

IBM CP4D INSTALLATION & CONFIGURATION IN ROKS

Sujatha Sureshkumar

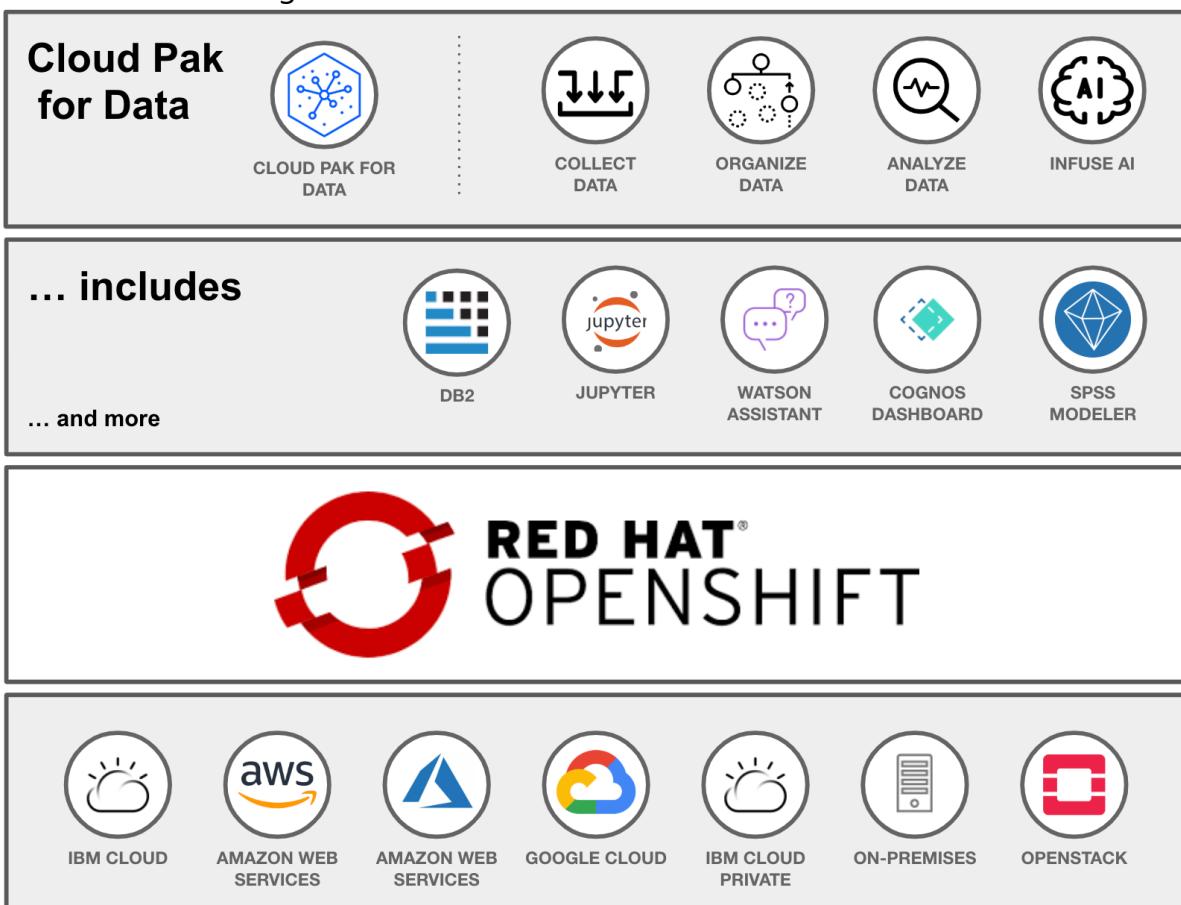
IBM CORPORATION ASEAN

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Overview

IBM Cloud Pak for Data is a unified data and AI platform that connects the right data, at the right time, to the right people anywhere. Running on the Red Hat OpenShift platform simplifies data access, automates data discovery and curation, and safeguards sensitive information by automating policy enforcement for all users in your organization. Make better data-driven decisions and lay the foundation for AI with a data fabric that connects siloed data on-premises or across multiple clouds without data movement. Discover actionable insights and apply trusted data to build, run, automate and manage AI models.



This document provides step-by-step instructions to install IBM Cloud Pak for Data on the Red Hat OpenShift cluster. However, before we begin the installation, let's ensure the following assumptions and pre-requisite are met.

Note: IBM® Cloud Pak for Data images are accessible from the IBM Entitled Registry. In most situations, it is strongly recommended that you mirror the necessary software images from the IBM Entitled Registry to a private container registry. Because we are deploying for demo purposes in this example, I have skipped mirroring IBM Cloud Pak for Data images in the private container registry.

Assumptions

- Installing fresh Cloud pak for data Control Plane, Foundational Services and Operators
- Red Hat OpenShift cluster has access to a high-speed internet connection and can pull images directly from IBM Entitled Registry.
- Installing for demo purposes and so, the latest version of the software will automatically install on the Red Hat OpenShift cluster.
- User has knowledge and experience managing Red Hat OpenShift cluster
- Installation of Cloud Pak for Data 4.5.2

Pre-Requisite

- Red Hat OpenShift cluster version 4.6 or later with min 48 vCPU and 192 GB RAM
- Bastion host with 2 vCPU and 4GB RAM with Linux OS
- Internet access for Bastion host and Red Hat OpenShift cluster
- OpenShift Container Storage (OCS) attached to Red Hat OpenShift cluster. This link will help you determine supported storage. In this demo, I have used OCS Storage.
- A User with OpenShift Cluster and Project Administrator access
- IBM Cloud Pak for Data Entitlement Key — Here is the link to download the entitlement key

After reviewing the system requirements and other planning information, install IBM Cloud Pak for Data by completing the provisioning clusters, setup environment variables, completing the installation task itself, and then completing the validation of installation tasks. When complete, the Cloud Pak for Data control plane would be installed. Services are installed separately.

You use the Cloud Pak for Data command-line interface to install the Cloud Pak for Data control plane and any services that you want to run.

This guide is based on Red Hat OpenShift (ROKS) v4.6 on IBM Cloud for Cloud Pak for Data Custom. A fully managed Red Hat OpenShift 4.6 cluster installed on IBM Cloud ready for Cloud Pak for Data installation.

Provisioning of ROKS

This section covers steps to provision ROKS for Cloud Pak for data in IBM Techzone and accessing the cluster.

Provisioning Cluster

The steps outlined below will assist you to prepare cluster for the installation of Cloud Pak for Data.

1. Login to TechZone (<https://techzone.ibm.com>). Login with your IBMID credentials.
2. Identify the right ROKS through : Go to Environments Tab -> Search for "ROKS CP4D". You will find a cluster " Red Hat OpenShift (ROKS) v4.6 on IBM Cloud for Cloud Pak for Data Custom" Indicating "CP4D must be installed manually". Click "Reserve".

Title	Description	Infrastructure	Collection	Regions
ROKS Cluster with CP4D Healthcare Demo	IBM Cloud managed OpenShift with Cloud Pak for Data Healthcare Demo	IBM Cloud	Production Deployment Guides for Cloud Pak Solutions	syd01 wdc06 sjc03 syd04 dal10
Red Hat OpenShift (ROKS) v4.6 on IBM Cloud for Cloud Pak for Data Custom	A fully managed Red Hat OpenShift 4.6 cluster installed on IBM Cloud ready for Cloud Pak for Data installation. CP4D must be installed manually.	IBM Cloud	Cloud Pak for Data Activation Kit	wdc04 che01 sao01 syd01 wdc06 fra02

3. Create a reservation of ROKS by "Select a reservation type" -> Click reserve now.

Select a environment/infrastructure **Select a reservation type** Fill out your reservation

Select your reservation type. Do you need this now or later?

Single environment reservation options:

Reserve now Schedule for later

Cancel Reset Submit

4. Specify the requirements of ROKS by "Fill out your reservation" -> Fill in the following mandatory fields -> Click submit.

Field Name	Field Value
Name	Red Hat OpenShift (ROKS) v4.6 on IBM Cloud for Cloud Pak for Data Custom
Purpose	Practice/self-education
Purpose description	CP4D Installation
Preferred Geography (required)	<<Your nearest location>>
End date and time	Up to 72 hours allowed. You may choose the maximum date time allowed.

Fill out your reservation

Name
Red Hat OpenShift (ROKS) v4.6 on IBM Cloud for Cloud Pak for Data Custom
Name this reservation. This will help identify it in your reservation list.

Purpose
Practice / Self-Education

Please select the purpose for this reservation request and review the [Reservation Duration Policy](#) to understand default durations allowed for specific infrastructures based on purpose.

Customer name(s)
Enter a customer name
Enter a list of customer names

Sales Opportunity Number
Enter an opportunity number(s)

Purpose description
CP4D Installation

What are you doing? Why do you need this? What are you trying to accomplish?

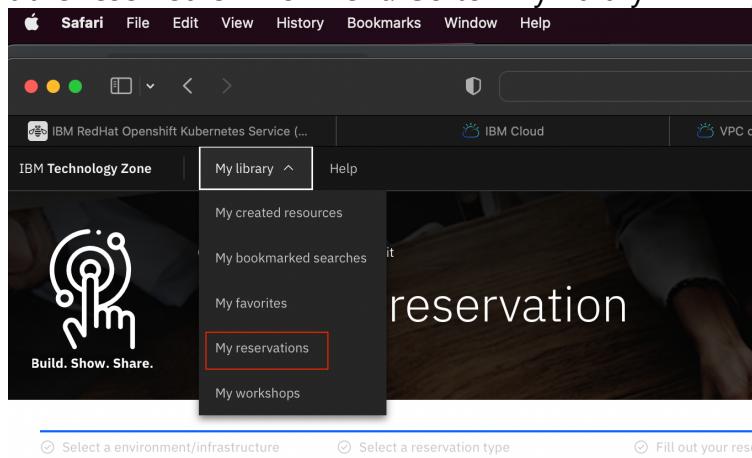
Preferred Geography (required)
Frankfurt 2

End date and time
Select a date
09/07/2022 Select a time
8:00 PM Asia/Singapore Available for up to 3 days (72 hours)

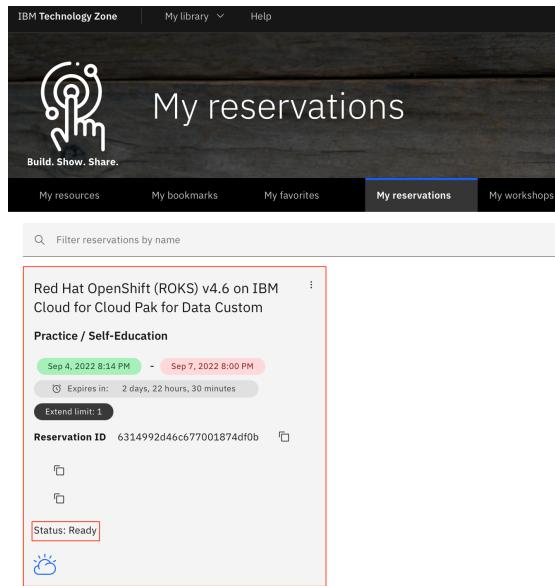
Notes
Enter any notes you would like to attach to this reservation

[Cancel](#) [Reset](#) [Submit](#)

5. Check out the reserved environment: Go to "My library" -> "My reservation"



6. Check on the status of the reservation. Status should be "Ready" to continue. Note:



Access to the cluster

- Environment details is accessible through Click "Environment" to get the details of provisioned environment and confirm on the choice.

Field	Remarks
Type	Cloud Provider
Region	Region that this environment is provisioned
Knowledge Center	Documentations links for your reference.
Slack #cp4d-tech	To discuss on technical matters for WD for ICP4D
DeveloperWorks	Documentations links for your reference.
Cluster URL	URL for the Openshift cluster

IBM Technology Zone | My library | Help

Notes

Shared Reservation
For full desktop access, connect to: https://cloud.ibm.com/kubernetes/clusters/cca9imdl0u7csgune5ng/overview?bss_account=ead8711ba2cc4d08a16fd37427f4f01a

Purpose
Practice / Self-Education

Notes
CP4D Installation

Environment

Reservation ID 631492d46c677001874df0b	Type IBM Cloud	Reservation method ibm-roks-cp4data	Transaction ID c246313a-56b9-475c-ab9e-41322bf4fb
Cloud Account ITZEV2	Region fra02	Environment cca9imdl0u7csgune5ng	Idle runtime limit 10800
Knowledge Center https://www.ibm.com/docs/en/cloud-paks/cp-data			
Slack #cp4d-tech https://ibm-cloudplatform.slack.com/archives/CAD1KG1QU			
DeveloperWorks https://developer.ibm.com/recipes/tutorials/how-to-deploy-cloud-paks-on-ibm-cloud-managed-openshift-cluster/			
Cluster ID cca9imdl0u7csgune5ng			
Cluster Name itzroks-661003lwek-x5xf4u5e			
Cluster URL https://cloud.ibm.com/kubernetes/clusters/cca9imdl0u7csgune5ng/overview?bss_account=ead8711ba2cc4d08a16fd37427f4f01a			
OpenShift Version 4.6_openshift			

2. IBM cloud environment can be accessed from the "Desktop" -> Click "Open Your IBM Cloud environment"

My reservations / Collection

Red Hat OpenShift (ROKS) v4.6 on IBM Cloud for Cloud Pak for Data Custom

Date: Sep 4, 2022 8:14 PM | Sep 7, 2022 8:00 PM | Expires in: 2 days, 22 hours, 27 minutes | Extend limit: 1

Status: Ready

Desktop

Open your IBM Cloud environment

Desktop url: https://cloud.ibm.com/kubernetes/clusters/cca9imdl0u7csgune5ng/overview?bss_account=ead8711ba2cc4d08a16fd37427f4f01a

Purpose
Practice / Self-Education

Notes
Shared Reservation
For full desktop access, connect to: https://cloud.ibm.com/kubernetes/clusters/cca9imdl0u7csgune5ng/overview?bss_account=ead8711ba2cc4d08a16fd37427f4f01a

CP4D Installation

3. OpenShift Web Console can be accessed by click "OpenShift web console"

Note: Enable pop up blocker for the "OpenShift web console" to open.

IBM Cloud | Search resources and products... | Catalog | Docs | Support | Manage | 2112072 - ITZ - V2 | Actions...

Clusters / **itzroks-661003lwek-x5xf4u5e** | Normal | c246313a-56... | Help | OpenShift web console | Actions...

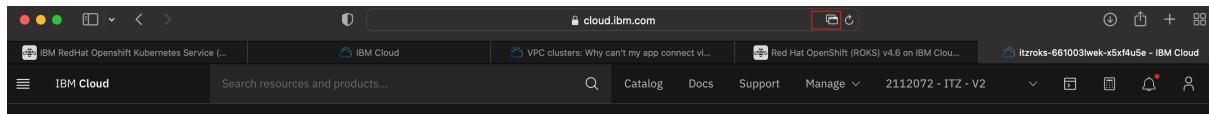
Overview

Worker nodes | Worker pools | DevOps **New**

Deprecated version:
Support will end in 53 days. To continue to receive support, update your version of Kubernetes.
[Review the docs](#) | [Update](#)

Node status 5 of 5 Normal	Add-on status 0 of 0 Normal	Master status Normal	Ingress status Healthy
Details ↓	Details ↓	Docs ↗	Docs ↗

Note: Click the pop-up to open up if it is not enabled previously.



4. Find the cluster details in the overview pane.

The screenshot shows the Red Hat OpenShift Container Platform Overview page. On the left, a sidebar menu includes Home, Overview (selected), Projects, Search, Explore, Events, Operators, Workloads, Networking, Storage, Builds, Monitoring, and Compute. The main content area is titled 'Overview' and has a tab for 'Cluster'. It displays the following information:

- Details:**
 - Cluster API Address: https://c100-e-eu-gb.containers.cloud.ibm.com:31736
 - Cluster ID: 0b8f8a69-1fe2-4be7-a985-440e8c33ze20
 - Provider: IBMCloud
 - OpenShift Version: 4.6.60
 - Update Channel: Not available
- Status:**
 - Cluster: Green checkmark
 - Operators: Green checkmark

A warning message: "Alerts are not configured to be sent to a notification system, meaning that you may not be notified in a timely fashion when important failures occur. Check the OpenShift documentation to learn how to configure notifications with Alertmanager."
- Activity:**
 - Ongoing: There are no ongoing activities.
 - Recent Events: A list of events with NS icons and descriptions like "Server has stop..." and "All pre-shutdown...".
- Cluster Utilization:**
 - 1 Hour chart showing CPU usage over time.
 - Resource Usage table: CPU (156.9 available, 3.09 used), Memory (604.4 GiB available, 24.27 GiB used).
- Cluster Inventory:**
 - 5 Nodes

5. OpenShift CLI login details can be retrieved by click "IAM#<<userid>>" -> Click "Copy login command".

The screenshot shows the Red Hat OpenShift Container Platform Overview page. The right sidebar shows the user IAM#sujatha.sureshkumar@ibm.com. A red box highlights the 'Copy Login Command' button under the 'Manage IAM/RBAC' section. Other options in the sidebar include 'Log out'.

6. Click "Display Token".

The screenshot shows the Red Hat OpenShift Container Platform Overview page. A red box highlights the 'Display Token' button at the bottom left of the main content area.

7. oc login commands will be displayed.



Installing the OpenShift CLI by using the web console

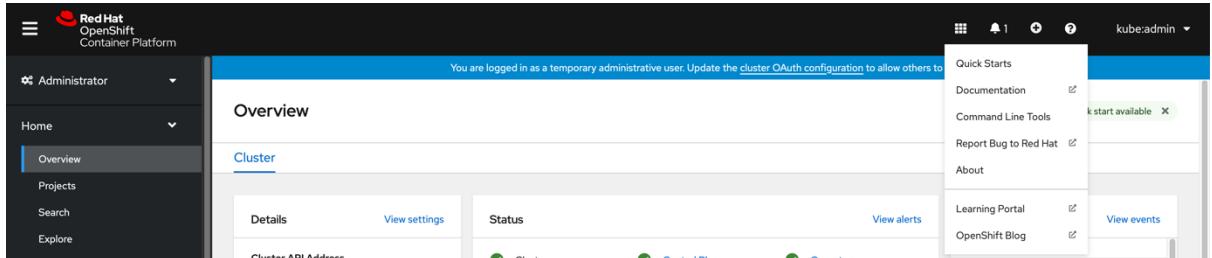
You can install the OpenShift CLI (`oc`) to interact with OpenShift Container Platform from a web console. You can install `oc` on Linux, Windows, or macOS.

Note: If you installed an earlier version of `oc`, you cannot use it to complete all of the commands in OpenShift Container Platform 4.7. Download and install the new version of `oc`.

Installing the OpenShift CLI on Linux using the web console

You can install the OpenShift CLI (`oc`) binary on Linux by using the following procedure.

1. From the web console, click ?.



2. Click **Command Line Tools**.

The screenshot shows the Red Hat OpenShift Container Platform web interface. The left sidebar is titled 'Administrator' and includes links for Home, Overview, Projects, Search, Explore, Events, Operators, Workloads, Networking, and Storage. The main content area is titled 'Command Line Tools' and contains a sub-section for 'oc - OpenShift Command Line Interface (CLI)'. It provides instructions for using the CLI and links to download the binary for various platforms (Linux, Mac, Windows, ARM, IBM Power, IBM Z) and view the license. A message at the top states: 'You are logged in as a temporary administrative user. Update the cluster OAuth configuration to allow others to log in.'

3. Select appropriate `oc` binary for your Linux platform, and then click **Download oc for Linux**.
4. Save the file.
5. Unpack the archive.

```
$ tar xvzf <file>
```

6. Move the `oc` binary to a directory that is on your `PATH`.

To check your `PATH`, execute the following command:

```
$ echo $PATH
```

After you install the OpenShift CLI, it is available using the `oc` command:

```
$ oc <command>
```

Installing the OpenShift CLI on Windows using the web console

You can install the OpenShift CLI (`oc`) binary on Windows by using the following procedure.

1. From the web console, click `?`.

The screenshot shows the Red Hat OpenShift Container Platform web interface. The left sidebar is titled 'Administrator' and includes links for Home, Overview, Projects, Search, Explore, Events, Operators, Workloads, Networking, and Storage. The main content area is titled 'Overview' and shows 'Cluster' details. A context menu is open on the right side, listing options like 'Quick Starts', 'Documentation', 'Command Line Tools' (which has a note 'k start available'), 'Report Bug to Red Hat', 'About', 'Learning Portal', and 'OpenShift Blog'. A message at the top states: 'You are logged in as a temporary administrative user. Update the cluster OAuth configuration to allow others to log in.'

2. Click **Command Line Tools**.

The screenshot shows the Red Hat OpenShift Container Platform web interface. The left sidebar is titled 'Administrator' and includes links for Home, Overview, Projects, Search, Explore, Events, Operators, Workloads, Networking, and Storage. The main content area is titled 'Command Line Tools' and contains a 'Copy Login Command' button. Below it, the 'oc - OpenShift Command Line Interface (CLI)' section is described with the following text: 'With the OpenShift command line interface, you can create applications and manage OpenShift projects from a terminal.' It also states that the 'oc' binary offers the same capabilities as the 'kubectl' binary but is further extended to natively support OpenShift Container Platform features. A list of download links is provided for various platforms:

- Download oc for Linux for x86_64
- Download oc for Mac for x86_64
- Download oc for Windows for x86_64
- Download oc for Linux for ARM 64 (unsupported)
- Download oc for Linux for IBM Power, little endian
- Download oc for Linux for IBM Z
- LICENSE

3. Select the `oc` binary for Windows platform, and then click **Download oc for Windows for x86_64**.
4. Save the file.
5. Unzip the archive with a ZIP program.
6. Move the `oc` binary to a directory that is on your `PATH`.

To check your `PATH`, open the command prompt and execute the following command:

```
C:\> path
```

After you install the OpenShift CLI, it is available using the `oc` command:

```
C:\> oc <command>
```

Installing the OpenShift CLI on macOS using the web console

You can install the OpenShift CLI (`oc`) binary on macOS by using the following procedure.

1. From the web console, click `?`.

The screenshot shows the Red Hat OpenShift Container Platform web interface. The left sidebar is titled 'Administrator' and includes links for Home, Overview, Projects, Search, Explore, Events, Overview (which is selected), and Operators. The main content area is titled 'Overview' and shows 'Cluster' details. A context menu is open over the 'Command Line Tools' link in the top right corner, listing options like 'Quick Starts', 'Documentation', 'Report Bug to Red Hat', 'About', 'Learning Portal', and 'OpenShift Blog'. The 'View events' option is highlighted with a blue border.

2. Click **Command Line Tools**.

The screenshot shows the Red Hat OpenShift Container Platform web interface. The left sidebar is titled "Administrator" and includes links for Home, Overview, Projects, Search, Explore, Events, Operators, Workloads, Networking, and Storage. The main content area is titled "Command Line Tools" and contains a "Copy Login Command" button. Below this is a section titled "oc - OpenShift Command Line Interface (CLI)" with a sub-section "With the OpenShift command line interface, you can create applications and manage OpenShift projects from a terminal." It lists download links for various platforms: Linux x86_64, Mac x86_64, Windows x86_64, ARM 64 (unsupported), Linux Power, little endian, and Linux IBM Z. There is also a "LICENSE" link.

3. Select the `oc` binary for macOS platform, and then click **Download oc for Mac for x86_64**.
4. Save the file.
5. Unpack and unzip the archive.
6. Move the `oc` binary to a directory on your PATH.

To check your PATH, open a terminal and execute the following command:

```
$ echo $PATH
```

After you install the OpenShift CLI, it is available using the `oc` command:

```
$ oc <command>
```

Pre-Installation Steps

The steps outlined below will assist you to prepare the ROKS with various pre-installation steps.

IBM Entitlement Key

1. Go to <https://myibm.ibm.com/products-services/containerlibrary>
2. Click "Copy key" (PS: If empty click "Get new key")

The screenshot shows a web browser window with the URL myibm.ibm.com/products-services/containerlibrary. The page title is "IBM". On the left sidebar, there's a "Container software library" section with "Get entitlement key" and "View library" options. The main content area is titled "Access your container software" and contains an "Entitlement key" section. It shows an entitlement key issued on August 16, 2022, with a blurred key value. Below the key are two buttons: "Copy key" (highlighted with a red box) and "Get new key". At the bottom of the page, there's a "Adding featured applications to clusters" section.

Setup Environment Variables

1. Create a shell script to store the environment variables.

```
vi cp4d_vars.sh
```

2. Following environment variables are declared in "cp4d_vars.sh". Replace the values based on the guide given below.

- IBM Entitlement Key => Refer to section: [IBM Entitlement Key](#).
- Token => Refer to section: [Access to the cluster](#): Step 7 for the login command
- Cluster URL => Refer to section: [Access to the cluster](#): Step 7 for the login command

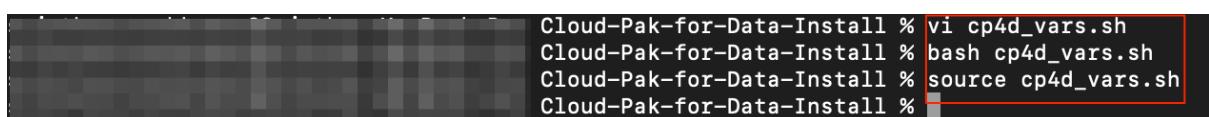
```
export token=<<Token>>
export clusterURL=<<Cluster URL >>
export IBMENTITLEMENTKEY=<<IBM Entitlement Key>>
encodedcredentials=$(echo -n "cp:$IBMENTITLEMENTKEY" | base64)
export registrylocation=cp.icr.io
```

3. Validation of "cp4d_vars.sh" shell script. Note: This step has to be executed every time there is a change in the "cp4d_vars.sh" shell script.

```
bash cp4d_vars.sh
```

4. Declaration of the environment variables. Note: This step has to be executed every time there is a change in the "cp4d_vars.sh" shell script.

```
source cp4d_vars.sh
```



Installation of Cloud Pak for Data

Download Repo Files

1. Download files from the GitHub repo using the following command. The repo contains the YAML files and text files.

```
git clone https://github.com/sandeepved/ASEANZK-CP4D-Practicum.git
```

```
: ~ % git clone https://github.com/sandeepved/ASEANZK-CP4D-Practicum.git
Cloning into 'ASEANZK-CP4D-Practicum'...
remote: Enumerating objects: 307, done.
remote: Counting objects: 100% (136/136), done.
remote: Compressing objects: 100% (81/81), done.
remote: Total 307 (delta 53), reused 133 (delta 51), pack-reused 171
Receiving objects: 100% (307/307), 37.28 MiB | 16.24 MiB/s, done.
Resolving deltas: 100% (116/116), done.
```

2. After downloading files, switch to the Cloud-Pak-for-Data-Install directory.

```
cd ./ASEANZK-CP4D-Practicum/scenario5/cp4d
```

```
~ % cd ./ASEANZK-CP4D-Practicum/scenario5/cp4d
cp4d %
```

Setting up projects (namespaces) on Red Hat OpenShift Container Platform

1. Login to your OpenShift cluster by executing the following command. Make sure the user you use has cluster and project admin access.

Refer to section: [Access to the cluster: Step 7](#) for the login command
oc login --token=\$token --server=\$clusterURL

```
: ~ % oc login --token=... --server=https://...:31736
[REDACTED]@[REDACTED]:[REDACTED] ~ % Logged into "https://[REDACTED].containers.cloud.ibm.com:31736" as "[REDACTED]" using the token provided.
You have access to 66 projects, the list has been suppressed. You can list all projects with 'oc projects'
Using project "cpd".
```

2. Create the projects by running the following commands

```
oc new-project ibm-common-services
oc new-project cpd-operators
oc new-project cpd-instance
```

```

Using project "default".
sujathasureshkumar@Sujathas-MacBook-Pro Cloud-Pak-for-Data-Install % oc new-project ibm-common-services
oc new-project cpd-operators
oc new-project cpd-instance

Now using project "ibm-common-services" on server "https://c101-e.eu-de.containers.cloud.ibm.com:30517".
You can add applications to this project with the 'new-app' command. For example, try:
  oc new-app rails-postgresql-example
to build a new example application in Ruby. Or use kubectl to deploy a simple Kubernetes application:
  kubectl create deployment hello-node --image=k8s.gcr.io/e2e-test-images/agnhost:2.33 -- /agnhost serv
e-hostname

Now using project "cpd-operators" on server "https://c101-e.eu-de.containers.cloud.ibm.com:30517".
You can add applications to this project with the 'new-app' command. For example, try:
  oc new-app rails-postgresql-example
to build a new example application in Ruby. Or use kubectl to deploy a simple Kubernetes application:
  kubectl create deployment hello-node --image=k8s.gcr.io/e2e-test-images/agnhost:2.33 -- /agnhost serv
e-hostname

Now using project "cpd-instance" on server "https://c101-e.eu-de.containers.cloud.ibm.com:30517".
You can add applications to this project with the 'new-app' command. For example, try:
  oc new-app rails-postgresql-example
to build a new example application in Ruby. Or use kubectl to deploy a simple Kubernetes application:
  kubectl create deployment hello-node --image=k8s.gcr.io/e2e-test-images/agnhost:2.33 -- /agnhost serv
e-hostname
sujathasureshkumar@Sujathas-MacBook-Pro Cloud-Pak-for-Data-Install %

```

3. Create the operator group for the IBM Cloud Pak foundational services project. The following example uses the recommended project name (ibm-common-services):

```
oc apply -f OperatorGroup.yaml
```

```
sujathasureshkumar@Sujathas-MacBook-Pro Cloud-Pak-for-Data-Install % oc apply -f OperatorGroup.yaml
operatorgroup.coreos.com/operatorgroup created
```

Configuring your cluster to pull Cloud Pak for Data images

1. Run the following command to generate a JSON file called .dockerconfigjson in the current directory.

```
oc extract secret/pull-secret -n openshift-config
```

```
Cloud-Pak-for-Data-Install % oc extract secret/pull-secret -n ope
nshift-config
.dockerconfigjson
```

2. Encode the username and password using Base64 encoding. Copy the output for step 3.

```
echo -n "cp:$IBMENTITLEMENTKEY" | base64
```

```
sujathasureshkumar@Sujathas-MacBook-Pro Cloud-Pak-for-Data-Install % echo -n "cp:$IBMENTITLEMENTKEY" | ba  
se64  
Y3A6ZX1KMGVYQW1PaUpLVjFRaUxDShiR2NpT21KSVV6STFOaUo5LmV5SnBjM01pT21KS1FrMGdUV0Z5YTJWMGNHeGhZM1VpTENKcF1YU  
WlPakUyTmpBMk1qYzRORGtzSW1wMGFTSTZJakV5TVRaafpEzzFZVEF5WVRSaFlUWTRNM113TTJZMk5XTTFZbVppWkJM0luMC43bkJUSm  
RxV0Y5Y1ZFTmVqV2xTcj1Ua2FrYTA10W1YWnVCQlpsscS1ZZ1NV  
sujathasureshkumar@Sujathas-MacBook-Pro Cloud-Pak-for-Data-Install %
```

3. Add an entry for the container registry to the auths section in the .dockerconfigjson file.

```
vi .dockerconfigjson
```

4. Copy the following snippet into "vi .dockerconfigjson". Note: Do not replace the whole file. Just add this snippet to the auths section.

base64-encoded-credentials = Step 2 encoded username and password (command:
echo -n "cp:\$IBMENTITLEMENTKEY" | base64)

```
"cp.icr.io":{  
    "auth":"<< base64-encoded-credentials>>",  
    "email":"not-used"  
},
```

```
{"auths":{ "cp.icr.io":{  
        "auth":"Y3A6ZX1KMGVYQW1PaUpLVjFRaUxDShiR2NpT21KSVV6STFOaUo5LmV5SnBjM01pT21KS1FrMGdUV0Z5YTJWMGNHe  
        GhZM1VpTENKcF1YUW1PakUyTmpBMk1qYzRORGtzSW1wMGFTSTZJakV5TVRaafpEzzFZVEF5WVRSaFlUWTRNM113TTJZMk5XTTFZbVppWkJ  
        JM0luMC43bkJUSmRxV0Y5Y1ZFTmVqV2xTcj1Ua2FrYTA10W1YWnVCQlpsscS1ZZ1NV",  
        "email":"not-used"  
    }, "cloud.openshift.com":{ "auth":"b3B1bnNoaWZ0LXJ1bGVhc2UtZGV2K29jbV9hY2Nlc3NfYzg2MjFhZTk0M2UzNG
```

5. Apply the new configuration by running the following command. It will restart master and worker nodes. It would take at least 20 min for the nodes to come back and be ready.

```
oc set data secret/pull-secret -n openshift-config --from-file=.dockerconfigjson=.dockerconfigjson  
sleep 1200
```

```
sujathasureshkumar@Sujathas-MacBook-Pro Cloud-Pak-for-Data-Install % oc set data secret/pull-secret -n op  
enshift-config --from-file=.dockerconfigjson=.dockerconfigjson  
sleep 1200  
secret/pull-secret data updated
```

Creating catalog sources

1. Create IBM Operator Catalog using the following command.

```
oc apply -f OperatorCatalog.yaml  
sleep 150
```

```
Cloud-Pak-for-Data-Install % oc apply -f OperatorCatalog.yaml
sleep 150
catalogsource.coreos.com/ibm-operator-catalog created
```

2. Verify that the IBM Operator Catalog was successfully created.

```
oc get catalogsource -n openshift-marketplace
```

```
Cloud-Pak-for-Data-Install % sleep 150
catalogsource.coreos.com/ibm-operator-catalog created
Cloud-Pak-for-Data-Install % oc get catalogsource -n openshift-marketplace
NAME          DISPLAY        TYPE   PUBLISHER   AGE
certified-operators Certified Operators  grpc  Red Hat    8h
community-operators Community Operators  grpc  Red Hat    8h
ibm-operator-catalog  IBM Operator Catalog  grpc  IBM      4m59s
redhat-marketplace  Red Hat Marketplace  grpc  Red Hat    8h
redhat-operators    Red Hat Operators   grpc  Red Hat    8h
Cloud-Pak-for-Data-Install %
```

3. Verify that ibm-operator-catalog is READY. It might take several minutes before the catalog source is ready. If the command does not return READY, wait a few minutes and try to verify the status again.

```
oc get catalogsource -n openshift-marketplace ibm-operator-catalog -o
jsonpath='{{.status.connectionState.lastObservedState}} {"\n"}'
```

```
Cloud-Pak-for-Data-Install % oc get catalogsource -n openshift-marketplace ibm-operator-catalog -o jsonpath='{{.status.connectionState.lastObservedState}} {"\n"}'
READY
```

Installing IBM Cloud Pak Dependencies

1. Create the following operator dependencies for your environment. The catalog that the operator dependencies points to depends on the type of catalog source that you created and the location from which the cluster pulls images.

```
oc apply -f CatalogDependencies.yaml
sleep 150
```

```
cp4d % oc apply -f CatalogDependencies.yaml
sleep 150

catalogsource.operators.coreos.com/ibm-cpd-ccs-operator-catalog created
catalogsource.operators.coreos.com/ibm-cpd-datarefinery-operator-catalog created
catalogsource.operators.coreos.com/ibm-db2aaservice-cp4d-operator-catalog created
catalogsource.operators.coreos.com/ibm-cpd-iis-operator-catalog created
catalogsource.operators.coreos.com/ibm-cpd-wml-operator-catalog created
catalogsource.operators.coreos.com/ibm-cpd-ws-operator-catalog created
catalogsource.operators.coreos.com/opencontent-elasticsearch-dev-catalog created
catalogsource.operators.coreos.com/ibm-rabbitmq-operator-catalog created
catalogsource.operators.coreos.com/ibm-cloud-databases-redis-operator-catalog created
catalogsource.operators.coreos.com/ibm-cpd-ws-runtimes-operator-catalog created
subscription.operators.coreos.com/ibm-common-service-operator created
```

Installing IBM Cloud Pak foundational services

1. Create the following operator subscription for your environment. The catalog that the operator subscription points to depends on the type of catalog source that you created and the location from which the cluster pulls images.

```
oc apply -f OperatorSubscription.yaml
sleep 300
```

```
: Cloud-Pak-for-Data-Install % oc apply -f OperatorSubscription.yaml
1
sleep 300
subscription.operators.coreos.com/ibm-common-service-operator created
Cloud-Pak-for-Data-Install %
```

2. Verify the status of ibm-common-service-operator, Customer resource definitions, and IBM Cloud Pak Foundational services

```
oc --namespace ibm-common-services get csv
oc get crd | grep operandrequest
oc api-resources --api-group operator.ibm.com
```

```
: Cloud-Pak-for-Data-Install % oc apply -f OperatorSubscription.yaml
sleep 300
subscription.operators.coreos.com/ibm-common-service-operator created
sujathasureshkumar@Sujathas-MacBook-Pro Cloud-Pak-for-Data-Install % oc --namespace ibm-common-services get csv
NAME DISPLAY VERSION REPLACES PHASE
ibm-common-service-operator.v3.19.4 IBM Cloud Pak foundational services 3.19.4 ibm-common-service-operator.v3.19.3 Succeeded
ibm-namespace-scope-operator.v1.13.3 IBM NamespaceScope Operator 1.13.3 ibm-namespace-scope-operator.v1.13.2 Succeeded
operand-deployment-lifecycle-manager.v1.17.3 Operand Deployment Lifecycle Manager 1.17.3 operand-deployment-lifecycle-manager.v1.17.2 Succeeded
Cloud-Pak-for-Data-Install % oc get crd | grep operandrequest
operandrequests.operator.ibm.com 2022-09-06T12:15:06Z
Cloud-Pak-for-Data-Install % oc api-resources --api-group operator.ibm.com
NAME SHORTNAMES APIVERSION NAMESPACED KIND
commonservices operator.ibm.com/v3 true CommonService
namespacescopes nss operator.ibm.com/v1 true NamespaceScope
operandbindinfos opbi operator.ibm.com/vialpha1 true OperandBindInfo
operandconfigs opcon operator.ibm.com/vialpha1 true OperandConfig
operandregistries opreg operator.ibm.com/vialpha1 true OperandRegistry
operandrequests opreq operator.ibm.com/vialpha1 true OperandRequest
podpresets operator.ibm.com/vialpha1 true PodPreset
```

3. Create the following data operator subscriptions for your environment. The catalog that the operator subscription points to depends on the type of catalog source that you created and the location from which the cluster pulls images.

```
oc apply -f DataOperatorSubscription.yaml  
sleep 300
```

```
cp4d % oc apply -f DataOperatorSubscription.yaml  
sleep 300  
  
subscription.operators.coreos.com/cpd-operator created  
subscription.operators.coreos.com/ibm-dv-operator-catalog-subscription created  
subscription.operators.coreos.com/ibm-dmc-operator-subscription created  
subscription.operators.coreos.com/ibm-db2uoperator-catalog-subscription created  
subscription.operators.coreos.com/ibm-db2wh-cp4d-operator-catalog-subscription created  
subscription.operators.coreos.com/ibm-cpd-wkc-operator-catalog-subscription created  
subscription.operators.coreos.com/ibm-cpd-ws-operator-catalog-subscription created  
cp4d %
```

Creating the License service operator subscription

1. Submit the following operand request to install the License Service operator in the project where you plan to install the Cloud Pak for Data software.

```
oc apply -f LicSrvOpr.yaml  
sleep 150
```

```
Cloud-Pak-for-Data-Install % oc apply -f LicSrvOpr.yaml  
sleep 150  
operandrequest.operator.ibm.com/common-service-license created
```

2. Run the following command to confirm that the operand request was created. Verify that the command returns Running. If the command returns Initialized or Installing, wait several minutes and rerun the command.

```
oc get pod -n ibm-common-services -l app.kubernetes.io/name=ibm-licensing -o  
jsonpath='{.items[0].status.phase} {"\n"}'
```

```
Cloud-Pak-for-Data-Install % oc get pod -n ibm-common-service  
-l app.kubernetes.io/name=ibm-licensing -o jsonpath='{.items[0].status.phase} {"\n"}'  
Running
```

Installing Cloud Pak for Data

1. Enable the IBM Cloud Pak for Data platform operator and the IBM Cloud Pak foundational services operator to watch the project where you will install IBM Cloud Pak for Data

```
oc apply -f cpdinstall.yaml  
sleep 60
```

```
oc project cpd-instance
```

```
Cloud-Pak-for-Data-Install % oc apply -f cpdinstall.yaml  
sleep 60  
operandrequest.operator.ibm.com/empty-request created
```

2. Change to the project where you installed Cloud Pak for Data.

```
oc apply -f customresource.yaml  
sleep 60
```

```
Cloud-Pak-for-Data-Install % oc project cpd-instance  
Already on project "cpd-instance" on server "https://c101-e.eu-de.containers.cloud.ibm.com:30517".
```

3. Create a custom resource to install Cloud Pak for Data.

```
sleep 3600  
oc get Ibmcpd ibmcpd-cr -o jsonpath=".status.controlPlaneStatus{'\n'}"
```

4. Run the following command to determine whether the ibmcpd-cr has been created. If the output is “InProgress,” then Wait for at least 60 minutes. Then, run the command again.

```
CP4D % oc get Ibmcpd ibmcpd-cr -o jsonpath=".status.controlPlaneStatus{'\n'}"  
Completed
```

```
oc get ZenService lite-cr -o jsonpath=".status.zenStatus{'\n'}"
```

5. Run the following command to determine whether the control plane is ready.

```
CP4D % oc get ZenService lite-cr -o jsonpath=".status.zenStatus{'\n'}"  
Completed
```

Validation of Cloud Pak for Data Installation

Access the Cloud Pak for Data

1. Get the URL of the Cloud Pak for the Data web client.

```
oc get ZenService lite-cr -o jsonpath=".status.url{'\n'}"
```

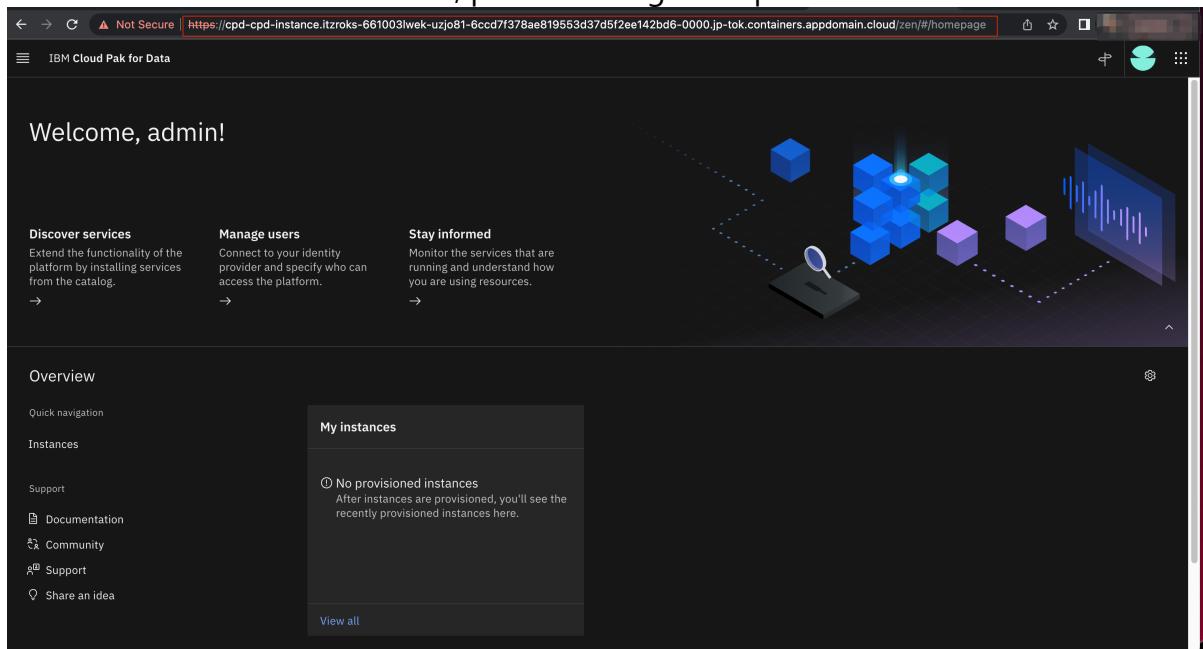
```
CP4D % oc get ZenService lite-cr -o jsonpath=".status.url{'\n'}"
cpd-cpd-instance.itzroks-661003lwek-uzjo81-6ccd7f378ae819553d37d5f2ee142bd6-0000.jp-tok.containers.appdomain.cloud
# initial_admin_password
7aPSV8LbWKTg
```

2. Get the initial password for the admin user.

```
oc extract secret/admin-user-details --keys=initial_admin_password --to=
```

```
CP4D % oc get ZenService lite-cr -o jsonpath=".status.url{'\n'}"
cpd-cpd-instance.itzroks-661003lwek-uzjo81-6ccd7f378ae819553d37d5f2ee142bd6-0000.jp-tok.containers.appdomain.cloud
# initial_admin_password
7aPSV8LbWKTg
```

3. With the URL and user id, password Login to cp4d



4. You are now logged into Cloud Pak for Data(CP4D). Now you can move to Scenario 1 or 2 or 3 and start doing your Practicum Lab exercise.