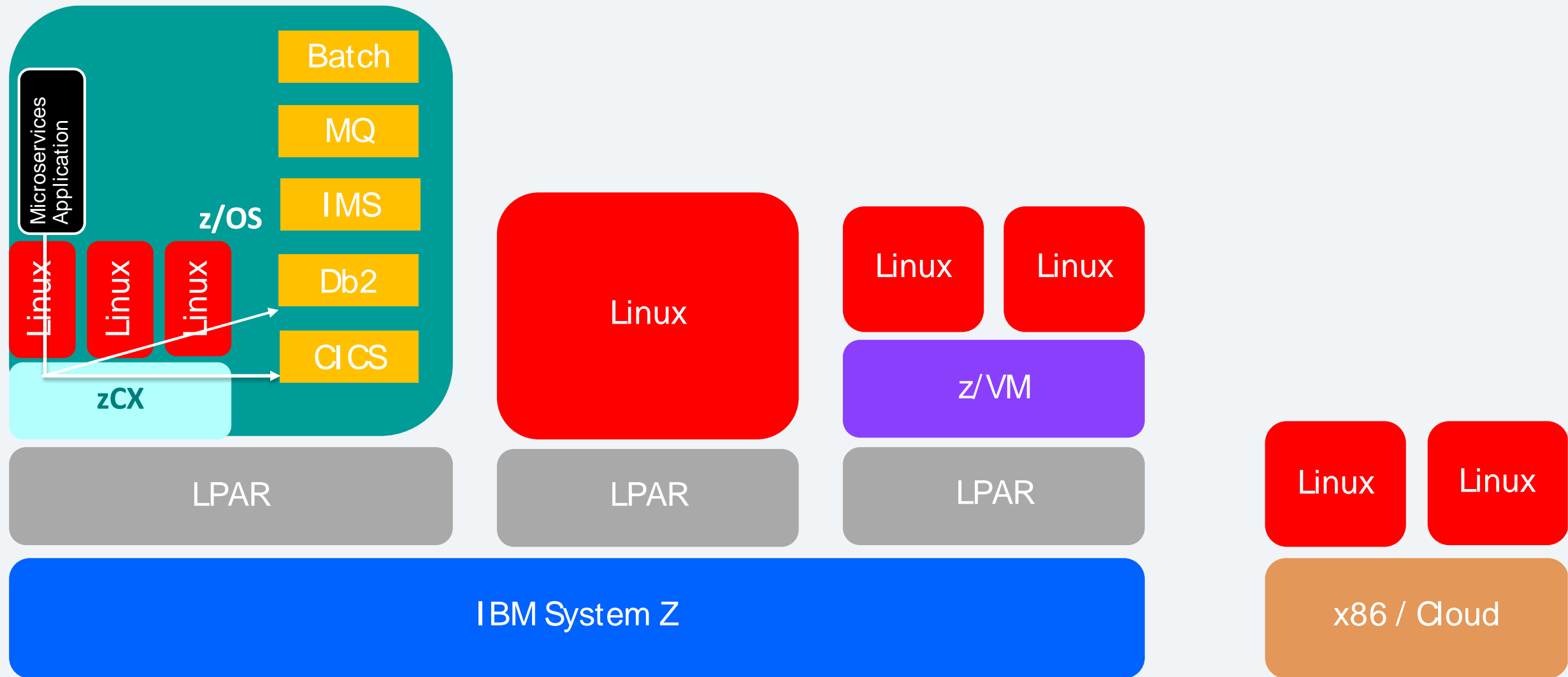
An example of composite solution deployment



An example of composite solution deployment IBM Z: offering co-location benefits



zCX: offering co-location benefits and operational consistency



Benefits of zCX for OpenShift

Workload Modernization	IBM Z QoS	Operational Efficiency
<ul style="list-style-type: none">• 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 Z workloads, co-located on the z/OS platform with no porting required.	<p>Co-location* offers advantages and enables operational control and exploitation of z/OS platform benefits and z/OS QoS:</p> <ul style="list-style-type: none">• Scalability• Availability• Integrated disaster recovery with GDPS• Workload Manager• Integration with z/OS Pervasive Encryption	<ul style="list-style-type: none">• 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.

*some co-location benefits can be experienced with LoZ under zVM



Product Install / Licensing / Trial

- Red Hat OpenShift support for zCX is licensed through IBM zCX Foundation for Red Hat OpenShift for z/OS product from Shopz

Part Number / PID	Part Description
5655-ZCX	IBM zCX Foundation for Red Hat OpenShift
5655-ZCY	IBM zCX Foundation for Red Hat OpenShift S&S

- Add the following entry to the IFAPRDxx parmlib member to enable **60 days** trial:
 - ```
PRODUCT OWNER('IBM CORP')
 NAME('zCXforOpenShift')
 ID(5655-ZCX)
 VERSION(*)
 RELEASE(*)
 MOD(*)
 FEATURENAME('zCX TRIALOCP60')
 STATE(ENABLED)
```
- Signup for Red Hat account and use the self-managed Red Hat OpenShift Trial program (60 days)
  - <https://www.redhat.com/en/technologies/cloud-computing/openshift/container-platform>
- Note:** Red Hat OpenShift license/entitlement from other platforms are **not transferrable** to zCX

## Self-managed

Self-managed on Red Hat OpenShift Container Platform, in the cloud, on your computer, or in your datacenter

[Start your trial](#)

If you've already started your trial, [return to it](#).

**Cost:** Free

### Features & highlights:

Most flexible and customizable deployment to any environment, with full cluster administrator access

**Trial length:** 60 days

### Requirements:

Existing infrastructure or cloud account  
May incur your own infrastructure costs

# Requirements

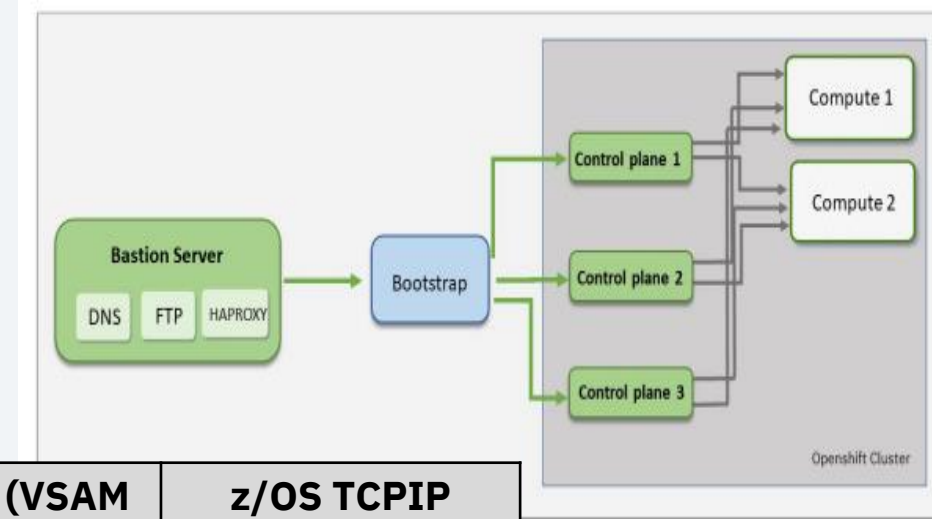
# zCX for Red Hat OpenShift v4.10/v4.11 Requirements

## Hardware:

- IBM z14 or higher
- 1 z/OS system with 6 zIIPs\* and SMT-2 enabled – NO HA
- **Recommended:** 3 z/OS LPARs with 6 zIIPs & SMT-2 enabled on each preferably on multiple Z CPCs

## Software:

- z/OS v2R4 or higher with recommended maintenance level
- Red Hat OpenShift release – 4.10+ (Red Hat account required to obtain binaries)



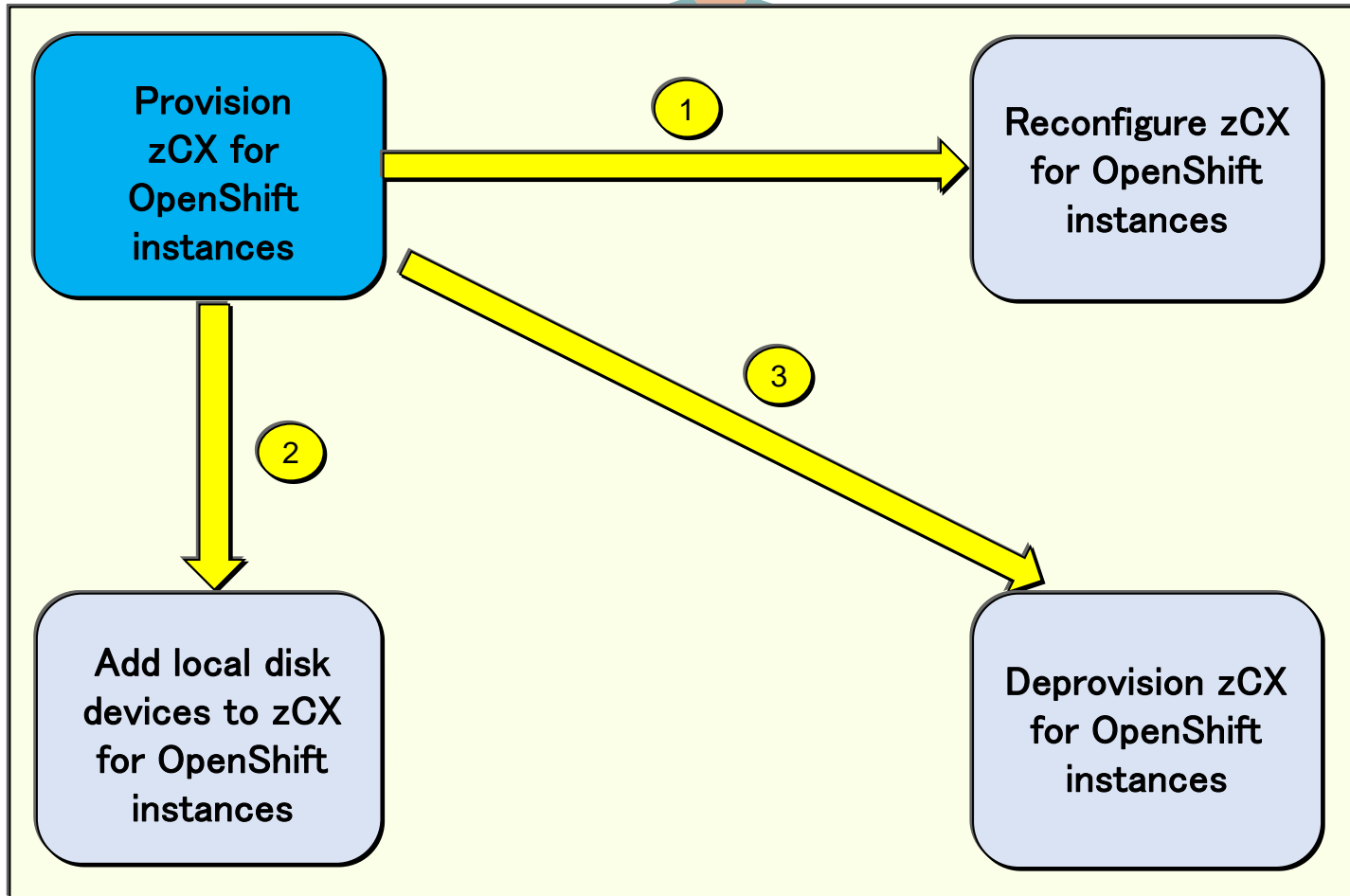
| Role                             | zCX OCP Instances | vCPUs     | z/OS Fixed Memory | Storage (VSAM LDS) | z/OS TCPIP DVIPA address |
|----------------------------------|-------------------|-----------|-------------------|--------------------|--------------------------|
| Bootstrap (Temporary)            | 1                 | 4         | 16 GB             | 100 GB             | 1                        |
| Control-plane Nodes              | 3                 | 4         | 16 GB             | 100 GB             | 3                        |
| Compute Nodes                    | 2                 | 2         | 8 GB              | 100 GB             | 2                        |
| Bastion Server in zCX (Optional) | 1                 | 2         | 8 GB              | 25 GB              | 1                        |
| <b>Total</b>                     | <b>6</b>          | <b>20</b> | <b>80 GB</b>      | <b>600 GB</b>      | <b>6</b>                 |

# Installation & Configuration

# zCX for OpenShift instances - Lifecycle Management Workflows



Zach  
Systems Programmer



## Note:

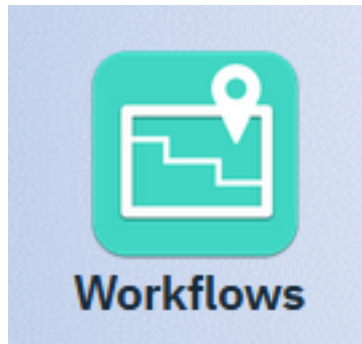
A restart of the zCX for OpenShift cluster nodes will be required for all configuration changes.



# zCX z/OSMF Workflow Guided Setup

- Use the provided ocp\_provision.xml file

Input values can be provided either using properties file or z/OSMF UI on the first workflow step



## Provision an IBM zOS Container Extensions for OpenShift Appliance Instance. -

### Workflow Details

#### Workflow Steps

| Actions ▾                |              |            |                                                                          |                       |
|--------------------------|--------------|------------|--------------------------------------------------------------------------|-----------------------|
| ↔ No filter applied      |              |            |                                                                          |                       |
| <input type="checkbox"/> | State Filter | No. Filter | Title Filter                                                             | CalledWorkflow Filter |
| <input type="checkbox"/> | ➡ Ready      | 1          | ■ Gather IBM zCX for OpenShift appliance instance properties             |                       |
| <input type="checkbox"/> | ⚠ Not Ready  | 2          | ■ Starts the IBM zCX for OpenShift appliance instance provisioning       |                       |
| <input type="checkbox"/> | ⚠ Not Ready  | 3          | ⊕ Resolve IBM zCX for OpenShift appliance instance properties            |                       |
| <input type="checkbox"/> | ⚠ Not Ready  | 4          | ■ Set IBM zCX appliance instance properties                              |                       |
| <input type="checkbox"/> | ⚠ Not Ready  | 5          | ⊕ Allocate VSAM dataset to hold IBM zCX appliance instance disk image    |                       |
| <input type="checkbox"/> | ⚠ Not Ready  | 6          | ⊕ Load the IBM zCX appliance instance disk image                         |                       |
| <input type="checkbox"/> | ⚠ Not Ready  | 7          | ⊕ Allocate and potentially format VSAM datasets to hold local storage    |                       |
| <input type="checkbox"/> | ⚠ Not Ready  | 8          | ⊕ Allocate VSAM datasets to hold diagnostics and logs data               |                       |
| <input type="checkbox"/> | ⚠ Not Ready  | 9          | ⊕ Allocate VSAM dataset to hold IBM zCX appliance instance configuration |                       |
| <input type="checkbox"/> | ⚠ Not Ready  | 10         | ⊕ Load IBM zCX appliance instance configuration disk image               |                       |
| <input type="checkbox"/> | ⚠ Not Ready  | 11         | ⊕ Generate the IBM zCX appliance                                         |                       |



# Workflow Guided Setup

- **OpenShift specific parameters:**
- ZCX\_OPENSHIFT\_NODE: Specify the IBM zCX for OpenShift appliance type.
- ZCX\_RHCOS\_KERNEL\_INSTALL\_PARM\_KEY: Red Hat CoreOS kernel installation device parameter key, provided by Red Hat

\* Select which flavor of IBM zCX for OpenShift Node to provision:

bootstrap

bootstrap  
control-node  
compute-node

*- Provide the Red Hat CoreOS installer rootfs URL location:*

\* Kernel parameter key that identifies the target device:

coreos.inst.install\_dev

\* Red Hat CoreOS installer rootfs URL location: ⓘ - Provide the Red Hat CoreOS installer rootfs URL location:

http://10.0.1.1:8080/install/rhcos-4.11.0-s390x-live-ro

\* Red Hat CoreOS installer ignition URL location: ⓘ - Provide the Red Hat CoreOS installer ignition URL location:

http://10.1.1.1:8080/ignition/bootstrap.ign

\* Red Hat CoreOS installer kernel URL location: ⓘ - Provide the Red Hat CoreOS installer kernel URL location:

https://10.1.1.1:8081/install/rhcos-4.11.0-s390x-live-k

\* Red Hat CoreOS installer initramfs URL location: ⓘ - Provide the Red Hat CoreOS installer initramfs URL location:

https://10.1.1.1:8081/install/rhcos-4.11.0-s390x-live-ir

☒ \* System trust CA: ⓘ - Enable TLS authentication for system trust CA:

System-wide trusted TLS CA Certificate: ⓘ - File path to private System-wide trusted CA certificate:

/home/https\_CA/server.crt



# Usage & Invocation

# Adjust MODIFY <zcx\_jobname>, DISPLAY,CONFIG

---

- Recognize and display the new name-value pairs:
  - 'zCX Type' with possible value of: 'zCX for OpenShift'
  - 'Node' with possible values of: 'compute-node', 'control-node', 'bootstrap'.
- Example below:

```
MODIFY OCPOPS4,DISPLAY,CONFIG
GLZC003I Configuration information for zCX instance OCPOPS4
File Path: /oc4z/shared/zcx_instances/OCPOPS4/start.json
FFDC Path: /global/zcx_zos/instances/OCPOPS4/FFDC
Dump Path: /global/zcx_zos/instances/OCPOPS4/FFDC/zcx-guest.dmp
Memory size: 16GB
Number of CPUs: 4
Number of Disks: 4
Number of Networks: 1
CTRACE Parmlib Member: CTIGLZ00
Memory Pages: 8
Memory Page Size: 2G fixed
zCX Type: zCX for OpenShift
Node: control-node
```

# Adjust MODIFY <zcx\_jobname>, DISPLAY,VERSION

---

- Version Information message for OpenShift as below:

```
MODIFY OCPOPS4,DISPLAY,VERSION
GLZB022I zCX instance OCPOPS4 version information
Bootloader: HZDC7C0 oa63370
 3.7.3 2.3.0
Current Appliance: HHRH110 oa63068
 OPENSIFT CONTROL
 20220411T134742Z
Available Appliance: N/A

Virtualization Layer: HBB77C0 OA64246 02/07/23
 Started on 2023/02/16 08:17:40

Workflows Performed:
Provision: 2.4.17 HHRH110 2022/05/06 16:14
Reconfigure: N/A N/A N/A
Upgrade: N/A N/A N/A
Add Data Disks: N/A N/A N/A
Add Local Stg Disks: N/A N/A N/A
```

# Interactions & Dependencies

---

- Software Dependencies
  - IBM zCX Foundation for Red Hat OpenShift
    - PID: 5655-ZCX and 5655-ZCY
    - FMID: HHRH110
  - APARs: OA62310 (z/OS 2.4 and 2.5), OA62311, and OA63800
  - Red Hat OpenShift binaries
    - Obtained from Red Hat Infrastructure page using Red Hat account/ID
- Hardware Dependencies
  - An IBM z14 or higher with z/OS 2.4 or higher is required.
- Exploiters
  - zSCC – IBM z Security Compliance Center

# Upgrade & Coexistence Considerations

---

- None

# Summary

---

- Install of IBM zCX Foundation for Red Hat OpenShift
- Enablement of Trial license to validate zCX for OpenShift
- Provisioning of zCX for OpenShift cluster instances
- Establishment of self-contained Red Hat OpenShift cluster on z/OS using zCX
- Discuss the benefits of deploying OpenShift Cluster on z/OS using zCX
  - Co-location benefits
  - Leveraging and extending z/OS qualities of service to OpenShift cluster and applications
- Bring cloud-native type of development experience to z/OS using zCX



# Modernize and Extend your z/OS® Applications with IBM zCX Foundation for Red Hat OpenShift!

| Resource                        | Link                                                                                                                                                                                                                                                                        |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Product Page                    | <a href="https://www.ibm.com/products/zcx-openshift?lnk=ushpv18nf2">https://www.ibm.com/products/zcx-openshift?lnk=ushpv18nf2</a>                                                                                                                                           |
| Content Solutions Page          | <a href="https://www.ibm.com/support/z-content-solutions/zcx-openshift/">https://www.ibm.com/support/z-content-solutions/zcx-openshift/</a>                                                                                                                                 |
| zCX for OpenShift Documentation | <a href="https://www.ibm.com/docs/en/zcxrhos/1.1.0">https://www.ibm.com/docs/en/zcxrhos/1.1.0</a>                                                                                                                                                                           |
| zCX IBM Community Page          | <a href="https://community.ibm.com/community/user/ibmz-and-linuxone/groups/topic-home?CommunityKey=2d6a0d68-f239-4ad4-ae69-207c63ff4b61">https://community.ibm.com/community/user/ibmz-and-linuxone/groups/topic-home?CommunityKey=2d6a0d68-f239-4ad4-ae69-207c63ff4b61</a> |