

## Course Exercises Guide

# IBM Cloud Pak for Automation, Installation and Administration

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**IBM** Training

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# Contents

Tradema	ırks	iv
Exercise	s description	v
Exercise	1. Deploying the IBM Operational Decision Manager (ODM) container	
	Part 1: Work with the development environment	1-5
	Part 2: Load the ODM docker images for Cloud Pak for Automation 1	·14
	Part 3: Prepare the required ODM database 1-	
	Part 4: Deploy the ODM container 1-	
	Part 5: Verify successful ODM deployment 1-	
	Part 6: Troubleshoot failed deployment 1-	
	Part 7: Access the running ODM containers 1-	-26
Exercise	2. Deploying the IBM FileNet P8 Content Platform Engine (CPE) container	2-1
	Part 1: Work with the development environment	2-5
	Part 2: Create the Persistent Volumes and Persistent Volume Claims that are required by Content	
	Platform Engine	14
	Part 3: Prepare the database required by Content Platform Engine	18
	Part 4: Prepare LDAP required by Content Platform Engine	
	Part 5: Load the Content Platform Engine docker images for Cloud Pak for Automation 2-	-25
	Part 6: Deploy the Content Platform Engine container 2-	31
	Part 7: Verify successful Content Platform Engine deployment 2-	36
	Part 8: Troubleshoot failed deployment 2-	38
	Part 9: Access the running Content Platform Engine container 2-	40
Exercise	3. Administering the IBM Cloud Pak for Automation containers	<b>3-1</b>
	Part 1: Explore the OpenShift web console for container management	3-3
	Part 2: Examine the available open source monitoring options	
	Part 3: Scale an application	40
	Part 4: Monitor applications with probes	
	x A. Installing Red Hat OpenShift Container Platform V3.1.1 to create the lab environme	
	Α	
	Part 1: Configure Environment for installing Red Hat OpenShift Container Platform 3.1.1	
	Part 2: Install Red Hat OpenShift	<b>∖-</b> 4

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# **Exercises description**

This course includes the following exercises:

- Deploying the IBM Operational Decision Manager (ODM) container
- Deploying the IBM FileNet P8 Content Platform Engine (CPE) container
- · Administering the IBM Cloud Pak for Automation containers

In the exercise instructions, you can check off the line before each step as you complete it to track your progress.



## Important

The exercises in this course use a set of lab files that might include scripts, applications, files, solution files, PI files, and others. The course lab files can be found in the following directory:

/root/labfiles, for Linux

The exercises point you to the lab files as you need them.

### **User accounts**

	Туре	User ID	Password
RHEL	Operating system	root	passw0rd
OpenShift	Container Platform	admin	passw0rd



### Important

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#### Read this section if you want to do the deployment exercises in a different order or skip a deployment

The order of the labs in this book is IBM Operational Decision Manager (ODM) container deployment in Exercise 1, followed by the IBM Content Platform Engine (CPE) container deployment in Exercise 2. Then, in Exercise 3 you do some container management using Red Hat **OpenShift Container Platform.** 

If you want to learn the deployment of both, the ODM and Content containers, then you can do both Exercise 1 and Exercise 2 and follow the sequence in this book.

However, if you do not want to work on both the deployments and are interested in just one of them - ODM or Content, you have that flexibility. Feel free to skip either Exercise 1, or Exercise 2 if you want to deploy only one container - ODM or Content. You can also choose to change the order of the deployment by doing Exercise 2 first and then Exercise 1, if you want.

Keep in mind, you must complete at least Exercise 1 or Exercise 2 or both before working on Exercise 3 on container management. Furthermore, if you skip Exercise 1 or Exercise 2, several screen captures in Exercise 3 might not match exactly with your environment and you need to modify few steps to match your project.

If you skip Exercise 1 and do Exercise 2 only, then you can use the cpe-lab project to do all your work in this Exercise 3. You can also use the container from the cpe-lab project instead of the containers that are deployed in the odm-lab project. Several screen captures and references might not match exactly with your environment so you need to modify your steps to match your environment.

If you skip Exercise 2 and do Exercise 1 only, then you can use the odm-lab project to do all your work in this exercise. Few screen captures and references might not match exactly with your environment so you need to modify your steps slightly to match your environment.



Information

Both the deployment exercises - Exercise 1 and Exercise 2 are allocated 5 hours each for completion. It provides plenty of time to troubleshoot and resolve any mistakes or errors in your labs. Make the best use of the time and do not rush through the labs as that can cause unnecessary typographical errors or user mistakes.

# Exercise 1. Deploying the IBM Operational Decision Manager (ODM) container

## **Estimated time**

05:00

## Overview

In this exercise, you complete the required steps to prepare, configure, and install IBM Operational Decision Manager (ODM) V8.10.2, which is part of IBM Cloud Pak for Automation V9.0.1 on top of a Red Hat OpenShift container platform (RHOCP) V3.11.

## Objectives

After completing this exercise, you should be able to:

- Start and shut the lab environment
- Connect to Red Hat OpenShift Container Platform (RHOCP)
- Load the ODM docker images for Cloud Pak for Automation (CP4A)
- Create and secure the ODM database
- Deploy the ODM container on RHOCP
- · Verify the successful ODM deployment
- Troubleshoot the deployment
- Connect to the ODM containers and successfully log in to the Decision Center console and Rule Execution Server console

### Introduction

The IBM Cloud Pak for Automation (CP4A) offers a software platform to develop, deploy, run, and manage your digital business automation projects by using its capabilities. In this exercise, you deploy the ODM containers.

## Requirements

Availability of the lab environment that consists of three Red Hat Enterprise Linux V7.7 virtual machines (VMs) with Db2 Enterprise V11.1.1.1 and Red Hat OpenShift (RHOCP) 3.11 installed. The required IBM Cloud For Automation (CP4A) software images are already downloaded on a VM.

#### Virtual machine configuration

Each virtual machine is configured with the following specification:

Table 1.

OS	CPUs	RAM	Disk
Red Hat Enterprise Linux (RHEL) 7.7	8	16 GB	300 GB
(64-bit)			

#### List of Servers with Roles

The virtual machines are listed below with their respective roles:

Table 2.

VM	RHCOCP Node type	IP address	Hostname
VM1- OCP master	Master	10.0.0.1	master.cp4a.com
VM2- OCP compute1	Compute	10.0.0.2	compute1.cp4a.com
VM3- OCP compute 2	Compute	10.0.0.3	compute2.cp4a.com

#### **Software Requirements**

The following packages are downloaded to the **Master** node:

Та	bl	e	3
10	$\sim$		υ.

Software	Folder name
IBM Cloud Pak for Automation images	/root/labfiles/cp4a

#### **User IDs and Passwords**

The following table contains a list of User ID and password information for this exercise: *Table 4.* 

Entry Point	User ID	Password
OpenShift web console:	admin	passw0rd
https://master.cp4a.com:8443		
or		
https://console.cp4a.com:8443		
Red Hat Linux VM	root	passw0rd
Db2 Enterprise	db2admin	passw0rd
Decision Center console:	odmAdmin	passw0rd
https://master.cp4a.com:< Decision Center		
console NodePort>		
Rule Execution Server console:	odmAdmin	passw0rd
https://master.cp4a.com:< Rule Execution		
Server console NodePort>		



#### Course updates and errata



A Course Corrections document might be available for this course.

If you are taking the class with an instructor, the instructor can provide this document to you.

If you are taking the course in a self-paced environment, the course corrections document is provided with the other manuals.

To check whether a Course Corrections document exists for this course:

- 1. Go to the following URL: http://www.ibm.com/developerworks/connect/middleware\_edu
- 2. On the web page, locate and click the **Course Information** category.
- 3. Find your course in the list and click the link.
- 4. Click the **Attachments** tab to see whether an errata document exists with updated instructions.
- 5. To save the file to your computer, click the document link and follow the dialog box prompts.

## **Exercise instructions**

## Part 1: Work with the development environment

Before you start working with this exercise, it is important to get familiar with the lab environment. In this section, you learn how to work with the environment. Give special attention to the steps you need to take when you go for a long break or return to the labs after extended period (such as the start of the next day).

Read the following three sections below carefully before starting your environment and connecting to your VM in step 1:

- Understand the various states of the lab environment
- Decide on using either RDP or Browser to connect to your VM
- · Copy and paste code in the environments

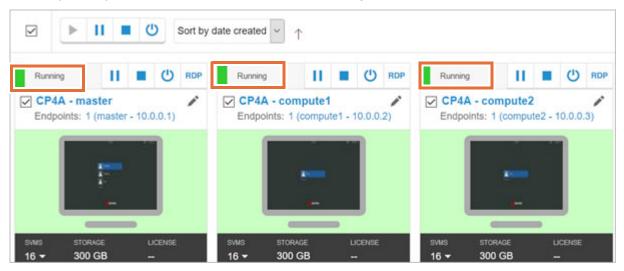
## Understand the various states of the lab environment

The instructions below describe the states of the lab environment. A good understanding ensures a pleasant user experience and minimizes any unpredictability in the lab environment.

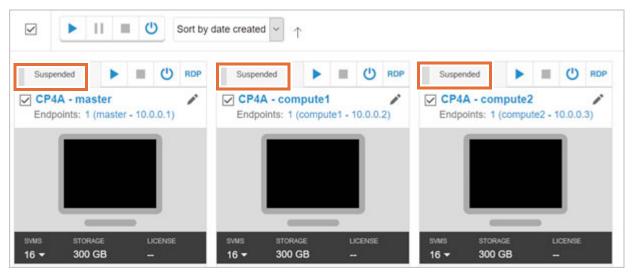
Three RHEL VMs make up your lab environment. Red Hat OpenShift (RHOCP) 3.11 is already installed. The RHOCP cluster consists of one master and two compute nodes. VM1 is the master. This master manages the two compute nodes - compute1 and compute2. It also schedules pods to run on those compute nodes.

Each square box represents one VM. For the three VMs, three square boxes are displayed next to each other in one row. The environment can be in any of the three states - Running, Suspended, or Powered off.

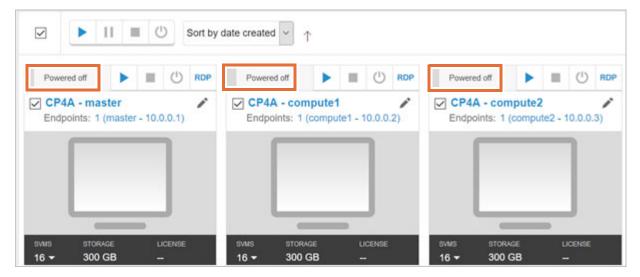
**Running** state: The environment is running if it displays **Running** for each VM box. To work with the lab environment, all the three VMs must be in a Running state. Before you can work with the labs, always verify that all the three VMs are in a Running state.



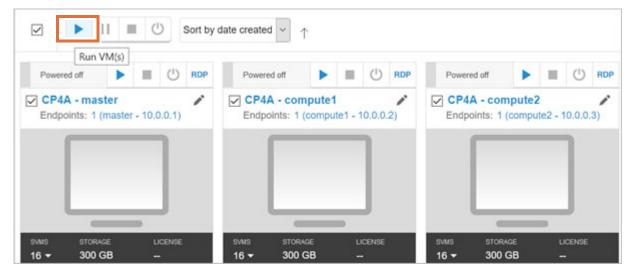
**Suspended** state: The environment is suspended when it displays **Suspended** for any single VM box. After **2 hours** of inactivity, the environment automatically suspends to conserve resources. Usually all the three VMs are suspended together. You cannot work with the lab environment even if a single VM is in a suspended state. That is because all the three VMs need to communicate with each other.



**Powered off** state: The environment is powered off or shuts down when it displays **Powered off** for any single VM box. Usually all the three VMs are powered off together. You cannot work with the lab environment even if a single VM is in a powered off state since all the three VMs need to communicate with each other.



How to switch from a Powered off state to a Running state? If the environment is Powered off and you are ready to work on the labs, then you need to bring the environment to a Running state. You do that by clicking the **Run VM(s)** icon that is displayed at the top to start the environment. Wait about 10 minutes for all the VMs and the services to come up before you are ready to log in.

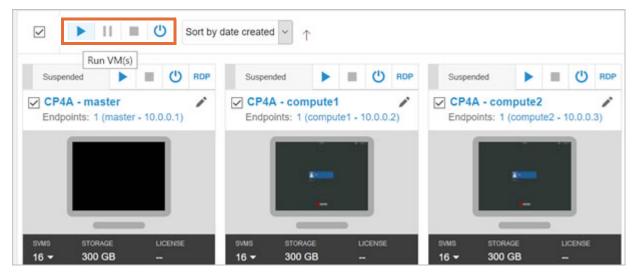




When starting the environment from the Powered off state, make sure to click the **Run VM(s)** icon that is displayed above the three VMs. This step starts all the three VMs properly with a single click. Do **NOT** click **Run this VM** next to each VM to start them one at a time.

Powered off	date created ~ ↑	Powered off
CP4A - master Run this VM Endpoints: 1 (master - 10.0.0.1)	CP4A - compute1 Endpoints: 1 (compute1 - 10.0.0.2)	CP4A - compute2 Endpoints: 1 (compute2 - 10.0.0.3)
SVMS STORAGE LICENSE	SYMS STORAGE LICENSE	SVMS STORAGE LICENSE

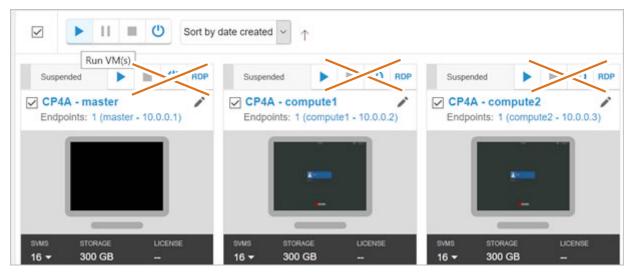
How to switch from a Suspended state to a Running state? When the environment is suspended and you are ready to work on the labs, then you need to bring the environment to a **Running** state. You do that by clicking the **Run VM(s)** icon to start the environment. Wait at least 10 minutes for all the VMs and the services to come up before you are ready to log in.



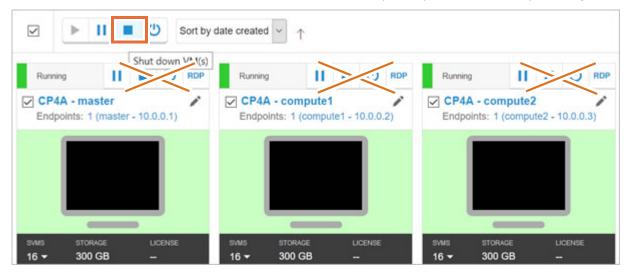
If you log in too quickly, sometimes the VM might not be responsive for a while when starting a VM from a suspended state. Even though the status changes to Running, give it another 5 minutes before connecting. This wait ensures that all services are up and the VMs are communicating with each other.



When starting the environment from the Suspended state, make sure to click the **Run VM(s)** icon that is displayed above all the three VMs. This step starts all the three VMs properly with a single click. Do **NOT** click the **Run this VM** next to each VM to start them one at a time.



What steps to take before you go for a break of more than 2 hours or are done for the day? It is a good idea to shut down the environment when you plan to be away for over 2 hours. It prevents the environment from going into the Suspended state. Power off the entire environment by clicking the Shut down VM(s) icon that is displayed above all the three VMs. This step stops all the three VMs properly with a single click. Do NOT click the Shutdown this VM next to each VM in an attempt to stop them one at a time as that can cause a VM (usually a compute VM) to hang.



What steps to take after you return to labs from a break of more than 2 hours? When you return after your long break or start work the next day and if you manually shut down the environment as described earlier, you can click the Run VM(s) icon that is displayed at the top of the environment. It starts all the VMs together with a single click. Wait at least 10 minutes before logging in to the VM and resuming your lab exercise.

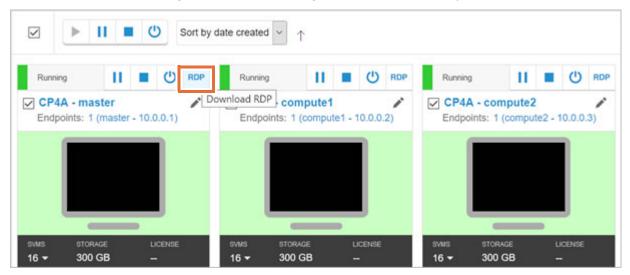
If you forgot to shut down the environment before going for a long break, then your environment state changes to **Suspended** after 2 hours. To bring it to Running state, you click the **Run VM(s)** icon that is displayed at the top of the environment and that starts all the VMs together. Wait at least 10 minutes before logging in to the VM. It is possible that the Master VM is unresponsive or unexpected results and behavior occurs after logging in. If that happens, go back to your earlier steps that you were doing before the break and verify that they are working correctly first before continuing with your lab. If things still do not appear to be working correctly, then shut down the entire environment by clicking the **Shut down VM(s)** icon that is displayed above all the three VMs. After you shut down the environment, you can then start the environment by clicking **Run VM(s)**. which starts all the three VMs together. This process ensures a clean start of the VMs. Continue working with the labs where you left off before.

## Decide on using either RDP or Browser to connect to your VM

You can connect to any of the three VMs by either using your browser or Remote Desktop Protocol (RDP). If you open RDP or browser sessions for each of the three VMs, make sure to close the ones not being used to avoid working with the wrong VM. You work with the Master VM only in the exercise.

Accessing the VM by using the browser: A browser is the quickest and easiest way to access and use your VM's desktop. You can start the browser by clicking the thumbnail image of the VM in the square box.

**Accessing the VM by using RDP**: By default, RDP is enabled in all of your VMs. To use RDP, click the RDP icon in the upper right corner of the image thumbnail as displayed below.



The first time that you click the RDP icon for a VM, a window opens asking what Firefox should do with this file. Leave the **Open With Remote Desktop Connection default** option selected and click **OK** to open the VM desktop.



### Information

If you use a browser to access the VM, you might notice a possible mouse lag sometimes. You can try both ways to connect to a VM and choose whichever one works best for you

## Copy and paste code in the environment

Copy and paste is tricky in the environment. It is a good idea to enter all the commands manually in the command line as instructed the exercise. It ensures correct entry of characters.

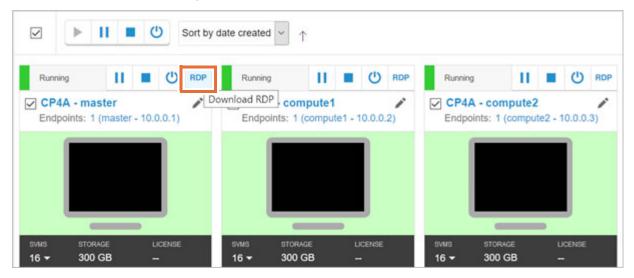
## When entering commands in the Linux Terminal, always enter the commands in a single line.

However, if you want to copy and paste some of the longer commands, you need to copy that command first into a text file, such as Notepad on your local desktop. **If the command displays in multiple lines in Notepad, make sure to format it to a single line.** Then, select and copy from Notepad before pasting into the Linux Terminal. If the paste does not work, then copy from Notepad file one more time and the second time the paste should work. During testing, it was found that repeating this step twice usually worked.

## Connect to the Master VM in the environment

Now that you read the description of various states of the lab environment, you are ready to start and work with it.

- \_\_\_\_1. Start your lab environment as mentioned in the previous instructions and make sure that it is in a Running state. All three VMs must be in the Running state.
- 2. Use RDP or Browser to connect to the Master VM.
  - \_\_\_\_a. Connect with the **Master** VM by either clicking the thumbnail image of the VM to start in the browser or click the RDP icon in the upper right corner of the **Master** image thumbnail as displayed below.

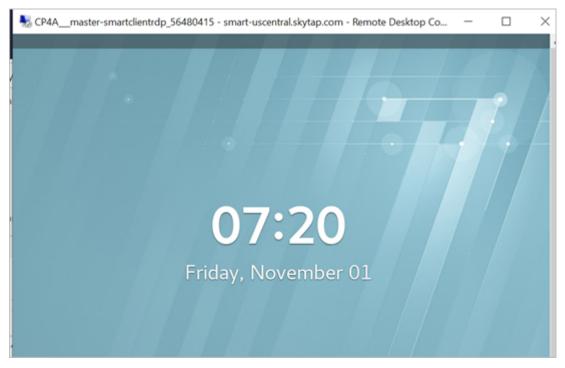


b. The first time that you click the RDP icon for the VM, a window opens asking what Firefox should do with this file. Leave the **Open With Remote Desktop Connection default** option selected and click **OK** to open the VM desktop.

	ster-smartclientrdp_56480415.rdp mote Desktop Connection
	//cloud.skytap.com
What should Fire	fox do with this file?
Open with	Remote Desktop Connection (default)
○ Save File ✓ Do this auto	omatically for files like this from now on.

You are now ready to work with the Master VM. Go to the next step to learn how to log in to the VM.

- 3. Log in to the Master VM. Remember, that you work with the Master VM throughout the exercise. All the commands that you run in this exercise, you run on the Master VM. Optionally, you can connect to the compute VMs to explore.
  - \_\_\_\_a. Regardless of the way you connect to the Master VM (either through the Browser or RDP), the time and date. is displayed on the desktop the first time you connect. Click the Enter key anywhere on the desktop to display the login screen.



- \_\_\_\_b. Click the Enter key anywhere on the desktop to display the login screen.
- \_\_\_\_c. Click Not listed.



\_\_\_\_d. Enter root in the Username field and click Next.

Username: root	
Cancel	Next

\_\_\_\_e. Enter passw0rd in the Password field and click Sign In.

Password:	
Cancel	O Sign In

\_\_\_\_f. You are now successfully logged in to the VM.

## Part 2: Load the ODM docker images for Cloud Pak for Automation

The installation of Cloud Pak for Automation requires downloading and deploying the appropriate docker images. The CP4A images needed for the labs are already downloaded and available under the /root/labfiles/cp4a folder. In this section, you load the required ODM images for CP4A.

- \_\_\_\_1. Verify that you are connected to the Master VM as instructed in the previous section.
- \_\_\_\_2. Log in to Red Hat OpenShift by using the command line
  - \_\_\_\_a. Double-click the Terminal shortcut on the desktop to open it.



\_\_\_\_b. In the terminal that opens, login to the OpenShift cluster. The OpenShift console URL is https://console.cp4a.com:8443 and the username/password is admin/passw0rd.

oc login https://console.cp4a.com:8443 -u admin -p passw0rd

\_\_\_\_c. Verify that the Login successful message is displayed.

\_\_\_\_ d. Examine the list of projects that is displayed. The asterisk \* next to a project name indicates the project that is being used in the current session. Verify that default project is being used. You do not work with this default project but create a new one in a later step.



\_\_\_\_ 3. Check the status of the nodes.

a. Verify that the master and the two compute nodes are in the ready state.

oc get nodes

[root@master ~]# oc NAME	STATUS	ROLES	AGE	VERSION
compute1.cp4a.com	Ready	compute	12d	v1.11.0+d4cacc0
compute2.cp4a.com	Ready	compute	12d	v1.11.0+d4cacc0
master.cp4a.com	Ready	infra,master	12d	v1.11.0+d4cacc0

- \_\_\_\_b. Verify that three nodes are listed and the status is Ready for all the nodes.
- 4. Create an OpenShift project for ODM
  - \_\_\_\_a. Create a project called **odm-lab** for ODM

oc new-project odm-lab

```
[root@master ~]# oc new-project odm-lab
Now using project "odm-lab" on server "https://console.cp4a.com:8443".
You can add applications to this project with the 'new-app' command. For example
, try:
    oc new-app centos/ruby-25-centos7~https://github.com/sclorg/ruby-ex.git
to build a new example application in Ruby.
[root@master ~]#
```

You are now ready to use this new project.

- 5. Load the ODM docker images
  - \_a. Identify the images for ICP4A that are located under /root/labfiles/cp4a folder

```
cd labfiles/cp4a
```

```
[root@master ~]# cd labfiles/cp4a
[root@master cp4a]# ls
ibm-dba-contentservices-3.0.0.tgz ICP4A19.0.1-ecm.tgz loadimages.sh
ibm-odm-prod-2.2.0.tgz ICP4A19.0.1-odm.tgz
[root@master cp4a]#
```

b. Create a login token for the internal docker registry to connect to the internal docker registry.

oc whoami -t



\_ c. Log in to the internal docker registry by using an authentication token. Replace the token variable with the token that you created in the previous step. Make sure to include the token in quotation marks (single or double quotation marks). Do not copy and paste the command from the pdf because the VM does not interpret the quotation marks correctly.

docker login docker-registry.default.svc:5000 -u admin -p '<token>'



\_\_\_\_\_\_d. You are now ready to push the ODM images to the internal docker registry. Before you load the registry, you can examine the loadimages.sh shell script that is included under the /root/labfiles/cp4a folder. Open the loadimages.sh script using an editor of your choice. Optionally, you can double-click the **Home** folder on the desktop, go to /root/labfiles/cp4a and then right-click loadimages.sh to open with Text Editor. Examine the loadimages.sh script and close it when done. Do not make any changes. This script loads the images and pushes them to internal docker registry.

\_\_\_\_e. Change the permission of the shell script before you run it.

chmod +x loadimages.sh

\_\_\_\_f. Push the ODM images (ICP4A19.0.1-odm.tgz) to the internal docker registry. Do not enter any space in the command:

./loadimages.sh -p ICP4A19.0.1-odm.tgz -r docker-registry.default.svc:5000/odm-lab

FrontAmastar chill child av landimanas sh
<pre>[root@master cp4a]# ./loadimages.sh -p ICP4A19.0.1-odm.tgz -r docker-registry.de fault.svc:5000/odm-lab</pre>
Important! Please ensure that you had login to the target Docker registry in adv ance.
Important! The load image sample script is for x86 64, amd64, or i386 platforms
only.
Supported arch: x86 64
ppa_path: ICP4A19.0.1-odm.tgz
arr_ppa_archive: ICP4A19.0.1-odm.tgz
<pre>target_docker_repo: docker-registry.default.svc:5000/odm-lab</pre>
Check image archives in the PPA package: ICP4A19.0.1-odm.tgz

It takes about 10 minutes for the command to run and the images to load. Wait until the command completes.

g. When the command completes, verify that all the ODM images are successfully loaded. Five images are listed.

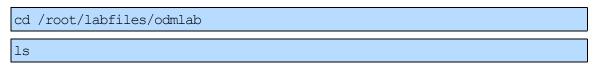
root@master:/labfiles/cp4a	-	۰	×
File Edit View Search Terminal Help			
Loading image file: images/b815d668b32e60fd32212ddb8bd3b47d9d0c9afe0bb267171d14ce99e95830ce.tar.gz Loaded image: odm-decisionrunner:8.10.2.0-amd64			
The push refers to a repository [docker-registry.default.svc:5000/odm-lab/odm-decisionrunner] 8.10.2.0-amd64: digest: sha256:a5887fa840a9693fd5218217d58525cd4d4c9ad22a91ef03c80a1fac657d67d1 size: 5760 Pushed image: docker-registry.default.svc:5000/odm-lab/odm-decisionrunner:8.10.2.0-amd64 Loading image file: images/d4b6aa6a0ec7b0533e824611d3b6243d099b6d0319c3dfcc68a9362e301a3cfb.tar.gz Loaded image: odm-decisionserverconsole:8.10.2.0-amd64			
The push refers to a repository [docker-registry.default.svc:5000/odm-lab/odm-decisionserverconsole] 8.10.2.0-amd64: digest: sha256:f032f121d921a5fd1bec1925a5ae5906bd8e1ee937574a32f7a93563ec80147 size: 5760 Pushed image: docker-registry.default.svc:5000/odm-lab/odm-decisionserverconsole:8.10.2.0-amd64 Loading image file: images/efe2381e327304ef4a1c45f7b8a179b7b7d55a55a6fd59a9192443f0450b17bd.tar.gz			
Loaded image: odm-decisionserverruntime:8.10.2.0-amd64 The push refers to a repository [docker-registry.default.svc:5000/odm-lab/odm-decisionserverruntime] 8.10.2.0-amd64: digest: sha256:378deb257b296bba5c4edef270fb60c5ad591a8d41614d173015a8c0084b2b44 size: 5760 Pushed image: docker-registry.default.svc:5000/odm-lab/odm-decisionserverruntime:8.10.2.0-amd64 PPA package ICP4A19.0.1-odm.tgz was processed completely.			
Docker images push to docker-registry.default.svc:5000/odm-lab completed, and check the following images in registry:	the I	Docke	er
<ul> <li>docker-registry.default.svc:5000/odm-lab/dbserver:8.10.2.0-amd64</li> </ul>			
<ul> <li>docker-registry.default.svc:5000/odm-lab/odm-decisioncenter:8.10.2.0-amd64</li> <li>docker-registry.default.svc:5000/odm-lab/odm-decisionrunner:8.10.2.0-amd64</li> </ul>			
<ul> <li>docker-registry.default.svc:5000/odm-lab/odm-decisionserverconsole:8.10.2.0-amd64</li> <li>docker-registry.default.svc:5000/odm-lab/odm-decisionserverruntime:8.10.2.0-amd64</li> </ul>			

You are now ready to create the ODM database.

## Part 3: Prepare the required ODM database

In this section, you create the required ODM database and connect to it.

- \_\_\_1. Create an ODM database
  - \_\_\_\_a. Switch to the /root/labfiles/odmlab folder and list the contents of the folder. The database script odmdb.sql is available there.





\_b. Initialize the Db2 environment variable and run the create database script.

. /home/db2admin/sqllib/db2profile	
db2 -tf odmdb.sql	



\_\_\_\_ c. It takes few minutes for the database script to run. Verify that the script ran successfully and the database is created.

Databa	se Co	onne	ction Inf	formation		
					x8664 11.1.1.1	
			n ID = lias =			
Local da	1000	ne a	105 -	00100		
DB20000I	The	SQL	command	completed	successfully.	
DB20000I	The	SQL	command	completed	successfully.	
DB20000I	The	SQL	command	completed	successfully.	
DB200001	The	SQL	command	completed	successfully.	
DB20000I	The	SQL	command	completed	successfully.	
DB200001	The	SQL	command	completed	successfully.	

2. Secure the ODM database.

To secure access to the database, a secret must be created to encrypt the database user and password before installing the helm chart.

\_\_\_\_\_d. Make sure that you are logged in to the OpenShift cluster. The OpenShift console URL is <a href="https://console.cp4a.com">https://console.cp4a.com</a>:8443 and the username/password is <a href="https://console.cp4a.com">admin/password</a>.

```
oc login https://console.cp4a.com:8443 -u admin -p passw0rd
```

\_ e. Verify that the Login successful message is displayed and that you are using the odm-lab project.

Login successful.								
You have access to the follo roject <projectname>':</projectname>	ving projects	s and can	switch	between	them	with	'oc	p
default kube-public kube-system								
<pre>* odm-lab openshift-console openshift-infra openshift-logging openshift-monitoring openshift-node openshift-sdn openshift-web-console</pre>								
Using project "odm-lab".								

\_\_\_\_f. Another way to find out which project you are using is to query OpenShift through the project command.

oc project			

\_\_\_\_g. Before creating a secret, it is a good idea to ensure that another secret with the same name does not exist in the cluster.ine.

oc get secret

h. Check the list of secrets that are returned and make sure that the odm-db-secret is not listed.

[root@master odmlab]# oc p Using project "odm-lab" or [root@master odmlab]# oc of	n server "https://console.cp4a.com:8443	3*.	
NAME	TYPE	DATA	AGE
builder-dockercfg-kfjs4	kubernetes.io/dockercfg	1	13h
builder-token-cx4nk	kubernetes.io/service-account-token	4	13h
builder-token-vdkkb	kubernetes.io/service-account-token	4	13h
default-dockercfg-gdbt2	kubernetes.io/dockercfg	1	13h
default-token-wtbgx	kubernetes.io/service-account-token	4	13h
default-token-x7drp	kubernetes.io/service-account-token	4	13h
deployer-dockercfg-6nx46	kubernetes.io/dockercfg	1	13h
deployer-token-k8hvc	kubernetes.io/service-account-token	4	13h
deployer-token-wk6mw	kubernetes.io/service-account-token	4	13h

\_\_\_\_i. Alternatively, instead of listing all the secrets and looking for one through the list, you can also check for the odm-db-secret specifically.

oc get secret odm-db-secret

```
[root@master odmlab]# oc get secret odm-db-secret
No resources found.
Error from server (NotFound): secrets "odm-db-secret" not found
```

\_\_\_\_j. Now that you confirmed that the secret does not exist, you are ready to create it. Enter the entire command on a single line:

```
oc create secret generic odm-db-secret --from-literal=db-user=db2admin --from-literal=db-password=passw0rd
```

```
[root@master ~]# oc create secret generic odm-db-secret --from-literal=db-user=d
>2admin --from-literal=db-password=passw0rd
secret/odm-db-secret created
[root@master ~]#
```

k. Verify that odm-db-secret is created.

oc get secret odm-db-secret

b2adminfrom-		lb-passwo		-db-secretfrom-literal=db-user=d
[root@master ~] NAME	]# oc get TYPE	secret o	dm-db-secret AGE	]
odm-db-secret [root@master ~]		2	lm	

You are now ready to deploy the ODM container.

### Part 4: Deploy the ODM container

\_\_\_1. Add privileges to the ODM project.

oc adm policy add-scc-to-user privileged -z default

[root@master odmlab]# oc adm policy add-scc-to-user privileged -z default scc "privileged" added\_to: ["system:serviceaccount:odm-lab:default"]

- 2. Install the helm chart for deployment
  - \_\_\_\_a. Review the yaml file. Make sure that you are in the /root/labfiles/odmlab folder to list the contents of the folder. The values.yaml is available there.

cd /root/labfiles/odmlab

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[[root@master odmlab]# cd /root/labfiles/odmlab	
[[root@master odmlab]# ls odmdb.sql values.yaml	

- b. Open the values.yaml file by using an editor of your choice. Optionally, you can double-click the Home folder on the desktop, go to /root/labfiles/odmlab and then right-click values.yaml to open with Text Editor. Examine the values.yaml script and close it when done. Do not make any changes as this file contains the properties for the helm chart that you use in the next step.
- \_\_\_\_3. Run the installation.
  - \_\_\_\_a. Switch to the cp4a folder and list the contents of the folder. The ibm-odm-prod-2.2.0.tgz helm chart is available there.

cd /root/labfiles/cp4a ls

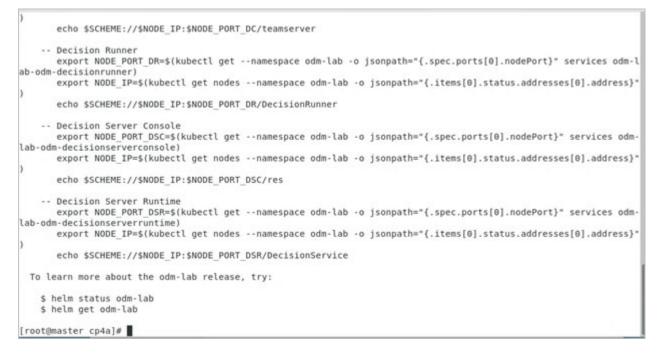
[root@master	chagla ra	- 0 0 toz	ICP4A19.0.1-ecm.tgz	loadimages.sh
ibm-odm-prod		stortgr	ICP4A19.0.1-odm.tgz	courringes. st

\_ b. Install the ODM helm chart using helm command.command:

helm install ibm-odm-prod-2.2.0.tgz --name odm-lab -n odm-lab -f ../odmlab/values.yaml



c. The command completes quickly and returns at the command prompt.



If everything went well, the ODM container is deployed in few minutes. You verify that in the next section.

### Part 5: Verify successful ODM deployment

In this section, you run several verification steps for successful ODM deployment

- 1. Check the status of the pod. A list of pods returns with a status of either running, failing, starting, crashing or something else. Although it takes time for the containers to start, checking the status first gives a good idea of the state of the pod.
  - \_\_\_\_a. Check the status of the pod.

oc get pods

b. Verify that there are four rows for pods.

```
[root@master cp4a]# oc get pods
                                                    READY
NAME
                                                             STATUS
                                                                                 RESTARTS
                                                                                            AGE
odm-lab-odm-decisioncenter-7f78864cb4-kwvb7
                                                    0/1
                                                             ContainerCreating
                                                                                 0
                                                                                            225
odm-lab-odm-decisionrunner-b6bf759fd-vccm4
                                                    0/1
                                                             ContainerCreating
                                                                                 Θ
                                                                                            225
odm-lab-odm-decisionserverconsole-77c88fbb85-snrlb
                                                    0/1
                                                              ContainerCreating
                                                                                 0
                                                                                            225
odm-lab-odm-decisionserverruntime-78c44b4547-ck776
                                                    0/1
                                                              ContainerCreating
                                                                                 Θ
                                                                                            225
[root@master cp4a]#
```

\_\_\_\_\_ c. Examine the status of the pods. They are being created. It takes few minutes for the pods to start and get into a Running status. It is OK if you see a Ready state of 0/1 for containers. Give it few minutes to change to state 1/1. While you are waiting for the state to change, continue to the next step for some verifications.

- 2. Verify the deployment status. When the deployment is started, the helm chart creates among others artifacts, a deployment.
  - \_\_\_\_a. Run the command to check deployment and get detailed information about the deployment.

oc describe deployment odm-lab
DECISION BELAEL KONCINE
<pre>export NODE PORT DSR=\${kubectl getnamespace odm-lab -o jsonpath="{.spec.ports[0].nodePort}" services odm- lab -d definition</pre>
lab-odm-decisionserverruntime)
<pre>export NODE_IP=\$(kubectl get nodesnamespace odm-lab -o jsonpath="{.items[0].status.addresses[0].address}"</pre>
<pre>echo \$SCHEME://\$NODE_IP:\$NODE_PORT_DSR/DecisionService</pre>
To learn more about the odm-lab release, try:
\$ helm status odm-lab
\$ helm get odm-lab
root@master cp4al# oc describe deployment odm-lab

b. Verify that a message is received that the replica set was successfully scaled to 1.

		ReplicaS	et 2m	deployment-controller	Scaled up replica set odm-lab-odm-decisionserverruntime-
Available Progressi OldReplicas NewReplicas Events:	ing Sets:	False I True <none></none>	ReplicaSe		48b9 (1/1 replicas created)
Conditions: Type		Status	Reason		

[root@master cp4a]#

3. Check the replica set.

oc describe replicaset odm-lab

a. Run the command to check the replica and return the information that a pod is created.

 Image: Incont@master cp4a]# oc describe replicaset odm-lab

 Medium:

 Ivents:

 Type
 Reason

 Age
 From

 Normal
 SuccessfulCreate

 Normal
 SuccessfulCreate

 Type
 replicaset-controller

 Created pod:
 odm-lab-odm-decisionserverruntime-6bdcc848b9

 Iroot@master cp4a]#

- \_4. Check the pod for messages that are generated during its creation.
  - \_a. Run the command to view the pod creation messages and watch for errors.

oc describe pod odm-lab

[root@master cp4a]# oc describe pod odm-lab

Type	Reason	Age	From	Message
Normal	Scheduled	1m	default-scheduler	Successfully assigned odm-lab/odm-lab-odm-decisionserverrunt
ime-78c44	b4547-6mfcf	to co	mputel.cp4a.com	
Normal	Pulling	lm	kubelet, compute1.cp4a.com	pulling image "docker-registry.default.svc:5000/odm-lab/odm-
decisions	erverruntim	e:8.10	.2.0-amd64"	
Normal	Pulled	1m	kubelet, compute1.cp4a.com	Successfully pulled image "docker-registry.default.svc:5000/
odm-lab/o	dm-decision	server	runtime:8.10.2.0-amd64"	
Normal	Created	595	kubelet, compute1.cp4a.com	Created container
Normal	Started	59s	kubelet, compute1.cp4a.com	Started container

- 5. Check the status of the pod one more time.
  - \_\_\_\_a. Now that some time is passed, you run the verification again to make sure that the state of containers is 1/1 and that all have a Running status.

get pods				
[root@master cp4a]# oc get pods				
NAME	READY	STATUS	RESTARTS	AGE
odm-lab-odm-decisioncenter-7f78864cb4-fc6l8	1/1	Running	0	4m
odm-lab-odm-decisionrunner-b6bf759fd-9rh59	1/1	Running	0	4m
odm-lab-odm-decisionserverconsole-77c88fbb85-f7xhv	1/1	Running	θ	4m
		Running	θ	4m

\_\_\_\_b. The successful installation results in containers with a Running status. Make sure that the status is Running for all containers. It is important that the container also displays 1/1 as in Ready. If it displays 0/1, then give it few more minutes before it changes to 1/1.

### Part 6: Troubleshoot failed deployment.

Several tasks are available for you troubleshoot a failed deployment. This section describes some of the steps you can take to ensure a successful deployment.

- 1. Check for typographical errors. If your deployment fails or you see an error, then the first thing to check is to make sure that there are no typographical errors. Check the typed command to see any obvious mistakes. You can scroll up through the terminal and examine the previous commands run, if needed. You can use the up arrow key in your keyboard to recall the earlier run commands to scan through any mistakes and make corrections and run them again.
- \_\_2. Verify that the lab environment is up and running. If you just started a suspended environment, then make sure that you give plenty of time before working with the environment. A good verification is to log in to the OpenShift console and make sure that you are successful.

oc login https://console.cp4a.com:8443 -u admin -p passw0rd

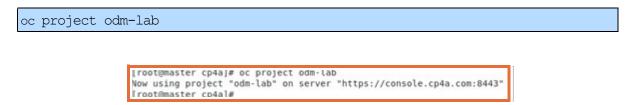
3. Verify the current project.

a. Verify that you are connected to the correct project - odm-lab.

oc project			

[root@master cp4a]# oc project	
Using project "odm-lab" on server [root@master cp4a]#	"https://console.cp4a.com:8443".

\_ b. If the current project is the default project or some other project, then switch to the odm-lab project.



- 4. Check the logs for the pod, fix errors, and then redeploy.
  - a. You can also check the logs for a failed or crashing pod to help troubleshoot the problem. First, check the pod status to identify the pod name that is being used in the current run.

oc get pods

The state of a pod might be stuck at 0/1 even though it says it is Running. If it does not change to 1/1 even after a while then you might want to check the log for that pod. Copy the name of that pod.

[root@master cp4a]# oc get pods		CTATUC	RESTARTS	
odm-db2admin-odm-decisioncenter-55f76b548b-67mgr	0/1	STATUS Running	0	AGE 2m
odm-db2admin-odm-decisionserverconsole-6445b54d89-g649f	1/1	Running Running	8	2m 2m
odm-db2admin-odm-decisionserverruntime-6fcf955847-k9w75	1/1	Running	0	2m

In other failures, it is possible that a pod fails to start and gives an error. If that happens, then you can again copy the name of the failing pod (s) to check the logs.

[root@master cp4a]# oc get pods NAME	READY		RESTARTS	AGE
dm-lab-odm-decisioncenter-7f78864cb4-nz8ck	0/1	CreateContainerConfigError	θ	35
dm-lab-odm-decisionrunner-b6bf759fd-m6s8c	0/1	CreateContainerConfigError	0	35
dm-lab-odm-decisionserverconsole-77c88fbb85-hpvg4	0/1	CreateContainerConfigError	Θ	35
dm-lab-odm-decisionserverruntime-78c44b4547-gwdx6	0/1	CreateContainerConfigError	θ	35

b. Check the logs of a specific problematic pod by using its name.

oc logs odm-lab-odm-decisioncenter-7f78864cb4-nz8ck

[root@master cp4a]# oc logs odm-lab-odm-decisioncenter-7f78864cb4-nz8ck Error from server (BadRequest): container "odm-lab-odm-decisioncenter" in pod "odm-lab-odm-decisioncenter-7f78864cb 4-nz8ck" is waiting to start: CreateContainerConfigError The result above indicates a problem with the request. You can go back to see whether any mistake was done or a step was skipped.

- \_\_\_\_5. Remove the current failed deployment, fix errors, and then redeploy. You do not need to run this step if you successfully deployed the ODM. In that case, you can review this step.
  - \_\_\_\_a. Run the command to purge the deployment. Do **NOT** run this command when the deployment is successful. Note that there are two dashes right before purge (even though it may look like a single dash) in the command. You can run this if you identified the problem, made the correction, and are ready to install the helm chart again for deployment.

helm delete	-purge		

\_ a. Check the pod status. The pods start terminating.

release "odm-lab" deleted

oc get pods

NAME	READY	STATUS	RESTARTS	AGE
odm-lab-odm-decisioncenter-7f78864cb4-fc6l8	1/1	Terminating	0	5h
odm-lab-odm-decisionrunner-b6bf759fd-9rh59	1/1	Terminating	Θ	5h
odm-lab-odm-decisionserverconsole-77c88fbb85-f7xhv	1/1	Terminating	0	5h
odm-lab-odm-decisionserverruntime-78c44b4547-6mfcf	1/1	Terminating	0	5h

\_b. Run the check again to verify the pods again until resources are no longer available.

[root@master		00	get	pods	
No resources	found.				

c. Now you are ready to install ODM helm chart again by using the helm command:

helm install ibm-odm-prod-2.2.0.tgz --name odm-lab -n odm-lab -f ../values.yaml

[root@master cp4a]# ls [root@master cp4a]# helm install ibm-odm-prod-2.2.0.tgz --name odm-lab -n odm-lab -f ../odmlab/values.yaml

### Part 7: Access the running ODM containers

Now that ODM is deployed, you are ready to connect to it. In this section, you verify the connectivity and access to ODM. You do not do any ODM development or other work with ODM. It is the task of an ODM developer or ODM Administrator.

- \_\_\_\_1. Identify ports and URL for the running containers
  - \_\_\_\_a. Verify that the pods are running.

b. Find the port numbers.

```
oc get services
[root@master cp4a]#
[root@master cp4a]# oc get services
```

\_\_\_\_\_c. Examine the output from the command. It displays the node ports of the running services. You log in to the relevant services in the next steps.

freekAmerikan andelik en mek annelana					
NAME	TYPE	CLUSTER-IP	EXTERNAL-IP	PORT(S)	AGE
odm-lab-odm-decisioncenter	NodePort	172.30.193.114	<none></none>	9453:32307/TCP	211
odm-lab-odm-decisionrunner	NodePort	172.30.10.40	<none></none>	9443:30684/TCP	21
odm-lab-odm-decisionserverconsole	NodePort	172.30.220.97	<none></none>	9443:30680/TCP	21
odm-lab-odm-decisionserverconsole-notif	ClusterIP	172.30.104.115	<none></none>	1883/TCP	21
odm-lab-odm-decisionserverruntime	NodePort	172.30.208.113	<none></none>	9443:31764/TCP	21

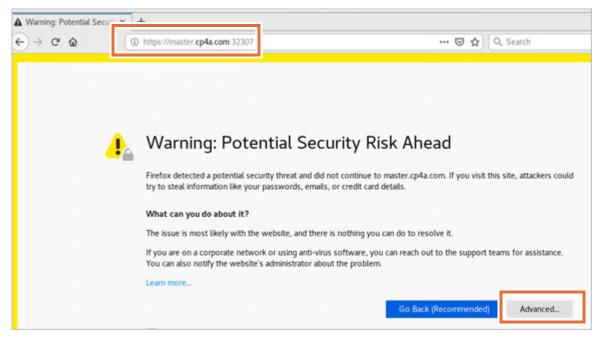
- \_\_\_\_2. Connecting to the Decision Center console
  - \_\_\_\_a. Find the node port for the decision center. The node port in the view below are the 5 digits between the colon and the forward slash. The node port in your environment is different from the node port in the view below:

<pre>[root@master cp4a]# [root@master cp4a]# oc get services</pre>					
	TYPE	CLUSTER-IP	EXTERNAL-IP	POF	AGE
odm-lab-odm-decisioncenter	NodePort	172.30.193.114	<none></none>	945 :32307/ CP	21m
	NodePort	172.30.10.40	<none></none>	9445.500047.CP	21m
odm-lab-odm-decisionserverconsole	NodePort	172.30.220.97	<none></none>	9443:30680/TCP	21m
odm-lab-odm-decisionserverconsole-notif	ClusterIP	172.30.104.115	<none></none>	1883/TCP	21m
odm-lab-odm-decisionserverruntime	NodePort	172.30.208.113	<none></none>	9443:31764/TCP	21m

\_b. Start the Decision Center console in the browser. Start Firefox and enter the following URL:

https://master.cp4a.com:<your Decision Center NodePort>

\_\_\_\_c. Verify that the Firefox warning page is displayed in the browser.



- d. Click Advanced.
- \_\_\_\_e. Scroll down and click Accept the Risk and Continue.

	hing you can do to resolve it.
you are on a corporate network or using anti-virus soft ou can also notify the website's administrator about the	ware, you can reach out to the support teams for assistance. problem.
am more	
	Go Back (Recommended) Advanced
	x does not trust this site because it uses a certificate
Websites prove their identity via certificates. Firefo that is not valid for master.cp4a.com:32307.	ix does not trust this site because it uses a certificate
	ix does not trust this site because it uses a certificate
	x does not trust this site because it uses a certificate

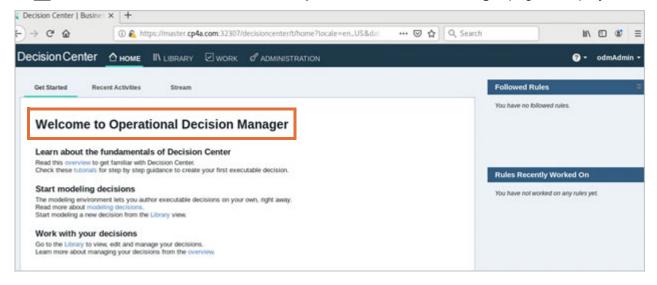
\_\_f. When the Privacy window is displayed, click Agree and Proceed.

_	important to the proper t s, provide secure log-in,	1	
Agree	and Proceed		
	Keep me logged		

\_\_\_\_g. You are ready to login, when the **Decision Center Business Console** login page is displayed. Log in by entering odmAdmin for both the **Username** and the **Password** field.

Username:	
odmAdmin	
Password:	
•••••	
Keep me logged in	

\_\_\_h. Make sure that the Welcome to Operational Decision Manager page is displayed.



Now that you successfully logged in, you confirmed a successful deployment of the Decision Center console. Next, you verify the other services.

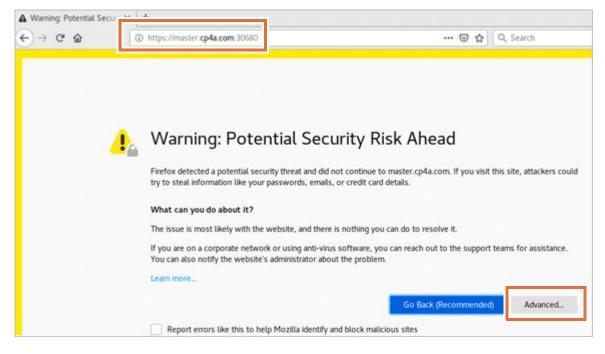
- \_\_\_\_3. Connect to the Rule Execution Server console
  - \_\_\_\_a. Find the node port for for the Rule Execution Server. Switch back to the Terminal and look for the name that has **decisionserverconsole** and find the node port. Note that the node port in your environment is different from the node port in the view below:

[root@master cp4a]# [root@master cp4a]# oc get services					
NAME	TYPE	CLUSTER-IP	EXTERNAL-IP	PORT(S)	AGE
odm-lab-odm-decisioncenter	NodePort	172.30.193.114	<none></none>	9453:32307/TCP	21m
odm-lab-odm-decisionserverconsole	NodePort NodePort	172.30.10.40 172.30.220.97	<none> <none></none></none>	9442-30680, CP	21m 21m
odm-lab-odm-decisionserverruntime	ClusterIP	172.30.104.115	<none></none>	1885, 157	21m
	NodePort	172.30.208.113	<none></none>	9443:31764/TCP	21m

b. Start the Rule Execution Server console in the browser. Start Firefox and enter the following URL:

https://master.cp4a.com:<your Rule Execution Server NodePort>

c. Verify that the Firefox warning page is displayed in the browser.



\_d. Click Advanced.

\_\_\_\_e. Scroll down and click Accept the Risk and Continue.

The issue	is most likely with the	website, and there is no	thing you can do to reso	lve it.	
		rk or using anti-virus sof 's administrator about the	tware, you can reach out e problem.	to the support tean	ns for assistance.
earn mo	e				
			Go Back (	Recommended)	Advanced
th	at is not valid for maste		fox does not trust this sit	e because it uses a e	certificate
Vie					

\_\_\_\_f. You are ready to log in, when the **Rule Execution Server console** login page is displayed. Log in by entering odmAdmin for both the **User Name** and the **Password** field and click **Sign In**.

	Sign in to the Rule Execution Server console User Name IodmAdmin Password
IBM.	Sign in ed Materials - Property of IBM © Copyright IBM Corp. 1987, 2019 All Rights ed. IBM long, tim.com and WebSphere are trademarks or registered arks of International Business Machines Cop., registered in many sons workheide. Other product and service names night be trademarks of other comparies. A current list of IBM trademarks is waitable on the Web at pht and trademark information

g. Verify that the Welcome to the Rule Execution Server console page is displayed.

	r ×	+					
→ C* @		🛈 🐔 https://master.	cp4a.com 30680	0/res/protected/home	.jsf	🖂 🏠	Q, Search
Rule Execution	Server	/			The subscription of the su	-	
Home Expl	orer	Decision War	ehouse	Diagnostics	Server Info	REST API	
1							
ų.							
elcome to the	e Rule	Execution Ser	ver consol	le			
leicome to the		Execution Ser					
	Use the		vse. and modify R				
Explorer	Use the Search	Explorer to deploy, brow	vse, and modify R				
Explorer Decision Watehouse	Use the Search Run the	Explorer to deploy, brow and view decision traces.	wse. and modify R wify installation.	tuleApps.			

Now that you successfully logged in, you confirmed a successful deployment of the Decision Server console. Next, you verify the other services.

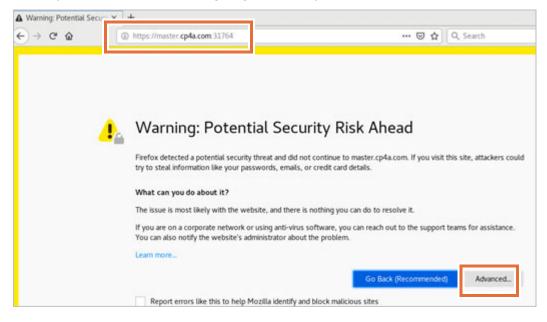
- 4. Connect to the Decision Server runtime.
  - \_\_\_\_a. Find the node port for for the decision center runtime. Note that the node port in your environment is different from the node port in the view below:

[root@master cp4a]#					
[root@master cp4a]# oc get services					
NAME	TYPE	CLUSTER-IP	EXTERNAL-IP	PORT(S)	AGE
odm-lab-odm-decisioncenter	NodePort	172.30.193.114	<none></none>	9453:32307/TCP	21m
odm-lab-odm-decisionrunner	NodePort	172.30.10.40	<none></none>	9443:30684/TCP	21m
odm-lab-odm-decisionserverconsole	NodePort	172.30.220.97	<none></none>	9443:30680/TCP	21m
de lab ede decisionserverconsole attif	ClusterIP	172.30.104.115	<none></none>	188.	21m
odm-lab-odm-decisionserverruntime	NodePort	172.30.208.113	<none></none>	944: 31764, ICP	21m

\_\_b. Start the Decision Server runtime in the browser. Start Firefox and enter the following URL:

https://master.cp4a.com:<your Decision Server runtime NodePort>

\_\_\_\_c. Verify that the Firefox warning page is displayed in the browser.



- \_\_\_\_d. Click Advanced.
- \_\_\_\_e. Scroll down and click Accept the Risk and Continue.

	rebsite, and there is nothing you can do to resolve it.
f you are on a corporate network 'ou can also notify the website's	or using anti-virus software, you can reach out to the support teams for assistance administrator about the problem.
eam more	
	Go Back (Recommended) Advanced
Websites prove their ident that is not valid for master. Error code: SEC_ERROR_U	

\_\_\_\_f. The Hosted Transparent Decision Service page is displayed. Note the listed Decision Server version 8.10.2.0 and the patch level.

-> C @	④ A https://master.cp4a.com:31764/DecisionService/	🖂 🕁	Q, Search
M. Rule Execution Hosted Transpare	n Server net Decision Service		
A Hosted T	ransparent Decision Service		
Hosted T	Precision Service		

- \_\_\_\_5. Connect to the Decision Runner.
  - \_\_\_\_a. Find the node port for the Decision Runner. The node port in your environment is different from the node port in the view below:

<pre>[root@master cp4a]# [root@master cp4a]# oc get services</pre>					
NAME	TYPE	CLUSTER-IP	EXTERNAL-IP	PORT(S)	AGE
ade lab ade decisionconter	NodePort	172.30.193.114	<none></none>	945. TCP	21m
odm-lab-odm-decisionrunner	NodePort	172.30.10.40	<none></none>	944: :30684 [CP	21m
oun con our occasionserver console	NodePort	172.30.220.97	<none></none>	9443: 30000/ TCP	21m
odm-lab-odm-decisionserverconsole-notif	ClusterIP	172.30.104.115	<none></none>	1883/TCP	21m
odm-lab-odm-decisionserverruntime	NodePort	172.30.208.113	<none></none>	9443:31764/TCP	21m

b. Start the Decision Runner in the browser. Start Firefox and enter the following URL:

https://master.cp4a.com:<your Decision Runner NodePort>

- \_\_\_\_c. Verify that the Firefox warning page is displayed in the browser.
- \_\_\_\_d. Click Advanced.
- \_\_\_\_e. Scroll down and click Accept the Risk and Continue.
- \_\_\_\_f. The Decision Runner page is displayed. Note the listed Decision Runner version 8.10.2.0 and the patch level.



- \_\_\_\_6. Close all the open windows. Before moving to the next exercise, it is a good idea to close all open windows and sessions.
  - \_\_\_\_a. Enter exit in the terminal to close it. If you had multiple terminal windows open close all of them

- \_\_\_\_b. Close the Firefox browser.
- \_\_\_\_\_c. Close any other open windows, including any text editors.
- \_\_\_\_d. Close the RDP console window or the browser window that was used to work with the Master VM.

You now completed the successful deployment of ODM containers and verified the connectivity and access to ODM. You do not do any ODM development or other work by using the ODM container. That is the task of an ODM developer or ODM Administrator. For ODM development related training refer to the IBM Training site. This concludes this exercise.

#### **End of exercise**

# Exercise 2. Deploying the IBM FileNet P8 Content Platform Engine (CPE) container

### **Estimated time**

05:00

#### Overview

In this exercise, you complete the required steps to prepare, configure, and install IBM Content Platform Engine (CPE) V5.5.3, which is part of IBM Cloud Pak for Automation V19.0.1 on top of a Red Hat OpenShift container platform (RHOCP) V3.11.

## **Objectives**

After completing this exercise, you should be able to:

- Start and shut the lab environment
- Connect to Red Hat OpenShift Container (RHOCP)
- Configure the Persistent Volumes required by Content Platform Engine
- · Prepare the database required by Content Platform Engine
- Prepare LDAP required by Content Platform Engine
- Load the Content Platform Engine docker images for Cloud Pak for Automation
- Deploy the Content Platform Engine container
- · Verify successful Content Platform Engine deployment
- Connect to the Content Platform Engine container and successfully log in to the Administrative Console for Content Engine (ACCE)

#### Introduction

The IBM Cloud Pak for Automation (CP4A) offers a software platform to develop, deploy, run, and manage your digital business automation projects by using its capabilities. In this exercise, you deploy the Content Platform Engine (CPE) container.

#### Requirements

Availability of the lab environment that consists of three Red Hat Enterprise Linux V7.7 virtual machines (VMs) with Db2 Enterprise V11.1.1.1, Open LDAP, and Red Hat OpenShift (RHOCP)

3.11 installed. The required IBM Cloud For Automation (CP4A) software images are already downloaded on a VM.

The completion of Exercise 1 is not a requirement to work on this Exercise 2.

#### Virtual machine configuration

Each virtual machine is configured with the following specification:

Table 5.

OS	CPUs	RAM	Disk
Red Hat Enterprise Linux (RHEL) 7.7 (64-bit)	8	16 GB	300 GB

#### List of Servers with Roles

The virtual machines are listed below with their respective roles:

Table 6.

VM	RHCOCP Node type	IP address	Hostname
VM1- OCP master	Master	10.0.0.1	master.cp4a.com
VM2- OCP compute1	Compute	10.0.0.2	compute1.cp4a.com
VM3- OCP compute 2	Compute	10.0.0.3	compute2.cp4a.com

#### **Software Requirements**

The following packages are downloaded to the Master node:

Table 7.

Software	Folder name
IBM Cloud Pak for Automation images	/root/labfiles/cp4a

#### **User IDs and Passwords**

The following table contains a list of User ID and password information for this exercise:

Table 8.
----------

Entry Point	User ID	Password
<b>OpenShift web console</b> : https://master.cp4a.com:8443	admin	passw0rd
or		
https://console.cp4a.com:8443		
Red Hat Linux VM	root	passw0rd
Db2 Enterprise	db2admin	passw0rd
LDAP console: https://master.cp4a.com:6443	cn=admin,	passw0rd
	dc=ibm,dc	
	=edu	
Administrative console for Content Engine (ACCE):	p8admin	passw0rd
http://master.cp4a.com: <http nodeport="">/acce</http>		



#### Course updates and errata



A Course Corrections document might be available for this course.

If you are taking the class with an instructor, the instructor can provide this document to you.

If you are taking the course in a self-paced environment, the course corrections document is provided with the other manuals.

To check whether a Course Corrections document exists for this course:

- 1. Go to the following URL: http://www.ibm.com/developerworks/connect/middleware\_edu
- 2. On the web page, locate and click the Course Information category.
- 3. Find your course in the list and click the link.
- 4. Click the **Attachments** tab to see whether an errata document exists with updated instructions.
- 5. To save the file to your computer, click the document link and follow the dialog box prompts.

# **Exercise instructions**

#### Part 1: Work with the development environment

Before you start working with this exercise, it is important to get familiar with the lab environment. In this section, you learn how to work with the environment. Give special attention to the steps you need to take when you go for a long break or return to the labs after extended period (such as the start of the next day).

Read the following three sections below carefully before starting your environment and connecting to your VM in step 1:

- Understand the various states of the lab environment
- Decide on using either RDP or Browser to connect to your VM
- · Copy and paste code in the environments

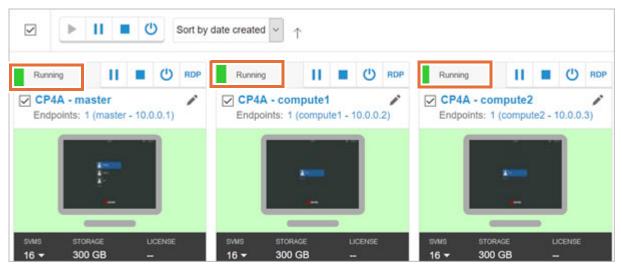
#### Understand the various states of the lab environment

The instructions below describe the states of the lab environment. A good understanding ensures a pleasant user experience and minimizes any unpredictability in the lab environment.

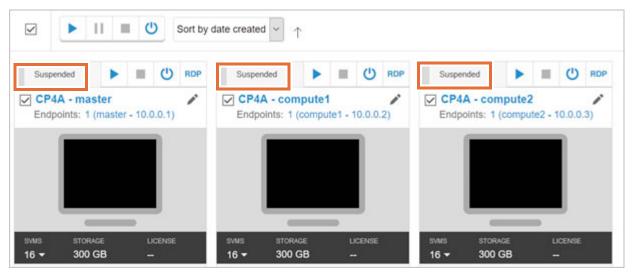
Three RHEL VMs make up your lab environment. Red Hat OpenShift (RHOCP) 3.11 is already installed. The RHOCP cluster consists of one master and two compute nodes. VM1 is the master. This master manages the two compute nodes - compute1 and compute2. It also schedules pods to run on those compute nodes.

Each square box represents one VM. For the three VMs, three square boxes are displayed next to each other in one row. When you click the link to access the lab environment for the first time, the environment can be in any of the three states - Running, Suspended, or Powered off.

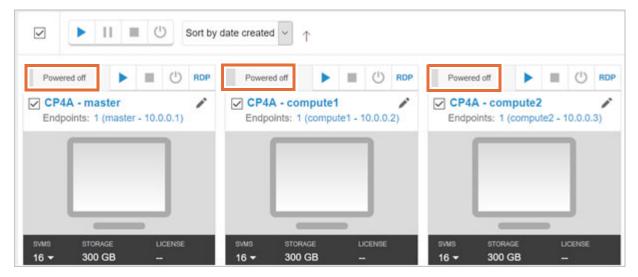
**Running** state: The environment is running when it displays **Running** for each VM box. To work with the lab environment, all the three VMs must be in a Running state. Before you can work with the labs, always verify that all the three VMs are in a Running state.



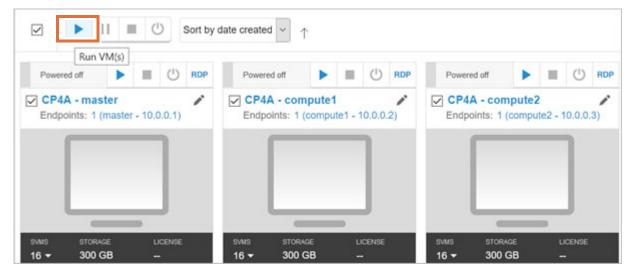
**Suspended** state: The environment is suspended when it displays **Suspended** for any single VM box. After **2 hours** of inactivity, the environment automatically suspends to conserve resources. Usually all the three VMs are suspended together. You cannot work with the lab environment even if a single VM is in a suspended state. It is because all the three VMs need to communicate with each other.



**Powered off** state: The environment is powered off or shut down when it displays **Powered off** for any single VM box. Usually all the three VMs are powered off together. You cannot work with the lab environment even if a single VM is in a powered off state since all the three VMs need to communicate with each other.



How to switch from a Powered off state to a Running state? If the environment is Powered off and you are ready to work on the labs, then you need to bring the environment to a Running state. You do that by clicking the **Run VM(s)** icon that is displayed at the top to start the environment. Wait about 10 minutes for all the VMs and the services to come up before you are ready to log in.

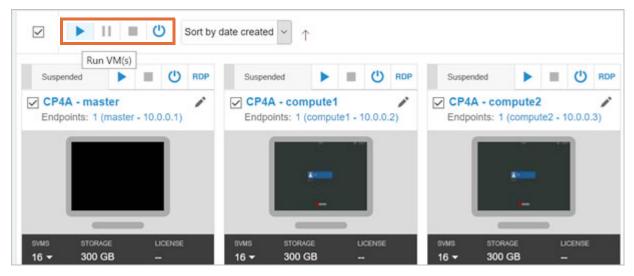




When starting the environment from the Powered off state, make sure to click the **Run VM(s)** icon that is displayed above all the three VMs. This step starts all the three VMs properly with a single click. Do **NOT** click **Run this VM** next to each VM to start them one at a time.

Sort by	date created Y	
Powered off	Powered off	Powered off
CP4A - master Run this VM Endpoints: 1 (master - 10.0.0.1)	CP4A - compute1 Endpoints: 1 (compute1 - 10.0.0.2)	CP4A - compute2
SVMS STORAGE LICENSE	SVMS STORAGE LICENSE	SVMS STORAGE LICENSE
16 - 300 GB	16 ▼ 300 GB	16 ▼ 300 GB -

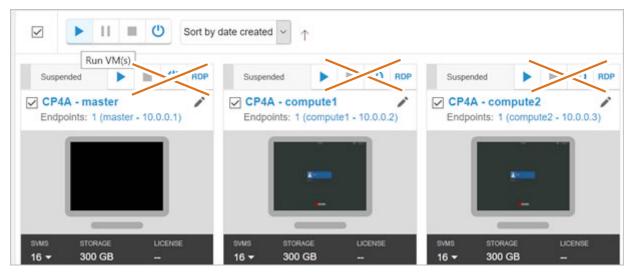
How to switch from a Suspended state to a Running state? When the environment is suspended and you are ready to work on the labs, then you need to bring the environment to a **Running** state. You do that by clicking the **Run VM(s)** icon to start the environment. Wait at least 10 minutes for all the VMs and the services to come up before you are ready to log in.



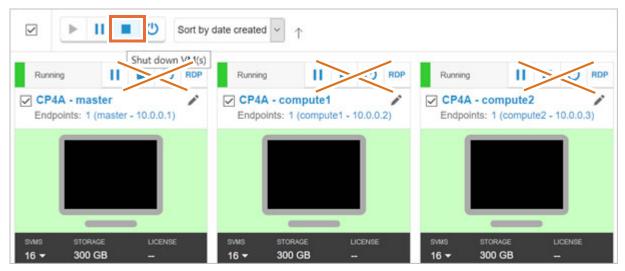
If you log in too quickly, sometimes the VM might not be responsive for a while when starting a VM from a suspended state. Even though the status changes to Running, give it another 5 minutes before connecting. This wait ensures that all services are up and the VMs are communicating with each other.



When starting the environment from the Suspended state, make sure to click the **Run VM(s)** icon that is displayed above all the three VMs. This step starts all the three VMs properly with a single click. Do **NOT** click the **Run this VM** next to each VM to start them one at a time.



What steps to take before you go for a break of more than 2 hours or are done for the day? It is a good idea to shut down the environment when you plan to be away for over 2 hours. It prevents the environment from going into the Suspended state. Power off the entire environment by clicking the Shut down VM(s) icon that is displayed above all the three VMs. This step stops all the three VMs properly. Do NOT click the Shutdown this VM next to each VM in an attempt to stop them one at a time as that can cause a VM (usually a compute VM) to hang.



What steps to take after you return to labs from a break of more than 2 hours? When you return after your long break or start work the next day and if you manually shut down the environment as described earlier, you can click the Run VM(s) icon that is displayed at the top of the environment. It starts all the VMs together. Wait at least 10 minutes before logging in to the VM and resuming your lab exercise.

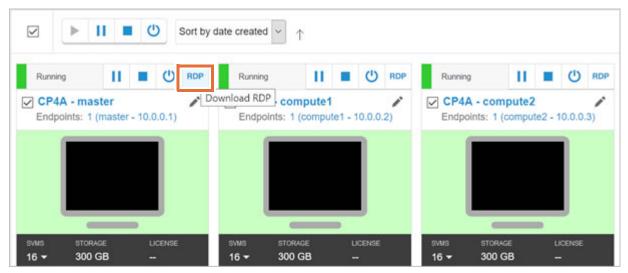
If you forgot to shut down the environment before going for a long break, then your environment state changes to **Suspended** after 2 hours. To bring it to Running state, you click the **Run VM(s)** icon that is displayed at the top of the environment and that starts all the VMs together. Wait at least 10 minutes before logging in to the VM. It is possible that the Master VM is unresponsive and displays unexpected results and behavior after logging in. If that happens, go back to your earlier steps that you were doing before the break and verify that they are working correctly first before continuing with your lab. If things still do not appear to be working correctly, then shut down the entire environment by clicking the **Shut down VM(s)** icon that is displayed above all the three VMs. After you have shut down the environment, you can then start the environment by clicking **Run VM(s)**. which starts all the three VMs together. This process ensures a clean start of the VMs. Continue working with the labs where you left off before.

# Decide on using either RDP or Browser to connect to your VM

You can connect to any of the three VMs by either using your browser or Remote Desktop Protocol (RDP). If you open RDP or browser sessions for each of the three VMs, make sure to close the ones not being used to avoid working with the wrong VM. You work with the Master VM only in the exercise.

Accessing the VM by using the browser: A browser is the quickest and easiest way to access and use your VM's desktop. You can start the browser by clicking the thumbnail image of the VM in the square box.

**Accessing the VM by using RDP**: By default, RDP is enabled in all of your VMs. To use RDP, click the RDP icon in the upper right corner of the image thumbnail as displayed below.



The first time that you click the RDP icon for a VM, a window opens asking what Firefox should do with this file. Leave the **Open With Remote Desktop Connection default** option selected and click **OK** to open the VM desktop.



#### Information

If you use a browser to access the VM, you might notice a possible mouse lag sometimes. You can try both ways to connect to a VM and choose whichever one works best for you

# Copy and paste code in the environment

Copy and paste is tricky in the environment. It is a good idea to enter all the commands manually in the command line as instructed the exercise. This ensures correct entry of characters.

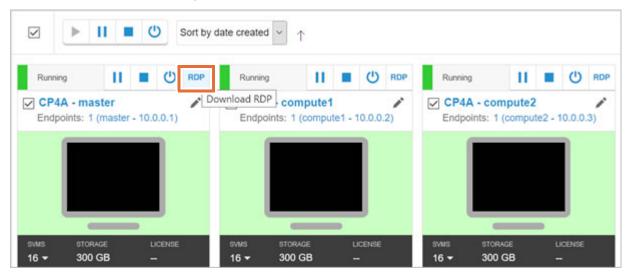
#### When entering commands in the Linux Terminal, always enter the commands in a single line

However, if you want to copy and paste some of the longer commands, you need to copy that command first into a text file, such as Notepad on your local desktop. **If the command displays in multiple lines in Notepad, make sure to format it to a single line.** Then, select and copy from Notepad before pasting into the Linux Terminal. If the paste does not work, then copy from Notepad file one more time and the second time the paste should work. During testing, it was found that repeating this step twice usually worked.

#### Connect to the Master VM in the environment

Now that you read the description of various states of the lab environment, you are ready to start and work with it.

- \_\_\_\_1. Start your lab environment as mentioned in the previous instructions and make sure that it is in a Running state. All three VMs must be in the Running state.
  - 2. Use RDP or Browser to connect to the **Master** VM.
    - \_\_\_\_a. Connect with the **Master** VM by either clicking the thumbnail image of the VM to start in the browser or click the RDP icon in the upper right corner of the **Master** image thumbnail as displayed below.

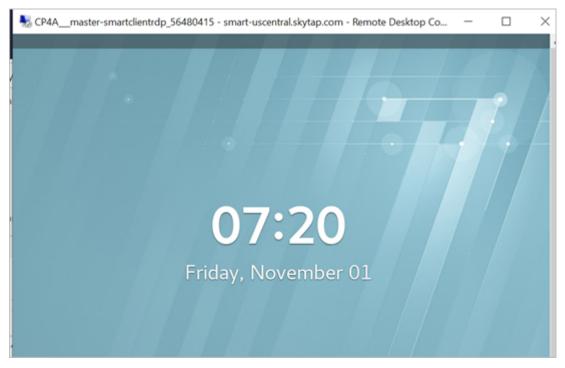


b. The first time that you click the RDP icon for the VM, a window opens asking what Firefox should do with this file. Leave the **Open With Remote Desktop Connection default** option selected and click **OK** to open the VM desktop.

Opening CP4Ar	naster-smartclientrdp_56480415.rdp	×
You have chosen	to open:	
No. CP4A_ma	aster-smartclientrdp_56480415.rdp	
which is: Re	emote Desktop Connection	
from: https	://cloud.skytap.com	
	efox do with this file? Remote Desktop Connection (default)	~
○ <u>S</u> ave File		
Do this aut	tomatically for files like this from now on.	
Cattions can be a	has and using the Applications tak in Eisefauls Onting	
Settings can be c	hanged using the Applications tab in Firefox's Option	is.

You are now ready to work with the Master VM. Go to the next step to learn how to log in to the VM.

- 3. Log in to the Master VM. Remember, that you work with the Master VM throughout the exercise. All the commands that you run in this exercise, you run on the Master VM. Optionally, you can connect to the compute VMs if you want to explore.
  - \_\_\_\_a. Regardless of the way you connect to the Master VM (either through the Browser or RDP), the time and date. is displayed on the desktop the first time you connect. Click the Enter key anywhere on the desktop to display the login screen.



\_\_\_b. Click Not listed.



\_\_\_\_c. Enter root in the Username field and click Next.

Username: root	
Cancel	Next

d. Enter passw0rd in the Password field and click Sign In.



\_\_\_\_e. You are now successfully logged in to the Master VM.

# Part 2: Create the Persistent Volumes and Persistent Volume Claims that are required by Content Platform Engine

The Content Platform Engine (CPE) container requires several persistent volume (PV) and persistent volume claims (PVC) in RHOCP. The Kubernetes persistent volume framework provides a mechanism for containers to request and use persistent storage. To avoid data loss, these services are configured to use persistent volumes. You create several PV and PVC in this section.

- \_\_\_\_1. Log in to Red Hat OpenShift by using the command line
  - \_\_\_\_a. Double-click the Terminal shortcut on the desktop to open it.



b. In the terminal that opens, login to the OpenShift cluster. The OpenShift console URL is https://console.cp4a.com:8443 and the username/password is admin/passw0rd.

oc login https://console.cp4a.com:8443 -u admin -p passw0rd

\_\_\_\_c. Verify that the Login successful message is displayed.

d. Examine the list of projects that is displayed. The asterisk \* next to a project name indicates the project that is being used in the current session. Depending on whether you completed Exercise 1 on ODM before working on this FileNet lab, the current project that is displayed is either odm-lab or the default project. You do not work with either the odm-lab or the default project but instead create a new one in a later step.



- 2. Check the status of the nodes.
- \_\_\_\_a. Verify that the master and the two compute nodes are in the ready state..

```
oc get nodes
```

```
[root@master ~]# oc get nodes
                   STATUS
                             ROLES
NAME
                                            AGE
                                                      VERSION
                   Ready
                                            21d
computel.cp4a.com
                             compute
                                                      v1.11.0+d4cacc0
                   Ready
compute2.cp4a.com
                                            21d
                                                      v1.11.0+d4cacc0
                             compute
master.cp4a.com
                   Ready
                             infra,master
                                            21d
                                                      v1.11.0+d4cacc0
[root@master ~]#
```

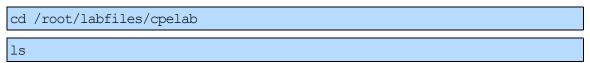
- \_\_\_\_b. Verify that three nodes are listed and the status is Ready for all the nodes.
- 3. Create an OpenShift project for CPE
  - \_\_\_\_a. Create a project called **cpe-lab** for Content Platform Engine.

oc new-project cpe-lab

```
[root@master ~]# oc new-project cpe-lab
Now using project "cpe-lab" on server "https://console.cp4a.com:8443".
You can add applications to this project with the 'new-app' command. For example
, try:
    oc new-app centos/ruby-25-centos7~https://github.com/sclorg/ruby-ex.git
to build a new example application in Ruby.
[root@master ~]#
```

You are now ready to use this new project.

- \_\_\_\_4. Create the PV and PVC required by CPE.
  - \_\_\_\_a. Go to the cpelab folder that is located under /root/labfiles/cpelab directory.



```
[root@master ~]# cd /root/labfiles/cpelab
[root@master cpelab]# ls
db2 deploy ldap pv
[root@master cpelab]#
```

b. The script to create the persistent volumes and persistent volume claims is located under the pv folder. Go to that pv folder.

cd pv	
ls	

```
[root@master pv]# ls
allyamls.sh mkyaml.sh
[root@master pv]#
```

\_ c. Two scripts are available under the pv folder. Make these two scripts executable before running them.

```
chmod +x *.sh
```

```
[root@master pv]# ls
[root@master pv]# chmod +x *.sh
[root@master pv]#
```

- d. Examine all the two scripts under the pv folder by using an editor of your choice. Optionally, you can double-click the Home folder on the desktop, Go to the /root/labfiles/cpelab/pv and then right-click each script to open with Text Editor. The allyamls.sh script makes a reference to the mkyaml.sh script that in turn creates a new create\_pvs.yaml file. Then, you run the newly created create\_pvs.yaml file that creates the persistent volumes and persistent volume claims. Examine the two scripts and do not make any changes. When done examining the scripts, close them.
- \_\_\_\_e. Run the allyamls.sh script.

./allyamls.sh

```
[root@master pv]# ./allyamls.sh
creating /nfs/cpe-lab/configDropins_overrides
creating /nfs/cpe-lab/log
creating /nfs/cpe-lab/FileNet
creating /nfs/cpe-lab/lib_bootstrap
creating /nfs/cpe-lab/temp
creating /nfs/cpe-lab/temp
creating /nfs/cpe-lab/icmrules
creating /nfs/cpe-lab/asa
run exportfs -arv
then run oc apply -f create_pvs.yaml
[root@master pv]#
```

\_\_\_\_\_f. As indicated by the script, notify the NFS server to update the exported directories:

exportfs -arv

```
[root@master pv]# exportfs -arv
exporting *:/nfs
[root@master pv]#
```

\_\_\_g. Verify that the create\_pvs.yaml file is created under the pv folder when you ran the allyamls.sh script earlier.

ls

[root@master pv]# ls allyamls.sh create pvs.yaml mkyaml.sh [root@master pv]#

h. You are now ready to apply the created yaml file with the generated definitions of all persistent volumes and persistent volume claims.

oc apply -f create pvs.yaml

```
[root@master pv]# oc apply -f create pvs.yaml
persistentvolume/cpe-lab-icp-cfgstore-pv created
persistentvolumeclaim/cpe-lab-icp-cfgstore-pvc created
persistentvolume/cpe-lab-icp-logstore-pv created
persistentvolumeclaim/cpe-lab-icp-logstore-pvc created
persistentvolume/cpe-lab-icp-fnlogstore-pv created
persistentvolumeclaim/cpe-lab-icp-fnlogstore-pvc created
persistentvolume/cpe-lab-icp-bootstrapstore-pv created
persistentvolumeclaim/cpe-lab-icp-bootstrapstore-pvc created
persistentvolume/cpe-lab-icp-textextstore-pv created
persistentvolumeclaim/cpe-lab-icp-textextstore-pvc created
persistentvolume/cpe-lab-icp-icmrulesstore-pv created
persistentvolumeclaim/cpe-lab-icp-icmrulesstore-pvc created
persistentvolume/cpe-lab-icp-filestore-pv created
persistentvolumeclaim/cpe-lab-icp-filestore-pvc created
[root@master pv]#
```

\_ i. Query the persistent volume claims to verify that several pv and pvc are created.

oc get pvc

\_\_\_\_j. Examine the several columns in the output. The NAME column lists all the persistent volume claims that are created. The VOLUME column displays all the persistent volumes created. The STATUS column shows that they are all bound. The remaining columns describe the other configuration that is required for the deployment.

[root@master pv]# oc get pvc	-	1001.000	CARACTER			
NAME	STATUS	VOLUME	CAPACITY	ACCESS MODES	STORAGECLASS	AGE
cpe-lab-icp-bootstrapstore-pvc	Bound	cpe-lab-icp-bootstrapstore-pv	1G1	RWX	cpe-lab-icp-bootstrapstore	4m
cpe-lab-icp-cfgstore-pvc	Bound	cpe-lab-icp-cfgstore-pv	1Gi	RWX	cpe-lab-icp-cfgstore	4m
cpe-lab-icp-filestore-pvc	Bound	cpe-lab-icp-filestore-pv	10G1	RWX	cpe-lab-icp-filestore	4m
cpe-lab-icp-fnlogstore-pvc	Bound	cpe-lab-icp-fnlogstore-pv	5G1	RWX	cpe-lab-icp-fnlogstore	4m
cpe-lab-icp-icmrulesstore-pvc	Bound	cpe-lab-icp-icmrulesstore-pv	161	RWX	cpe-lab-icp-icmrulesstore	4m
cpe-lab-icp-logstore-pvc	Bound	cpe-lab-icp-logstore-pv	5Gi	RWX	cpe-lab-icp-logstore	4m
cpe-lab-icp-textextstore-pvc	Bound	cpe-lab-icp-textextstore-pv	1G1	RWX	cpe-lab-icp-textextstore	4m

You now completed the successful creation of PV and PVCs

#### Part 3: Prepare the database required by Content Platform Engine

In this section, you create the required database and configure them for storing the Global Configuration Database (GCD) and the Object Store data.

- \_\_\_\_1. Create the required database
  - \_\_\_\_a. Switch to the /root/labfiles/cpelab/db2 folder and list the contents of the folder. Several scripts to create databases are available there.

cd /root/labfiles/cpelab/db2	
ls	

```
[root@master pv]# cd /root/labfiles/cpelab/db2
[root@master db2]# ls
create_gcddb.sh DB2JCCDriver.xml GCDDB.xml setfilenetworkload.sh
create_osldb.sh db2_list_databases.sh OS1DB.xml
[root@master db2]#
```

\_b. Make the database scripts executable, and copy them to the home directory of the Db2 instance user, who can access the database.

```
chmod +x *.sh
cp *.sh /home/db2admin
```

```
[root@master db2]# chmod +x *.sh
[root@master db2]# cp *.sh /home/db2admin
[root@master db2]# ■
```

\_\_\_\_\_c. Switch to the db2admin directory and list the contents to verify that the scripts were copied successfully.

```
cd /home/db2admin
```

ls

```
[root@master db2]# cd /home/db2admin
[root@master db2admin]# ls
create_gcddb.sh db2admin setfilenetworkload.sh
create_os1db.sh db2_list_databases.sh sqllib
[root@master db2admin]#
```

\_d. Run the setfilenetworkload.sh script for the Db2 configuration.

su - db2admin ./setfilenetworkload.sh

```
[root@master db2admin]# su - db2admin ./setfilenetworkload.sh
Last login: Wed Oct 23 10:27:23 PDT 2019 on pts/0
DB2_WORKLOAD=FILENET_CM
DB2_SKIPINSERTED=YES [DB2_WORKLOAD]
DB2_OPTPROFILE=YES [DB2_WORKLOAD]
DB2_USE_ALTERNATE_PAGE_CLEANING=YES [DB2_WORKLOAD]
DB2_MINIMIZE_LISTPREFETCH=YES [DB2_WORKLOAD]
DB2_EVALUNCOMMITTED=YES [DB2_WORKLOAD]
DB2COMM=TCPIP
DB2AUTOSTART=YES
[root@master db2admin]#
```

\_e. Create the GCDDB database by running the create gcddb.sh script.

```
su - db2admin ./create gcddb.sh
```

```
[root@master db2admin]# su - db2admin ./create gcddb.sh
Last login: Sun Nov 10 12:55:48 PST 2019 on pts/0
SQL1024N A database connection does not exist. SQLSTATE=08003
SQL1013N The database alias name or database name "GCDDB " could not be
found. SOLSTATE=42705
Creating the database, patience please
DB20000I The CREATE DATABASE command completed successfully.
  Database Connection Information
Database server
                      = DB2/LINUXX8664 11.1.1.1
SQL authorization ID = DB2ADMIN
Local database alias = GCDDB
DB20000I The SQL command completed successfully.
DB20000I The UPDATE DATABASE CONFIGURATION command completed successfully.
DB20000I The UPDATE DATABASE CONFIGURATION command completed successfully.
DB20000I The SQL command completed successfully.
[root@master db2admin]#
```

\_\_\_\_f. Create the OS1DB database by running the create\_os1db.sh script.

su - db2admin ./create\_os1db.sh

```
root@master db2admin]# su - db2admin ./create os1db.sh
ast login: Sun Nov 10 12:56:50 PST 2019 on pts/0
JL1024N A database connection does not exist. SOLSTATE=08003
)L1013N The database alias name or database name "OS1DB " could not be
pund. SOLSTATE=42705
reating the database, patience please
320000I The CREATE DATABASE command completed successfully.
 Database Connection Information
Database server
                     = DB2/LINUXX8664 11.1.1.1
SQL authorization ID = DB2ADMIN
Local database alias = OS1DB
320000I The SQL command completed successfully.
320000I The UPDATE DATABASE CONFIGURATION command completed successfully.
320000I The UPDATE DATABASE CONFIGURATION command completed successfully.
320000I The SQL command completed successfully.
root@master db2admin1#
```

\_\_\_\_g. For verification, run the last db2\_list\_databases.sh script. Verify that the GCDDB and the OS1DB databases are listed. If you also completed Exercise 1, then the ODMDB database is also listed.

su - db2admin ./db2 list databases.sh

```
Database alias
                                      = GCDDB
 Database name
                                      = GCDDB
 Local database directory
                                      = /home/db2admin
Database release level
                                      = 14.00
 Comment
                                      =
Directory entry type
                                      = Indirect
Catalog database partition number
                                      = 0
Alternate server hostname
                                      =
 Alternate server port number
                                      =
Database 2 entry:
Database alias
                                      = 0S1DB
Database name
                                      = 0S1DB
Local database directory
                                      = /home/db2admin
Database release level
                                      = 14.00
Comment
                                      =
Directory entry type
                                      = Indirect
Catalog database partition number
                                      = 0
Alternate server hostname
                                      =
 Alternate server port number
                                      =
[root@master db2admin]#
```

You completed the creation of the database.

- \_\_\_\_2. Add the java archives for accessing the Db2 server.
  - \_\_\_\_a. Copy the Db2 Client files into the persistent volume directory configDropins\_overrides.

```
cp /opt/ibm/db2/V11.1/java/db2jcc* /nfs/cpe-lab/configDropins_overrides
```

```
[root@master db2admin]# cp /opt/ibm/db2/V11.1/java/db2jcc* /nfs/cpe-lab/configDropins_over
rides
[root@master db2admin]#
```

\_b. Switch back to the /root/labfiles/cpelab/db2 folder.

cd /root/labfiles/cpelab/db2

\_\_ c. Copy the XML files to the configDropins\_overrides directory. Review the XML files to examine the contents.

cp \*.xml /nfs/cpe-lab/configDropins overrides

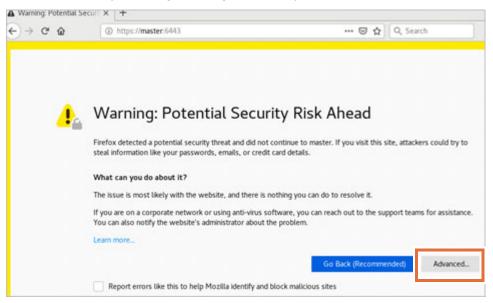
```
[root@master db2admin]# cd /root/labfiles/cpelab/db2
[root@master db2]# cp *.xml /nfs/cpe-lab/configDropins_overrides
[root@master db2]# ■
```

You are now ready to complete the LDAP configuration.

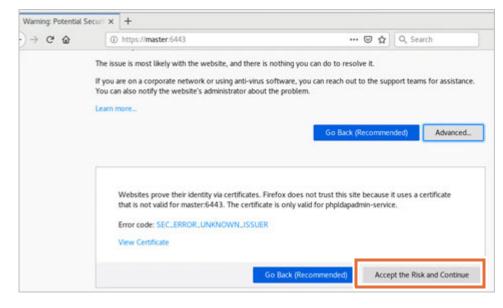
## Part 4: Prepare LDAP required by Content Platform Engine

In this section, you examine LDAP users and then make the XML available to the CPE container. The openLDAP docker container is already installed and configured on the Master VM.

- \_\_\_\_1. Log in to the OpenLDAP Administration console.
  - \_\_\_\_a. Start a Firefox session and click the OpenLDAP administration console shortcut. Optionally, you can enter https://console.cp4a.com:6443 in the URL field and press the Enter key.
  - \_\_\_\_b. When the Security warning message is displayed, click Advanced.

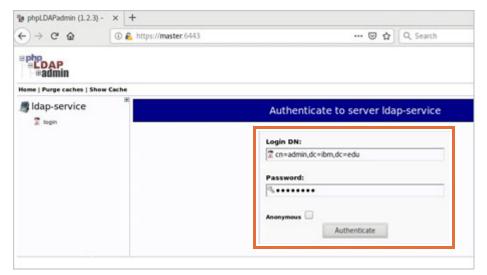


\_ c. Scroll down and click **Accept Risk and Continue**.



\_\_\_\_d. Click login.

\_\_\_\_e. Enter cn=admin, dc=ibm, dc=edu in the Login DN field and enter passw0rd in the Password field. Click Authenticate.



\_\_\_\_\_f. Expand the users on the left pane to examine the list of users.

	¢)	6	2		ę
search as: cn=a		info	import	export	log
 dc=ib		edu (	33)		1
			ry here		
-	adam		,		
🔭 cn	admin				
🧕 cn	alice				
💂 cn	CEAdn	nin			
🧕 cn	charly				
	christi				
	christo	ph			
-	conny				
-	cpebo		5	tative	
	gcdad		present	lauve	
-	icnadn				
	icnadn				
-	ingo				
-	ingrid				
		anad	gement		

\_\_\_\_g. Scroll down the list and click the **p8admin** user.



h. Note that the description field in the right pane for the user p8admin. It defines the user as the primary p8 administrator. The FileNet developer uses this p8admin user to work with the cpe container. You log in to the deployed container later in the exercise.

		Name: cn=p8admin,dc=ibm,dc=edu e: Default
<b>3</b> <b>6</b>	Switch Template Switch Template Switch Template Sopy or move this entry SRename Score Scor	
	cn p8admin (add value) (rename)	required, tdn
	description primary p8 administrator	r

\_\_\_\_\_i. To make the LDAP available to WebSphere Liberty in the CPE Container, an XML configuration file is needed in the persistent volume referring to the directory configDropins\_overrides. Switch back to the open terminal and go to the /root/labfiles/cpelab/ldap folder. Then, list the contents of the folder.

cd /root/labfiles/cpelab/ldap
ls

```
[root@master db2]# cd /root/labfiles/cpelab/ldap
[root@master ldap]# ls
ldap_TDS.xml p8users.ldif
[root@master ldap]#
```

- \_\_\_\_j. The p8users.ldif file consists of LDAP users that were already populated in openLDAP for this exercise. The ldap\_TDS.xml configuration file makes the users available to the CPE container. Feel free to examine the two files. Do not make any changes to the XML file.
- \_\_\_\_k. Copy the XML to the configDropins\_overrides directory.

```
cp ldap_TDS.xml /nfs/cpe-lab/configDropins_overrides
```

```
[root@master ldap]# cp ldap_TDS.xml /nfs/cpe-lab/configDropins_overrides
[root@master ldap]#
```

# Part 5: Load the Content Platform Engine docker images for Cloud Pak for Automation

The installation of Cloud Pak for Automation requires downloading and deploying the appropriate docker images. The CP4A images that are needed for the labs are already downloaded and available under the /root/labfiles/cp4a folder. In this section, you load the required CPE images for CP4A.

- \_\_\_1. Load the CPE docker images
  - \_\_\_\_a. Identify the images for ICP4A that are located under /root/labfiles/cp4a folder

cd /root/labfiles/cp4a

```
[root@master ldap]# cd /root/labfiles/cp4a
[root@master cp4a]# ls
ibm-dba-contentservices-3.0.0.tgz ICP4A19.0.1-ecm.tgz loadimages.sh
ibm-odm-prod-2.2.0.tgz ICP4A19.0.1-odm.tgz
[root@master cp4a]#
```

\_b. Create a directory under /root/labfiles/cp4a and call it ecm.

mkdir ecm

\_\_\_\_\_ c. Go to the new ecm directory.

cd ecm

\_\_d. Unpack the CP4A distribution file for the containers of the Enterprise Content Management system. The file name is ICP4A19.0.1-ecm.tgz.

tar xvfz ../ICP4A19.0.1-ecm.tgz

\_\_e. It takes few minutes for all the images to be extracted. The last file is a large archive and takes a little extra time. Verify that 5 images are extracted to the ecm folder.

[root@master ecm]# tar xvfz/ICP4A19.0.1-ecm.tgz	
images/11f11b46d1bb531fa5f40938aba118fa42052c6f4e655d0c3733a33f990e2e27.tar.gz	
tar: images/11f11b46d1bb531fa5f40938aba118fa42052c6f4e655d0c3733a33f990e2e27.tar.gz:	impla
usibly old time stamp 1969-12-31 16:00:00	
images/ea952b6d8dd2af79b4212910a26a8e6d3b2aead89f2e2e4816ce56e3fe0ffe56.tar.gz	
tar: images/ea952b6d8dd2af79b4212910a26a8e6d3b2aead89f2e2e4816ce56e3fe0ffe56.tar.gz:	impla
usibly old time stamp 1969-12-31 16:00:00	
images/1953557e582185f5d01cc4b56c9eac3fdfc41d7173f470daea11a67c0c198e89.tar.gz	
tar: images/1953557e582185f5d01cc4b56c9eac3fdfc41d7173f470daea11a67c0c198e89.tar.gz:	impla
usibly old time stamp 1969-12-31 16:00:00	
images/cdc6ff5b83a9e777d72344e3a57e0997968325f7c2f4153954be6dd000d08ff1.tar.gz	
tar: images/cdc6ff5b83a9e777d72344e3a57e0997968325f7c2f4153954be6dd000dd08ff1.tar.gz:	impla
usibly old time stamp 1969-12-31 16:00:00	
images/13d98681077f3e92ad0cfb05a4d2cc8e981907aa7d5f5082e37ad0d09221bfa7.tar.gz	
tar: images/13d98681077f3e92ad0cfb05a4d2cc8e981907aa7d5f5082e37ad0d09221bfa7.tar.gz:	impla
usibly old time stamp 1969-12-31 16:00:00	zmp cu
manifest.json	
tar: manifest.json: implausibly old time stamp 1969-12-31 16:00:00	
manifest.yaml	
tar: manifest.yaml: implausibly old time stamp 1969-12-31 16:00:00	
[root@master_ecm]#	
Line could for could a	

\_a. Examine to the contents of the ecm folder and then go to the images folder to verify that five images are located under that images folder.

S	
d images	
S	

```
[root@master ecm]# ls
images manifest.json manifest.yaml
[root@master ecm]# cd images
[root@master images]# ls
11f11b46d1bb531fa5f40938aba118fa42052c6f4e655d0c3733a33f990e2e27.tar.gz
13d98681077f3e92ad0cfb05a4d2cc8e981907aa7d5f5082e37ad0d09221bfa7.tar.gz
1953557e582185f5d01cc4b56c9eac3fdfc41d7173f470daea11a67c0c198e89.tar.gz
cdc6ff5b83a9e777d72344e3a57e0997968325f7c2f4153954be6dd000d08ff1.tar.gz
ea952b6d8dd2af79b4212910a26a8e6d3b2aead89f2e2e4816ce56e3fe0ffe56.tar.gz
[root@master images]#
```

b. Switch back to the ecm folder.

cd ..

[root@master	images]#	cd	
[root@master	ecm]#		

\_\_\_\_\_c. Create a login token for the internal docker registry to connect to the internal docker registry.

```
oc whoami -t
```

[root@master ecm]# oc whoami -t
cumYLdlVHA-K16v2vJskL3HVUoM7rHFo6dyfiBVhWjE
[root@master ecm]#

\_\_\_\_\_d. Log in to the internal docker registry by using an authentication token. Replace the token variable with the token that you created in the previous step. Make sure to include the token in quotation marks (single or double quotation marks). Do not copy and paste the command from the pdf because the remote VM does not interpret the quotation marks correctly.

docker login docker-registry.default.svc:5000 -u admin -p '<token>'

<pre>[root@master ecm]# docker login docker-registry.default.svc:5000</pre>	- U	admin	- p	'cumYLdlVHA-K
16v2vJskL3HVUoM7rHFo6dyfiBVhWjE'				
Login Succeeded				
[root@master ecm]#				

e. You are now ready to push the CPE images to the internal docker registry. Before you load the registry, you examine the manifest.json file that is included under the /root/labfiles/cp4a/ecm folder. Open the manifest.json file using an editor of your choice. Optionally, you can double-click the Home folder on the desktop, go to /root/labfiles/cp4a/ecm and then right-click manifest.json to open with Text Editor. Examine the file and find the name of the container images for the Content Platform Engine. Copy the image name between the quotation marks (Do not copy the quotation marks). Do not make any changes. You load that image to the docker registry in the next step.

```
"manifest-revision": "1.0",
"charts": null,
"images": [
  {
    "image": "cpe",
    "tag": "ga-
    "archive":
                images/11f11b46d1bb531fa5f40938aba118fa42052c6f4e655d0c3733a33f990e2e27.tar.gz
  },
  {
    "image": "css",
    "tag": "ga-553-p8css",
    "archive": "images/ea952b6d8dd2af79b4212910a26a8e6d3b2aead89f2e2e4816ce56e3fe0ffe56.tar.gz"
  },
  {
    "image": "cmis",
    "tag": "ga-304-cmis-if007",
    "archive": "images/1953557e582185f5d01cc4b56c9eac3fdfc41d7173f470daea11a67c0c198e89.tar.gz"
  }.
  {
    "image": "extshare",
    "tag": "ga-306-es",
    "archive": "images/cdc6ff5b83a9e777d72344e3a57e0997968325f7c2f4153954be6dd000d08ff1.tar.gz"
 },
  {
    "image": "crs",
    "tag": "ga-553-p8cgql",
    "archive": "images/13d98681077f3e92ad0cfb05a4d2cc8e981907aa7d5f5082e37ad0d09221bfa7.tar.gz"
  }
]
```

#### \_ f. Load the CPE image and push it to the internal docker registry.

docker load < images/11f11b46d1bb531fa5f40938aba118fa42052c6f4e655d0c3733a33f990e2e27.tar.gz

[root@master ecm]# docker load < images/11f11b46d1bb531fa5f40938aba118fa42052c6f4e655d0c37
33a33f990e2e27.tar.gz</pre>

g. Wait until the image is completely loaded into the docker registry. The command outputs the name of the image which it loads.

						root@maste	r:~/labfiles/cp4a/ecm
File	Edit	View	Search	Terminal	Help		
c1faa	abc75	d6f:	Loading	layer	7.168	kB/7.168	kB
18c1	5ac7e	c79:	Loading	layer	11.78	kB/11.78	kB
ef2c	33c8b	ofee:	Loading	layer	4.096	kB/4.096	kB
						MB/7.442	
						MB/3.323	
						kB/3.072	
						kB/3.072	
						kB/7.168	
						kB/6.144	
0c2fe	ef391	44c:	Loading	layer	6.656	kB/6.656	kB
6ab8	71f96	992:	Loading	layer	8.192	kB/8.192	kB
4d871	01375	iclc:	Loading	layer	8.192	kB/8.192	kB
7a220	9118	Bdbc:	Loading	layer	3.072	kB/3.072	kB
ebdd:	160d7	003:	Loading	layer	3.072	kB/3.072	kB
21e0	07549	977:	Loading	layer	34.82	kB/34.82	kB
52e7	ed718	321b:	Loading	layer	3.345	MB/3.345	MB
						MB/7.444	
c5d9:	19b59	8a4:	Loading	layer	8.192	kB/8.192	kB
						kB/6.656	
						MB/237.9	
ch4f:	7507	1e87 .	Loading	laver	244 6	MB/244.6	MB
Loade	ed im	nage:	cpe:ga-	553-p8c	pe		
[root]	t@mas	ster e	ecm]#				
[100	Lallas	Lei	cmj#				

\_\_h. Using the docker tag command, give the container an additional tag pointing to the RHOCP docker repository.

docker tag cpe:ga-553-p8cpe docker-registry.default.svc:5000/cpe-lab/cpe:ga-553-p8cpe

```
[root@master ecm]# docker tag cpe:ga-553-p8cpe docker-registry.default.svc:5000/cpe-lab/cp
e:ga-553-p8cpe
[root@master ecm]#
```

\_\_i. Push the image to the RHOCP docker registry. It takes several minutes for the images to load.

docker push docker-registry.default.svc:5000/cpe-lab/cpe:ga-553-p8cpe

[root@master ]	ecm]# docker push docker-registry.default.svc:5000/cpe-lab/cpe:ga-553-p8cpe
	rs to a repository [docker-registry.default.svc:5000/cpe-lab/cpe]
cb4fa7507e82:	
9330a21b5545:	Preparing
9a77876b87e6:	Preparing
c5d919b598a4:	Preparing
7b8490acb8e6:	Preparing
52e7ed71821b:	Preparing
21e0b7549977:	Preparing
ebdd160d7003:	Preparing
7a22d9118dbc:	Preparing
4d87b1375c1c:	Preparing
6ab871f96992:	Preparing
0c2fef39144c:	Preparing
5c5fec803719:	Preparing
cd58c2517184:	Preparing
cb4fa7507e82:	Pushed
6d41dd604c32:	Pushed
65e7f19a852c:	Pushed
275fea097c85:	Pushed
ef2c33c8b6ee:	Pushed

\_\_\_\_j. To finish the configuration of the files in the configDropins\_overrides directory, assign the files to the user id 50001, and the group id 50000.

cd /nfs/cpe-lab/configDropins overrides/

chown 50001:50000 \*

chmod 755 \*

```
e813ccb40331: Pushed
35265ad107f5: Pushed
4765a2d3f85d: Pushed
ga-553-p8cpe: digest: sha256:123e4e25581331da651ab2b552fa6f27a18f2752dfdd8c49842c71c7bd404
[root@master ecm]# cd /nfs/cpe-lab/configDropins_overrides/
[root@master configDropins_overrides]# chown 50001:50000 *
[root@master configDropins_overrides]# chmod 755 *
[root@master configDropins_overrides]#
```

k. Verify the permission and group change displays correctly.

ls -l

```
[root@master configDropins_overrides]# ls -l
total 7420
-rwxr-xr-x. 1 50001 50000 3905812 Nov 10 13:05 db2jcc4.jar
-rwxr-xr-x. 1 50001 50000 212 Nov 10 13:08 DB2JCCDriver.xml
-rwxr-xr-x. 1 50001 50000 3668626 Nov 10 13:05 db2jcc_jar
-rwxr-xr-x. 1 50001 50000 1534 Nov 10 13:05 db2jcc_license_cu.jar
-rwxr-xr-x. 1 50001 50000 1015 Nov 10 13:08 GCDDB.xml
-rwxr-xr-x. 1 50001 50000 617 Nov 10 13:26 ldap_TDS.xml
-rwxr-xr-x. 1 50001 50000 1048 Nov 10 13:08 OS1DB.xml
[root@master configDropins overrides]#
```

You are now ready to deploy the CPE container.

## Part 6: Deploy the Content Platform Engine container

For deployment of the CPE container, two deployment methods are supported, deployment using a yaml file, and deployment using a helm chart. In this exercise, you deploy by using the Helm chart. It is available in the cpelab/deploy folder.

An archive with the helm chart is also available on

```
https://github.com/icp4a/cert-kubernetes/blob/19.0.1/CONTENT/helm-charts
/ibm-dba-contentservices-3.0.0.tgz.
```

- \_\_\_1. Prepare for deployment.
  - \_\_\_\_a. Go to the deploy folder and view its content.

```
cd /root/labfiles/cpelab/deploy
```

```
[root@master deploy]# ls
ibm-dba-contentservices-3.0.0.tgz values.yaml
[root@master deploy]#
```

- b. The archive with the helm chart in github also contains the values.yaml file, which is the only file of the Helm chart that needs to be customized. To make deployment easier, a version of the values.yaml file with the required changes is available in the deploy directory. Examine the values.yaml file by opening it using an editor of your choice. Optionally, you can double-click the Home folder on the desktop, go to /root/labfiles/cpelab/deploy folder and then right-click values.yaml to open with Text Editor.
- \_\_\_\_ c. Check the image tag in the vlaues.yaml file. The image tag contains details for accessing the CPE container. Find the value of the pullPolicy. The pullPolicy in the image section has been set to IfNotPresent to make sure the container is only loaded when needed.

```
# Default values for ibm-ecm-icp.
# This is a YAML-formatted file.
# Declare variables to be passed into your templates.
arch:
   amd64: "3 - Most preferred"
replicaCount: 1
image:
   repository: docker-registry.default.svc:5000/cpe-lab/cpe
   tag: ga-553-p8cpe
   pullPolicy: IfNotPresent
```

\_\_\_\_d. Check the dataVolume section. The dataVolume specification has been adapted to match the names of the persistent volume claims, which were created by the script before.

```
## global persistence settings
persistence:
    enabled: true
# useDynamicProvisioning: false
## Persistence parameters for /database
dataVolume:
## Persistence parameters for CPE
    nameforCPECfgstore: "cpe-cfg-stor"
    nameforCPELogstore: "cpe-log-stor"
    nameforFilestore: "file-stor"
    nameforICMrulestore: "icmrule-stor"
    nameforTextextstore: "textext-stor"
    nameforFNLogstore: "fnlog-stor"
```

- \_e. Close the yaml when you are done examining it. Do not make any changes.
- 2. Create a secret. The deployment needs access to the docker registry, which is granted through the secret named admin.registrykey. If it had been existing before, recreate it, by first deleting an old version of it.
  - \_\_\_\_a. Delete old secret, if present.

oc delete secret admin.registrykey -n cpe-lab

```
[root@master deploy]# oc delete secret admin.registrykey -n cpe-lab
Error from server (NotFound): secrets "admin.registrykey" not found
[root@master deploy]#
```

\_b. Create an authentication token for the internal docker registry to connect to the internal docker registry.

oc whoami -t

```
[root@master deploy]# oc whoami -t
cumYLdlVHA-K16v2vJskL3HVUoM7rHFo6dyfiBVhWjE
[root@master deploy]#
```

\_\_\_\_\_ c. Create a new secret. Log in to the internal docker registry by using an authentication token. Replace the token variable with the token that you created in the previous step. Make sure to include the token in quotation marks (single or double quotation marks). Do not copy and paste the command from the pdf as the quotation marks are not interpreted correctly by the remote VM. Make sure to enter the entire command in a single line.

```
oc create secret docker-registry admin.registrykey
--docker-server=docker-registry.default.svc:5000 --docker-username=admin
--docker-password='<token>' --docker-email=ecmtest@ibm.edu -n cpe-lab
```

```
[root@master deploy]# oc whoami -t
cumYLdlVHA-K16v2vJskL3HVUoM7rHFo6dyfiBVhWjE
[root@master deploy]# oc create secret docker-registry admin.registrykey --docker-server=d
ocker-registry.default.svc:5000 --docker-username=admin --docker-password='cumYLdlVHA-K16v
2vJskL3HVUoM7rHFo6dyfiBVhWjE' --docker-email=ecmtest@ibm.edu -n cpe-lab
secret/admin.registrykey created
[root@master deploy]#
```

d. Verify correct installation of the admin.registrykey. Check the output and confirm that the password returned is the same token value that you entered before.

```
oc get secret admin.registrykey --output="jsonpath={.data.\.dockerconfigjson}" |
base64 --decode
```

```
[root@master deploy]# oc get secret admin.registrykey --output="jsonpath={.data.\.dockerco
nfigjson}" | base64 --decode
{"auths":{"docker-registry.default.svc:5000":{"username":"admin","password":"cumYLdlVHA-K1
6v2vJskL3HVUoM7rHFo6dyfiBVhWjE","email":"ecmtest@ibm.edu","auth":"YWRtaW46Y3VtWUxkbFZIQS1L
MTZ2MnZKc2tMM0hWVW9NN3JIRm82ZHlmaUJWaFdqRQ=="}}}[root@master deploy]#
```

- \_ e. If the password that is displayed is incorrect, delete the admin.regsitrykey and try re-creating it.
- \_\_\_\_\_f. In OpenShift, the security context constraint on allowed user and group ids in a container can cause deployment errors. To prevent it, you update the namespace to include the constraints for the components that you want to deploy. But first, run the command to make sure that you can use gedit.

export EDITOR=gedit	
	[root@master deploy]# export E0IT0R=gedit
	[root@master_deploy]# export_buluk=gedit [root@master_deploy]#
g. Now you are ready to	o use gedit. Run the command to update the namespace.
	5
oc edit namespace cp	• · ·
	• · ·

\_ h. In the editor, find the following two lines:

openshift.io/sa.scc.supplemental-groups: 1000130000/10000
openshift.io/sa.scc.uid-range: 1000130000/10000

	t the object below. Lines beginning with a '#' wil	
	ty file will abort the edit. If an error occurs wh	file saving this file will be
reopened w	ith the relevant failures.	
apiVersion:		
kind: Namespa	ace	
metadata:		
annotation		
	t.io/description: ""	
openshif	t.io/display-name: ""	
	t.io/requester: admin	
ananchifi	4 4a/aa aaa maa, 40,411 410	
openshift	t io/ea ecc supplemental_groups: 1000130000/10000	
openshift	t.io/sa.scc.supplemental-groups: 1000130000/10000 t.io/sa.scc.uid-range: 1000130000/10000	]
openshift	t.io/sa.scc.uid-range: 1000130000/10000	J
openshift	t.io/sa.scc.uid-range: 1000130000/10000	
openshif name: cpe- resourceVe	t.io/sa.scc.uid-range: 1000130000/10000 lab	
openshift name: cpe- resourceVe selfLink:	t.io/sa.scc.uid-range: 1000130000/10000 lab rsion: "133007"	
openshift name: cpe- resourceVer selfLink: uid: 068ac	t.io/sa.scc.uid-range: 1000130000/10000 lab rsion: "133007" /api/v1/namespaces/cpe-lab	J
openshift name: cpe- resourceVe selfLink:	t.io/sa.scc.uid-range: 1000130000/10000 lab rsion: "133007" /api/v1/namespaces/cpe-lab alc-ff54-1le9-87f6-00505629cc20	
openshift name: cpe- resourceVer selfLink: , uid: 068aca spec:	t.io/sa.scc.uid-range: 1000130000/10000 lab rsion: "133007" /api/v1/namespaces/cpe-lab alc-ff54-lle9-87f6-00505629cc20 :	
openshift name: cpe- resourceVe selfLink: , uid: 068ac spec: finalizers	t.io/sa.scc.uid-range: 1000130000/10000 lab rsion: "133007" /api/v1/namespaces/cpe-lab alc-ff54-lle9-87f6-00505629cc20 :	

\_\_\_\_i. Change the 1000130000/10000 value to 500/1000099999 for both the lines. The two lines are changed to the following values:

openshift.io/sa.scc.supplemental-groups: 500/1000099999

openshift.io/sa.scc.uid-range: 500/1000099999

\_\_\_\_j. Verify that the changes are done correctly.



- \_\_\_\_ k. Click Save at the top and then close the file. You might have to maximize the editor to view the Save button.
- I. Add privileges to the CPE project.

oc adm policy add-scc-to-user privileged -z default



- \_\_\_3. Install the helm chart for deployment
  - \_\_\_\_a. Verify that you are in the /root/labfiles/cpelab/deploy folder.

p	wd
_a.	List the contents of the deploy folder and verify that ibm-dba-contentservices-3.0.0.tgz helm chart is listed.
1:	S
	[root@master deploy]# pwd /root/labfiles/cpelab/deploy
	<pre>ibm-dba-contentservices-3.0.0.tgz /alues.yaml</pre>

\_\_\_\_b. Install the CPE helm chart by using the helm command. Make sure to enter the entire command in a single line.

helm install ibm-dba-contentservices-3.0.0.tgz --name cpe-lab --namespace cpe-lab --values values.yaml

[[root@master deploy]# [root@master deploy]# helm install ibm-dba-contentservices-3.0.0.tgz --name cpe-lab --namespace cpe-lab --values values.yaml

#### c. The command completes quickly and returns at the command prompt.

NOTES:
1.Get the application URL with ClusterIP and Port to configure Navigator.
# Get the ClusterIP for the service
export CLUSTER_IP=\$(kubectl getnamespace cpe-lab -o jsonpath="{.spec.clusterIP}" services cpe-lab-ibm-dba-contentservic
# Get the Port for the service
export PORT=\$(kubectl getnamespace cpe-lab -o jsonpath="{.spec.ports[0].port}" services cpe-lab-ibm-dba-contentservice
echo "Using this Cluster IP address and Port to configure CSS server in CPE: \$CLUSTER_IP:\$PORT*
2.Get the application URL with Node IP and Port by running these commands:
export NODE_PORT=\$(kubectl getnamespace cpe-lab -o jsonpath="{.spec.ports[0].nodePort}" services cpe-lab-ibm-dba-conten ervices)
# Get the HTTPS Port for the service
<pre># Replace this with actual deployment service name for <service name=""></service></pre>
export NODE_PORT_HTTPS=\$(kubectl getnamespace cpe-lab -o jsonpath="{.spec.ports[1].nodePort}" services cpe-lab-ibm-dba- ntentservices)
# Get the proxy IP for the cluster
export NODE_IP=\$(kubectl get nodes   grep proxy   awk '{print \$1}')
<pre>echo http://\$NODE_IP:\$NODE_PORT</pre>
echo https://SNODE IP:SNODE PORT HTTPS

If everything went well, the CPE container is deployed in few minutes. You verify that in the next section.

## Part 7: Verify successful Content Platform Engine deployment

In this section, you run several verification steps for successful CPE deployment

- 1. Check the status of the pod. The status of the pod is a good indicator of whether the containers are either running, failed, started, crashed, and so on. Although it takes time for the containers to start, checking the status first gives a good idea of the state of the pod.
  - \_\_\_\_a. Check the status of the pod.

oc get pods

- \_\_\_\_b. Verify that there is one row for the cpe pod.
- c. Examine the status of the pod as it is being created. It takes few minutes for the pod to start and get into a Running status. It is OK if you see a Ready state of 0/1 for pod. Give it some time to change to state 1/1. While you are waiting for state to change, continue with the following verifications. You run this command again later. If the state is already 1/1 then you can optionally, review the remaining verification steps.

[root@master deploy]# oc get pods				
NAME	READY	STATUS	RESTARTS	AGE
cpe-lab-ibm-dba-contentservices-5dc55857bb-2pn57 [root@master deploy]#	0/1	ContainerCreating	0	255

- 2. Verify the deployment status. When the deployment is started, the helm chart creates among others artifacts, a deployment.
  - \_\_\_\_a. Run the command to check deployment and get detailed information about the deployment.

oc describe deployment cpe-lab



\_\_\_\_b. Verify that a message is received that the replica set was successfully scaled to 1.

ClaimName: ReadOnly:	cpe-lab-icp-icmrulesstore-pvc false						
textext-stor	2						
Type: ClaimName: ReadOnly:	PersistentVolumeClaim (a reference to a PersistentVolumeClaim in the same namespace) cpe-lab-icp-textextstore-pvc false						
bootstrap-st	or:						
Type: ClaimName: ReadOnly:	PersistentVolumeClaim (a reference to a PersistentVolumeClaim in the same namespace) cpe-lab-icp-bootstrapstore-pvc false						
fnlog-stor:							
Type: ClaimName: ReadOnly: file-stor:	PersistentVolumeClaim (a reference to a PersistentVolumeClaim in the same namespace) cpe-lab-icp-fnlogstore-pvc false						
	PersistentVolumeClaim (a reference to a PersistentVolumeClaim in the same namespace)						
Type: ClaimName: ReadOnly:	<pre>cpe-lab-icp-filestore-pvc false</pre>						
Conditions:							
Туре	Status Reason						
Available	True MinimumReplicasAvailable						
Progressing	True NewReplicaSetAvailable						
	<pre>cpe-lab-ibm-dba-contentservices-5dc55857bb (1/1 replicas created) <none></none></pre>						
Normal Scali	ngReplicaSet 6m deployment-controller Scaled up replica set cpe-lab-ibm-dba-contentservices-5dc55857bb to						
[root@master de	ploy]#						

- 3. Check the replica set.
  - \_\_\_\_a. Run the command to check the replica and return the information that a pod is created.

UC	describe re	plic	caset cpe-lab	
		11	root@master deploy]# o(	c describe replicaset cpe-lab
		11	root@master deploy]# o(	c describe replicaset cpe-lab
		11	root@master deploy]# o4	c describe replicaset cpe-lab
Keado	nlv: Talse	It	root@master deploy]# o4	c describe replicaset cpe-lab
Kead0	nly: Talse		rootgmaster deployj# o4	c describe replicaset cpe-lab
Keadu nts: ype	nly: Talse Reason	Age	From	Message
nts:	annonen i			

- 4. Check the pod for messages that are generated during its creation.
  - \_\_\_\_a. Run the command to view the pod creation messages and watch for errors.

oc describe pod cpe-lab

[root@master deploy]# oc describe pod cpe-lab

Туре	Reason	Age	From	Message
		+ + + +		
Normal	Scheduled	13m	default-scheduler	Successfully assigned cpe-lab/cpe-lab-ibm-dba-contentservices-5dc55857b
b-2pn57 t	o computel.	cp4a.c	om	
Normal	Pulling	13m	kubelet, compute1.cp4a.com	pulling image "docker-registry.default.svc:5000/cpe-lab/cpe:ga-553-p8cp
e*				
Normal	Pulled	11m	kubelet, compute1.cp4a.com	Successfully pulled image "docker-registry.default.svc:5000/cpe-lab/cpe
:ga-553-p	8cpe*			
Normal	Created	11m	kubelet, compute1.cp4a.com	Created container
Normal	Started	11m	kubelet, computel.cp4a.com	Started container

- 5. Check the status of the pod one more time.
  - \_\_\_\_a. Now that some time is passed, you run the verification again to make sure that the state of the CPE pod is 1/1 and that it has a Running status. If the state is still 0/1, then wait few more minutes and check again.

get pods					
[root@master deploy]# oc get pods NAME	READY	STATUS	RESTARTS	AGE	
cpe-lab-ibm-dba-contentservices-5dc55857bb-2pn57	1/1	Running	0	16m	

\_\_\_\_b. The successful installation results in a running CPE container. Make sure that the status is Running for the pod. It is important that the container also displays 1/1 as in Ready. If it displays 0/1, then give it few more minutes before it changes to 1/1.

#### Part 8: Troubleshoot failed deployment.

Several tasks are available for you troubleshoot a failed deployment. This section describes some of the steps you can take to ensure a successful deployment.

- 1. Check for typographical errors. If your deployment fails or you see an error, then the first thing to check is to make sure that no typographical errors exist. Check the typed command to see any obvious mistakes. You can scroll up through the terminal and examine the previous commands, if needed. You can use the up arrow key in your keyboard to recall the earlier run commands to scan through any mistakes and make corrections.
- 2. Verify that the lab environment is up and running. If you started a suspended environment, then make sure that you give plenty of time before working with the environment. A good verification is to log in to the OpenShift console and make sure that you are successful.

oc login https://console.cp4a.com:8443 -u admin -p passw0rd

- 3. Verify the current project.
  - \_\_\_\_a. Verify that you are connected to the correct project cpe-lab.

oc project

\_\_\_\_b. If the current project is the default project or some other project, then switch to the cpe-lab project.

oc project cpe-lab

- 4. Check container logs for the container, fix errors and then redeploy.
- \_\_\_\_a. You can also check the logs for a failed or crashing container to help troubleshoot the problem. First, check the pod status to identify the container name that is being used in the current run.

oc get pods

The state of a container might be stuck at 0/1 even though it says it is Running. If it does not change to 1/1 even after a while then you might want to check the log for that container. Copy the name of that container.

READY	STATUS	RESTARTS
0/1	Running	0

In other failures, it is possible that a container fails to start and gives an error. If that happens, then you can again copy the name of the failing container (s) to check the logs.

b. Check the logs of a specific problematic container by using its name.

oc logs ocpe-lab-ibm-dba-contentservices-5dc55857bb

If the results indicate a problem, then you can go back to see whether any mistake was done or a step was skipped.

- \_\_\_\_5. Remove the current failed deployment, fix errors, and then redeploy. You do not need to run this step if you successfully deployed CPE. In that case, you can just review this step.
  - \_\_\_\_a. Run the command to purge the deployment. Do **not** run this command when the deployment is successful. Note that there are two dashes right before purge (even though it can look like a single dash) in the command. You can run this when you identified the problem, made the correction, and are ready to install the helm chart again for deployment.

helm delete cpe-lab --purge

\_\_\_\_a. Check the pod status. The containers start terminating.

oc get pods

- \_\_\_\_b. Run the check again to verify the pods again until resources are no longer available.
- \_ c. Now you are ready to install CPE helm chart again using the helm command:

# Part 9: Access the running Content Platform Engine container

Now that CPE is deployed, you are ready to connect to it. In this section, you verify the connectivity and access to CPE. You do not do any CPE development. That is the task of a CPE developer or CPE Administrator.

- \_\_\_\_1. Identify ports and URL for the running containers
  - \_\_\_\_a. Verify that containers are running.
  - \_\_\_\_b. Find the port numbers.

oc (	describe se	rvice	cpe-lab		

```
[root@master deploy]#
[root@master deploy]# oc describe service cpe-lab
```

\_\_\_\_\_c. Examine the output from the command. It displays the node ports of the running services. You log in to the relevant services in the next steps.

Session Affinity: External Traffic Policy: Events:	ClientIP Cluster <none></none>
NodePort:	https 30742/TCP
Port:	https 9443/TCP
NodePort:	http 30938/TCP
Annotations: Selector: Type: IP: Port:	chart=ibm-dba-contentservices-3.0.6 heritage=Tiller release=cpe-lab servicename=cpesvc <none> app=ibm-dba-contentservices NodePort 172.30.146.98 http 9080/TCP</none>
[root@master deploy]# [root@master deploy]# oc Name: Namespace: Labels:	<pre>cpe-lab.ibm-dba-contentservices cpe-lab app=ibm-dba-contentservices</pre>

Note the node port. There are two of them. One for an http request and the other for an https request.

- \_\_\_\_2. Connect to the Administrative Console for Content Engine (ACCE)
  - \_\_\_\_a. Find the node port for the CPE container. For ACCE URL, you can use either http://master.cp4a.com:<http node port>/acce or https://master.cp4a.com:<https node port>/acce. The node port in your environment is different from the node port in the view below:
  - \_\_\_\_b. Start Firefox and enter the following URL:

https://master.cp4a.com:<https NodePort>/acce

\_c. Verify that the ACCE login page is displayed in the browser.

IBM Administrative Conso ×	+	
↔ ♂ @ [	(i) master.cp4a.com:30938/acce/	😇 🏠 🔍 Search
IBM Administrative Console for Content F	Nationm Engine	
	Welcome to IBM A Content Platform E	dministrative Console for ingine
	User name:	
	Log In	IBM.
	excidentia. Jana and all Jano based trademative attilizates. The Chudie Obtide In Technology indud conjunction with this application. This Program is 1 Program. This Tomes agreement may be after to %Exc. BML Licenser's Application, or provided as a %Exc. BML Licenser's Application, or provided as a	Tops are trademarks of BM Corporation, registered in many juriadicions of Tops are trademarks or registered trademarks of Onicia and/or to determin is subjects to anticide of use tones and can only be used in contract under the terms of the loanes agreement accentracying the code of a Program directly tolder or theory leftering and "Loanes" or printed loanes agreement. Please read this agreement servicity before also the Program or agree to these terms.

- \_\_\_\_d. Log in by using p8admin for User name and passw0rd for Password. Click Log In.
- \_\_\_\_e. After a successful login to the Administrative console, verify that the Domain configuration page is displayed. This confirms the successful ACCE deployment.

IBM Adr	ninistrative Co	anso X	+															
€ → (	° @		() master.cp	4a.com	30	093	8/ac	cce/								•	6	Ð
IBM Administ	rative Console fo	r Content P	atform Engine															
1 New Do	main																	
< Back	Next > F	inish [	Cancel															
resource, and	d each FileNet	P8 serve	ping of resourc r, belongs to on m to this step to	ily one do	oma	ain.	AF	FileN										
After you clic	k Next, you ca	nnot retu	m to this step to	o change	the	e ni	ame.	8										
• Name : d	2																	
System	User name : 12																	
System	User password	iii																
• Confirm	password :			-													Ē	
Choose I	key manageme	ent :			P		e def nfigu		nana	gem	ient	2						

- \_\_\_\_3. Connect to the Content Engine Ping Page (CE Ping page)
  - \_\_\_\_a. Use the same the node port for the CPE container that you used before. For CE Ping Page URL, you can use either http://master.cp4a.com:<http node port>/ FileNet/Engine or https://master.cp4a.com:<https node port>/FileNet/Engine.
  - \_\_\_\_b. In the browser, enter the following URL:

https://master.cp4a.com:<https NodePort>/FileNet/Engine

\_\_\_\_c. Verify that the CE Ping Page is displayed in the browser.

Content Engine Startup	Cont × +						
-) → ♂ @	(i) master.cp4	4a.com: 30938/FileNet/Engine	… ☺ ☆	Q, Search	III\		۲
🍇 Content Engine St	artup Context (Ping	Page)					
Key			Value				_
Local Host	cpe-lab-ibm-dba-co	ntentservices-5dc55857bb-2pn57					
Start Time	Tue Nov 05 13:41:	32 UTC 2019					
Product Name	P8 Content Platform	n Engine - 5.5.3.0					
Build Version	dap553.1500						
Startup Message	P8 Content Platform 5dc55857bb-2pn57	n Engine Startup: 5.5.3.0 dap553.1500 Сорут 7	ight IBM Corp. 2003, 2019 Al	l rights reserved on cpe-lab-i	bm-dba-conten	tservic	:05-
Operating System	Linux 3.10.0-1062.	4.1.el7.x86_64					
Available Processors	1						
Classpath	/opt/ibm/wlp/bin/to	ols/ws-server.jar:/opt/ibm/wlp/bin/tools/ws-java	agent.jar:/opt/ibm/wlp/bin/tooi	ls/ws-javaagent.jar			
JDBC Driver	IBM Data Server D	river for JDBC and SQLJ 4.22.29					
Јум	java.vm.vendor java.vm.name java.runtime.versio java.runtime.name java.vm.version java.vm.info java.fullversion	IBM Corporation IBM J9 VM on 8.0.5.35 - pxa6480sr5fp35-20190418_01(S Java(TM) SE Runtime Environment 2.9 JRE 1.8.0 Linux amd64-64-Bit Compressed 16677d7 IBM - 72459d3 8.0.5.35 - pxa6480sr5fp35-20190418_01(S (IT enabled, AOT enabled) Open[9 - 77763	References 20190417_414854 R5 FP35) JRE 1.8.0 Linux amo	164-64-Bit Compressed Refer			

- \_\_\_\_4. Connect to the Content Engine Health Page (CE Health page)
  - \_\_\_\_a. Use the same the node port for the CPE container that you used before. For CE Health Page URL, you can use either http://master.cp4a.com:<http node port>/ P8CE/Health or https://master.cp4a.com:<https node port>/ P8CE/Health.
  - \_\_\_\_b. In the browser, enter the following URL:

https://master.cp4a.com:<https NodePort>/P8CE/Health

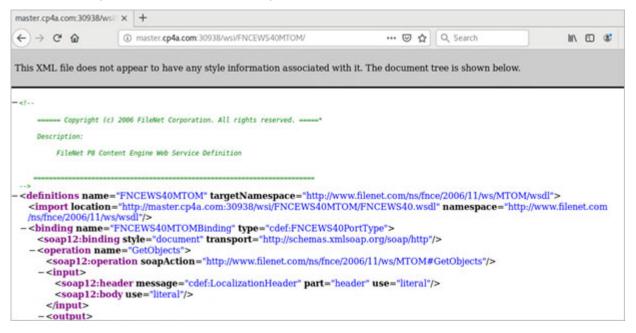
\_ c. Verify that the CE Health Page is displayed in the browser.

FileNet Content Engine	× +
← → ♂ ŵ	(i) master.cp4a.com:30938/P8CE/Health
IBM FileNet Content Manage	
💱 CE System Health	
CE Instance: []	
Location: Home	
Domain	
Ø Global Configuration D	atabase
Ø Directory Configuration	nds: [0]
PE Connection Points:	(0)
PE Isolated Regions: [0	01
Fixed Content Devices:	[0]
Resources:	
Object Stores: [0]	
Storage Areas: [0]	
Gontent Cache Areas:	[0]
Sites:	
Ø Sites: [0]	

- \_\_\_5. Connect to the Content Engine Web Service (CE WS)
  - \_\_\_\_a. Use the same the node port for the CPE container that you used before. For CE WS URL, you can use either http://master.cp4a.com:<http node port>/wsi/FNCEWS40MTOM/ or https://master.cp4a.com:<https node port>/wsi/FNCEWS40MTOM/.
  - \_\_\_\_b. In the browser, enter the following URL:

https://master.cp4a.com:<https NodePort>/wsi/FNCEWS40MTOM/

c. Verify that the CE WS is displayed as an XML in the browser.



- 6. Close all open windows. Before moving to the next exercise, it is a good idea to close all open windows and sessions.
  - \_\_\_\_a. Enter exit in the terminal to close it. If you had multiple terminal windows open close all of them
  - \_\_\_\_b. Close the Firefox browser.
  - \_\_\_\_\_c. Close any other open windows, including any text editors.
  - \_\_\_\_d. Close the RDP console window or the browser window that was used to work with the Master VM.

You now completed the successful deployment of the CPE container and verified the connectivity and access to CPE. You do not do any CPE development or any other work by using the CPE container. That is the task of a FIIeNet P8 Content Platform Engine developer or FIIeNet P8 Content Platform Engine Administrator. For FIIeNet P8 Content Platform Engine development related training refer to the IBM Training site. This concludes this exercise.

# End of exercise

# Exercise 3. Administering the IBM Cloud Pak for Automation containers

## **Estimated time**

02:00

## Overview

In this exercise, you do some basic administration and management of the installed containerized IBM Cloud Pak for Automation products that are deployed on the Red Hat OpenShift environment.

# Objectives

After completing this exercise, you should be able to:

- Explore the Red Hat OpenShift container (RHOCP) web console for container management
- Examine the available open source monitoring options metrics, alerts, and dashboards
- Scale an application deployment by using OpenShift
- Monitor containers by using probes

#### Introduction

The IBM Cloud Pak for Automation (CP4A) offers a software platform to develop, deploy, run, and manage your digital business automation projects by using its capabilities. In this exercise, you administer the containers.

Management of containerized products is an extensive area. In this exercise, you get introduced to some important administration areas of container management by using OpenShift and learn some key basic skills that are required by an administrator.

## Requirements

- Availability of the lab environment that consists of three Red Hat Enterprise Linux V7.7 virtual machines (VMs) with Red Hat OpenShift (RHOCP) 3.11 installed.
- Completion of either Exercise 1 or Exercise 2 or both.

#### Virtual machine configuration

Each virtual machine is configured with the following specification:

#### Table 9.

OS	CPUs	RAM	Disk
Red Hat Enterprise Linux (RHEL) 7.7	8	16 GB	300 GB
(64-bit)			

#### List of Servers with Roles

The virtual machines are listed below with their respective roles:

Table 10.

VM	RHCOCP Node type	IP address	Hostname
VM1- OCP master	Master	10.0.0.1	master.cp4a.com
VM2- OCP compute1	Compute	10.0.0.2	compute1.cp4a.com
VM3- OCP compute 2	Compute	10.0.0.3	compute2.cp4a.com

#### **Software Requirements**

The following packages are downloaded to the Master node:

Table 11.

Software	Folder name
IBM Cloud Pak for Automation images	/root/labfiles/cp4a

#### **User IDs and Passwords**

The following table contains a list of User ID and password information that is required for this exercise:

Table 12.

Entry Point	User ID	Password
OpenShift web console:	admin	passw0rd
https://master.cp4a.com:8443		
or		
https://console.cp4a.com:8443		
Red Hat Linux VM	root	passw0rd



In this exercise, you work with the existing odm-lab and cpe-lab projects that you created in Exercise 1 and Exercise 2. You also work with containers from the odm-lab project that you deployed in Exercise 1.

**If you skipped Exercise 1 and did Exercise 2 only,** then you can use the cpe-lab project to do all your work in this Exercise 3. You can also use the container from the cpe-lab project instead of the containers that are deployed in the odm-lab project. Several screen captures and references might not match exactly with your environment so you need to modify your steps to match your environment.

**If you skipped Exercise 2 and did Exercise 1 only**, then you can use the odm-lab project to do all your work in this exercise. Few screen captures and references might not match exactly with your environment so you need to modify your steps slightly to match your environment.

The basic management behavior is the same regardless of the project or pod type.

### Part 1: Explore the OpenShift web console for container management

Until now, you worked with the command-line interface (CLI) to interact with RHOCP. In this exercise, in addition to using the CLI, you also work with the OpenShift web console.

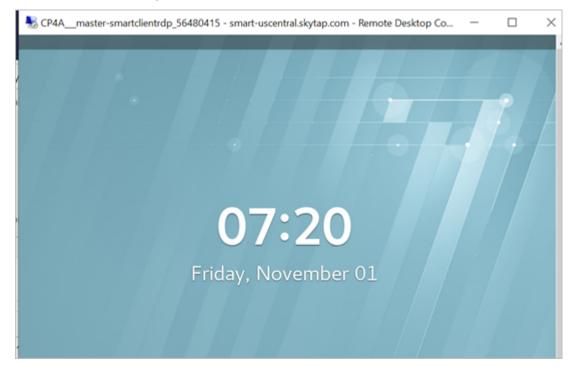
The OpenShift web console is a user interface accessible from a web browser. It is a convenient way to manage and monitor applications. Although CLI can be used to manage the lifecycle of applications, the web console presents several extra benefits, such as the state of a deployment, pod, service, and other resources, and providing information about system-wide events.

The web console runs as a pod on the master.

You can use the web console to monitor critical properties in your infrastructure, which include:

- The readiness or the status of a pod
- The availability of a volume
- The availability of monitoring metrics, alerts and dashboard
- The availability of an application by using probes
- 1. Verify that the lab environment is up and running as explained in the previous Exercises. If you completed either Exercise 1 or Exercise 2, then you are already familiar with the steps to take when your environment is in a Suspended or Powered Off state. If needed, you can also review those instructions again to make sure that your environment is in a Running state before continuing with this exercise.

- 2. Log in to the **Master** VM. Remember, that you work with the **Master** VM throughout the exercise. All the commands that you run in this exercise, you run on the **Master** VM.
  - \_\_\_\_a. If the time, and date displays on the desktop, click the Enter key anywhere on the desktop for the login screen to come up.



\_\_\_b. Click Not listed.



\_\_\_\_c. Enter root in the Username field and click Next.

\_d. Enter passw0rd in the Password field and click Sign In.



- \_\_\_\_e. You are now successfully logged in to the Master VM.
- 3. Log in to the Red Hat OpenShift cluster by using the command line
  - \_\_\_\_a. Double-click the Terminal shortcut on the desktop to open it.

Home	
Trasi	
P- Teminal	

b. In the terminal that opens, log in to the OpenShift cluster. The OpenShift console URL is https://console.cp4a.com:8443 and the username/password is admin/passw0rd.

oc login https://console.cp4a.com:8443 -u admin -p passw0rd

- \_\_\_\_ c. Verify that the Login successful message is displayed. It does not matter which project you are connected to right now. Next, you verify that things are running fine in the environment.
- \_\_\_\_4. Check the status of the nodes.
  - \_\_\_\_\_d. Verify that the master and the two compute nodes are in the ready state.

oc get nodes

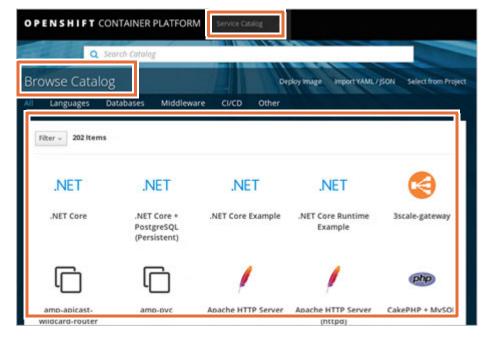
[root@master ~]# oc NAME	get nodes STATUS	ROLES	AGE	VERSION
computel.cp4a.com	Ready	compute	12d	v1.11.0+d4cacc0
compute2.cp4a.com	Ready	compute	12d	v1.11.0+d4cacc0
master.cp4a.com	Ready	infra,master	12d	v1.11.0+d4cacc0

- \_\_\_\_e. Verify that three nodes are listed and the status is Ready for all the nodes.
- \_\_\_5. Log in to the OpenShift web console
  - \_\_\_\_a. Start Firefox and click the OpenShift web console shortcut. Optionally, you can enter https://console.cp4a.com:8443 in the URL field and press the Enter key.
    - \_b. Enter admin in the Username field and passw0rd in the password field. Click Log In.

OPENSHIFT CONTAINER PLATFORM	
Usemame admin	Welcome to the OpenShift Container Platform.
Password ••••••	
Log In	

You are now ready to work with the web console.

- \_\_\_\_6. Explore the Service Catalog view.
  - \_\_\_\_a. The first time you log in to the web console you are in the Service Catalog view. Verify that the Browse Catalog page is open with several service templates displayed.



OpenShift Container Platform includes a service catalog, which is an implementation of the Open Service Broker API (OSB API) for Kubernetes. This allows users to connect

any of their applications that are deployed in OpenShift Container Platform to a wide variety of templates.

A template describes a set of objects that can be parameterized and processed to produce a list of objects for creation by OpenShift Container Platform. A template can be processed to create anything you have permission to create within a project, for example services, build configurations, and deployment configurations.

\_ b. These Catalog templates are grouped by categories such as Languages, Databases, Middleware, CICD, and other. Click the **Databases** tab.

nage	Deploy ima			log	owse Cata	Bro
	Other	CI/CD	Middleware	Databases	Languages	All
	Other	CI/CD	Middleware	Databases	Languages	All

\_\_\_\_\_c. Several database options are displayed. Click **Postgres**.

Bro	wse Cata	log			Deploy image Import YAML / JSON
All	Languages	Databases	Middleware	CI/CD Other	
	All	Mongo	Mysoc Mysqu	Postgres	Ad MariaDB

d. Click PostgreSQL.



e. The PostgreSQL configuration page is displayed. OpenShift Container Platform provides a container image for running PostgreSQL. This image can provide database services based on username, password, and database name settings provided by configuration. You can use this configuration in your existing projects. Click **Next**.

	×
Configuration	Results
pport of	
t storage. For more information about using this template, er/,	including OpenShift considerations, see
t supported. You must have persistent volumes available i	n your cluster to use this template.
	Cancel < Bacl Next >
	2 apport of t storage. For more information about using this template, er/.

\_\_\_\_f. In the template configuration page, select the odm-lab project if you did Exercise 1. Otherwise, select cpe-lab project. Leave the remaining defaults and click **Create**.

stgreSQL			
Information	Configuration	Results	
Add to Project odm-lab			×
Memory Limit 512MI Maximum amount of memory the container can use.			~
Namespace			
openshift			~
The OpenShift Namespace where the ImageStream res	ides.		
postgresql		_	5

g. A message is displayed that PostgreSQL is created successfully. While this portion of the creation is successful, it fails, as you see later. The purpose of these steps is to demonstrate how easy it is to add a new template from the service catalog and then show how to investigate the failed pod. In a later step, you view the failed status and explore the events that are generated for the PostgreSql pod. Click **Close**.

stgreSQL		
Information	Configuration	Results
0	3	0
PostgreSQL h	s been created in <b>odm-lab</b> succes	sfully.
Continue to the project overview		
	ce(s) have been created in your project: post	gresql.
	ce(s) have been created in your project: post	gresql.
Username: us	ce(s) have been created in your project: post	gresql.
The following service Username: us Password: fr Database Name: sa	ce(s) have been created in your project: post erA73 rGeNriJMWJeHiD spledb	gresql.
The following service Username: us Password: fr Database Name: sa	ce(s) have been created in your project: post prA73 GenrilMMUeHiD	gresql.
The following servi Username: us Password: fi Database Name: sa Connection URL: po	ce(s) have been created in your project: post erA73 rGeNriJMWJeHiD spledb	

- \_\_h. Feel free to explore the other templates available in the service catalog.
- 7. Verify that the PostgreSql database pod throws an error.
  - \_\_\_\_a. Switch back to the terminal and check the current project for that session.

oc project

b. Make sure that the current project is the one that you used earlier for the configuration of the Postgresql service. Switch to that project if you need to. If you completed both Exercise 1 and Exercise, then you used odm-lab project in the earlier step.

oc project odm-lab

\_\_\_\_\_c. Check the pods for your project.

#### oc get pods

If you are in the odm-lab project, you see four pods for odm and two pods for Postgresql.

If it has been less than 10 minutes since you added Postgresql database to your project, then one of the Postgresql pods is in Ready 1/1 state. It is the pod that is attempting the deployment of the database. The second pod is in the pending state since it is still waiting for deployment to occur. That is why the state is still 0/1 and not 1/1 for the second Postgresql pod. The AGE column displays the time that lapsed since you added the Postgresql service. If it displays less than 10 minutes, then the state continues to be 0/1. Wait for the pod to fail with an error. For that to happen, the AGE column needs to get to at least 10 minutes for the Postgresql row.

DY STATUS	RESTARTS	AGE
Running	1	1h
Running	0	1m
Pending	Θ	1m
	Pending	Pending 0

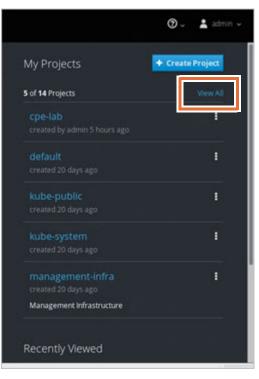
\_\_\_\_\_d. Check the pods one more time to see whether 10 minutes passed. The timeout value for this deployment is 600 seconds or 10 minutes. It takes 10 minutes from the time you added the service for the error to appear. You know 10 minutes passed when the Age displays at 10m or more. When that happens, only one Postgredql pod is listed and since it failed deployment the status is Error. You can now continue to the next step.

[root@master ~]# oc get pods				
NAME	READY	STATUS	RESTARTS	AGE
odm-lab-odm-decisioncenter-7f78864cb4-n2qzn	1/1	Running	1	1h
odm-lab-odm-decisionrunner-b6bf759fd-nqzkw	1/1	Running	1	1h
odm-lab-odm-decisionserverconsole-77c88fbb85-2h2h9	1/1	Running	1	1h
ada lab ada dasisiansasurrenting 90-1464849 mau90	3.73	Dunning		14
postgresql-1-deploy	0/1	Error	Θ	11m
Lioo (Sugarei - 1a				

- \_ e. Leave the terminal open and switch to the web console.
- \_\_\_\_8. Explore the Service Catalog view
  - \_\_\_\_f. Verify that you are still in the Service Catalog view of the web console.



\_\_\_\_g. The right pane displays the projects that you have permission to work with. Since admin is the cluster administrator, all projects are listed. Click **View All** to view all the projects in this cluster.



- \_\_\_\_h. In the My Projects page that opens, scroll down and click **odm-lab**. If you did not complete the odm-lab project in Exercise 1, then open the cpe-lab project that you created in Exercise 2.
- i. Verify that the current view switches from the **Service Catalog** view to the **Application Console** view.





#### Reminder

The steps below show the pods for the odm-lab project. If you use the cpe-lab project, then the screen captures do not match exactly with your environment. You need to modify the steps to match your project.

- 9. Explore the **Application Console** view in the web console.
  - \_\_\_\_a. When you click a project, the web console provides an overview of your project. The **Overview** tab is selected by default and provides a high-level view of the current project. It displays the name of the services and their associated pods that are running in the project. Verify that the ODM pods are displayed. (If you opened the cpe-lab project, you see only the CPE pod). You might need to scroll down the browser to view all the pods.

OPEN	O P E N S H I F T CONTAINER PLATFORM Application Console 🗸 🖉 🗸 🛓 admin						
≡	odm-lab		Q Search Catalog Add to Project ~				
<b>8</b> 0	rerview	Name  V Filter by name	Ust by Application ~				
<b>So</b> Ap	plications >	appucation odm-lab-ibm-odm-prod					
	ilds >	<ul> <li>&gt; odm-lab-odm- decisioncenter, #1</li> </ul>	1 pod I				
(신 Re	sources >	DEPLOYMENT	0				
🛋 Sta	orage	> odm-lab-odm- decisionrunner, #1	1 pod I				
Ф м	onitoring	<ul> <li>DEFLOYMENT</li> <li>odm-lab-odm- decisionserverconsole, #1</li> </ul>	1 pod I				
))) Ca	talog	> odm-lab-odm- decisionserverruntime #1	1 pod E				

b. If you scroll further down, you see the failed postgresql pod that you just added to the project. If you do not see the error for postgresql, then it is trying to re-create the deployment. The timeout value for this deployment is 600 seconds or 10 minutes. It takes 10 minutes from the time you added the service for the error to appear.

>	odm-lab-odm- decisionrunner, #1		1 pod	:
>	odm-lab-odm- decisionserverconsole, i	и	() pod	ı
>	DEPLOYMENT odm-lab-odm- decisionserverruntime,	e1	() pod	ı
PLICATIO	on gresql-persistent			
OSLE	gresqi-persisterit			

\_\_\_\_\_c. Click the **Applications** tab. The Applications tab provides access to deployments, pods, services, and routes. It also gives access to Stateful Sets, a Kubernetes feature that provides a unique identity to pods for managing the ordering of deployments.

		*
🚳 Overview		Applications
& Applications	*	Deployments Stateful Sets
😂 Builds	3	Pods Services
伦] Resources		Routes

 d. Click Application > Deployments to view the deployments for the odm-lab project. Once again, you see the four rows for ODM container deployment and one for the failed postgresql deployment.

eployments Learn More	æ				
Filter by label					Add
eployment Configs					
Name	Last Version	Status		Created	Trigger
				76 minutes and	Config changes
postgresql	#1	× Faile	ed	26 minutes ago	Config change
postgresql Deployments Name	#1 Last Ve		ed Replicas	Created	Strategy
eployments			-		
eployments Name	Last Ve		Replicas	Created	Strategy
Deployments Name odm-lab-odm-decisioncenter	Last Ve		Replicas 1 replica	Created 7 hours ago	Strategy Rolling update

\_\_e. Click Application > Pods to view the Pods for the odm-lab project. All the pods have a Running status except for the postgresql pod. All the ODM pods are in a Ready state as indicated by a value of 1/1. As an Administrator, it is a good idea to check the pods and to confirm their status and state. If any pods are failing or the ready state is 0/1, as in the postgresql pod, then you know that something might be broken and needs your attention.

ilter by label				Add
Name	Status	Containers Ready	Container Restarts	Age
postgresql-1-deploy	× Error	0/1	0	34 minutes
odm-lab-odm-decisioncenter-7f78864cb4-kgjmb	3 Running	1/1	0	7 hours
odm-lab-odm-decisionrunner-b6bl759fd-h7p67	C Running	1/1	0	7 hours
odm-lab-odm-decisionserverconsole- 77c88fbb85-9pbw4	C Running	1/1	0	7 hours
odm-lab-odm-decisionserverruntime- 78c44b4547-zsgrj	2 Running	1/1	0	7 hours

Recall the CLI command **oc get pods** that you ran to check the status of the pods. The output of that command is similar to the one from the web console.

\_\_\_\_\_f. Click **Builds > Images**.

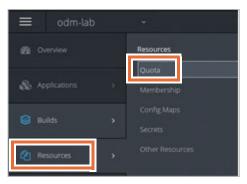
≡ odm-lab	. *
2 Overview	Builds
\delta Applications 🔹	Builds Pipelines
😫 Builds	Images

\_\_\_\_\_g. Verify that five Image Streams are listed. If you recall, in Exercise 1, you ran the docker push command to push the ODM images to the OCP docker repository. Similarly, you also did a docker push for the CPE image in Exercise 2. That image stream is in the cpe-lab project and is not visible here in the odm-lab project. An image stream and its associated tags provide an abstraction for referencing container images from within the OpenShift Container Platform. By using the image stream and its tags, you can see what images are available and ensure that you are using the specific image that you need even if the image in the repository changes. Image streams do not contain actual image data, but present a single virtual view of related images, similar to an image repository.

Filter by label			Add
Name	Docker Repo	Tags	Updated
dbserver	docker-registry.default.svc:5000/odm-lab/dbserver	8.10.2.0-amd64	8 hours ago
odm-decisioncenter	docker-registry.default.svc:5000/odm-lab/odm-decisioncenter	8.10.2.0-amd64	8 hours ago
odm-decisionrunner	docker-registry.default.svc:5000/odm-lab/odm-decisionrunner	8.10.2.0-amd64	8 hours ago
odm-decisionserverconsole	docker-registry.default.svc:5000/odm-lab/odm- decisionserverconsole	8.10.2.0-amd64	8 hours ago
odm-decisionserverruntime	docker-registry.default.svc:5000/odm-lab/odm- decisionserverruntime	8.10.2.0-amd64	8 hours ago

If you used the cpe-lab project, then you see one image stream.

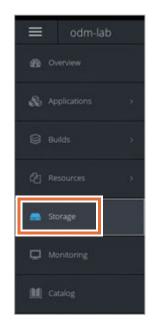
\_\_\_\_h. Click **Resources > Quota**.



\_\_\_\_i. The resource quotas and limit ranges for the project are displayed. No quotas or limit ranges are defined for this project. A resource quota provides constraints that limit aggregate resource consumption per project. It can limit the quantity of objects that can be created in a project by type, and the total amount of compute resources that may be consumed by resources in that project. A limit range enumerates compute resource constraints in a project at the pod and container level, and specifies the amount of resources that a pod or container can consume. Both of these constraints are defined by the cluster administrator to manage project resources and is done in the cluster console that you explore later.

Quota	Learn More IP
Limits resour	ce usage within this project.
There are no	resource quotas set on this project.
Limit R	ange
Defines mini	num and maximum constraints for runtime resources such as memory and CPU
There are no	limit ranges set on this project.

\_\_\_j. Click the **Storage** tab.



k. The Storage tab provides access to storage requests. There is one entry of the persistent volume claim (PVC) for the Postgresql database that you added before.
 However, the status is in pending status which indicates a possible issue with the PVC.

ilter by label				Add
Name	Status	Capacity	Access Modes	Age
postgresd	E Pending		RWO (Read-Write- Once)	an hour

If you used the cpe-lab project, then you see several PVs since you created them in Exercise 2.

\_\_\_\_I. Recall that you created several persistent volume claims (PVC) for the cpe-lab project. To verify that you can view those in this console, switch to the cpe-lab project by clicking the project list and selecting cpe-lab.

OPEN	SHIFT CONT	AINER PL	ATFORM
≡	odm-lab		
æ	cpe-lab		rage 🗔
	default		
🗞 Ap	kube-public		
	kube-system		
S BU	management-infra		
(Å) Re			
	onenchilt concolo		

\_\_\_\_m. As you saw earlier, clicking a project, displays the Application overview page by default and lists the single CPE pod.

≡	cpe-lab	¥	<b>Q</b> Search Catalog	Add to Project 🛩
80	Overview	Name v Filter by nome		List by Application ~
æ		APPLICATION ibm-dba-contentse	rvices	
9		> DEPLOYMENT cpe-lab-lbm-dba	-contentservices, #1	1 pod i
ch	Resources >			

\_ n. Click the **Storage** tab for the cpe-lab project. This time you notice several persistent volumes claims listed. You created these PVC by using the command line in the CPE exercise. Since you also created persistent volumes that time, the PVC are bounded and ready for use.

Storage Learn More @				Create Storag
Filter by label				Ad
Name	Status	Capacity	Access Modes	Age
cpe-lab-icp-bootstrapstore-pvc using storage class cpe- lab-icp-bootstrapstore	<ul> <li>✓ Bound to</li> <li>volume cpe-lab-</li> <li>icp-</li> <li>bootstrapstore</li> <li>-pv</li> </ul>	1 GiB	RWX (Read- Write-Many)	13 hours
cpe-lab-lcp-cfgstore-pvc using storage class cpe-lab-lcp- cfgstore	<ul> <li>Bound to</li> <li>volume cpe-lab-</li> <li>icp-cfgstore-pv</li> </ul>	1 GIB	RWX (Read- Write-Many)	13 hours

You can create new PVC by clicking Create Storage in the web console instead of using the CLI. It is a matter of personal preference and expertise.

\_\_\_\_\_o. Click the Monitoring tab. The Monitoring tab provides access to build, deployment, and pod logs. It also provides access to event notifications for the various objects in the project.

cpe-lab	<ul> <li>Q Seero</li> </ul>	h Cotolog Add to Project ~
Overview	Monitoring	Events All memory     View Details
Applications >	All w Filter by nome	urces Pulled Constance image 'tooker-registry.default.soc an hour ang
Builds >	Pods	Created
Resources >	contentservices     CRunning     contentservices     CRunning     contentservices     contentservices	poducpe-lab-item-dba-contentservices-5d Created container an hour ago
Storage	Deployments	Started pods/cpe-lab-ibm-dba-contentservices-5d Started container
Monitoring	contentservices- succession	An hour ago Killing odd/cze-lub-it/m-dta-contention/ices-5d_
Catalog	manual in constants.	

\_ p. Examine the Events page that opens to the right of the page. Depending on the state of the pods and your environment you might see some events. If you recently started the environment, the cpe and odm containers would be started recently too and there might be some events indicating that. Depending on which project you used to create the PostgreSql service, the events vary between the projects. If you created the Postgresql service in the odm-lab project, then you do not see the error event here in the cpe-lab project. No errors for either the odm or cpe containers exist. Many objects, such as pods and deployments, have their own Events tab as well, which shows events that are related to that object. You explore those events later.

A comprehensive list of events in the OpenShift Container Platform 3.11 is available at https://docs.openshift.com/container-platform/3.11/dev\_guide/events.html

\_ q. Switch back to the odm-lab project and click Monitoring again. This time notice several events in the Events section that are related to the Postgresql service.

≡ odm-lab		Ŷ			Q Search Catalog		Add to Project 🛩
2 Overview	_	Mon	itoring			Θ	Events Atwarring View Details
& Applications	>	All v	Filter by name		Hide older resources	6	
😂 Builds	>	Pods				_	3 minutes ago 312 times in the last hour
街 Resources	>	>	odm-lab-odm- decisioncenter- 7f78864cb4-kgjmb created 8 hours ago	3 Running - 1/1 ready	cdm-lab/odm- decisioncenter 47f1a17	▲	Failed Scheduling pods/postgresql-1-7xkg5 pod has unbound PersistentVolumeClaims (r an hour ago 194 times in the last hour
<ul> <li>Storage</li> <li>Monitoring</li> </ul>		>	odm-lab-odm- decisionrunner- b6bf759fd-h7p67 created 8 hours ago	C Running - 1/1 ready	<ul> <li>odm-lab/odm- decisionrunner a5887fa</li> </ul>	0	Successful Delete rc/postgresql-1 Deleted pod: postgresql-1-7xkg5
III] Catalog		>	odm-lab-odm- decisionserverconsol e-77c88fbb85-9pbw4 created 8 hours ago	C Running - 1/1 ready	<ul> <li>odm-lab/odm- decisionserverconsole fe32f12</li> </ul>	0	an hour ago Replication Controller Scaled dc/postgresql Scaled replication controller "postgresql-1" fr

- \_\_\_\_r. The postgresql failed binding events are listed in the project in which postgresql service is added. Depending on which project you used to create the Postgresql service, you see the failed event only in that project. These failed events are caused by the failed postgresql deployment, which is part of the project you used. Click the **Failed Binding** event. Optionally, you can also click events to see the details.
- \_\_\_\_s. The details show the pending status of postgresql. Click the Events tab.

Storage i postgresql	
postgresql wattin	g for 1 GiB allocation, created an hour ago
app postgressipersi	stent template postgresql-persistent-template
Details Events	
Status:	
Status: Requested Capacity:	Yending 1 GiB

t. The Events tab mentions the reason for the failed binding, which is missing the PV.

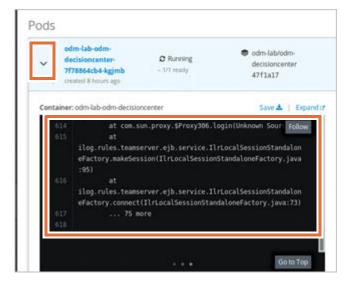
ipp sould	resql-persistent template postgresql-persistent-template
tails	vents
The Lot	sond Sort by Time - 1
Filter by key	Sorroy Line - 1
Time	Reason and Message
	Failed Binding

Reading the message, the cluster administrator knows how to resolve the problem. Since the administrator did not create any persistent volume, the persistent volume claim for PostgreSQL remains unbound. As a result, the PostgreSql pod stays in a pending status and eventually fails. To solve this error, the cluster administrator can create PVs using either the CLI or the cluster console that you explore next.

- \_\_\_\_10. Explore the events for the odm pod. (If you skipped the ODM exercise, then you can work with the cpe project and use the cpe pod for the steps below)
  - \_\_\_\_a. Click the Monitoring tab.
  - \_\_\_\_b. Click the right arrow to the left of the decision center pod (It is the first one).

≡	odm-lab	÷			Q Search Catalog		
😰 Overv	iew	Monit	oring			Θ	Events 🖌
🗞 Applik	ations >	All v	Filter by name		Hide older resources	()	Failed Bir persisten no persist
😂 Build:	•>	Pods					2 minutes 373 times
ද් Resou	irces >	>	odm-lab-odm- decisioncenter- 7f78864cb4-kgjmb created 8 hours ago	C Running - 1/1 ready	<ul> <li>odm-lab/odm- decisioncenter</li> <li>47f1a17</li> </ul>	◬	Failed Scl pods/pos pod has u an hour a
👼 Stora	<u>şe</u>		odm-lab-odm- decisionrunner-	C Running	odm-lab/odm-		194 times Successfi
🖵 Monit	oring	>	b6bf759fd-h7p67 created 8 hours ago	- 1/1 ready	decisionrunner a5887fa	0	rc/postgr Deleted p an hour a
[11] Catalo	28	>	odm-lab-odm- decisionserverconsol e-77c88fbb85-9pbw4 created 8 hours ago	C Running - 1/1 ready	<ul> <li>odm-lab/odm- decisionserverconsole f032f12</li> </ul>	(	Replicatio dc/postgr Graled rec

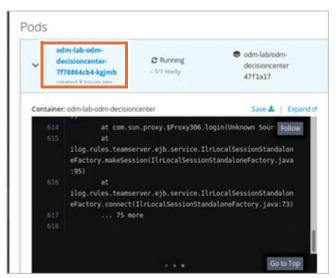
\_\_\_\_\_c. Clicking the right arrow, turns the direction of the arrow down and opens the decision center container log view.



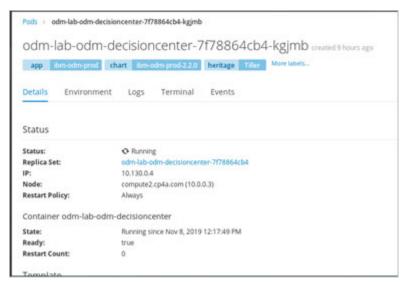
\_\_\_\_\_d. You can scroll up and down through the logs and examine them. You can also save the logs to your VM when you want to go through them in details by clicking the **Save** link.

~	odm-lab-odm- decisioncenter-         C Running         odm-lab/odm- decisioncenter           2778554cb4-kgimb         -1/1 ready         decisioncenter           created 8 hours ago         47f1a17
Contai	iner: odm-lab-odm-decisioncenter Save 🛓   Expan
	14 at com.sun.proxy.\$Proxy306.login(Unknown sour Fellow
30	15 at
	<pre>ilog.rules.teamserver.ejb.service.IlrLocalSessionStandalon eFactory.makeSession(IlrLocalSessionStandaloneFactory.java :95)</pre>
6	16 at ilog.rules.teamserver.ejb.service.IlrLocalSessionStandalon eFactory.connect(IlrLocalSessionStandaloneFactory.java:73)
	17 75 more

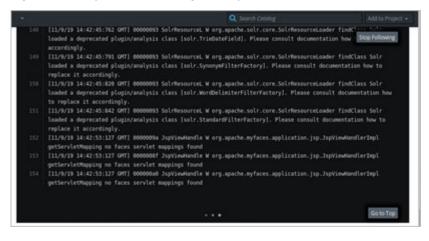
e. Click the odm-lab-decisioncenter link.



\_\_\_\_\_f. You are in the Pod Details view. Examine the details listed.

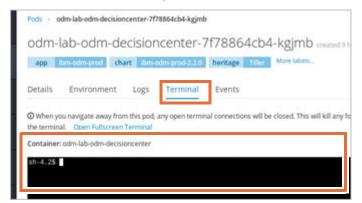


\_\_\_\_g. Click Logs. It displays the same logs that you saw before.



h. Click **Go to Top** at the bottom of the logs or scroll up to view the Terminal tab.

\_\_\_\_\_i. Click Terminal. A shell to the running Decision Center container starts.



\_\_\_\_j. Feel free to type few sample commands in the shell as a test.



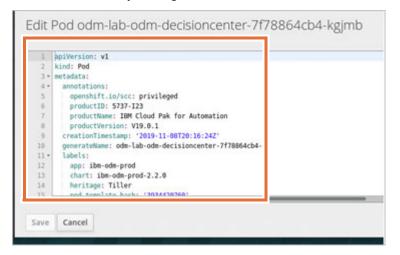
\_ k. Click **Details** again and this time scroll down to explore the template.

Containers	
odm-lab-odm-decisioncenter	
Image: odm-lab/odm-decisioncenter	
Ports: 9453/TCP (dc-port)	
■ Mount: odm-lab-odm-logging-volume /config/logging read-write	
Mount: lib-workarea-volume /opt/lbm/wlp/output/defaultServer/workarea read-write	
Mount: default-token-t7mls Nar/run/secrets/kubernetes.jo/serviceaccount read-only	
im CPU: 500 millicores to 2 cores	
im. Memory: 512 MIB to 4 GIB	
Readiness Probe: GET /decisioncenter/healthCheck on port dc-port (HTTPS) 10s delay, 10s timeout	
Liveness Probe: GET /decisioncenter/healthCheck on port dc-port (HTTPS) 300s delay. Ss timeout	
Volumes	
odm-lab-odm-logging-volume	
Type:	config map (populated by a config map)
Config Map:	odm-lab-odm-dc-logging-configmap
Key to File:	dc-logging → logging.xml
likaasekasaaaaluma	

\_\_\_ I. Click Actions > Edit YAML.



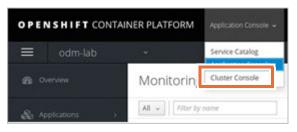
\_ m. The yaml file opens. If runtime changes are needed, they can be made here. Feel free to explore. Do not make any changes and click Cancel to close it.



\_ 11. Explore the **Cluster Console** view in the web console.

You must be a cluster administrator to access the Cluster Console. Since the admin user is the cluster administrator, you can log in to the Cluster Console.

\_\_\_\_a. Click the down arrow next to Application Console and then click the Cluster Console link.



\_\_\_\_b. You might be prompted to log in to the Cluster Console since it is secured for a cluster admin access only. If prompted to log in, use admin / passw0rd credentials to log in.

\_\_\_\_\_c. Verify that a list of all the Projects for the cluster is displayed. Remember, that since you are in the Cluster console, you can view all the artifacts in the cluster, so all the projects are listed, not just the odm-lab project, or the cpe-lab project.

OPENSHIFT CONTAINER PLATFORM Cluster Console ~				
🕈 Home	Projects			
Workloads	Create Project			
+9 Networking	NAME 1	STATUS		
Storage	¢ 🔞 cpe-lab	Active		
🗟 Builds	🗢 🙉 default	Active		
S Builds	🔅 🛞 kube-public	Active		
Monitoring	0 🔞 kube-system	Active		
🌣 Administration	🗘 🤫 management-infra	Active		
Projects	odm-lab	Active		
Namespaces Nodes	© 🙉 openshift	Active		
Service Accounts	🗢 🔞 openshift-console	Active		

\_\_d. Click Workloads > Pods and then select all Projects under the Project list to view all the pods for the cluster. The administrator can get an overview of the status of all the pods that are either running, terminating, crashing and so on in the environment and then take any appropriate corrective steps.

OPENSHIFT CONTA	INER PLATFORM Cluster Conso	le 🗸		
🕈 Home	Project: all projects 🗸		8 8	
Workloads     Pods	Pods Create Pod			
Deployments Deployment Configs				
Stateful Sets Secrets	35 Running 0 Pending	0 Terminating	0 CrashLoopBackOff	0 Completed
Config Maps	NAME †	NAMESPACE	POD LABELS	
Cron Jobs Jobs Daemon Sets Replica Sets	🜣 🍘 alertmanager-main-0	NS openshift- monitoring	alertmanager=m app=alertmanag controlle =alen statefulset.kub	er tmanager
Replication Controllers	🌣 😰 alertmanazer-main-1	NS openshift-	alertmanagerim	ain

\_\_\_\_e. Feel free to click the Deployments, Deployment Configs, Stateful Sets, Secrets, and ConfigMaps under **Workloads** and examine the content that is listed. Also, note the scope of the Project that is displayed at the top; it says all projects. This means that you have a view on every object and artifact in the cluster \_\_\_\_f. Scroll down on the left and click **Storage > Persistent Volumes**. The list displays the persistent volumes that you created in the CPE exercise. OpenShift provides both static and dynamic storage management for container data by using the Kubernetes concepts of Persistent Volumes and Persistent Volume Claims. Persistent volumes are OpenShift resources that are created and destroyed only by an OpenShift administrator. A persistent volume resource represents network-attached storage accessible to all OpenShift nodes. The PVs listed here can be requested and used by Persistent Volume Claims of several projects. If any PV is missing or needs edit, the administrator can then create a new PV by clicking Create Persistent Volume.

	Cron Jobs Jobs Daemon Sets Replica Sets Replication Controllers HPAs	Persistent Volumes Create Persistent Volume NAME 1	LABELS
-0	Networking Services Routes Ingress Network Policies	Competablicp-bootstrapstore-pv     Competablicp-cfgstore-pv     Competablicp-filestore-pv     Competablicp-filestore-pv     Competablicp-filestore-pv	No labels No labels No labels No labels
•	Storage Persistent Volumes Persistent Volume Claims Storage Classes	Control Contro Control Control Control Control Control Control Control Control Co	No labels No labels No labels

- g. Clicking Monitoring displays links for Alerts, Metrics, and Dashboards that can be configured in the OpenShift Cluster. Do not click any of these links as you explore them separately in the next section.
- \_\_\_h. Expand Administration and click Resource Quotas.
- \_\_\_\_\_i. No Resource Quotas are defined. In an earlier step, you explored the Quota and Limit Ranges for the odm-lab project and it did not display any values. It is because no Resource Quotas were defined by the administrator. Click Create Resource Quota.

Project: all projects 🗸	
Resource Quotas	
Create Resource Quota	
	No Resource Quotas Found

\_\_\_\_j. The resource quota can be created for a specific project only and not for all project at the same time. When you click Create Resource Quota, the Project changes to default. You can optionally select which project you want to restrain. In the Create Resource Quota that opens, explore the values that you can configure and limit.

1	apiVersion: v1
2	kind: ResourceQuota
-	metadata:
1	name: example
4	namespace: default
ş +	spec:
7 -	hard:
	pods: '4'
	requests.cpu: '1'
1	requests.memory: 1Gi
1	limits.cpu: '2'
	limits.memory: 261

k. Click Cancel when done, do not save any changes

## Part 2: Examine the available open source monitoring options

The OpenShift metrics subsystem enables the capture and long-term storage of performance metrics for an OpenShift cluster. Metrics are collected for nodes and for all containers that are running in each node.

The metrics subsystem is deployed as a set of containers based on the following open source projects:

#### Heapster

Collects metrics from all nodes in a Kubernetes cluster and forwards them to a storage engine for long-term storage. Red Hat OpenShift Container Platform uses Hawkular as the storage engine for Heapster. The Heapster project was incubated by the Kubernetes community to provide a way for third-party applications to capture performance data from a Kubernetes cluster.

#### **Hawkular Metrics**

Provides a REST API for storing and querying time-series data. The Hawkular Metrics component is part of the larger Hawkular project. Hawkular Metrics uses Cassandra as its data store. Hawkular was created as the successor to the RHQ Project and is a key piece of the middleware management capabilities of the Red Hat CloudForms product.

#### Hawkular Agent

Collects custom performance metrics from applications and forwards them to Hawkular Metrics for storage. The application provides metrics to the Hawkular Agent. The Hawkular OpenShift Agent (HOSA) is a technology preview features and is not installed by default Red Hat does not provide support for technology preview features and does not recommend using them for production.

#### Cassandra

Stores time-series data in a non-relational, distributed database.

#### **Prometheus and Grafana**

In addition to the open source projects mentioned above, OpenShift Container Platform ships with a pre-configured and self-updating monitoring stack that is based on the Prometheus open source project and its wider ecosystem. It provides monitoring of cluster components and ships with a set

of alerts to immediately notify the cluster administrator about any occurring problems and a set of Grafana dashboards. The Prometheus Operator (PO) creates, configures, and manages Prometheus and Alertmanager instances. It also automatically generates monitoring target configurations based on familiar Kubernetes label queries. OpenShift Container Platform Monitoring ships with a Prometheus instance for cluster monitoring and a central Alert manager cluster.

The OpenShift metrics subsystem works independently of other OpenShift components. Red Hat OpenShift Container Platform does not force an organization to deploy the full metrics subsystem. If an organization already has a monitoring system and wants to use it to manage an OpenShift cluster, there is the option of deploying only the Heapster component and to delegate long-term storage of metrics to the external monitoring system.

Configuring these metrics is beyond the scope of this exercise. As an Administrator, one needs to be careful in how these monitoring capabilities are configured as it can impact the performance of the cluster.

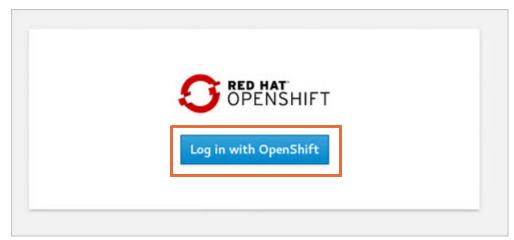
- \_\_\_\_1. Explore Monitoring metrics.
  - \_\_\_\_a. Make sure that you are in the Cluster Console view of the web console.



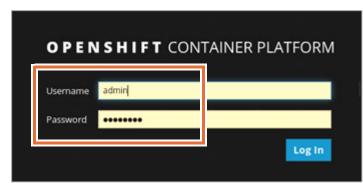
\_\_\_\_b. Click Monitoring > Metrics.



\_\_\_\_c. In the new browser tab that opens, click Log in with OpenShift.



\_\_\_\_d. Enter admin in the Username field and enter passw0rd in the Password field. Click Log In.



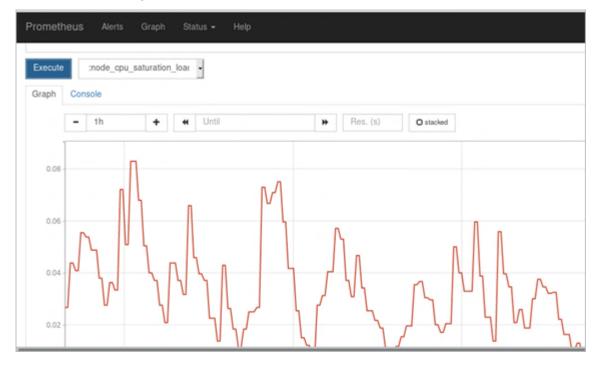
\_\_\_\_e. Leave the default options selected and click **Allow selected permissions** to give access to the admin account.

Rec	uested permissions
	user:info Read-only access to your user information (including username, identities, and group membership)
•	user:check-access Read-only access to view your privileges (for example, "can I create builds?")
You	will be redirected to https://prometheus-k8s-openshift-monitoring.cp4a.com/oauth/callback

\_\_\_\_f. In the page that opens, select node.cpu\_saturation\_load1 and click Execute.

Prometheu	s Alerts Graph Status <del>×</del> Help
O Enable query hi	story
:kube_pod_	info_node_count:
Execute	:kube_pod_info_node_cou
Graph Co	- insert metric at cursor -
Element	:node_cpu_saturation_load1:
kube_pod, 4	nove-cpu_ousaoon.avg.m
	:node_disk_saturation:avg_irate
Add Graph	:node_disk_utilisation:avg_irate
	:node_memory_MemFreeCachedBuffers:sum
	:node_memory_MemTotal:sum
	:node_memory_swap_io_bytes:sum_rate
	:node_memory_utilisation:
	:node_net_saturation:sum_irate

- \_\_\_\_g. Click the Graph tab.
  - h. Examine the graph that opens in the Graph tab.



- \_\_\_\_\_i. Click any specific point on the graph to view the CPU saturation load for that moment.
- \_\_\_\_j. Next, select node.cpu\_utilization\_avg1 from the list and click Execute. See how the graph changes for the average utilization of the CPU.

k. Click Alerts from the menu at the top.



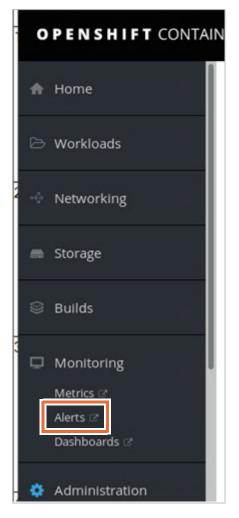
I. The Alert manager manages incoming alerts; this includes silencing, inhibition, aggregation, and sending out notifications through methods such as email, PagerDuty, and HipChat. Click the **DeadMansSwitch** under alerts. OpenShift Container Platform Monitoring ships with a dead man's switch alert to ensure the availability of the monitoring infrastructure. The **DeadMansSwitch** is a Prometheus alerting rule that always triggers. The Alert manager continuously sends notifications for the dead man's switch to the notification provider that supports this function. This also ensures that communication between the Alert manager and the notification provider is working. Several alerts are preinstalled by default.

### Alerts

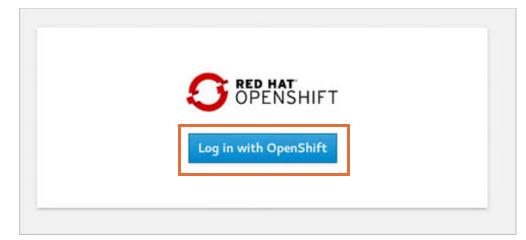
Show annotations		
DeadMansSwitch (1 active)		
<pre>alert: DeadMansSwitch expr: vector(1) labels:     severity: none annotations:     description: This is a DeadMansSwitch     is functional.     summary: Alerting DeadMansSwitch</pre>	meant to ensure that the entire	Alerting pipeline
Labels	State	Active Since
alertname="DeadMansSwitch" severity="none"	FIRING	2019-11-14 01:48:30.163677339 +0000 UTC
Annotations		
description This is a DeadMansSwitch meant to ensure that the		

\_m. Feel free to click the other menu options. For an explanation of all the alert rules, see Red Hat OpenShift documentation.

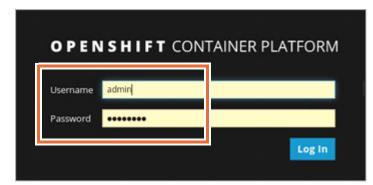
- \_\_\_\_2. Explore Monitoring alerts.
  - \_\_\_\_a. Switch back to the cluster console view tab and click **Monitoring > Alerts**.



\_\_\_\_b. In the new browser tab that opens, click Log in with OpenShift.



\_\_\_\_\_c. When the login page opens, enter admin in the Username field and enter passw0rd in the Password field. Click Log In.



\_\_\_\_\_d. Leave the default options selected and click **Allow selected permissions** to give access to the admin account.

Autho	orize Access	
Service a (admin)	account alertmanager-main in project openshift-monitoring	s requesting
Requested	permissions	
✓ user:i	nfo	
Read-o membe	nly access to your user information (including username, identities, and group rship)	
	check-access nly access to view your privileges (for example, "can I create builds?")	
You will be r	edirected to https://alertmanager-main-openshift-monitoring.cp4a.com/oauth/callback	
Allow se	lected permissions Deny	

\_\_\_\_e. In the page that opens, there are three tabs - Alerts, Silences, and Status.

The Alert manager handles alerts that are sent by client applications such as the Prometheus server. It takes care of duplicating, grouping, and routing them to the correct receiver integration such as email, PagerDuty, or OpsGenie. It also takes care of silencing and inhibition of alerts.

Silences are configured in the web interface of the Alert manager. Silences are a straightforward way to mute alerts for a given time. A silence is configured based on matchers, just like the routing tree. Incoming alerts are checked whether they match all the equality or regular expression matchers of an active silence. If they do, no notifications are sent out for that alert.

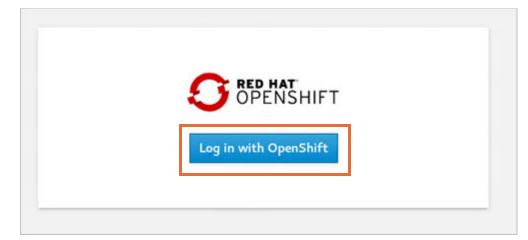
The Status displays the targets that are being monitored.

You do not do any Alert manager configuration.

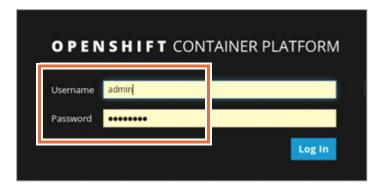
- \_\_\_\_3. Explore Monitoring Dashboards.
  - \_\_\_\_a. Switch back to the cluster console view tab and click **Monitoring > Dashboards**.

0	PENSHIFT CONTAIN
*	Home
Ъ	Workloads
\$	Networking
-	Storage
(3)	Builds
Q	Monitoring
	Metrics 🖉
	Alerts 🖻
	Dashboards 🖻
•	Administration

\_\_\_\_b. In the new browser tab that opens, click Log in with OpenShift.



\_\_\_\_c. When the login page opens, enter admin in the Username field and enter passw0rd in the Password field. Click Log In.



\_\_\_\_\_d. Leave the default options selected and click **Allow selected permissions** to give access to the admin account.

Sei	rvice account grafana in project openshift-monitoring is requesting	permission to
Req	uested permissions	
~	user:info	
	Read-only access to your user information (including username, identities, and group membership)	
	user:check-access	
	Read-only access to view your privileges (for example, "can I create builds?")	

\_\_\_\_e. Verify that the Home Dashboard page opens.

Ô	Home -			
+			Home Dashboard	
<b>≜</b> <b>∻</b>	Install Grafana	Create your first data source	Create your first dashboard	Add Users
5	Starred dashboards Recently viewed dashboards		Installed Apps None Installed. B Installed Panels	rowse Grafana.com

In addition to Prometheus and Alert manager, OpenShift Container Platform Monitoring also includes a Grafana instance and pre-built dashboards for cluster monitoring troubleshooting. The Grafana instance that is provided with the monitoring stack, along with its dashboards, is read-only.

\_\_\_\_f. Click **Home** at the upper left of the page.

<b>\$</b>	Home +	
+		Home Dashboard

\_\_\_\_g. Click the link for K8s / Compute Resources/Cluster to view the resources for your OpenShift cluster.

General
K8s / Compute Resources / Cluster
 K8s / Compute Resources / Namespace
 K8s / Compute Resources / Pod
 K8s / USE Method / Cluster
 K8s / USE Method / Node

h. The cluster resource page opens. Examine the CPU and memory requests by cluster.

K8s / Compute	e Resources / Cluster	• 🗰 🕸		O Last 1 hour Refre	sh every 10s Q
latasource prometheu	5 <b>•</b>				
Headlines					
CPU Utilisation	CPU Requests Co	CPU Limits Commi_	Memory Utilisation	Memory Requests	Memory Limits Co
3.93%	15.48%	39.4%	20.7%	12.11%	31.6%
СРИ					
.40		CPUI	Usage		
.30					
120					

\_\_\_\_i. Scroll down to view the requests broken down by namespace.

		Requests by Nam	espace		
lamespace	Memory Usage	Memory Requests	Memory Requests %	Memory Limits	Memory Limits %
penshift-sdn	366.03 MB	1.57 GB	23.27%		
dm-lab	2.09 GB	2.15 GB	97.53%	13.96 GB	15.00%
ube-system	956.19 MB				
penshift-web-console	12.75 MB	104.86 MB	12.16%		
penshift-monitoring	1.29 GB	1.05 GB	123.24%	629.15 MB	205.41%
lefault	54.98 MB	536.87 MB	10.24%		

- \_\_\_\_j. Feel free to continue to explore the grafana dashboard.
- \_\_\_\_4. Explore the Home dashboard. Now that you explored the Monitoring tab, there is one more dashboard in the cluster console that is of great interest to the Administrator.
  - \_\_\_\_\_a. Switch back to the Cluster Console tab and click **Home > Status**.

ēo	PENSHIFT CONTAI
	Home
	Status
	Events
ø	Workloads
-0	Networking

b. The cluster status page for all the projects is displayed and provides a high-level view of your cluster.

•	Home	Project: all projects 🗸			
s	Status Search Events	Cluster Status			Software Info
B	Workloads	Kubernetes API	OpenShift Console	Alerts Firing	Crashlooping Pods
-0 I	Networking	UP All good	UP All good	0 Alerts	0 Pods
-	Storage	Control Diago Status			
9 6	Builds	Control Plane Status API Servers Up	Controller Managers Up	Schedulers Up	API Request Success Rate
• •	Monitoring	100%	100%	100%	99%

The administrator can check the health of the cluster by examining this view. It shows the API server is up and all is good. The number of alerts being fired is listed here also along with any crashing pods.

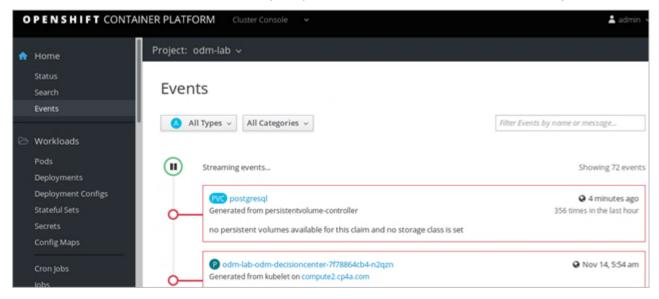
\_\_\_\_\_c. Scroll down to see the Capacity planning section. it displays the CPU Usage, Memory Usage, Disk Usage and Pod Usage. The administrator can use this data to investigate any problem areas in the cluster and address those issues.

100%	100%	100%	99%
Capacity Planning			
CPU Usage	Memory Usage	Disk Usage	Pod Usage

d. Click Home > Events on the left pane.



\_\_\_\_e. The Events page displays events that are being generated for all projects. If you switch to the odm-lab or cpe-lab project, you can see the failed events from Postgresql.



## Part 3: Scale an application

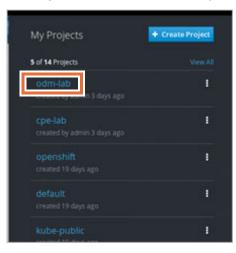
As part of managing application deployments, an administrator must be able to control the number of replicas of pods. Replication controller guarantees that the specified number of replicas of a pod are running always.

The replication controller instantiates more pods if pods are killed, or are deleted explicitly by an administrator. Similarly, it deletes pods as necessary to match the specified replica count, if there are more pods running than the desired count. Although Kubernetes administrators usually manage replication controllers directly, the recommended approach for OpenShift users is to manage a deployment configuration that creates or changes replication controllers on demand.

In this section, you use both the CLI and web console to view and manage replicas.

- \_\_\_\_1. Change the number of replicas for an application.
  - \_\_\_\_a. Switch to the **Service Catalog** view at the top.

\_ b. In the My Projects on the right, click the odm-lab project.



\_\_\_\_\_c. The view switches to the Application console view. Click **Applications > Pods** to view the pods for the project.

OPE	NSHIFT CO	NTAI	NER PLATFORM	Application Co	rsole ~
≡	odm-lab				
<b>e</b> 0			Applications		
8. 4	pplcations	,			
			Stateful Sets		od
😂 в			Services		sioncer
CE R					

- \_\_\_\_d. For the dm-lab project, there are four pods running and one failed postgresql pod. If you are using the cpe-lab project, then the number of pods varies.
- \_\_\_\_e. Leave the web console open and open a new terminal and login to the OpenShift cluster. The OpenShift console URL is https://console.cp4a.com:8443 and the username/password is admin/passw0rd.

oc login https://console.cp4a.com:8443 -u admin -p passw0rd

\_\_\_\_\_f. Check the current project being used in the cluster.

oc project

\_\_\_\_g. If the current project is cpe-lab, then switch to the odm-lab project.

oc project odm-lab

h. Check the status of the pods and compare the result with the one in the web console. The number of pods is the same.

oc get pods

[root@master ~]# oc get pods				
NAME	READY	STATUS	RESTARTS	AGE
odm-lab-odm-decisioncenter-7f78864cb4-kgjmb	1/1	Running	θ	9h
odm-lab-odm-decisionrunner-b6bf759fd-h7p67	1/1	Running	0	9h
odm-lab-odm-decisionserverconsole-77c88fbb85-9pbw4	1/1	Running	0	9h
odm-lab-odm-decisionserverruntime-78c44b4547-zsgrj	1/1	Running	0	9h
postgresql-1-deploy	0/1	Error	θ	3h
[root@master ~]#				

\_ i. Run the command with the -o wide option to view the internal IP address and the node of each running pod.

oc get pods -o wide

[root@master ~]# oc get pods -o wide						
NAME	READY	STATUS	RESTARTS	AGE	IP	NODE
NOMINATED NODE						
odm-lab-odm-decisioncenter-7f78864cb4-kgjmb	1/1	Running	0	9h	10.130.0.4	compute2.cp4a.com
<none></none>						
odm-lab-odm-decisionrunner-b6bf759fd-h7p67	1/1	Running	0	9h	10.129.0.4	compute1.cp4a.com
<none></none>						
odm-lab-odm-decisionserverconsole-77c88fbb85-9pbw4	1/1	Running	8	9h	10.130.0.3	compute2.cp4a.com
<none></none>						
odm-lab-odm-decisionserverruntime-78c44b4547-zsgrj	1/1	Running	0	9h	10.129.0.5	compute1.cp4a.com
<none></none>		202012				
postgresgl-1-deploy	0/1	Error	0	3h	10.129.0.6	computel.cp4a.com
<none></none>						
[root@master ~]#						

\_\_\_\_j. The cluster administrator may decide to remove the failed postgresql pod. Before continuing, delete that pod. To delete, you use the name of the postgresql pod.

oc delete pod postgresql-1-deploy

[root@master deploy]# oc get pods -o wide	- S		
NAME	READY	STATUS	RESTARTS
DE			
odm-lab-odm-decisioncenter-7f78864cb4-kgjmb	1/1	Running	θ
odm-lab-odm-decisionrunner-b6bf759fd-h7p67	1/1	Running	Θ
odm-lab-odm-decisionserverconsole-77c88fbb85-9pbw4	1/1	Running	Θ
odm-lab-odm-decisionserverruntime-78c44b4547-zsgrj	1/1	Running	0
postgresql-1-deploy	0/1	Error	0
[root@master deploy]# oc delete pod postgresql-1-dep	ploy		
pod "postgresql-1-deploy" deleted			

k. Verify that the pod is deleted.

oc get pods -o wide

[root@master deploy]# oc get pods -o wide	de Carlo		
NAME	READY	STATUS	RESTARTS
E			
odm-lab-odm-decisioncenter-7f78864cb4-kgjmb	1/1	Running	0
odm-lab-odm-decisionrunner-b6bf759fd-h7p67	1/1	Running	8
odm-lab-odm-decisionserverconsole-77c88fbb85-9pbw4	1/1	Running	0
odm-lab-odm-decisionserverruntime-78c44b4547-zsgrj	1/1	Running	0

\_\_\_\_I. Leave the terminal open and switch to the web console and click the Overview tab.

\_m. In the pods that are displayed, click the right arrow next to Decision Center pod.

odm-	∞ -lab-ibm-odm-prod	
>	odm-lab-odm- decisioncenter, #1	🚺 pod 🚦
>	odm-lab-odm- decisionrunner, #1	() pod I
>	odm-lab-odm- decisionserverconsole, #1	() pod I
>	DEFLOYMENT odm-lab-odm-	() pod i

\_\_\_\_n. The view is expanded and the arrow is pointed down. The view shows the Decision Center pod that is running. Note that the number of pods is 1.

<ul> <li>DEPLOYMENT odm-lab-odm-decisioncenter, #1</li> </ul>	1
CONTAINERS	$\frown$
odm-lab-odm-decisioncenter  The second secon	1 ^
Ports: 9453/TCP (dc-port)	pod

\_\_\_\_ o. You can click the up arrow or down arrow next to the blue donut to increase or decrease the number of pods. Click the up arrow twice to scale the number of pods to 3.

dm-lab-ibm-odm-prod	
odm-lab-odm-decisioncenter, #1	
CONTAINERS	
Image: odm-lab/odm-decisioncenter	3

\_\_\_\_ p. Switch back to the terminal and run the command again to view the number of pods. This time notice the two new pods start. Take a note of the compute nodes where the new pods are running. It might be either that both the new pods are running on the same node or they run on different ones.

oc get pods -o wide

odm-lab-odm-decisioncenter-7f78864cb4-kgjmb	1/1	Running	0	11h	10.130.0.4	computel code com
odm-lab-odm-decisioncenter-7f78864cb4-m5bsz	0/1	Running	0	45	10.130.0.10	compute2.cp4a.com
odm-lab-odm-decisioncenter-7f78864cb4-z6z6c	0/1	Running	θ	4s	10.129.0.18	compute1.cp4a.com
dm-lab-odm-decisionrunner-b6bf759fd-h7p67	1/1	Running	0	11h	10.129.0.4	
dm-lab-odm-decisionserverconsole-77c88fbb85-9pbw4	1/1	Running	θ	11h	10.130.0.3	compute2.cp4a.com
odm-lab-odm-decisionserverruntime-78c44b4547-zsgrj [root@master deploy]#	1/1	Running	0	11h	10.129.0.5	compute1.cp4a.com

\_\_\_ q. Go back to the Application console and click the up arrow four more times to scale the the number of pods to 7.

odm-lab-odm-decisioncenter, #1	1
containers odm-lab-odm-decisioncenter	
Image: odm-lab/odm-decisioncenter	Pods

\_r. Switch back to the terminal and run the command again to view the number of pods. This time notice the four new pods that are starting. Count the total number of pods that running on the compute1 node and the total number of pods that are running on the compute2 node. The number of pods running on the compute1 node is close to the number of pods running in the compute2 node. This way the Administrator is assured that the router is balancing the request between the compute nodes.

oc get pods -o wide

AHE	READY	STATUS	RESTARTS	AGE	IP		NODE
INATED NODE							
dm-lab-odm-decisioncenter-7f78864cb4-5ttl2	0/1	Running	0	25	10.129.	20	computel.cp4a.com
ne> dm-lab-odm-decisioncenter-7f78864cb4-cwwwg	0/1	ContainerCreating	0	25	<none></none>		compute1.cp4a.com
ne>							
dm-lab-odm-decisioncenter-7f78864cb4-j9p7p ne>	0/1	Running	0	25	10.130.	12	compute2.cp4a.com
dm-lab-odm-decisioncenter-7f78864cb4-kgjmb ne>	1/1	Running	0	11h	10.130.	4	compute2.cp4a.com
dm-lab-odm-decisioncenter-7f78864cb4-m5bsz ne>	0/1	Running	0	2m	10.130.	10	compute2.cp4a.com
dm-lab-odm-decisioncenter-7f78864cb4-vmlgr ne>	0/1	ContainerCreating	0	25	<none></none>		compute2.cp4a.com
dm-lab-odm-decisioncenter-7f78864cb4-z6z6c ne>	0/1	Running	0	2m	10.129.	18	compute1.cp4a.com
dm-lab-odm-decisionrunner-b6bf759fd-h7p67 ne>	1/1	Running	0	11h	10.129.	4	compute1.cp4a.com
dm-lab-odm-decisionserverconsole-77c88fbb85-9pbw4 ne>	1/1	Running	0	11h	10.130.	3	compute2.cp4a.com
dm-lab-odm-decisionserverruntime-78c44b4547-zsgrj	1/1	Running	0	11h	10.129.	5	computel.cp4a.com

\_s. If a pod crashes or is deleted, a new one starts to match the replica # set, which is 7 in this instance. In the terminal, select the name of one of the pods and run the command to delete it.

oc delete pod <a pod name>

[root@master deploy]# oc delete pod odm-lab-odm-decisioncenter-7f78864cb4-5q6fb
pod "odm-lab-odm-decisioncenter-7f78864cb4-5q6fb" deleted

\_\_\_\_\_t. One pod gets deleted but since the replica # is set to 7, a new pod is started right away to keep the number of running pods to 7 always.

rt@master deploy]# oc get pods -o wide	READY	STATUS	RESTARTS	AGE	IP	NODE
MINATED NODE		AND STORES TO AN A STORE OF				
lab-odm-decisioncenter-7f78864cb4-5qfpq None>	0/1	Running	0	40s	10.130.0.22	compute2.cp4a.
lab-odm-decisioncenter-7f78864cb4-7vfwt	1/1	Running	0	18m	10.130.0.21	compute2.cp4a.
lab-odm-decisioncenter-7f78864cb4-9b9nm	1/1	Running	θ	27m	10.129.0.22	compute1.cp4a.
lab-odm-decisioncenter-7f78864cb4-cqznd	1/1	Running	0	18m	10.129.0.24	compute1.cp4a.
lab-odm-decisioncenter-7f78864cb4-w6f2n None>	1/1	Running	θ	18m	10.129.0.23	computel.cp4a.
lab-odm-decisioncenter-7f78864cb4-wdcxk	1/1	Running	0	lh	10.130.0.14	compute2.cp4a.
lab-odm-decisioncenter-7f78864cb4-zcgmw none>	1/1	Running	0	18m	10.130.0.20	compute2.cp4a.
lab-odm-decisionrunner-b6bf759fd-n7mxr none>	1/1	Running	θ	18h	10.129.0.12	compute1.cp4a.
lab-odm-decisionserverconsole-77c88fbb85-xgx88 none>	1/1	Running	0	18h	10.129.0.13	compute1.cp4a.
lab-odm-decisionserverruntime-78c44b4547-dtmkq	1/1	Running	θ	18h	10.129.0.14	compute1.cp4a.

\_\_\_\_ u. Go back to the web console and change the number of pods back to 1 as it was before. You do that by clicking the down arrow 6 times to scale the number of pods down to 1.



## Part 4: Monitor applications with probes

OpenShift applications, including IBM Cloud Pak for Automation containerized applications, can become unhealthy due to issues such as temporary connectivity loss, configuration errors, or application errors. Developers can use probes to monitor their applications. A probe is a Kubernetes action that periodically performs diagnostics on a running container. Probes can be configured by using either the oc command-line client or the OpenShift web console. There are currently two types of probes that administrators can use:

#### **Liveness Probe**

A liveness probe determines whether an application that is running in a container is in a healthy state. If the liveness probe detects an unhealthy state, OpenShift kills the pod and tries to redeploy it again. Developers can set a liveness probe by configuring the

template.spec.containers.livenessprobe paragraph of a pod configuration.

#### **Readiness Probe**

A readiness probe determines whether a container is ready to serve requests. If the readiness probe returns a failed state, OpenShift removes the container's IP address from the endpoints of all services. Developers can use readiness probes to signal to OpenShift that even though a container is running, it should not receive any traffic from a proxy. Developers can set a readiness probe by configuring the

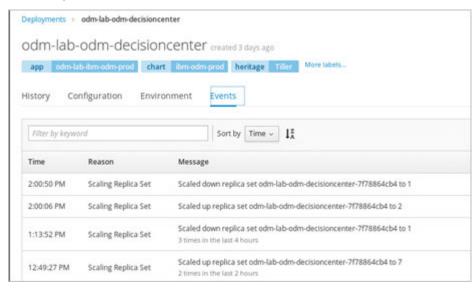
- \_\_\_\_1. Check the events for the project.
  - \_\_\_\_a. Make sure that you are in the odm-lab project in the Application console view of the web console.
  - b. In the web console, click the **Overview** tab.
  - \_\_\_\_ c. Click the Decision Center deployment.

odm-lab-ibm-odm-prod		
odm-lab-odm-decisioncenter, #1		1
contantis odm-lab-odm-decisioncenter mage: odm-lab/odm-decisioncenter ~ Ports:9453/TCP (dc port) McTrecisions		
Service - Internal Traffic odm-tab-odm-decisioncenter 9453/TCP (decisioncenter thms) -> 9453	Routes - External Traffic @ Create Route	

\_\_\_\_d. Click the Events tab.

app odm-lab-i	bm-odm-prod chart ibm-odm-prod he	eritage Tiller More labels
story Confi	guration Environment Events	
Filter by label		• •
/ersion	Name	Replicas
1	odm-lab-odm-decisioncenter-7f78	8864cb4 1 replica

\_\_\_\_e. The latest generated events are listed.



\_\_\_\_\_f. Click the **Configuration** tab. Scroll down to view the container details.

ont	tainers
dm	-lab-odm-decisioncenter
۰	Image: odm-lab/odm-decisioncenter
$A_{F}$	Ports: 9453/TCP (dc-port)
	Mount: odm-lab-odm-logging-volume → /config/logging read-write
8	$Mount: hb-workarea-volume \rightarrow /opt/lbm/wlp/output/defaultServer/workarea-read-write$
ite.	CPU: 500 millicores to 2 cores
in.	Memory: 512 MIB to 4 GIB
٥	Readiness Probe: GET /decisioncenter/healthCheck on port dc-port (HTTPS) 10s delay, 10s timeout
0	Liveness Probe: GET /decisioncenter/healthCheck on port dc-port (HTTPS)
	300s delay, 5s timeout

- \_\_\_\_g. Examine the Readiness Probe and Liveness Probe settings for the container.
- \_\_\_h. To change the settings of the Readiness Probe and Liveness Probe, you can click Actions and then click **Edit Health Checks**.

	Pause Rollou
	Add Storage
	Add Autoscaler Edit Resource Limits
	Edit Health Checks
	CUIL TAME
we	Delete

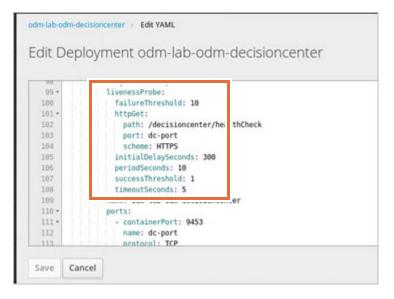
\_\_\_\_i. For each probe type, you can select the type, such as HTTP GET, TCP Socket, or Container Command, and specify the parameters for each type. You do not change any settings and click Cancel.

Deployments > odm-lab-odm-decisioncenter > Edit Health Checks
Health Checks: odm-lab-odm-decisioncenter
Container health is periodically checked using readiness and liveness probes.
Readiness Probe
A readiness probe checks if the container is ready to handle requests. A failed readiness probe not receive any traffic from a proxy, even if it's running.
Туре
HTTP GET
Use HTTPS Path
/decisioncenter/healthCheck
Port
dc-port

\_\_\_\_j. The web console can also be used to edit the YAML file that defines the deployment configuration. Click **Actions > Edit YAML**.

	Actions ~		
	Pause Rollows		
	Add Storage		
	Add Autoscaler		
	Edit Resource Limits		
	Edit Monthly Checks		
_	Edit YAML		
¢	Delete		

k. Upon the creation of a probe, a new entry is added to the configuration file for the deployment configuration. You can review or edit a probe by using the deployment configuration editor The live editor allows you to edit the periodSeconds, successThreshold, and failureThreshold and few other options. Scroll through the YAML file to examine the entries.



The **periodSeconds** value of 10 seconds specifies that the OpenShift performs a liveness probe every 10 seconds. The **initialDelaySeconds** value of 300 seconds tells OpenShift that it needs to wait 300 seconds before performing the first probe. To perform a probe, OpenShift sends an HTTP GET request to the server that is running in the Container and listening on port 8080. If the handler for the server's /health path returns a success code, OpenShift considers the Container to be alive and healthy. If the handler returns a failure code, the OpenShift kills the Container and restarts it.

Any code greater than or equal to 200 and less than 400 indicates success. Any other code indicates failure.

The **timeoutSeconds** value of 5 seconds is the time OpenShift waits for the probe to finish. If this time is exceeded, OpenShift Container Platform considers the probe to have failed.

The **SuccessThreshold** value of 1 is the minimum consecutive successes for the probe to be considered successful after having failed.

The **failureThreshold** value of 10 is the minimum consecutive failures for the probe to be considered failed after having succeeded.

Readiness and liveness probes can be used in parallel for the same container. Using both, an administrator, can configure the values to ensure that traffic does not reach a container that is not ready for it, and that containers are restarted when they fail

- \_\_\_\_2. Close all open windows.
  - \_\_\_\_a. Enter exit in the terminal to close it. If you had multiple terminal windows open close all of them
  - \_\_\_\_b. Close the Firefox browser.

- \_\_\_\_\_c. Close any other open windows, including any text editors.
- \_\_\_\_d. Close the RDP console window or the browser window that was used to work with the Master VM.

You now completed some basic administration tasks for managing containers in the OpenShift environment. This concludes this exercise.

## End of exercise

## Exercise review and wrap-up

The first part of the exercise ...

# Appendix A. Installing Red Hat OpenShift Container Platform V3.1.1 to create the lab environment

## **Overview**

This appendix describes how to prepare the Red Hat Enterprise Linux environment and install Red hat OpenShift Container Platform (RHOCP) V3.11.

## Part 1: Configure Environment for installing Red Hat OpenShift Container Platform 3.1.1

- \_\_\_1. Login to the Master node as root \ passw0rd
- 2. Verify that ports are open by running the ss command. Note that for this environment, ports have already been verified. As a test, you can check port 9091 that is needed by Calico. Replace the <port\_numbers> variable with 9091. If the port is not in use, the output is empty. If the port is in use, an output is displayed. In this example, since the port is not in use, the output is empty.

```
ss -tnlp | awk '{print $4}'| egrep -w "<port numbers>"
```

\_\_\_\_3. Make sure the Python 2.6+ (2.6 – 2.9.x are supported) is installed on each node in the cluster. To verify the Python version run the following command.

python -V

**Note:** Python V3.x is not supported yet.

4. Make sure unzip is installed.

unzip -v

Unzip version should be at 6.0 or higher.

\_\_\_\_5. Make sure proper version of Firefox is installed.

Firefox must be the most recent version.

firefox -v

Version should be at 60.2.2 or higher.

\_\_\_\_6. Verify the GNU Compiler Collection is installed.

rpm -q gcc -v

GCC should be at version 4.8 or higher and is used to configure Socat in a later step.

7. Verify NTP is enabled.

timedatectl

- \_\_ 8. It is a good idea to synchronize the clocks in each node in the cluster. To synchronize your clocks, you can use network time protocol (NTP). Verify that the response includes "NTP enabled:: yes"
- 9. Increase the number of mmap counts (Node: Master and Compute nodes)

The default operating system limits on mmap counts is likely to be too low, which may result in out of memory exceptions. Increase the number of mmap counts on each node in the cluster.

\_\_a. Update kernel parameters.

```
echo "kernel.sem=250 32000 32 1024" >> /etc/sysctl.conf
echo "vm.max map count=262144" >> /etc/sysctl.conf
```

\_\_\_\_b. Restart the server for changes to take effect

shutdown -r now

\_\_\_\_10. Configure Password-less SSH (Node: Master)

Configure password-less SSH from the Master node to all other nodes in the cluster.

#### \_\_\_\_a. Create keys for Master node

```
ssh-keygen -b 4096 -f ~/.ssh/id_rsa -N ""
cat ~/.ssh/id rsa.pub | sudo tee -a ~/.ssh/authorized keys
```

b. Copy the public key to all the nodes in the cluster.

ssh-copy-id -i ~/.ssh/id rsa.pub root@<WORKER NODE IP>

If you get a warning that all keys were skipped, that is expected behavior. Answer "yes" if asked to connect.

When prompted to continue to connect, enter yes.

When prompted to enter a password, enter password.

c. Verify that you can now use SSH from the master node to other nodes *without supplying a password*.

ssh root@<WORKER\_NODE\_IP>

\_\_\_\_\_d. Once connected to the worker node, restart the sshd on each worker node.

systemctl restart sshd



#### Important

If you receive an error message stating "Signing failed, agent refused operation" verify the IP you are using is correct.

\_e. Enter exit to exit SSH session to the worker node

- 11. Configure Secure Shell (SSH) for root user. (Node: Master and Compute nodes)
  - \_\_a. Before editing the host file on the Master node (next step), get the host name of each node by using the hostname command. Make a note of the Master and Worker host names.

hostname

b. Enable remote login

```
sed -i 's/prohibit-password/yes/' /etc/ssh/sshd_config
```

```
sed -i 's/PermitRootLogin no/PermitRootLogin yes/' /etc/ssh/sshd_config
```

\_\_\_\_\_c. Restart ssh

systemctl restart sshd

\_\_\_12. Configure /etc/hosts file (Node: Master)

Edit the /etc/hosts file on the Master node and add IP addresses and host names for each node in the cluster.

\_\_\_\_a. Update the /etc/hosts file on the Master node

```
127.0.0.1 localhost

<MASTER_NODE_IP> <MASTER_NODE_HOSTNAME> #master

<compute1_NODE_IP> <WORKER_NODE_HOSTNAME> #compute1

<compute2_NODE_IP> <WORKER_NODE_HOSTNAME> #compute2
```

\_\_\_\_b. Copy /etc/hosts from Master node to all cluster servers

scp /etc/hosts root@<compute NODE IP>:/etc/hosts

The /etc/hosts file must be identical on all machines in the cluster. Answer "yes" if asked to connect.



#### Important

Enable Red Hat subscription on Master and Worker nodes. Refer to subscription document for details. It is important to complete the steps in the Subscription document before continuing or else commands fail. The exception is if you are running these steps in your own environment (not this sandbox), in which case, check with your RHEL Administrator.

\_\_\_\_13. Stop and disable Firewall (Node: Master and Compute nodes)

service firewalld stop systemctl disable firewalld

If you restart any of the VMs then you must stop and disable firewall again using these commands.

- \_\_\_\_14. Start and enable the NFS and RPC services (Node: Master)
  - \_\_\_\_a. Enable NFS and RPC services:

systemctl	enable	nfs-server
systemctl	enable	rpcbind
systemctl	enable	nfs-lock
systemctl	enable	nfs-idmap

b. Start NFS and RPC services:

systemctl	start	nfs-server
systemctl	start	rpcbind
systemctl	start	nfs-lock
systemctl	start	nfs-idmap

## Part 2: Install Red Hat OpenShift

 Update the host file on Master to add an entry for the cluster console link to work in the OpenShift web console. Cluster console view is a view that opens when you are logged into the OpenShift web console. This link does not work if the host does not have the following entry in this environment:

10.0.0.1 console.cp4a.com

2. Update the host file to add the entries for the metrics to work in the cluster console.

```
grafana-openshift-monitoring.cp4a.com
prometheus-k8s-openshift-monitoring.cp4a.com
alertmanager-main-openshift-monitoring.cp4a.com
```

\_ 3. The host file looks like the following:

```
127.0.0.1 localhost localhost.localdomain localhost4 localhost4.localdomain4
::1 localhost localhost.localdomain localhost6 localhost6.localdomain6
10.0.0.1 master.cp4a.com console console.cp4a.com grafana-openshift-monitoring.cp4a.com
prometheus-k8s-openshift-monitoring.cp4a.com alertmanager-main-openshift-monitoring.cp4a.com
10.0.0.2 compute1.cp4a.com compute1
10.0.0.3 compute2.cp4a.com compute2
```

- \_\_\_\_\_4. Download the inventory file from Red Hat and customize it for the installation as needed.
- 5. Check the prerequisites by running the command below.

ansible-playbook -vv playbooks/prerequisites.yml

\_\_6. Run the following command to install OpenShift cluster.

```
ansible-playbook -vv
/usr/share/ansible/openshift-ansible/playbooks/deploy_cluster.ym
l
```

7. Set the password for user admin.

```
htpasswd -cb /etc/origin/master/htpasswd admin passw0rd
```

8. Add the cluster-admin role to user admin.

oc adm policy add-cluster-role-to-user cluster-admin admin

It may say that user admin could not be found. That won't have any impact, just ignore the message.

- 9. Open https://master.cp4a.com:8443 in Firefox browser. Verify you can login with admin/passw0rd. Bookmark the page for future use
- 10. Verify that you can click the Cluster Console link at the top. This confirms that you can view the cluster console and do cluster admin administration and monitoring using the console. You can also go to the cluster console directly by using the link: https://console.cp4a.com:8443
- \_\_\_\_11. Download tiller.yaml from shared box folder. Create a service account for your tiller pod and assign it to cluster-admin role.

kubectl apply -f /root/tiller.yaml

helm init --service-account tiller --upgrade

```
oc adm policy add-cluster-role-to-user cluster-admin
system:serviceaccount:kube-system:tiller
```

\_\_\_\_12. Extract helm package.

tar zxvf \*.gz

\_\_\_\_13. Copy helm executable file to /usr/bin.

cp linux-amd64/helm /usr/bin

\_\_\_\_14. Initialize helm locally.

helm init --client-only --skip-refresh

15. Copy tiller docker image to both compute nodes.

scp tiller.tar root@compute1:/root

scp tiller.tar root@compute2:/root

16. Use SSH to connect to both compute nodes, load the docker image.

```
ssh compute1
docker load -i tiller.tar
exit
ssh compute2
docker load -i tiller.tar
exit
```

\_\_\_\_17. Make sure you quit SSH and go back to VM 1. Install tiller.

helm init

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\_\_\_\_18. Create a service account for your tiller pod and assign it cluster-admin role.

```
kubectl apply -f /root/tiller.yaml
helm init --service-account tiller --upgrade
oc adm policy add-cluster-role-to-user cluster-admin
system:serviceaccount:kube-system:tiller
```

# Create an OSEv3 group that contains the masters, nodes, and etcd groups

### Sample Inventory file:

[OSEv3:children] masters nodes etcd # Set variables common for all OSEv3 hosts [OSEv3:vars] # SSH user, this user should allow ssh based auth without requiring a password ansible\_ssh\_user=root openshift\_deployment\_type=openshift-enterprise openshift\_image\_tag=v3.11.117 #openshift\_pkg\_version=-3.11.117 # If ansible\_ssh\_user is not root, ansible\_become must be set to true #ansible\_become=true # default selectors for router and registry services

# openshift\_router\_selector='node-role.kubernetes.io/infra=true'

# openshift\_registry\_selector='node-role.kubernetes.io/infra=true'

# uncomment the following to enable htpasswd authentication; defaults to DenyAllPasswordIdentityProvider

openshift\_master\_identity\_providers=[{'name': 'htpasswd\_auth', 'login': 'true', 'challenge': 'true', 'kind': 'HTPasswdPasswordIdentityProvider'}]

openshift\_master\_default\_subdomain=cp4a.com

openshift\_disable\_check=memory\_availability,disk\_availability,docker\_storage,docker\_image\_availability

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#os\_sdn\_network\_plugin\_name=redhat/openshift-ovs-multitenant

openshift\_master\_cluster\_method=native openshift\_master\_cluster\_hostname=console.cp4a.com openshift\_master\_cluster\_public\_hostname=console.cp4a.com

ansible\_service\_broker\_install=false openshift\_enable\_service\_catalog=false template\_service\_broker\_install=false openshift\_logging\_install\_logging=false

# registry passwd
oreg\_url=registry.redhat.io/openshift3/ose-\${component}:\${version}
oreg\_auth\_user=XXXXX
oreg\_auth\_password=XXXX
# openshift\_examples\_modify\_imagestreams=true

# docker config openshift\_docker\_additional\_registries=registry.redhat.io #openshift\_docker\_insecure\_registries=rh16.cn.ibm.com:5000 #openshift\_docker\_blocked\_registries openshift\_docker\_options="--log-driver json-file --log-opt max-size=1M --log-opt max-file=3"

openshift\_cluster\_monitoring\_operator\_install=true openshift\_metrics\_install\_metrics=true openshift\_enable\_unsupported\_configurations=True openshift\_logging\_es\_nodeselector='node-role.kubernetes.io/infra: "true" openshift\_logging\_kibana\_nodeselector='node-role.kubernetes.io/infra: "true"

# host group for masters [masters] master.cp4a.com

# host group for etcd

[etcd] master.cp4a.com

# host group for nodes, includes region info

[nodes]

master.cp4a.com openshift\_node\_group\_name='node-config-master-infra' compute1.cp4a.com openshift\_node\_group\_name='node-config-compute' compute2.cp4a.com openshift\_node\_group\_name='node-config-compute'

#openshift\_console\_install=true
#openshift\_console\_hostname=console.cp4a.com
#openshift\_master\_api\_port=8443
#openshift\_master\_console\_port=8443





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