OCP_4.8_and_CP4I_2021.4_installation_guide_V1.4

For

DASHEN BANK

Sudan Street,

Infront of National Bank of Ethiopia,

Addis Ababa, Ethiopia.

By

EIDIKO SYSTEMS INTEGRATORS (PVT) LTD

Suite 1,

MJR Prashant Hills Raidurgam,

Hyderabad, Telangana 500032.

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Document Information

Title	OCP_4.8_and_CP4I_2021.4_installation_guide_V1.4
Author	Upender Kuncham
File Ref.	
Document Template version	1.10

Revision History

Version	Status	Date	Author / Editor	Details Of Change
1.0	Updated		Upender Kuncham	Draft Proposal
1.1	Updated		ShashiVardhan	Initial Version
1.2	Updated		Ahmed Azraq	Ibm Review
1.3	Updated		ShashiVardhan Naresh Uppala Gupta Rajesh	Updated the Document based on Comments by Ahmed and added the required fields.
1.4	Updated		Ahmed Azraq	Added more review Comments
1.5	Updated		ShashiVardhan	Final Documentation

			Naresh Uppala Gupta Rajesh	

Document Control

Distribution List

Name	Organization	Role	Email
Molla Berhie	Dashen Bank	Senior Manager, IT Projects	molla.berhie@dashenbanksc.com
Ratan Sripurapu	Eidiko Systems Integrators Pvt.Ltd.	Technical Architect	ratan.siripurapu@eidiko.com
Upender Kuncham	Eidiko Systems Integrators Pvt.Ltd.	Project Lead	upender.kuncham@eidiko.com
Ibadur Rehman	Eidiko Systems Integrators Pvt.Ltd.	Team Lead	ibadurrehman.shaik@eidiko-india.com
T. ShashiVardhan Naresh Uppala Gupta Rajesh	Eidiko Systems Integrators Pvt.Ltd.	Openshift	shashivardhan.tulshannagari@eidiko.com nareshbabu.uppala@eidiko-india.com rajesh.kandregula@eidiko-india.com

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1. Introduction

This document will guide you the installation of OpenShift cluster, ODF and CP4I, for better understanding incorporating the required URL's during the installation procedure.

2. OpenShift Container Platform installation overview

The OpenShift Container Platform installation program offers you flexibility. You can use the installation program to deploy a cluster on infrastructure that the installation program provisions and the cluster maintains or deploy a cluster on infrastructure that you prepare and maintain.
These two basic types of OpenShift Container Platform clusters are frequently called installer-provisioned infrastructure clusters and user-provisioned infrastructure clusters.

Both types of clusters have the following characteristics:

- Highly available infrastructure with no single points of failure is available by default
- Administrators maintain control over what updates are applied and when

In the Dashen Bank we are followed with a User Provisioned Infrastructure process.

To know more about the OpenShift Installation overview please refer to the following link.

https://docs.openshift.com/container-platform/4.8/architecture/architecture-installation.html

3. System Requirement:

3.1 Machine List:

The following list of machines configured in Dashen Bank environment

Role	Hostname	I P	Physical Machine Mapping	OS Version	vCPU	RAM (GB)	Disk 1 (GB)	Disk 2 Storage (GB)	Comments
Bastion Node	install.cloudpakprod.dash enbank.local	192.168.18.16	CAT2_1	Linux	4	16	120		
Bootstrap Node	bootstrap.cloudpakprod.d ashenbank.local	192.168.18.17	CAT2_1	RHCOS	4	16	100		Temp only during installation
Master Node 01	master01.cloudpakprod.d ashenbank.local	192.168.18.21	CAT2_1	RHCOS	4	16	100		
Master Node 02	master02.cloudpakprod.d ashenbank.local	192.168.18.22	CAT1_1	RHCOS	4	16	100		

Master Node 03	master03.cloudpakprod.d ashenbank.local	192.168.18.23	CAT1_2	RHCOS	4	16	100		
Storage	storage01.cloudpakprod.d ashenbank.local	192.168.18.31	CAT1_1	RHCOS	12	26	100	1000	

Node 01

Storage Node 02	storage02.cloudpakprod.d ashenbank.local	192.168.18.32	CAT1_2	RHCOS	12	26	100	1000	
Storage Node 03	storage03.cloudpakprod.d ashenbank.local	192.168.18.33	CAT1_3	RHCOS	12	26	100	1000	
Worker Node 01	worker01.cloudpakprod.d ashenbank.local	192.168.18.41	CAT1_1	RHCOS	16	64	100		
Worker Node 02	worker02.cloudpakprod.d ashenbank.local	192.168.18.42	CAT1_2	RHCOS	16	64	100		
Worker Node 03	worker03.cloudpakprod.d ashenbank.local	192.168.18.43	CAT1_2	RHCOS	16	64	100		

Worker Node 04	worker04.cloudpakprod.d ashenbank.local	192.168. 18.44	CAT2_1	RHCOS	16	64	100		
Worker Node 05	worker05.cloudpakprod.d ashenbank.local	192.168. 18.45	CAT2_1	RHCOS	16	64	100		
APIC Gateway 01	datapower01.prod.dashen bank.local	10.0.20. 10/11	CAT1_1	RHCOS	4	16	120		Virtual IP is 10.0.20.18
APIC Gateway 02	datapower02.prod.dashen bank.local	10.0.20. 12/13	CAT1_3	RHCOS	4	16	120		
APIC Gateway 03	datapower03.prod.dashen bank.local	10.0.20. 14/15	CAT2_1	RHCOS	4	16	120		

4. Preparation for OCP Installation

4.1 Creating the user-provisioned infrastructure

Before you deploy an OpenShift Container Platform cluster that uses user-provisioned infrastructure, you must create the underlying infrastructure.

Prerequisites:

1 Review the OpenShift Container Platform 4.x Tested Integrations page before you create the supporting infrastructure for your cluster.

4.1.1 Configure DHCP or set static IP addresses on each node.

Configure DHCP (Dynamic Host Configuration Protocol) or set static IP addresses on each node:

DHCP server is configured to provide persistent IP addresses and host names to the cluster machines. During the initial boot, the machines require either a DHCP server or that static IP addresses be set on each host in the cluster to establish a network connection, which allows them to download their Ignition config files.

If DHCP is configured then you don't need to set static ip's on machines.

To configure the DHCP follow the link

https://access.redhat.com/documentation/en-us/red_hat_enterprise_linux/7/html/networking_guide/sec-dhcp configuring-server

NOTE-1: If DHCP is not configured then update the static ip's on each machine. Here we have used static IPs.

NOTE-2: In the Dashen Bank DHCP configuration has been done by using the *ansible-playbook* command which ensures Provisioning of the load balancers, Configuring ports and configuring DNS.

4.1.2 Provision the required load balancers.

Before you install OpenShift Container Platform, you must provision two load balancers that meet the following requirements:

API load balancer: Provides a common endpoint for users, both human and machine, to interact with and configure the platform.
Application Ingress load balancer: Provides an Ingress point for application traffic flowing in from outside the cluster.

To know more about Load Balancers please follow the link below.

https://docs.openshift.com/container-platform/4.8/installing/installing_bare_metal/installing-restricted networks-bare-metal.html

NOTE-1: In the Dashen Bank provisioning load balancers has been done by using the ***ansible-playbook*** command which ensures DHCP configuration, provisioning of the load balancers, configuring ports and configuring DNS

4.1.3 Configure the ports for your machines.

OpenShift infrastructure components communicate with each other using ports, which are communication endpoints that are identifiable for specific processes or services. Ensure the following ports required by OpenShift are open between hosts, for example if you have a firewall in your environment. Some ports are optional depending on your configuration and usage.

To know more about ports please follow the link below.

https://docs.openshift.com/enterprise/3.1/install_config/install/prerequisites.html

Now then, go to Network Access and check about ports.

NOTE-1: In the Dashen Bank configuring the ports has been done by using the ***ansible-playbook*** command which ensures DHCP configuration, provisioning of the load balancers, configuring ports and configuring DNS

4.1.4 Configure DNS:

DNS stands for Domain Name System, translates hostnames or URLs into IP addresses. For example, if we type www.dashenbank.local in browser, the DNS server translates the domain name into its associated ip address. Since the IP addresses are hard to remember all time, DNS servers are used to translate the hostnames like www.dashenbank.local to 173.xxx.xx.xxx. So it makes it easy to remember the domain names instead of its IP address.

To know more about DNS configuration please follow the link below.

https://access.redhat.com/documentation/en-us/red_hat_enterprise_linux/8/html/configuring_and_managing_networking/manually-configuring-the-etc resolv-conf-file_configuring-and-managing-networking

NOTE-1: In the Dashen Bank configuring the ports has been done by using the ***ansible-playbook*** command which ensures DHCP configuration, provisioning of the load balancers, configuring ports and configuring DNS

4.1.5 Downloading the required files for installation:

In order to install the OpenShift we need the following files to be downloaded and kept in the installation machine.

OpenShift-installer:

Extract the tar file from the following URL

https://mirror.openshift.com/pub/openshift-v4/x86_64/clients/ocp/4.8.2/openshift-client-linux-4.8.2.tar.gz

Bios files:

Extract the raw.gz file from the following URL

```
https://mirror.openshift.com/pub/openshift-v4/dependencies/rhcos/4.8/4.8.2/rhcos-4.8.2-x86_64-metal.x86_64.raw.gz
```

For simplicity, rename the downloaded file into bios.raw.gz.

oc and kubectl commands files:

Extract the tar.gz file from the following URL

```
https://mirror.openshift.com/pub/openshift-v4/x86_64/clients/ocp/4.8.2/openshift-install-linux-4.8.2.tar.gz
```

Red Hat CoreOs ISO Image:

Get the ISO image file from the following URL

```
https://mirror.openshift.com/pub/openshift-v4/x86_64/dependencies/rhcos/4.8/4.8.2/rhcos-4.8.2-x86_64-live.x86_64.iso
```

NOTE: Verify the version which you are downloading before starting further steps. We have faced an issue here as we have gone through 4.9 instead of the 4.8 OCP version.

After installing the above 4 files you need to copy those files into different paths.

Copy **oc, kubectl, & openshift-installer** into **/usr/local/bin/**

Now, check the version of the oc client by following command,

```
$ oc version
```

Copy **bios.raw.gz** file into **/var/www/html/install**

4.1.6 Configuring other required services:

NTP Configuration:

NTP (Network Time Protocol) is for keeping hosts in sync with the world clock. Time synchronization is important for time sensitive operations, such as log keeping and time stamps, and is highly recommended for Kubernetes, which OpenShift Container Platform is built on**.**

NTP must be configured in your system.

NOTE:

1. We have configured the local bastion node as NTP server as there is an issue with the main NTP server of Dashen Bank. Once it is resolved we can configure the main NTP server provided by the DasheBank.

2. We have configured the NTP by using below procedure:
   step1: install NTP by following command,

firstly, check ntp is configured or not:

```
-$ timedatectl
```

If ntp is not configured follow below commands to configure ntp.

```
# timedatectl set-ntp true
# yum install chrony
# systemctl enable chronyd -now
$ vi /etc/chrony.conf
```

Please, see below chrony.conf file that we have used for NTP server configuration:


```
# Use public servers from the pool.ntp.org project.
# Please consider joining the pool (http://www.pool.ntp.org/join.html).
pool 2.centos.pool.ntp.org iburst

# Record the rate at which the system clock gains/losses time.
driftfile /var/lib/chrony/drift

# Allow the system clock to be stepped in the first three updates
# if its offset is larger than 1 second.
makestep 1.0 3

# Enable kernel synchronization of the real-time clock (RTC).
rtcsync

# Enable hardware timestamping on all interfaces that support it.
#hwtimestamp *

# Increase the minimum number of selectable sources required to adjust
# the system clock.
#minsources 2
```

```
# Allow NTP client access from the local network.
#allow 192.168.0.0/16
allow 192.168.18.0/26

# Serve time even if not synchronized to a time source.
#local stratum 10
#Server 172.30.1.59 ## These 2 are the Main NTP server, when it is active, shift to the main server. #Server 172.26.14.59
server 192.168.18.16

# Specify file containing keys for NTP authentication.
keyfile /etc/chrony.keys

# Get TAI-UTC offset and leap seconds from the system tz database.
leapsectz right/UTC

# Specify directory for log files.
logdir /var/log/chrony

# Select which information is logged.
#log measurements statistics tracking
```

To check the NTP configuration,

```
$ chronyc sources
```

Now, for more information please follow the below link:

```
https://docs.openshift.com/container-platform/4.8/installing/install_config/installing
customizing.html#installation-special-config-chrony_installing-customizing
```

Firewall settings:

Firewalld is enabled by default, disable it

```
$ systemctl stop firewalld.service

$ systemctl disable firewalld.service
```


```
$ systemctl stop firewalld.service

$ systemctl disable firewalld.service
```


If it cannot be disabled, please add the following firewall rules.

53/tcp and 53/udp: DNS server
22623/tcp: OCP machine config server
6443/tcp: OCP API server
80/tcp: OCP ingress http
443/tcp: OCP ingress https

For example, use the commands below to modify firewalld settings to allow DNS server.

```
firewall-cmd --add-port=53/tcp --zone=internal --permanent
firewall-cmd --add-port=53/tcp --zone=public --permanent
firewall-cmd --add-port=53/udp --zone=internal --permanent
firewall-cmd --add-port=53/udp --zone=public -permanent
firewall-cmd -reload
```

To know more about the firewalld, follow the below link:

```
https://access.redhat.com/documentation/en-us/red_hat_enterprise_linux/7/html/security_guide/b
h stopping_firewalld
```

Named, sshd, HAProxy service must be active:

HAProxy (High Availability Proxy) is open source proxy and load balancing server software. It provides high availability at the network (TCP) and application (HTTP/S) layers, improving speed and performance by distributing workload across multiple servers. HAProxy runs on Linux, FreeBSD and Solaris operating systems. HA-Proxy is used for the non-production environment. For the production and DR environments, Dashen Bank shall provide load balancers.

To install HAProxy:

NOTE-1: In the Dashen Bank installing and configuring HA-Proxy have been done through the ansible script, so this step can be skipped.

```
$ yum install HAProxy
$ systemctl status HAProxy
$ systemctl start HAProxy
```

The Secure Shell Daemon application (SSH daemon or sshd) is the daemon program for ssh. This program is an alternative to rlogin and rsh and provides encrypted communications between two untrusted hosts over an insecure network.

To check and start sshd Service:

```
$ systemctl status sshd
$ systemctl start sshd
```

After completion of the above steps, we must change the hostname, by running following commands and change in the respective fields.

```
$ vi /etc/hosts --- change hostname in hosts
$ vi /etc/hostname --- change hostname in hostname
$ reboot
```

To know more about hostname click on following link:

```
https://www.cyberciti.biz/faq/rhel-8-change-hostname-computer-name-command/
```

5.OCP Installation

5.1 Installing ansible in helper node:

If you use ansible command then no need to configure the prerequisites (DNS, DHCP, Load Balancer, Configure the ports).Ansible command by default configures all the prerequisites.

It will install all prerequisites needed for OpenShift installation.

Hence we install ansible for default configurations.

```
$ yum -y install ansible
And to check its version:
$ ansible -version
$ yum install -y git
```

NOTE: The ansible version of 2.9.23 or above only is accepted.

Problems faced during ansible script installation:

1. The version of OC is mismatched and installed OCP4.9 instead of 4.8. Hence, we downloaded the required version of openshift installer files ie., 4.8.2.

5.2 Installation steps:

Please follow the below steps for the installation

We need helper node directory, we can get it by following git clone command,

```
$ git clone https://github.com/RedHatOfficial/ocp4-helpernode
```

Every OpenShift Container Platform 4.x pattern includes a helper node. The helper node manages a number of services that are used to install, configure, and access an OpenShift cluster.

The services include the following:

- **HA Proxy server** - provides load balancing and proxy services
- **HTTP server** - RHCOS nodes download the ignition config files from the HTTP server
- **DNS server** - provides IP address name resolution
- **NFS server** - provides storage for the OpenShift image repository
- **DHCP server** - provides static IP address assignment based on the RHCOS node's MAC address

NOTE: To know more about helper node, please go through the below link:

```
https://www.ibm.com/docs/en/psw/2.3.2.0?topic=patterns-openshift-container-platform-helper-node
```

Then go to helper node directory and create one vars.yaml file


```
$ cd ocp4-helpernode/

$ touch vars.yaml
```

Place the below details in the vars.yaml:

```
staticips: true
helper:
 name: "cloudpakprod"
 ipaddr: "192.168.18.16"
 networkifacename: "ens192"
 dns:
 domain: "dashenbank.local"
 clusterid: "cloudpakprod"
 forwarder1: "8.8.4.4"
 forwarder2: "8.8.8.8"
 forwarder3: "192.168.1.1"
 bootstrap:
 name: "bootstrap"
 ipaddr: "192.168.18.17"
 masters:
 - name: "master01"
          ipaddr: "192.168.18.21"
 - name: "master02"
          ipaddr: "192.168.18.22"
 - name: "master03"
          ipaddr: "192.168.18.23"
 workers:
 - name: "storage01"
          ipaddr: "192.168.18.31"
 - name: "storage02"
          ipaddr: "192.168.18.32"
 - name: "storage03"
          ipaddr: "192.168.18.33"
 - name: "worker01"
          ipaddr: "192.168.18.41"
 - name: "worker02"
          ipaddr: "192.168.18.42"
 - name: "worker03"
          ipaddr: "192.168.18.43"
 - name: "worker04"
          ipaddr: "192.168.18.44"
 - name: "worker05"
```

```
ipaddr: "192.168.18.45"
```

Problems faced during installation:

Change the URLs in ocp4-helpernode/vars/main.yml to reflect the target version (OpenShift 4.8). This was configured to OpenShift 4.9 in one of the installations for Dashen Bank and it resulted in installing OpenShift 4.9 instead.

NOTE: Before moving on to further steps, please check whether these static IP addresses are not being used or not.

Now run the ansible-playbook command to configure DNS, DHCP, Load balancer, & default Ports:

```
$ ansible-playbook -e @vars.yaml tasks/main.yml
```

After running the ansible-playbook command all the packages will be downloaded automatically which are required for OpenShift installation.

Now as a sanity check, check the oc version again.

```
$ oc version

Output:

Client Version: 4.8.29
Kubernetes Version: v1.21.6+bb8d50a
```

Place helper ip (Installer Node) address in /etc/resolv.conf:

```
$ vi /etc/resolv.conf
Search for the cp4i-uat.dashenbank.local &
Add 192.168.18.16(helper IP) in it.
```

Now, verify DNS is configured or not, for every nodes which are to be in cluster, by following command:

```
$ dig bootstrapname.hostname
$ dig mastername.hostname
$ dig workernamae.hostname
```

After using dig command, the output if you get ANSWER as 1 then dns is configured if ANSWER is 0 then dns is not configured and you have an error.

Generating SSH:

Generate an SSH private key and add it to the agent. If you want to perform installation debugging or disaster recovery on your cluster, you must provide an SSH key to both your ssh-agent and the installation program. You can use this key to access the bootstrap machine in a public cluster to troubleshoot installation issues.

Generating ssh key, evaluating it and starting the ssh-agent process as background using below commands.

```
$ ssh-keygen -t rsa -b 4096
$ eval "$(ssh-agent -s)"
$ ssh-add
```

Creating an *ocp* directory and a file install-config.yaml in it:

```
$ mkdir workspace
$ mkdir cloudpakprod
$ cd /workspace/cloudpakprod/
$ touch install-config.yaml
```

Place the below details in the install-config.yaml:

```
apiVersion: v1
baseDomain: cloudpakprod.dashenbank.local
compute:
- hyperthreading: Enabled
        name: worker
        replicas: 0 # Must be set to 0 for User Provisioned Installation as worker nodes will be
manually deployed.
controlPlane:
hyperthreading: Enabled
name: master
replicas: 3
metadata:
name: cloudpakprod
networking:
clusterNetwork:
- cidr: 10.128.0.0/14
hostPrefix: 23
networkType: OpenShiftSDN
serviceNetwork:
- 172.30.0.0/16
platform:
none: {}
fips: false
pullSecret: '<add REDHAT licensed Pull-secret>'
sshKey: "<place the ssh key which we have generated in the above steps>"
```

Note: We have faced an issue while using pullsecret which expired and we have started from this point again after clearing all the things we have done with the expired pullsecret.

To get install-config.yaml file and more details about this use below link,

https://docs.openshift.com/container-platform/4.8/installing/installing_bare_metal/installing-restricted-networks bare-metal.html#installation-bare-metal-config-yaml_installing-restricted-networks-bare-metal

In the above yaml file take pull secret from Red Hat login account by following URL,

```
https://cloud.redhat.com/openshift/install/pull-secret
```

Take the ssh key from /root/.ssh/id_rsa.pub.

Creating manifest and ignition files:

To modify some cluster definition files and manually start the cluster machines, you must generate the Kubernetes manifest and Ignition config files so that the cluster needs to make its machines. The installation configuration file transforms into the Kubernetes manifest. The manifests wrap into the Ignition configuration files, which are later used to create the cluster.

NOTE: To know more about manifest and ignition files click on the following link.

```
https://docs.openshift.com/container-platform/4.8/installing/installing_bare_metal/installing-restricted networks-bare-metal.html#installation-user-infra-generate-k8s-manifest-ignition_installing-restricted-networks bare-metal
```

Create the Manifest files

```
$ openshift-install create manifests --dir=<installation_directory>

$ openshift-install create ignition-configs --dir=<installation_directory
```

Now, run the following commands to configure NTP.

```
cat << EOF | base64 -w0
server 192.168.18.16 iburst
driftfile /var/lib/chrony/drift
makestep 1.0 3
rtcsync
logdir /var/log/chrony
EOF
```

```
cat << EOF >
/workspace/cloudpakprod/openshift/99_masters-chrony-configuration.yaml
apiVersion: machineconfiguration.openshift.io/v1
kind: MachineConfig
metadata:
labels:
        machineconfiguration.openshift.io/role: master
name: masters-chrony-configuration
spec:
config:
ignition:
config: {}
security:
tls: {}
timeouts: {}
version: 3.1.0
        networkd: {}
        passwd: {}
        storage:
```

files:
- contents:
source: data:text/plain;charset=utf
8;base64,c2VydmVyIDEwLjE3MS41Ny45OCBpYnVyc3QKZHJpZnRmaWxlIC92YXIvbGliL2Nocm9ueS9kcmlmdApt
tY WtlC3RlcCAxLjAgMwpydGNzeW5jCmxvZ2RpciAvdmFyL2xvZy9jaHJvbnkK
mode: 420
overwrite: true
path: /etc/chrony.conf
osImageURL: ""
EOF

```
cat << EOF >
/workspace/cloudpakprod/openshift/99_workers-chrony-configuration.yaml
apiVersion: machineconfiguration.openshift.io/v1
kind: MachineConfig
metadata:
labels:
        machineconfiguration.openshift.io/role: worker
name: workers-chrony-configuration
spec:
config:
ignition:
config: {}
security:
tls: {}
timeouts: {}
version: 3.1.0
        networkd: {}
        passwd: {}
        storage:
files:
- contents:
source: data:text/plain;charset=utf
8;base64,c2VydmVyIDEwLjE3MS41Ny45OCBpYnVyc3QKZHJpZnRmaWxlIC92YXIvbGliL2Nocm9ueS9kcmlmdAptY
W tlc3RlcCAxLjAgMwpydGNzeW5jCmxvZ2RpciAvdmFyL2xvZy9jaHJvbnkK
mode: 420
overwrite: true
path: /etc/chrony.conf
osImageURL: ""
EOF
```

Remove the machines/machineset definitions if any since it is not needed in UPI installation in case it is not removed already.

```
$ rm -f
/workspace/cloudpakprod/openshift/99_openshift-cluster-api_master-machines-*.yaml
/workspace/cloudpakprod/openshift/99_openshift-cluster-api_worker-machineset-*.yaml
```

Create the Ignition files

```
$ openshift-install create ignition-configs --dir=<installation_directory
```

Then check (auth bootstrap.ign master.ign metadata.json worker.ign) these files or obtained or not in ocp directory.

Give full permissions to bootstrap.ign, master.ign, metadata.json, & worker.ign.

```
$ chmod -R 544 bootstrap.ign master.ign metadata.json worker.ign
```

Then copy these (bootstrap.ign master.ign metadata.json worker.ign) into /var/www/html/install directory.

Go to the browser and check all 6 files are there or not by using the following URL [whatever helper node Ip you have when you are installing, replace that IP with the following IP, in our case we have used the following Ip]

```
http://192.168.18.16:8080/install
```

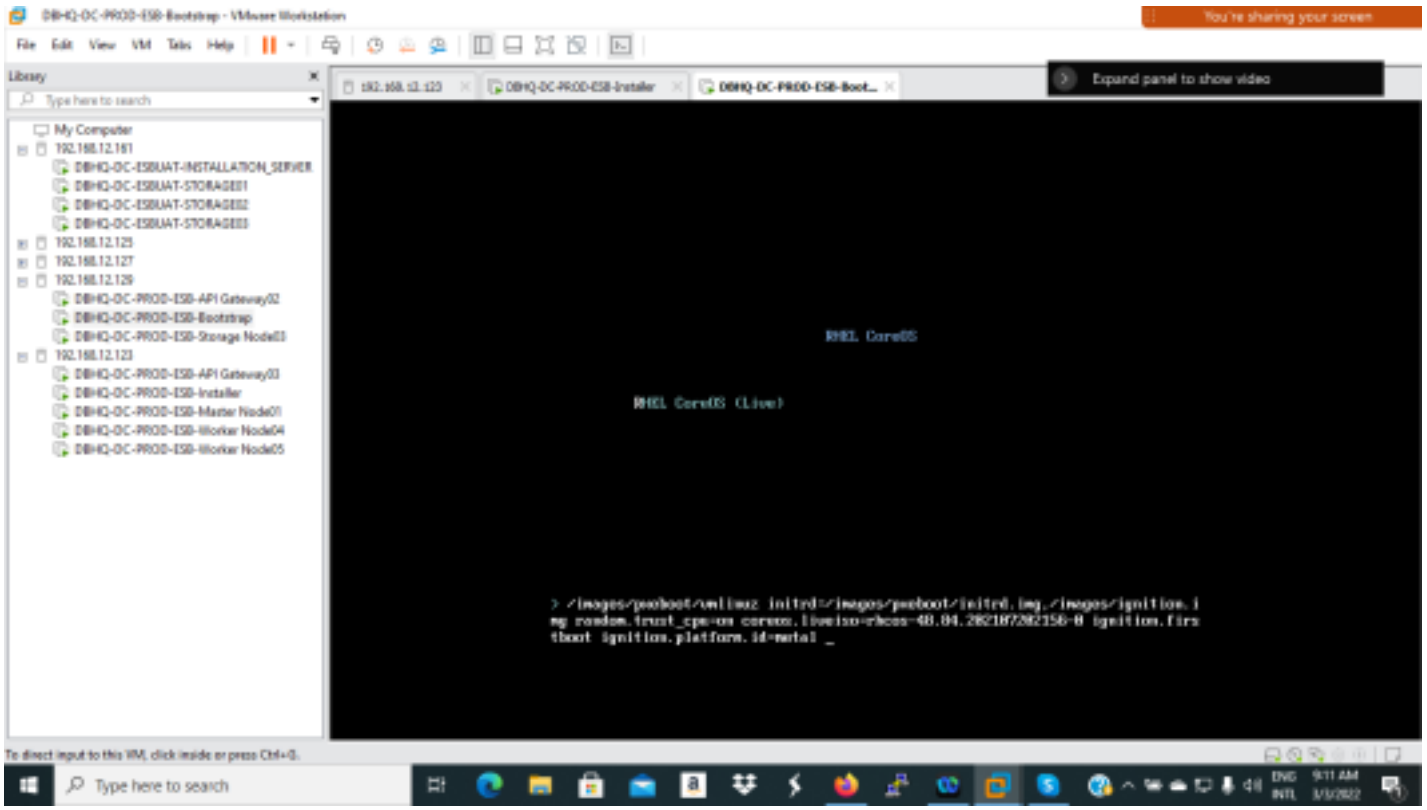
Once the firewall is checked, if it is running, stop the firewall.

```
$ systemctl status firewalld
$ systemctl stop firewalld
```

Then go to the bare metal and check the following details:

1. Check whether hyperthreading is enabled and use virtual cores accordingly such as for masternodes and bootstrap 2*2=4 vCPUs, for worker nodes 8*2=12 vCPUs, and for the storage nodes 6*2=12 vCPUs. 2. Now, start the bootstrap machine and to enter into it, right click on the mouse and use the tab at a time so that you'll be in the machine to run the kernel command.

For the reference please find the below picture.



Run the kernels as shown below for the masters first after bootstrap.

```
coreos.inst.install_dev=sda
coreos.inst.ignition_url=http://192.168.18.16:8080/install/bootstrap.ign
coreos.inst.insecure_url=http://192.168.18.16:8080/install/bios.raw.gz
ip=192.168.18.17::192.168.1.1:255.255.252.0:bootstrap.cloudpakprod.dashenbank.local::no
ne nameserver=192.168.18.16


coreos.inst.install_dev=sda
coreos.inst.ignition_url=http://192.168.18.16:8080/install/master.ign
coreos.inst.insecure_url=http://192.168.18.16:8080/install/bios.raw.gz
ip=192.168.18.21::192.168.1.1:255.255.252.0:master01.cloudpakprod.dashenbank.local::no
ne nameserver=192.168.18.16


coreos.inst.install_dev=sda
coreos.inst.ignition_url=http://192.168.18.16:8080/install/master.ign
coreos.inst.insecure_url=http://192.168.18.16:8080/install/bios.raw.gz
ip=192.168.18.22::192.168.1.1:255.255.252.0:master02.cloudpakprod.dashenbank.local::no
ne nameserver=192.168.18.16


coreos.inst.install_dev=sda
coreos.inst.ignition_url=http://192.168.18.16:8080/install/master.ign
coreos.inst.insecure_url=http://192.168.18.16:8080/install/bios.raw.gz
ip=192.168.18.23::192.168.1.1:255.255.252.0:master03.cloudpakprod.dashenbank.local::no
ne nameserver=192.168.18.16
```

NOTE: To know more about kernel commands click on:

https://docs.openshift.com/container-platform/4.8/installing/installing_bare_metal/installing-restricted networks-bare-metal.html#creating-machines-bare-metal-restricted-network

Creating the cluster:

To create the OpenShift Container Platform cluster, you wait for the bootstrap process to complete on the

machines that you provisioned by using the Ignition config files that you generated with the installation program.

```
$ openshift-install --dir=/workspace/cloudpakprod/ wait-for bootstrap-complete --log-level=info
```

NOTE: To know more click on the link below.

```
https://docs.openshift.com/container-platform/4.8/installing/installing_bare_metal/installing-restricte
d
networks-bare-metal.html#installation-installing-bare-metal_installing-restricted-networks-bare-metal
```

Now, please run the following commands in bootstrap and masters respectively by connecting to that nodes through *ssh* to check the logs of each while waiting for bootstrapping is completed.

```
$ ssh core@192.168.18.17 or by hostname (bootstrap machine)
```

```
$ journalctl -b -f -u kubelet.service -u crio.service -u bootkube.service
##########################################################################################

## $ ssh core@192.168.18.21 or by hostname (master node1)

$ journalctl -b -f -u kubelet.service -u crio.service
##########################################################################################

## $ ssh core@192.168.18.22 or by hostname (master node2)

$ journalctl -b -f -u kubelet.service -u crio.service
##########################################################################################
```

Now, once the installation of ocp is done,

Logging in to the cluster by using the CLI:

To export the kubeadmin credentials,

```
$ export KUBECONFIG=/workspace/cloudpakprod/auth/kubeconfig
```

To verify you can run oc commands successfully using the exported configuration.

```
$ oc whoami
```

NOTE: To know more on how to verify click on:

https://docs.openshift.com/container-platform/4.8/installing/installing_bare_metal/installing-restricted networks-bare-metal.html#cli-logging-in-kubeadmin_installing-restricted-networks-bare-metal

Approving the certificate signing requests for your machines:
To check if all the nodes are in the ready state or not**.**

```
$ oc get nodes
```

After successfully installing the ocp4.8 cluster, add remaining nodes such as worker nodes along with storage nodes by following the same procedure on the bare metal. Run the following kernel commands as well.

```
coreos.inst.install_dev=sda
coreos.inst.ignition_url=http://192.168.18.16:8080/install/worker.ign
coreos.inst.insecure_url=http://192.168.18.16:8080/install/bios.raw.gz
ip=192.168.18.41::192.168.1.1:255.255.252.0:worker01.cloudpakprod.dashenbank.localname::no
ne nameserver=192.168.18.16

coreos.inst.install_dev=sda
coreos.inst.ignition_url=http://192.168.18.16:8080/install/worker.ign
coreos.inst.insecure_url=http://192.168.18.16:8080/install/bios.raw.gz
ip=192.168.18.42::192.168.1.1:255.255.252.0:worker02.cloudpakprod.dashenbank.localname::no
ne nameserver=192.168.18.16
```

```
coreos.inst.install_dev=sda
coreos.inst.ignition_url=http://192.168.18.16:8080/install/worker.ign
coreos.inst.insecure_url=http://192.168.18.16:8080/install/bios.raw.gz
ip=192.168.18.41::192.168.1.1:255.255.252.0:worker03.cloudpakprod.dashenbank.localname::no
ne nameserver=192.168.18.16

coreos.inst.install_dev=sda
coreos.inst.ignition_url=http://192.168.18.16:8080/install/worker.ign
coreos.inst.insecure_url=http://192.168.18.16:8080/install/bios.raw.gz
ip=192.168.18.44::192.168.1.1:255.255.252.0:worker04.cloudpakprod.dashenbank.localname::no
ne nameserver=192.168.18.1

coreos.inst.install_dev=sda
coreos.inst.ignition_url=http://192.168.18.16:8080/install/worker.ign
coreos.inst.insecure_url=http://192.168.18.16:8080/install/bios.raw.gz
ip=192.168.18.45::192.168.1.1:255.255.252.0:worker05.cloudpakprod.dashenbank.localname::no
ne nameserver=192.168.18.16

coreos.inst.install_dev=sda
coreos.inst.ignition_url=http://192.168.18.16:8080/install/worker.ign
coreos.inst.insecure_url=http://192.168.18.16:8080/install/bios.raw.gz
ip=192.168.18.31::192.168.1.1:255.255.252.0:storage01.cloudpakprod.dashenbank.localname::no
ne nameserver=192.168.18.16

coreos.inst.install_dev=sda
coreos.inst.ignition_url=http://192.168.18.16:8080/install/worker.ign
coreos.inst.insecure_url=http://192.168.18.16:8080/install/bios.raw.gz
ip=192.168.18.32::192.168.1.1:255.255.252.0:storage02.cloudpakprod.dashenbank.localname::no
ne nameserver=192.168.18.16

coreos.inst.install_dev=sda
coreos.inst.ignition_url=http://192.168.18.16:8080/install/worker.ign
coreos.inst.insecure_url=http://192.168.18.16:8080/install/bios.raw.gz
ip=192.168.18.33::192.168.1.1:255.255.252.0:storage03.cloudpakprod.dashenbank.localname::no
ne nameserver=192.168.18.16
```

To see the CSRs status, if any CSRs are pending then approve them by using below command.

```
$ oc get csr
```

To approve all pending csr's,

```
$ oc get csr -o go-template='{{range .items}}{{if not .status}}{{.metadata.name}}{{"\n"}}{{end}}{{end}}' | xargs
--no run-if-empty oc adm certificate approve
```

NOTE: To know more click on,

https://docs.openshift.com/container-platform/4.8/installing/installing_bare_metal/installing-restricted networks-bare-metal.html#installation-approve-csrs_installing-restricted-networks-bare-metal

watch the cluster components come online:

```
$ watch -n5 oc get clusteroperators
```

NOTE: Must and should all Clusters are to be in AVAILABLE state are = **True**, PROGRESSING are = **False**, DEGRADED are = **False**

Please check the link below for further information.

https://docs.openshift.com/container-platform/4.8/installing/installing_bare_metal/installing-restricted-networks bare-metal.html#installation-operators-config_installing-restricted-networks-bare-metal

```
$ oc get pods --all-namespaces
```

To view all pods

To create new project,

```
$ oc create new-project PROJECT-NAME
```

To get all the projects,

```
$ oc get projects
```

Login into the cluster through Console & CLI for other users:

First you need to update nameserver helper ip on your system in /etc/resolv.conf.

Through CLI:

```
$ oc login https://api.clusterid.eidikointernal.com:6443
```

Through web-console:

https:console-openshift-console.apps.clusteris.eidikointernal.com

Cleanup:

1.Power off and delete the bootstrap VM.

2.Remove bootstrap server address from HAProxy configuration (/etc/haproxy/haproxy.cfg), then reload HAProxy.

```
systemctl reload haproxy
```

NOTE: Here, when we tried with different ways to get the main NTP server connection, we lost worker5 as the network team forcefully took the IP of the node and hence it is disconnected from the cluster. Hence we added worker5 as a new worker node into the cluster by the following procedure.

6. Add another worker node

For adding the worker node into the cluster , Please refer to the following links.

https://access.redhat.com/solutions/4246261 (cluster created less than 24 hours)
https://access.redhat.com/solutions/4799921 (cluster created more than 24 hours)

If the environment has been running over 24 hours, the certificate should have been regenerated.

Go to the installation folder (e.g. /root/ocp46), retrieve the certificate using the command below.

```
openssl s_client -connect api-int.ocp.example.com:22623 -showcerts
```

The certificate is a block of text starting with "BEGIN CERTIFICATE" and ending at "END

CERTIFICATE". Save it in a file, e.g. named“api-int.pem”.

Encode the certificate using base64 with the "--wrap=0" option.

```
base64 --wrap=0 ./api-int.pem 1> ./api.int.base64
```

Just in case, make a backup of worker.ign.

```
cp worker.ign worker.ign.bak
```

Open worker.ign with a text editor, replace the value followed by “base64”using the content of api.int.base64.

Finally follow the steps in Create worker VM to add another worker node. Also don’t forget to approve the CSRs.

Make sure that vCPUs and ram are provided according to the requirements.

7. Remove worker node

For removing the worker node from the cluster , Please refer to the following link.

```
https://docs.openshift.com/container-platform/4.8/nodes/nodes/nodes-nodes-working.html
```

8. Troubleshooting of various issues we faced during the installation of OCP4.8 cluster

The following are the issues where we faced certain blocking and we troubleshooted accordingly.

1. **Pullsecret:**
   We used a pullsecret that expired and the images couldn't be pulled by the masters and bootstrap from the respective sites during the installation of OCP after running the kernel commands.
   We re-installed the cluster from step **5.2** by providing a temporary free licensed pullsecret of TADELE. Later we changed the pullsecret after getting Ateneh's licensed account for pullsecret by following the below procedure.

https://access.redhat.com/solutions/4902871

2. **Incorrect Version of OCP installer files:**
   When we downloaded it's a 4.8.2 version of ocp installer files but, as there were previous files of 4.9, the final version overridden it to 4.9. Hence, we have re-initiated the procedure from step **4.1.5** making sure this time by removing the old files and downloading the required installer files.

3. **vars.yaml configuration:**
   During the vars.yaml, we have provided the fully qualified domain name (FQDN), hence we didn't get the hostname as required. So, we re-initiated the procedure from **Then go to the bare metal and check the following details** in the **STEP 5.**

4. **NTP Configuration:**
   The provided NTP server by dashen bank wasn't working and all the nodes are not synchronized during the installation. Hence, we configured the NTP locally ie., in the bastion node and configured it as the NTP server and repeated the steps from **5.**
   Steps to configure the NTP please refer to the section of **4.1.6.**

5. **Kernel Command FQDN:**
   During the kernel initialization, we haven't provided the fully qualified domain name (FQDN), hence we didn't get the hostname as required. So, we re-initiated the procedure from **Then go to the bare metal and check the following details** in the **STEP 5.**

6. **Internet Connectivity:**
   Before the final try, we have seen that the internet bandwidth was very low and the masters couldn't be able to form a cluster as they weren't able to download the required files from the respective sites of the internet. Hence, we finally fixed the issue and completed all the cluster setup without any interruptions.

9. OCS configuration

Red Hat OpenShift Container Storage is a provider of agnostic persistent storage for OpenShift Container Platform supporting file, block, and object storage, either in-house or in hybrid clouds. As a Red Hat storage solution, Red Hat OpenShift Container Storage is completely integrated with OpenShift Container Platform for deployment, management, and monitoring.

Red Hat OpenShift Container Storage provides its own documentation library. The complete set of Red Hat OpenShift Container Storage documentation identified below is available at:

https://access.redhat.com/documentation/en-us/red_hat_openshift_container_storage/4.8/html single/deploying_and_managing_openshift_container_storage_using_redhat_openstack_platform/index#verifying openshift-container-storage-deployment_osp

Before going further, we added storage nodes to a label called infra, which is because only storage related tasks are being performed by storage nodes. Use below commands for adding labels for 3 storage nodes.

```
$ oc label node storage01.cloudpakprod.dashenbank.local node
role.kubernetes.io/infra=""

$ oc label node storage01.cloudpakprod.dashenbank.local
cluster.ocs.openshift.io/openshift-storage=""

$ oc adm taint node storage01.cloudpakprod.dashenbank.local
node.ocs.openshift.io/storage="true":NoSchedule
#################################################################################
##  #########

$ oc label node storage02.cloudpakprod.dashenbank.local node
role.kubernetes.io/infra=""

$ oc label node storage02.cloudpakprod.dashenbank.local
cluster.ocs.openshift.io/openshift-storage=""

$ oc adm taint node storage02.cloudpakprod.dashenbank.local
node.ocs.openshift.io/storage="true":NoSchedule
#################################################################################
##  #########

$ oc label node storage03.cloudpakprod.dashenbank.local node-
```

```
role.kubernetes.io/infra=""

$ oc label node storage03.cloudpakprod.dashenbank.local
cluster.ocs.openshift.io/openshift-storage=""

$ oc adm taint node storage03.cloudpakprod.dashenbank.local
node.ocs.openshift.io/storage="true":NoSchedule
```

9.1 Installing Local Storage Operator:

Use this procedure to install the Local Storage Operator from the Operator Hub before creating OpenShift Container Storage clusters on local storage devices.

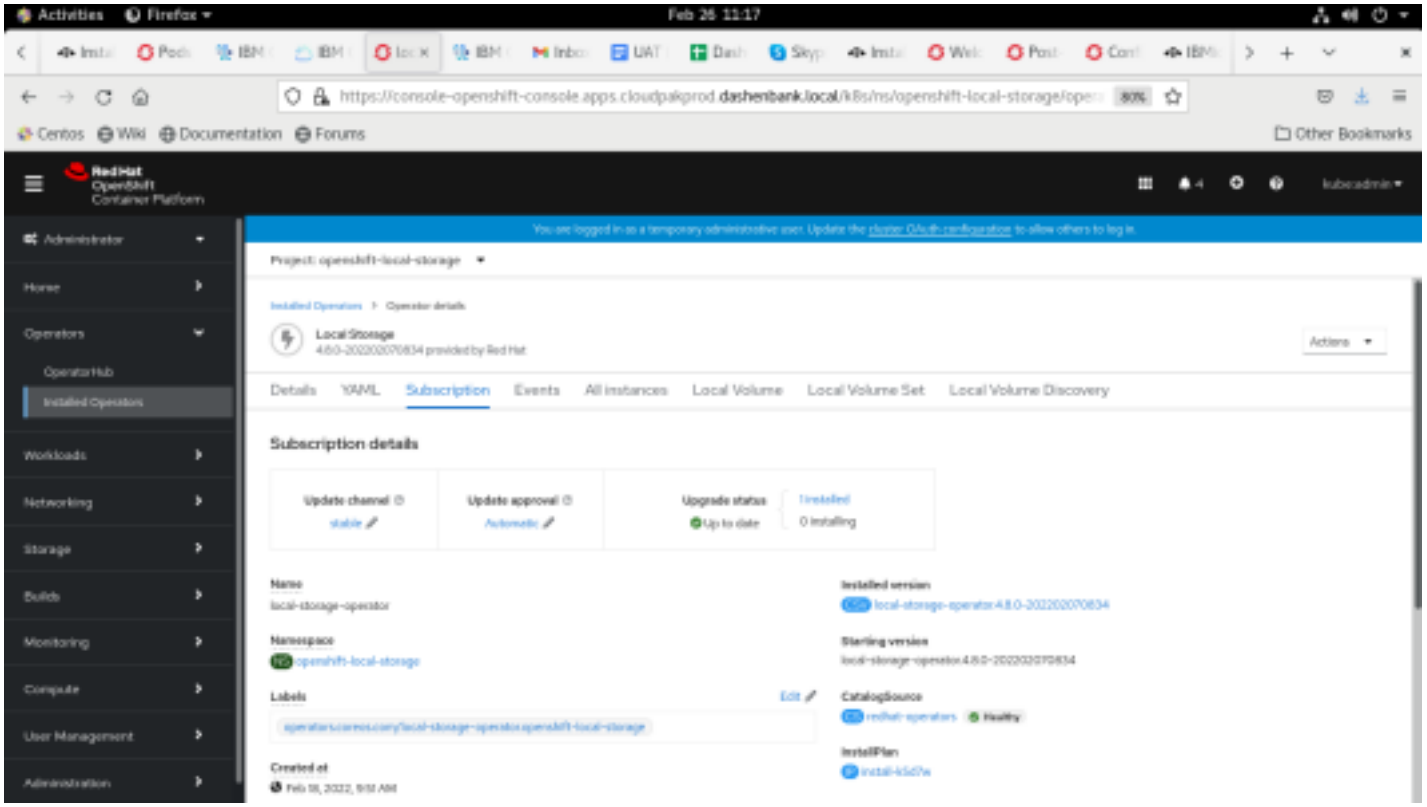
- Log in to the OpenShift Web Console.

- Click **Operators** → **Operator Hub**.
- Search for **Local Storage Operator** from the list of operators and click on it.
- Click **Install**.

Set the following options on the **Install Operator** page:

1) Channel as stable-4.8
2) Installation Mode as A specific namespace on the cluster
3) Installed Namespace as Operator recommended namespace openshift-local-storage.
4) Approval Strategy as Automatic
5) Click Install.

Verify that the Local Storage Operator shows the Status as Succeeded.



9.2 Installing OpenShift Container Storage using local storage devices:

OpenShift Container Platform using local storage devices provides you with the option to create internal cluster resources. This will result in the internal provisioning of the base services, which helps to make additional storage classes available to applications.

9.2.1 Procedure: Through web console :

1. Click **Operators** → **OperatorHub** in the left pane of the OpenShift Web Console.
2. Use **Filter by keyword** text box or the filter list to search for OpenShift Container Storage from the list of operators.
3. Click **OpenShift Container Storage**.
4. On the **OpenShift Container Storage operator** page, click Install.
5. On the **Install Operator** page, ensure the following options are selected by default::

    a. Channel as **eus-4.8**

    b. Installation Mode as **A specific namespace on the cluster**

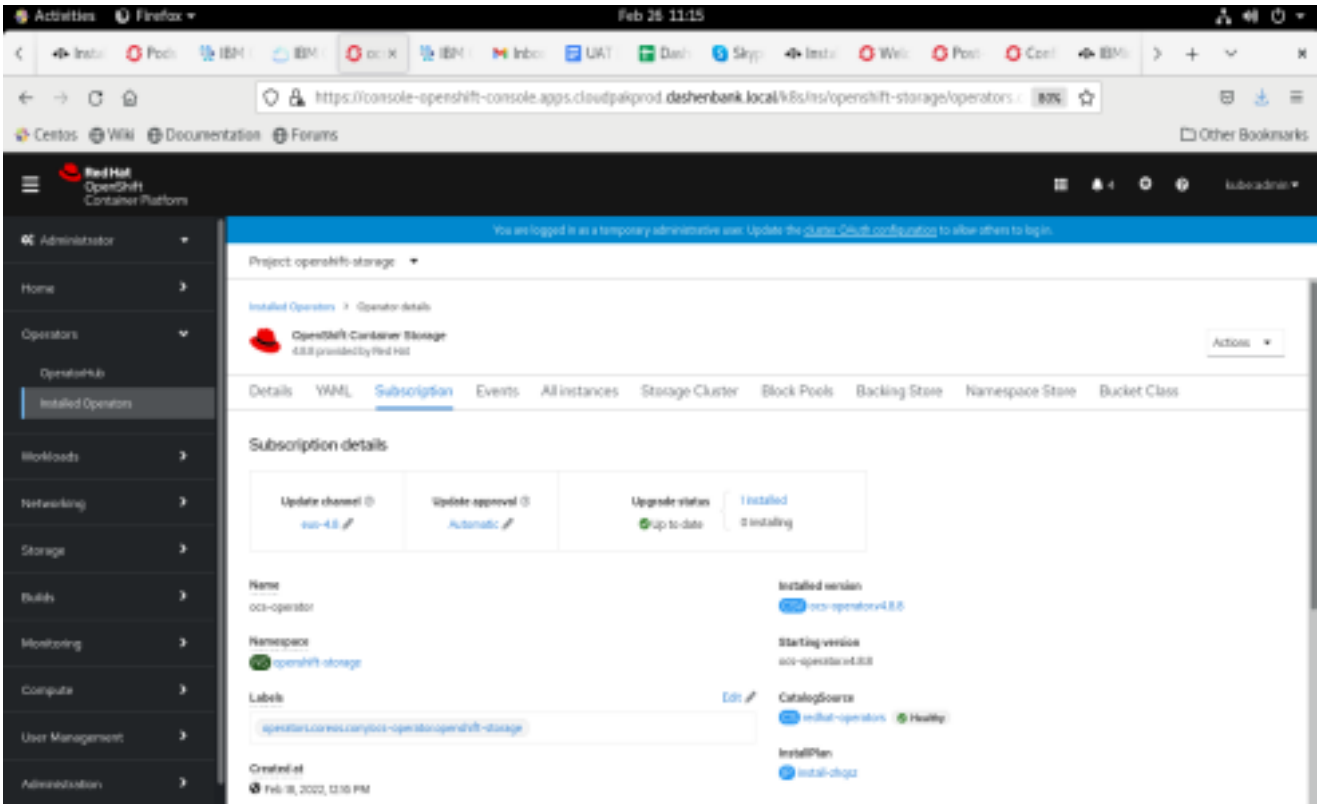
    c. Installed Namespace as **Operator recommended namespace openshift-storage**. If Namespace openshift-storage does not exist, it will be created during the operator installation.

    d. Select **Enable operator recommended cluster monitoring on this namespace** checkbox as this is required for cluster monitoring.

    e. Select **Approval Strategy** as **Automatic** or **Manual**. Approval Strategy is set to **Automatic** by default.

Verification steps:

✦ Verify that **OpenShift Container Storage** Operator shows a green tick indicating successful installation. ✦ Click **View Installed Operators in namespace openshift-storage** link to verify that OpenShift Container Storage Operator shows the **Status** as Succeeded on the Installed Operators dashboard.



✦

9.3 Creating OpenShift Container Storage cluster on bare metal

By following the procedure below, we have installed OCS.

Prerequisites:

Here, we have 3 storage nodes with the same storage type and size attached to each node (has a 1000GB SSD hard drive) to use local storage devices on bare metal.

Procedure:

1. Log into the OpenShift Web Console.
2. Click **Operators** → **Installed Operators** to view all the installed operators.

   Ensure that the **Project** selected is **openshift-storage**.

3. Click **OpenShift Container Storage**.
4. Click **Create Instance** link of Storage Cluster.
5. Select **Internal-Attached devices** for the **Select Mode**. By default, Internal is selected. 6. Create a storage cluster using the wizard that includes disk discovery, storage class creation, and storage cluster creation.
7. You are prompted to install the Local Storage Operator if it is not already installed. Click **Install**
8. And install the operator as described in Installing Local Storage Operator.

Discover disks:You can discover a list of potentially usable disks on the selected nodes. Block disks and partitions that are not in use and available for provisioning persistent volumes (PVs) are discovered.

Choose the Select nodes to discover disks from a subset of the available nodes of the **following:**

- **All nodes** to discover disks in all the nodes.
- **Select nodes** to discover disks from a subset of the available nodes.

NOTE: If the nodes selected do not match the OpenShift Container Storage cluster requirement of an aggregated 30 CPUs and 72 GiB of RAM, a minimal cluster will be deployed.

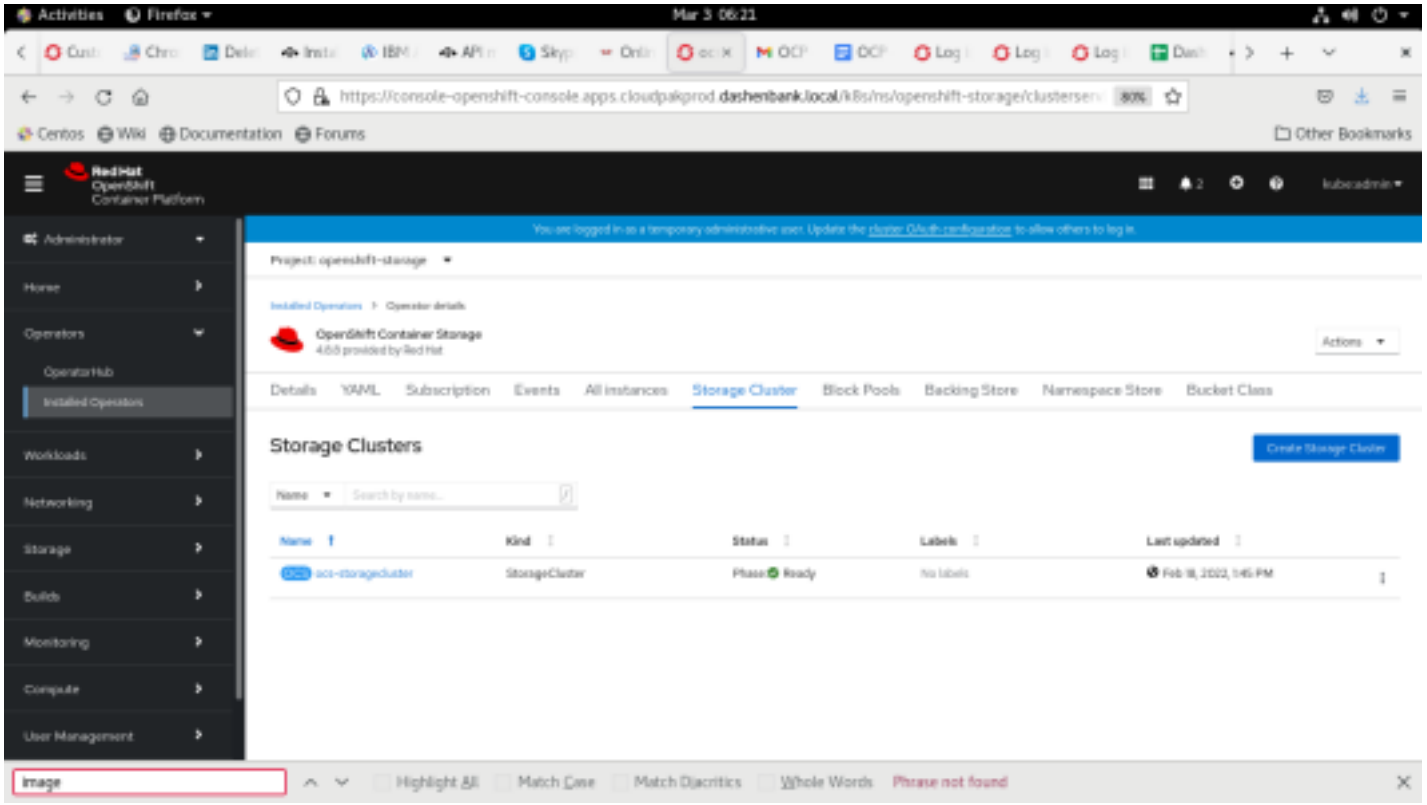
9.Click **Next**.

10.Create **Storage class**

a. Enter the **Local Volume Set Name**.

b. Enter the **Storage Class Name** as **ocs-storagecluster**.

c. The nodes selected for disk discovery in the previous step are displayed in the Filter Disks By section.



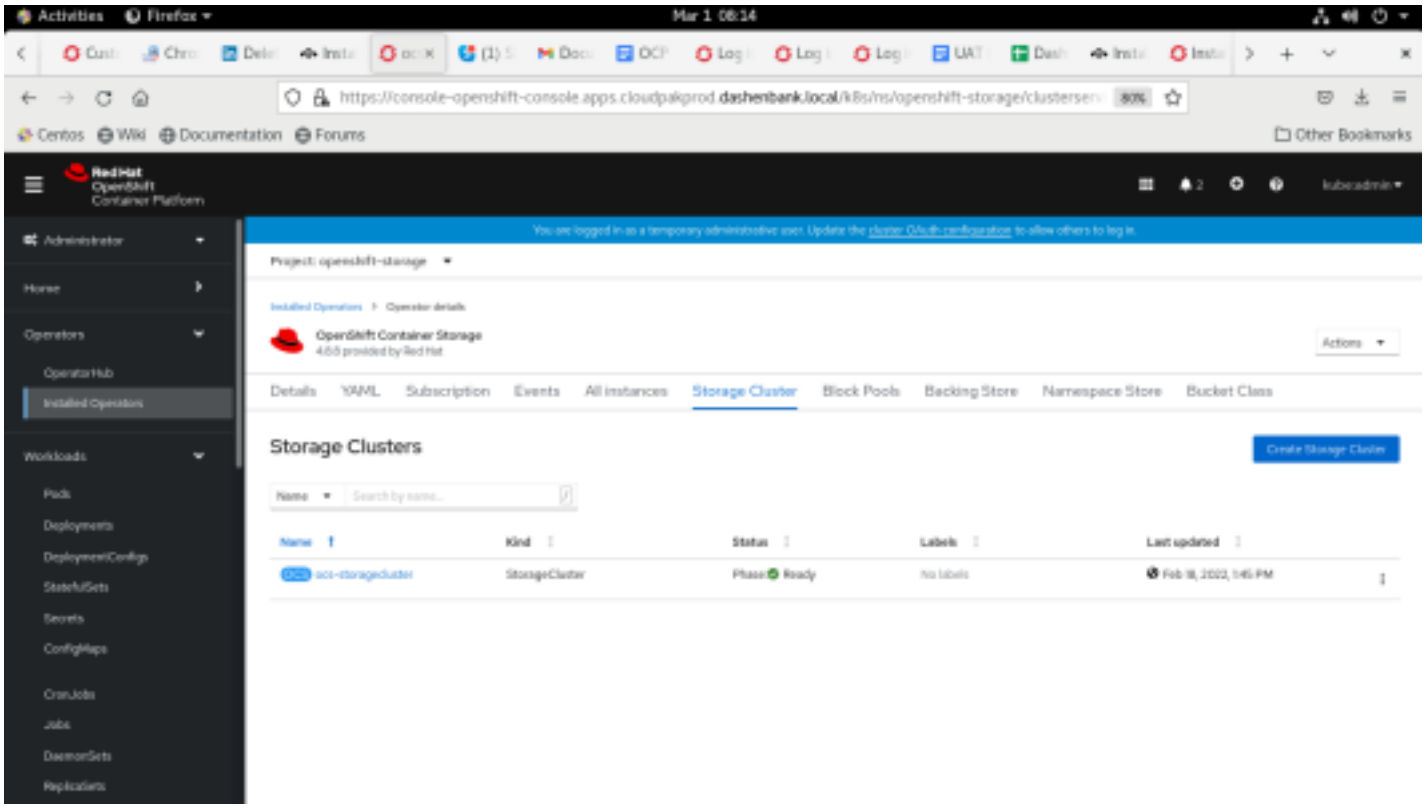
Select the nodes:

Disks on selected nodes to select a subset of the nodes for which you discovered the devices.

Verification steps:

- To verify that the final Status of the installed storage cluster shows as Phase: Ready with a green tick mark.

  Click Operators→Installed Operators→Storage Cluster link to view the storage cluster installation status.



Alternatively, when you are on the Operator Details tab, you can click on the StorageCluster tab to view the status.

- To verify if flexible scaling is enabled on your storage cluster, perform the following steps (for arbiter mode, flexible scaling is disabled):

  1. Click ocs-storage cluster in the Storage Cluster tab.

  2. In the YAML tab, search for the keys flexibleScaling in spec section and failureDomain in status section. If flexible scaling is true and failureDomain is set to host, the flexible scaling feature is enabled

- To verify that all components for OpenShift Container Storage are successfully installed, seeVerifying your OpenShift Container Storage installation.
- To verify that OpenShift Container Storage is successfully installed, see Verifying your OpenShift Container Storage installation.

Verifying The OpenShift Container Storage cluster is healthy:

To verify that the cluster of OpenShift Container Storage is healthy, follow the steps in the procedure.

Procedure:

1. Click Storage → Overview and click the Block and File tab.
2. In the Status card, verify that *Storage Cluster* and *Data Resiliency* has a green tick mark.
3. In the Details card, verify that the cluster information is displayed.

Verifying that the OpenShift Container Storage specific storage classes exist

To verify the storage classes exists in the cluster:

Procedure:

- Click Storage → Storage Classes from the OpenShift Web Console.
- Verify that the following storage classes are created with the OpenShift Container Storage cluster creation:

- ocs-storagecluster-ceph-rbd
- ocs-storagecluster-cephfs
- openshift-storage.noobaa.io
- ocs-storagecluster-ceph-rgw

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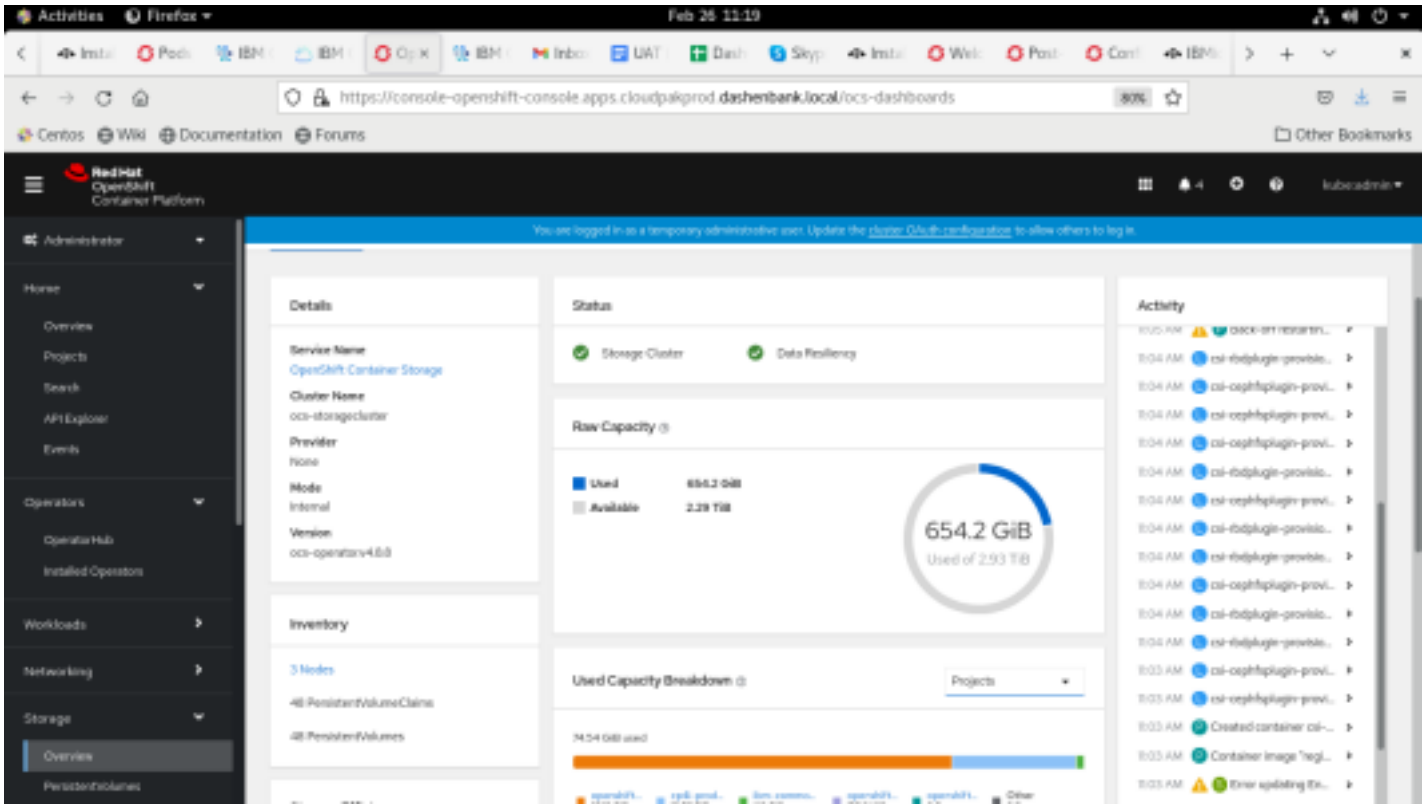
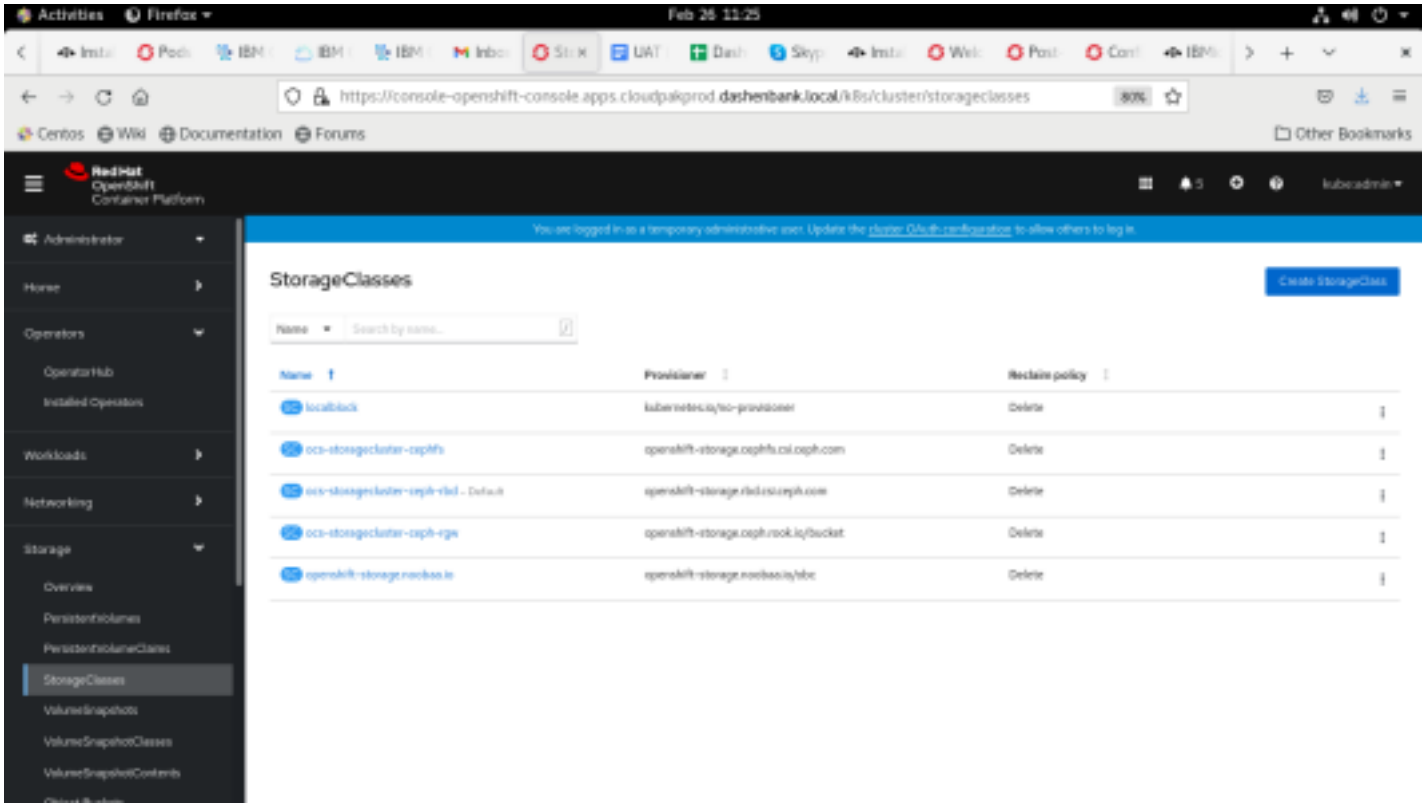
Dashen Bank

EiDiKO




Activities
Firefox
Feb 26 11:25
https://console-openshift-console.apps.cloudpakprod.dashenbank.local/k8s/cluster/storageclasses
Centos
Wiki
Documentation
Forums
Other Bookmarks
Red Hat OpenShift Container Platform
kubeadmin
Administrator
Home
Operators
OperatorHub
Installed Operators
Workloads
Networking
Storage
Overview
PersistentVolumes
PersistentVolumeClaims
StorageClasses
VolumeSnapshots
VolumeSnapshotClasses
VolumeSnapshotContents
StorageClasses
Name
Provisioner
Reclaim policy
Delete

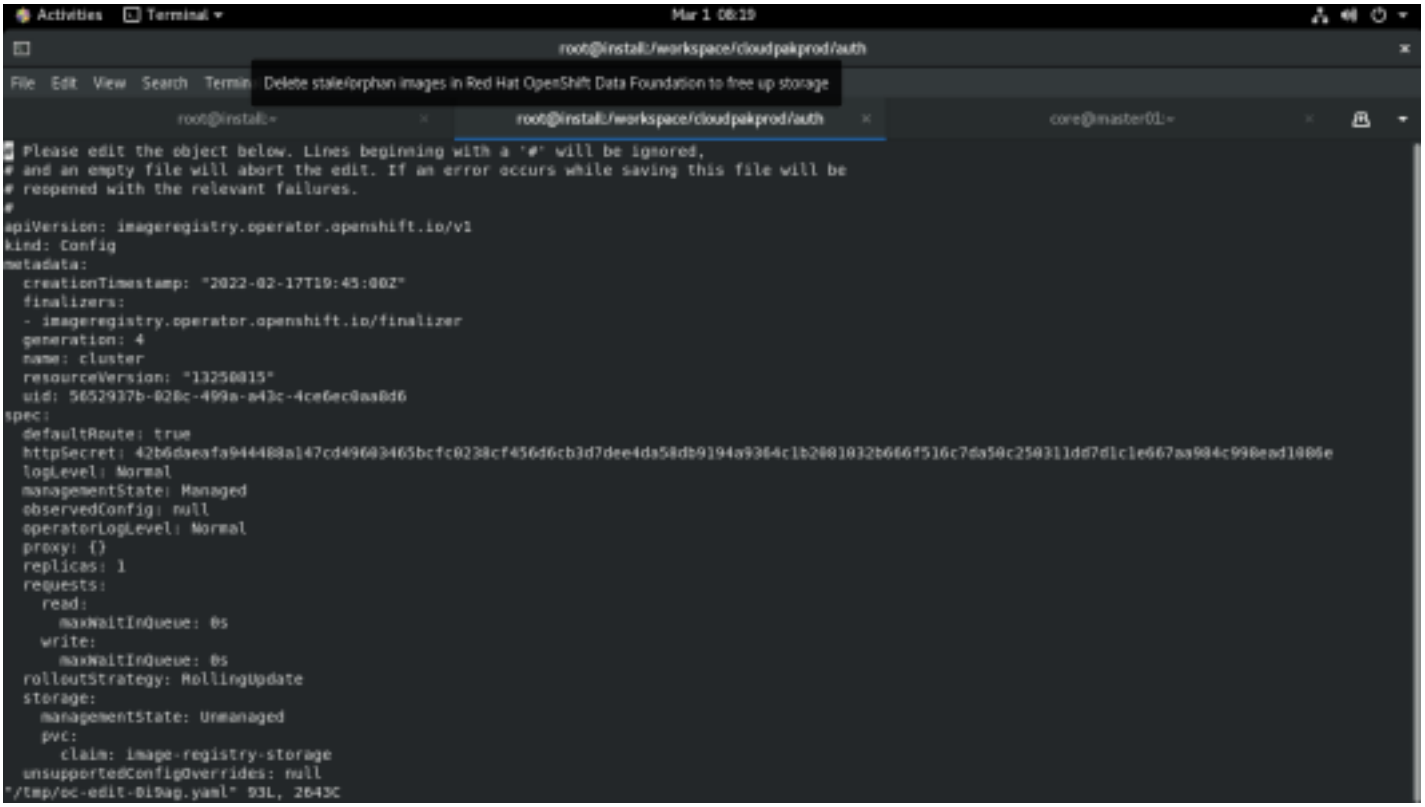
10. Configure Image Registry

Creating a RWX PVC using Cephfs (rook-cephfs) storage class

```
cat << EOF > /workspace/cloudpakprod/image-registry-storage.yaml
apiVersion: v1
kind: PersistentVolumeClaim
metadata:
name: image-registry-storage
namespace: openshift-image-registry
spec:
accessModes:
- ReadWriteMany
resources:
requests:
storage: 100Gi
storageClassName: ocs-storagecluster-cephfs
EOF
oc create -f /workspace/cloudpakprod/image-registry-storage.yaml
```

Update the image registry operator configuration. Update the specs to use the created PVC. Update spec.storage : {}, and Update spec.managementState from "Removed" to "Managed".

```
oc edit configs.imageregistry.operator.openshift.io
```



Enable default route for image registry.

```
oc patch configs.imageregistry.operator.openshift.io/cluster --type merge -p '{"spec":{"defaultRoute":true}}'
```

Wait several minutes. Then login to the cluster again.

Login to the registry using podman.

```
podman login default-route-openshift-image-registry.apps.ocp.example.com -u admin -p `oc whoami -t` --tls verify=false
```

11. Installing cluster logging

We have installed OpenShift Logging by deploying the OpenShift Elasticsearch and Red Hat OpenShift Logging Operators. The OpenShift Elasticsearch Operator creates and manages the Elasticsearch cluster used by OpenShift Logging. The Red Hat OpenShift Logging Operator creates and manages the components of the logging stack.

The process for deploying OpenShift Logging to OpenShift Container Platform involves:

- Reviewing the OpenShift Logging storage considerations.

- Installing the OpenShift Elasticsearch Operator and Red Hat OpenShift Logging Operator using the OpenShift Container Platform web console or CLI.

11.1. Installing OpenShift Logging using the web console:

You can use the OpenShift Container Platform web console to install the OpenShift Elasticsearch and Red Hat OpenShift Logging Operators.

Note:If you do not want to use the default Elasticsearch log store, you can remove the internal Elasticsearch logStore and Kibana visualization components from the ClusterLogging custom resource (CR). Removing these components is optional but saves resources. For more information, see Removing unused components if you do not use the default Elasticsearch log store.

Prerequisites:

- Ensure that you have the necessary persistent storage for Elasticsearch. Note that each Elasticsearch node requires its own storage volume.

Elasticsearch is a memory-intensive application. By default, OpenShift Container Platform installs three Elasticsearch nodes with memory requests and limits of 16 GB. This initial set of three OpenShift Container Platform nodes might not have enough memory to run Elasticsearch within your cluster. If you experience memory issues that are related to Elasticsearch, add more Elasticsearch nodes to your cluster rather than increasing the memory on existing nodes.

Procedure:

To install the OpenShift Elasticsearch Operator and Red Hat OpenShift Logging Operator using the OpenShift Container Platform web console:

1) Install the OpenShift Elasticsearch Operator:

a) In the OpenShift Container Platform web console, click **Operators** → **OperatorHub**.

b) Choose **OpenShift Elasticsearch Operator** from the list of available Operators, and click **Install**.

c) Ensure that the **All namespaces on the cluster** are selected under **Installation Mode**.

d) Ensure that **openshift-operators-redhat** is selected under **Installed Namespace**.

You must specify the openshift-operators-redhat namespace. The openshift-operators namespace might contain Community Operators, which are untrusted and could publish a metric with the same name as an OpenShift Container Platform metric, which would cause conflicts.

e) Select **Enable operator recommended cluster monitoring on this namespace**.

This option sets the openshift.io/cluster-monitoring: "true" label in the Namespace object. You must select this option to ensure that cluster monitoring scrapes the openshift-operators-redhat namespace.

f) Select **stable-5.x** as the **Update Channel**.

g) Select an **Approval Strategy**.

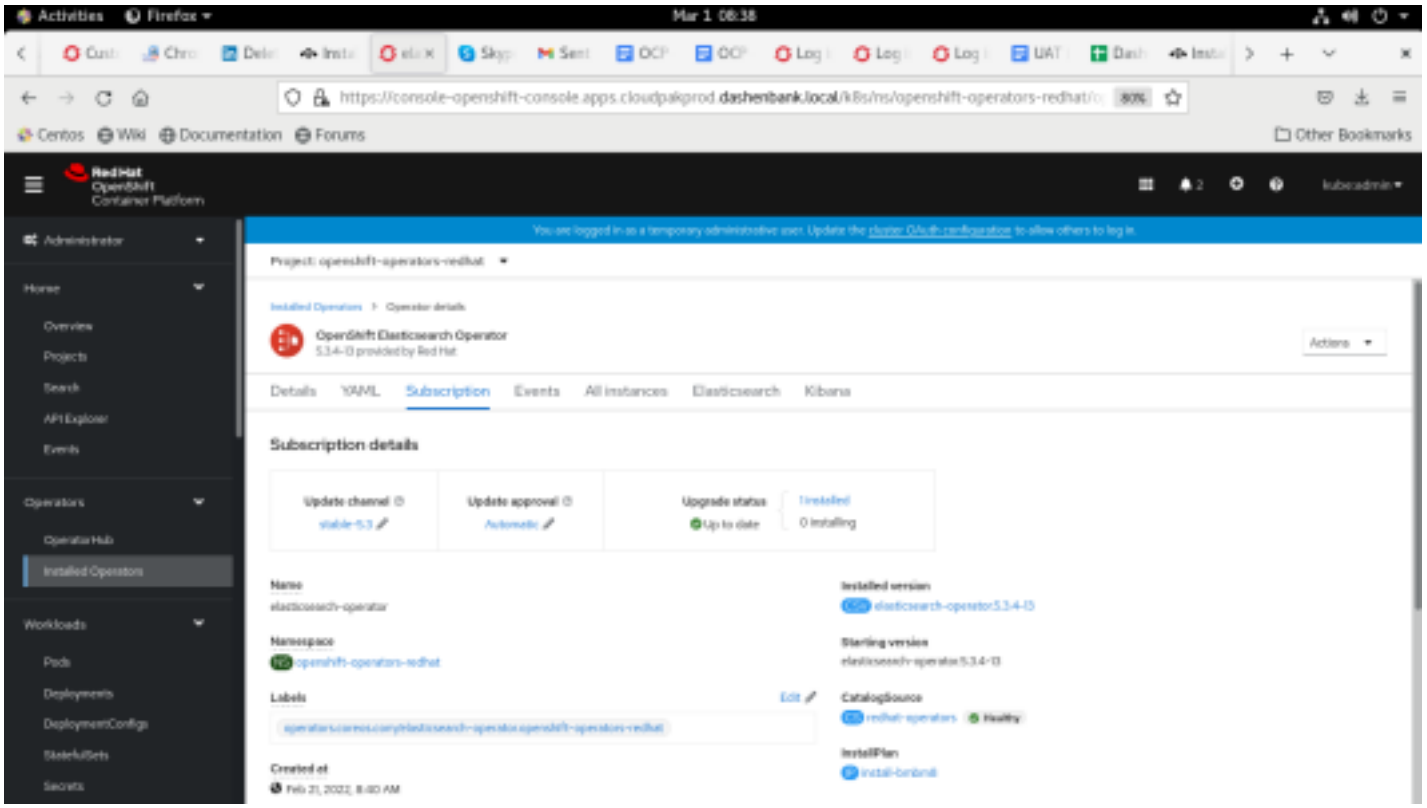
i) The **Automatic** strategy allows Operator Lifecycle Manager (OLM) to automatically update the Operator when a new version is available.

ii) The **Manual** strategy requires a user with appropriate credentials to approve the Operator update.

h) Click **Install**.

i) Verify that the OpenShift Elasticsearch Operator installed by switching to the **Operators** → **Installed Operators** page.

j) Ensure that **OpenShift Elasticsearch Operator** is listed in all projects with a **Status** of **Succeeded**.



2) Install the Red Hat OpenShift Logging Operator:

a) In the OpenShift Container Platform web console, click **Operators** → **OperatorHub**.

b) Choose **Red Hat OpenShift Logging** from the list of available Operators, and click **Install**.

c) Ensure that the **A specific namespace on the cluster** is selected under **Installation Mode**.

d) Ensure that the Operator **recommended namespace** is **openshift-logging** under **Installed Namespace**.

e) Select **Enable operator recommended cluster monitoring on this namespace**.

This option sets the openshift.io/cluster-monitoring: "true" label in the Namespace object. You must select this option to ensure that cluster monitoring scrapes the openshift-logging namespace.

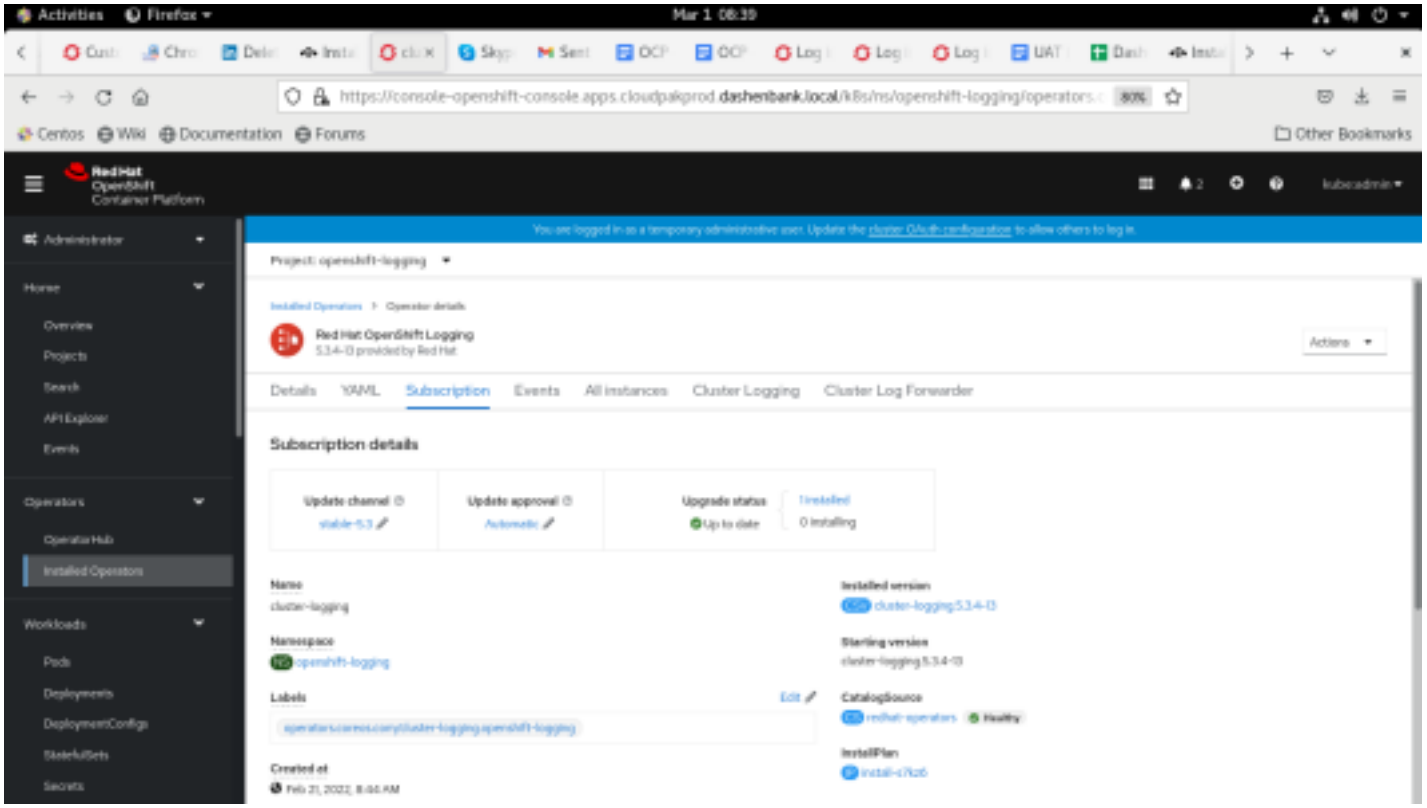
f) Select **stable-5.x** as the **Update Channel**.
g) Select an **Approval Strategy**.

i) The **Automatic** strategy allows Operator Lifecycle Manager (OLM) to automatically update the Operator when a new version is available.

ii) The **Manual** strategy requires a user with appropriate credentials to approve the Operator update.

h) Click **Install**.

i) Verify that the Red Hat OpenShift Logging Operator installed by switching to the **Operators** → **Installed Operators** page.



j) Ensure that **Red Hat OpenShift Logging** is listed in the **openshift-logging** project with a **Status** of **Succeeded**.

If the Operator does not appear as installed, to troubleshoot further:

i) Switch to the **Operators** → **Installed Operators** page and inspect the **Status** column for any errors or failures.

ii) Switch to the **Workloads** → **Pods** page and check the logs in any pods in the openshift-logging project that are reporting issues.

3) Create an OpenShift Logging instance:

a) Switch to the **Administration** → **Custom Resource Definitions** page.

b) On the **Custom Resource Definitions** page, click **ClusterLogging**.
c) On the **Custom Resource Definition details** page, select **View Instances** from the **Actions** menu.

d) On the **ClusterLoggings** page, click **Create ClusterLogging**.

You might have to refresh the page to load the data.

e) In the YAML field, replace the code with the following:

```
apiVersion: "logging.openshift.io/v1"
kind: "ClusterLogging"
metadata:
name: "instance"
 namespace: "openshift-logging"
spec:
managementState: "Managed"
 logStore:
type: "elasticsearch"
retentionPolicy:
application:
maxAge: 1d
infra:
maxAge: 2d
audit:
maxAge: 2d
elasticsearch:
nodeCount: 3
resources:
limits:
memory: 16Gi
requests:
cpu: 500m
memory: 16Gi
storage:
storageClassName: "ocs-storagecluster-ceph-rbd"
size: "100G"
redundancyPolicy: "SingleRedundancy"
visualization:

type: "kibana"
kibana:
resources:
limits:
memory: 736Mi
requests:
cpu: 100m
memory: 736Mi
replicas: 1
curation:
```

```
type: "curator"
curator:
resources:
limits:
memory: 256Mi
requests:
cpu: 100m
memory: 256Mi
schedule: "30 3 * * *"
collection:
logs:
type: "fluentd"
fluentd:
resources:
limits:
memory: 736Mi
requests:
cpu: 100m
memory: 736Mi
```

NOTE: Please follow the below instructions for further reference.

1.The name must be an instance.

2. The OpenShift Logging management state. In some cases, if you change the OpenShift Logging defaults, you must set this to Unmanaged. However, an unmanaged deployment does not receive updates until OpenShift Logging is placed back into a managed state.

3. Settings for configuring Elasticsearch. Using the CR, you can configure shard replication policy and persistent storage.

4. Specify the length of time that Elasticsearch should retain each log source. Enter an integer and a time designation: weeks(w), hours(h/H), minutes(m) and seconds(s). For example, 7d for seven days. Logs older than the maxAge are deleted. You must specify a retention policy for each log source or the Elasticsearch indices will not be created for that source.

5.Specify the number of Elasticsearch nodes. See the note that follows this list.
6.Enter the name of an existing storage class for Elasticsearch storage. For best performance, specify a storage class that allocates block storage. If you do not specify a storage class, OpenShift Logging uses ephemeral storage.

7.Specify the CPU and memory requests for Elasticsearch as needed. If you leave these values blank, the OpenShift Elasticsearch Operator sets default values that should be sufficient for most deployments. The default values are 16Gi for the memory request and 1 for the CPU request.

8.Specify the CPU and memory requests for the Elasticsearch proxy as needed. If you leave these values blank, the OpenShift Elasticsearch Operator sets default values that should be sufficient for most deployments. The default values are 256Mi for the memory request and 100m for the CPU request.

9.Settings for configuring Kibana. Using the CR, you can scale Kibana for redundancy and configure the CPU and memory for your Kibana nodes. For more information, see **Configuring the log visualizer**.

10.Settings for configuring Fluentd. Using the CR, you can configure Fluentd CPU and memory limits. For more information, see **Configuring Fluentd**.

f. Click **Create**. This creates the OpenShift Logging components, the Elasticsearch custom resource and components, and the Kibana interface.

Now, verify the instance is created by the following commands:

```
$ oc get deployment
```

output:

```
NAME READY UP-TO-DATE AVAILABLE AGE
cluster-logging-operator 1/1 1 1 8d
elasticsearch-cdm-krsbwdf7-1 1/1 1 1 7d23h
elasticsearch-cdm-krsbwdf7-2 1/1 1 1 7d23h
elasticsearch-cdm-krsbwdf7-3 1/1 1 1 7d23h
kibana 1/1 1 1 7d23h
```

The number of primary shards for the index templates is equal to the number of Elasticsearch data nodes..

4) Verify the install:

a) Switch to the **Workloads** → **Pods** page.

b) Select the **openshift-logging** project.

You should see several pods for OpenShift Logging, Elasticsearch, Fluentd, and Kibana similar to the following list:

i) cluster-logging-operator-cb795f8dc-xkckc

ii) elasticsearch-cdm-b3nqzchd-1-5c6797-67kfz

iii) elasticsearch-cdm-b3nqzchd-2-6657f4-wtprv

iv) elasticsearch-cdm-b3nqzchd-3-588c65-clg7g

v) fluentd-2c7dg

vi) fluentd-9z7kk

vii) fluentd-br7r2

viii) fluentd-fn2sb

ix) fluentd-pb2f8

x) fluentd-zqgqx

xi) kibana-7fb4fd4cc9-bvt4p

11.2. Post-installation tasks

If you plan to use Kibana, you must manually create your Kibana index patterns and visualizationsto explore and visualize data in Kibana.

If your cluster network provider enforces network isolation, allow network traffic between the projects that contain the OpenShift Logging operators.

Defining Kibana index patterns

An index pattern defines the Elasticsearch indices that you want to visualize. To explore and visualize data in Kibana, you must create an index pattern.

Prerequisites

- A user must have the cluster-admin role, the cluster-reader role, or both roles to view the infra and audit indices in Kibana. The default kubeadmin user has proper permissions to view these indices.

  If you can view the pods and logs in the default, kube- and openshift- projects, you should be able to access these indices. You can use the following command to check if the current user has appropriate permissions:

```
$ oc auth can-i get pods/log -n <project>

Output:
```

```
yes
```

  Elasticsearch documents must be indexed before you can create index patterns. This is done automatically, but it might take a few minutes in a new or updated cluster.

Procedure:

To define index patterns and create visualizations in Kibana:

1. In the OpenShift Container Platform console, click the Application Launcher and select **Logging**.

2. Create your Kibana index patterns by clicking **Management** → **Index Patterns** → **Create index pattern**:

- ○ Each user must manually create index patterns when logging into Kibana the first time to see logs for their projects. Users must create an index pattern named app and use the @timestamp time field to view their container logs.

- ○ Each admin user must create index patterns when logged into Kibana the first time for the app, infra, and audit indices using the @timestamp time field.

3. Create Kibana Visualizations from the new index patterns.

For the further information use below link:

https://docs.openshift.com/container-platform/4.8/logging/cluster-logging-deploying.html

12. Installing and configuring CP4I

We are installing IBM Cloud Pak® for Integration on an internet-connected cluster using the OpenShift web console, you can follow these steps to get up-and-running quickly with IBM Cloud Pak for Integration. This procedure covers all phases of installation up to, but not including, deploying instances of capabilities.

This task must be performed by a Cluster Administrator.

CP4I installation:

You can use express installation if your deployment meets the following requirements and criteria:

Cluster requirements

Please find the required information through the below link:

https://www.ibm.com/docs/en/cloud-paks/cp-integration/2021.4?topic=installing-online-installation-openshift web-console

Storage requirements

Please find the required information through the below link:

https://www.ibm.com/docs/en/cloud-paks/cp-integration/2021.4?topic=installing-online-installation-openshift-

web-console

12.1 Installing IBM Cloud Pak foundational services by using the console:

You can use the IBM Cloud Pak foundational services operator to install foundational services in your cluster. Use the following procedure to install foundational services version 3.15.x.

12.1.1. Prerequisites:

An OpenShift Container Platform cluster must be installed. For the supported OpenShift Container Platform versions, see Supported OpenShift versions and platforms.

12.1.2. Installing the foundational services operator:

You must complete these tasks from your OpenShift cluster console to install the latest version of foundational services operator.

Create the foundational services catalog source.

A. Log in to your OpenShift cluster console.
B. Click the plus icon. You see the **Import YAML** dialog box.
C. Create the IBM Cloud Pak foundational services CatalogSource.

To create the CatalogSource, paste the following definition in the YAML dialog box:

```
apiVersion: operators.coreos.com/v1alpha1
kind: CatalogSource
metadata:
name: ibm-operator-catalog
namespace: openshift-marketplace
spec:
displayName: ibm-operator-catalog
publisher: IBM Content
sourceType: grpc
image: icr.io/cpopen/ibm-operator-catalog
updateStrategy:
registryPoll:
interval: 45m
```

D.Click **Create**. The catalog source ibm-operator-catalog is created.

E.Verify that the source container is running.

```
oc -n openshift-marketplace get pod | grep ibm-operator-catalog
```

1. Create a namespace for the IBM Cloud Pak foundational services operator. You need a dedicated namespace for the operator.

    a. From the navigation pane, click **Home** > **Projects**. The **Projects** page is displayed.
    b. Click **Create Project**. A **Create Project** area is displayed.
    c. Enter details of the namespace that you are creating. For example, you can specify **common-service** as the name.
    d. Click **Create**. The namespace for your IBM Cloud Pak foundational services operator is created.

2. Install the IBM Cloud Pak foundational services operator that you created.

    a. From the navigation pane, click **Operators** > **OperatorHub**. The **OperatorHub** page is displayed. b. In the **All Items** field, enter IBM Cloud Pak foundational services. The **IBM Cloud Pak foundational services** operator is displayed.
    c. Click the **IBM Cloud Pak foundational services** tile. The **IBM Cloud Pak foundational services** window is displayed.
    d. Click **Install**. You see the **Install Operator** page.
    e. Set **Installation Mode** to the specific namespace that you created for the IBM Cloud Pak foundational services operator. For example, common-service.
    f. Set **Update Channel** to the v3 version.
    g. Set **Approval Strategy** to Automatic.
    h. Click **Install**. After a few minutes, the **IBM Cloud Pak foundational services** operator and the **Operand Deployment Lifecycle Manager** operator are installed, and you can see these operators on the **Installed Operators** page.

The IBM Cloud Pak foundational services operator creates the ibm-common-services namespace, or the custom namespace that you specified in the configmap, and installs the Operand Deployment Lifecycle Manager operator and the IBM NamespaceScope Operator in the namespace.

Optionally, configure the foundational services webhook. For more information, see IBM Cloud Pak foundational services webhook**.**

12.1.3. Setting the hardware profile:

Set the hardware requirements profile based on the workloads in your cluster. For more information about the profiles, see Hardware requirements and recommendations for foundational services.

The default profile is starterset. You can change the profile to small, medium, or large, if required.

Note: For versions 3.5.x and 3.6.x, if you change the profile to large or medium, you cannot scale down the profile to small after installation. However, you can switch between large and medium, or scale up a profile after installation.

1. From the navigation pane, click **Home** > **Search**.
2. From the **Project** drop-down list, select ibm-common-services.
3. From the **Resources** drop-down list, select CommonService.

4. Click the common-service resource.
5. Select the YAML tab.
6. Update the spec.size parameter. We in production provided ‘size’ parameter as medium.

```
apiVersion: operator.ibm.com/v3
kind: CommonService
metadata:
name: common-service
namespace: ibm-common-services
spec:
size: medium
```

Click **Save**.

12.1.4. Installing foundational services in your cluster

1. From the navigation pane, click **Operators** > **Installed Operators**.
2. From the **Project** drop-down list, select the ibm-common-services namespace. You see the **IBM Cloud Pak foundational services** operator and the **Operand Deployment Lifecycle Manager** operator. **Note:** You must install and configure foundational services in the ibm-common-services namespace.

The **IBM Cloud Pak foundational services** operator provides the CommonService custom resource. If required, you can customize the service definitions by editing the custom resource. For more information, see Configuring foundational services by using the CommonService custom resource.

1. Obtain the entitlement key that is assigned to your ID.

a. Log in to Container Software Library by using the IBMid and password that are associated with the entitled software.
b. In the **Entitlement keys** section, click **Copy key** to copy the entitlement key to the clipboard.
c. Copy the key to a safe place. You need the key to create your pull secret.
d. (Optional) Verify the validity of the key by logging in to the IBM Entitled Registry by using a container tool.

```
docker login cp.icr.io --username cp --password entitlement_key
```

2.Log in to your OpenShift Container Platform cluster by using the oc login command.

3.Create a Docker registry secret named ibm-entitlement-key and add the pull secret to the namespace where you are installing foundational services.

```
oc create secret docker-registry ibm-entitlement-key \
--docker-username=cp \
--docker-password=<entitlement_key> \
--docker-server=cp.icr.io \
--namespace=<target_namespace>
```

These are the variables that you need to designate:

- *<entitlement_key>* is the value of your entitlement key that you copied earlier from Container Software Library .
- *<target_namespace>* is the namespace where you are installing foundational services in your cluster. The default namespace that you can use here is ibm-common-services.

12.1.5. Creating the OperandRequest instance:

To create the instance, click **Operand Deployment Lifecycle Manager**, select the **OperandRequest** tab, and click **Create OperandRequest**. On the **Create OperandRequest** page, select a configuration mode: **Form View** or **YAML View**.

Creating the OperandRequest instance by using the YAML View:

Complete these steps to use the YAML to create the OperandRequest instance.

1. On the **Create OperandRequest** page, select **YAML View**.

2. Paste the following content in the YAML editor:

```
apiVersion: operator.ibm.com/v1alpha1
kind: OperandRequest
metadata:
name: common-service
namespace: ibm-common-services
labels:
app.kubernetes.io/instance: operand-deployment-lifecycle-manager
app.kubernetes.io/managed-by: operand-deployment-lifecycle-manager
app.kubernetes.io/name: odlm
spec:
requests:
- operands:
- name: ibm-cert-manager-operator
- name: ibm-mongodb-operator
- name: ibm-iam-operator
- name: ibm-monitoring-grafana-operator
- name: ibm-healthcheck-operator
- name: ibm-management-ingress-operator
- name: ibm-licensing-operator
- name: ibm-commonui-operator
- name: ibm-events-operator
- name: ibm-ingress-nginx-operator(deprecated)
- name: ibm-auditlogging-operator
- name: ibm-platform-api-operator
- name: ibm-zen-operator
registry: common-service
```

1. In the spec.requests.operands section, retain the operator names of the services that you want to install in your cluster. You can remove the services that you do not want. For a list of foundational services that you can install, see IBM Cloud Pak foundational services operators and versions.

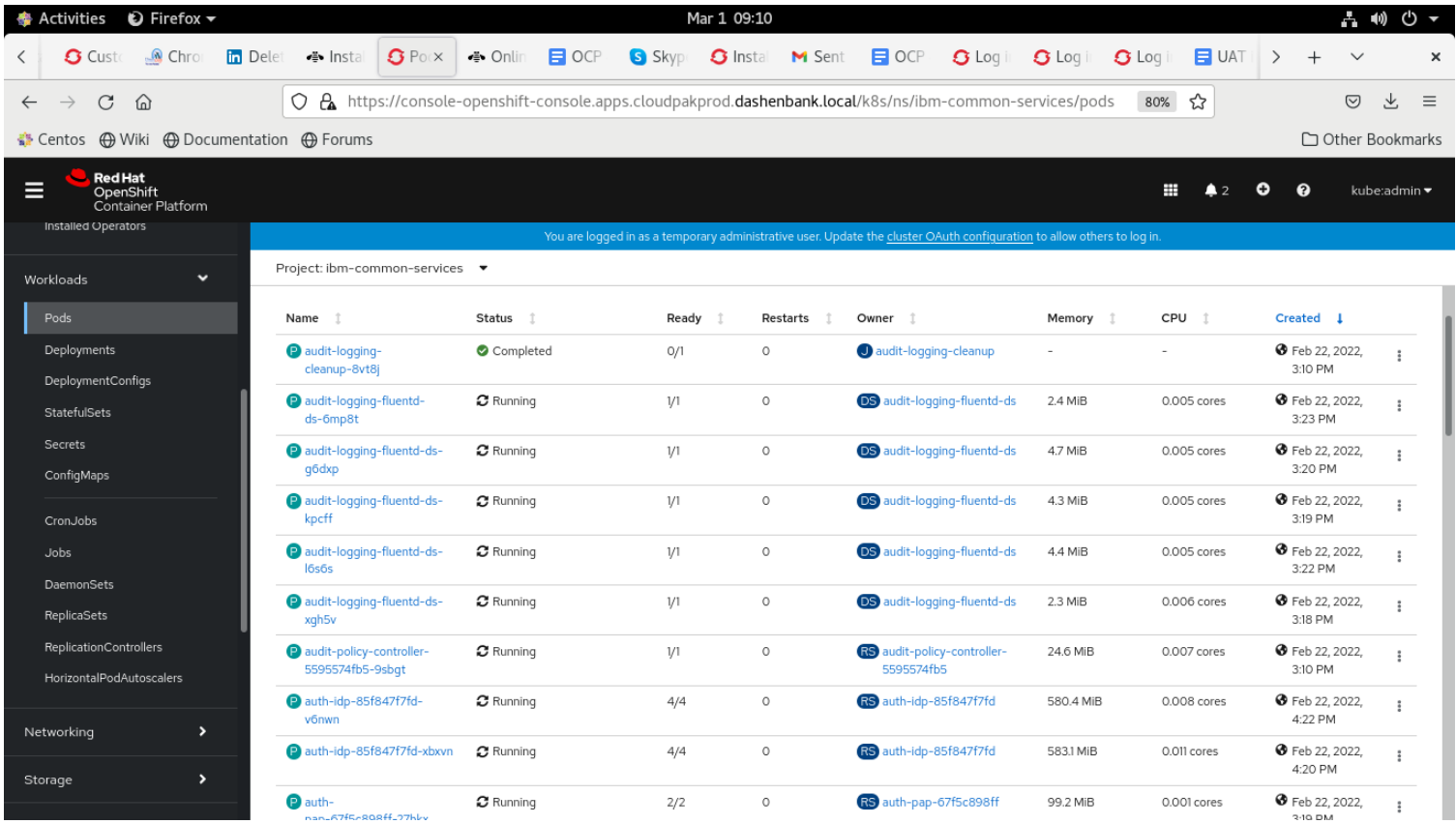
2. Add bindings to access a service. This step is optional. For more information, see Accessing the services.

3. Click **Create**.

You can see the list of services that are installed in your cluster on the **Operators** > **Installed Operators** page.

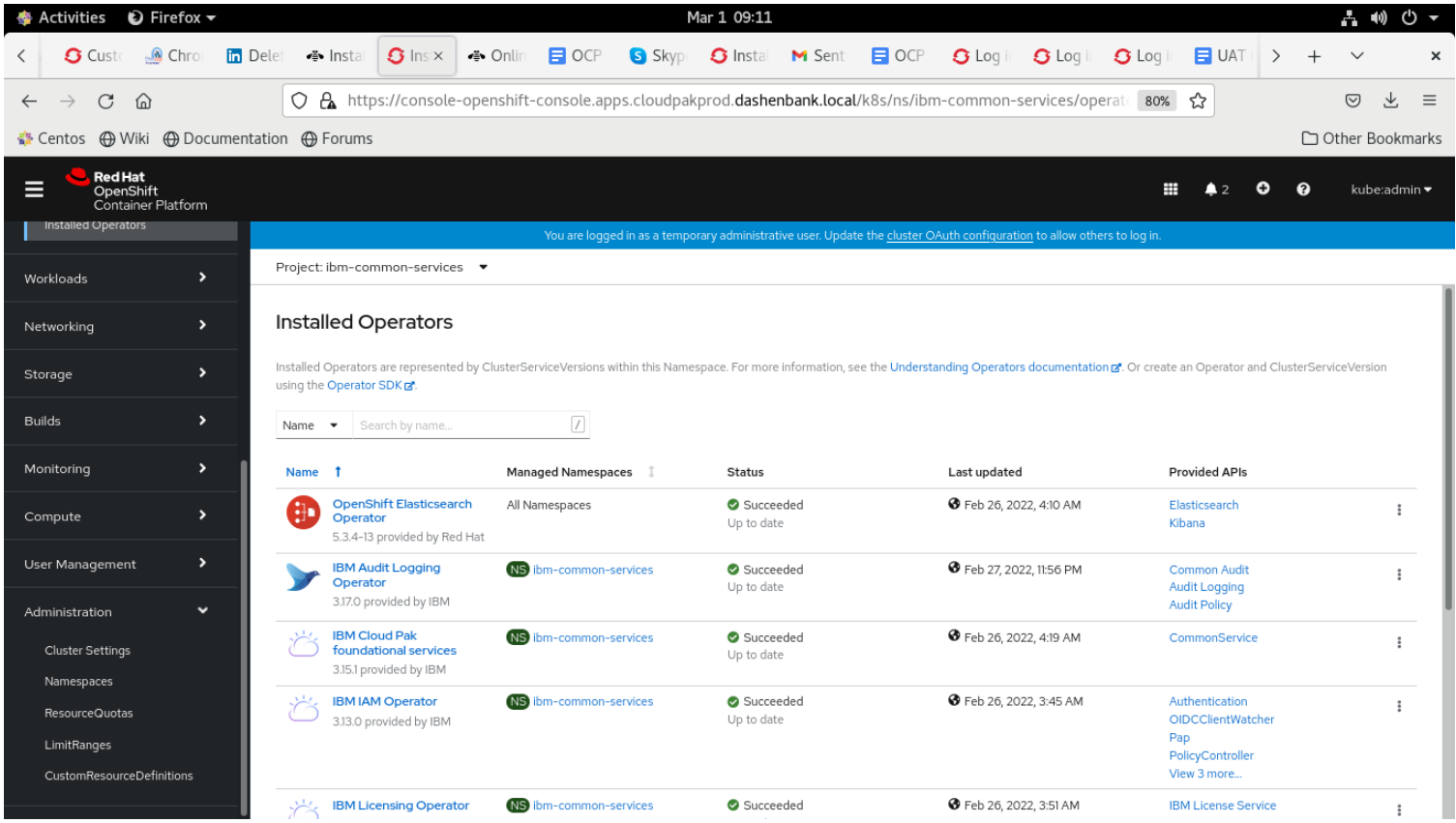
12.1.6. Verifying the installation:

Checking all the pods are up and running in ibm-common-services namespace.

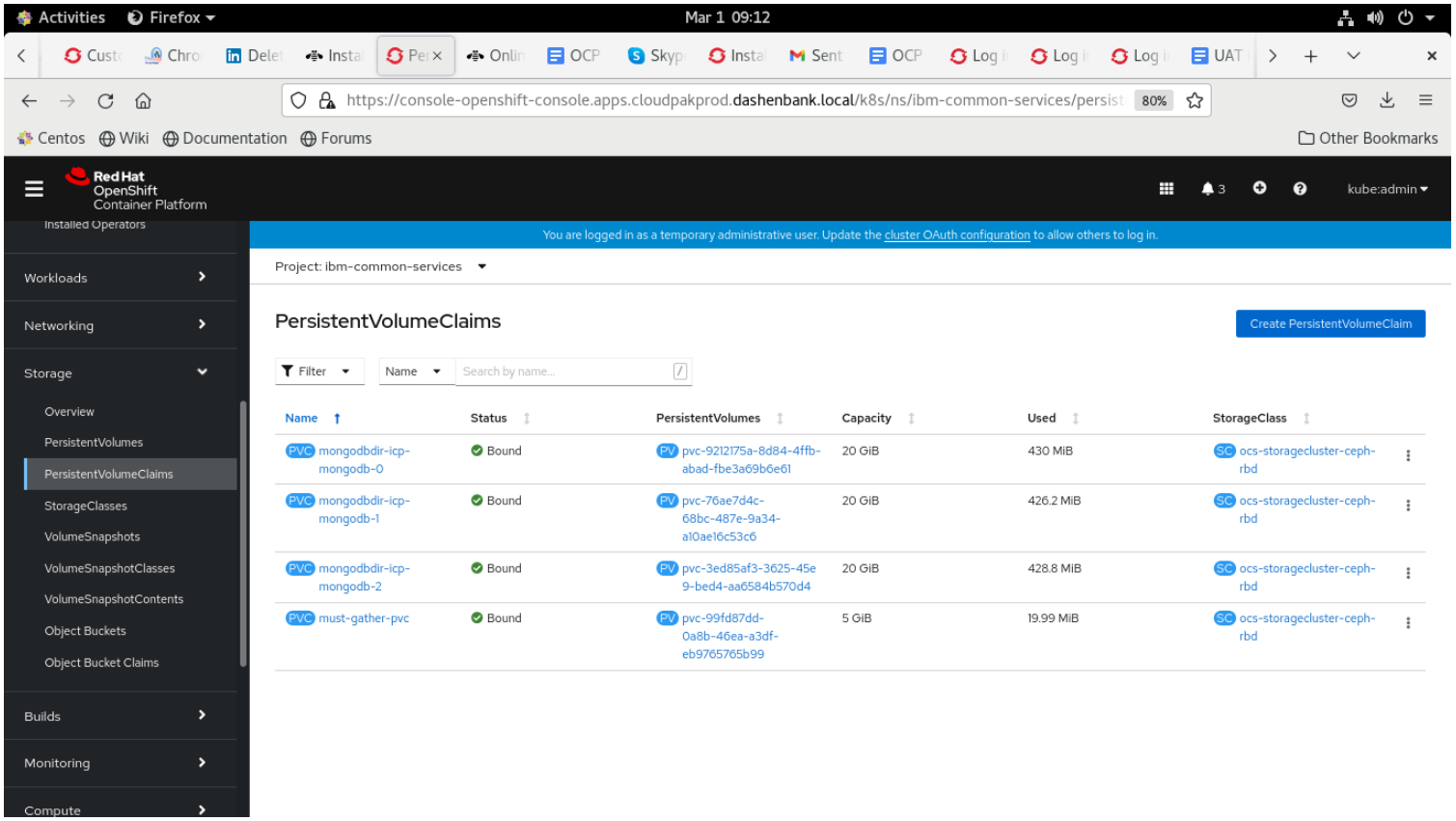


\

checking all the operators in the ibm-common-services namespace:

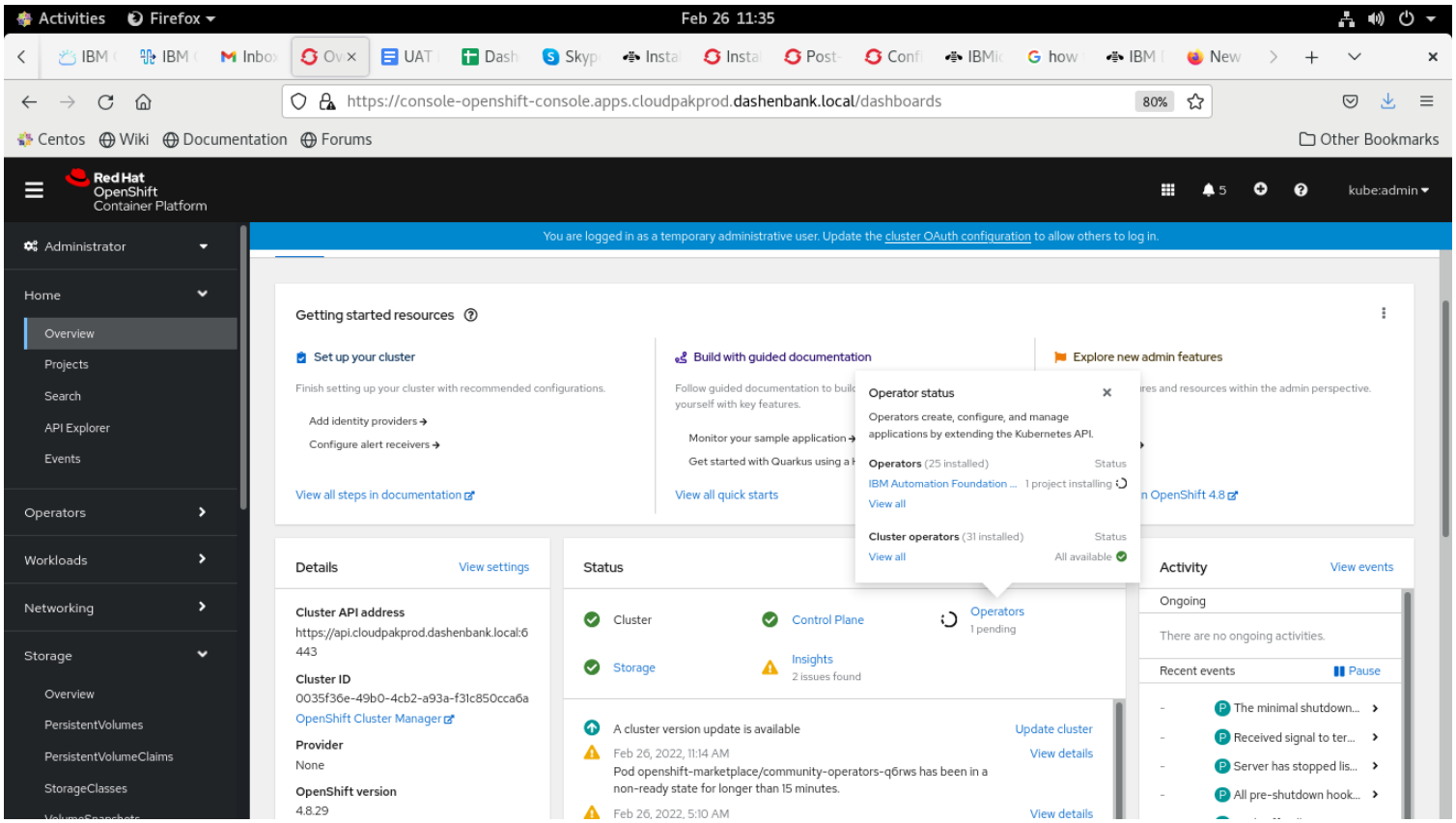


Checking if all the PVCs are bounded.



Check operator status:

1. From the navigation pane, click **Home** > **Overview**. The cluster status is displayed.
2. Click **Operators** on the status card. The operator statuses are displayed.



12.2 Installing IBM Cloud Pak foundational services by using the CLI:

For further information, use below link:

https://www.ibm.com/docs/en/cpfs?topic=315-installing-foundational-services-by-using-cli

12.2.1 Installing the Cloud Pak for Integration Operator

Open the Red Hat OpenShift Operator Hub. Switch to the Administrator perspective, if you're not there already. In the left navigation menu of the OpenShift console, click Operators.

1 Search for and select the **IBM Cloud Pak for Integration operator**.

2 Click **Install.**

3 Select the latest update channel.

4 You can choose to install Cloud Pak for Integration in one namespace or for all namespaces on your

cluster. If in doubt, choose the All namespaces on the cluster installation mode, and accept the default Installed Namespace.

5 Select the Automatic approval strategy.

6 Click Install.

Obtaining your entitlement key

Obtain an entitlement key from IBM Container Library. You will use this key in the next section.

Click Get an entitlement key.

1 Copy the entitlement key presented to a safe place so you can use it in Adding a pull secret to a namespace.

2 (Optional) Verify the validity of the key by logging in to the IBM Entitled Registry using a container tool.

```
docker login cp.icr.io --username cp --password <entitlement_key>
```

Creating a namespace for the cp4i installation:

```
$ oc new-project cp4i-prod
```

Adding the pull secret to the namespace:

To install Cloud Pak for Integration in its own namespace, create a docker registry secret named ibm entitlement-key, using the following command. On the third line, replace your_entitlement_key with the value of your entitlement key from the previous section.In the last line, replace target_namespace with the name of your target namespace:

```
oc create secret docker-registry ibm-entitlement-key --docker-username=cp --docker-password=<entitlementkey>
-- docker-server=cp.icr.io --namespace=cp4i-prod
```

For further information, please follow this link below.

https://www.ibm.com/docs/en/cloud-paks/cp-integration/2021.4?topic=installing-online-installation-openshift web-console

12.2.1.1 Deploying the Platform Navigator:

To configure and deploy the Platform Navigator:

Open the OpenShift web console.

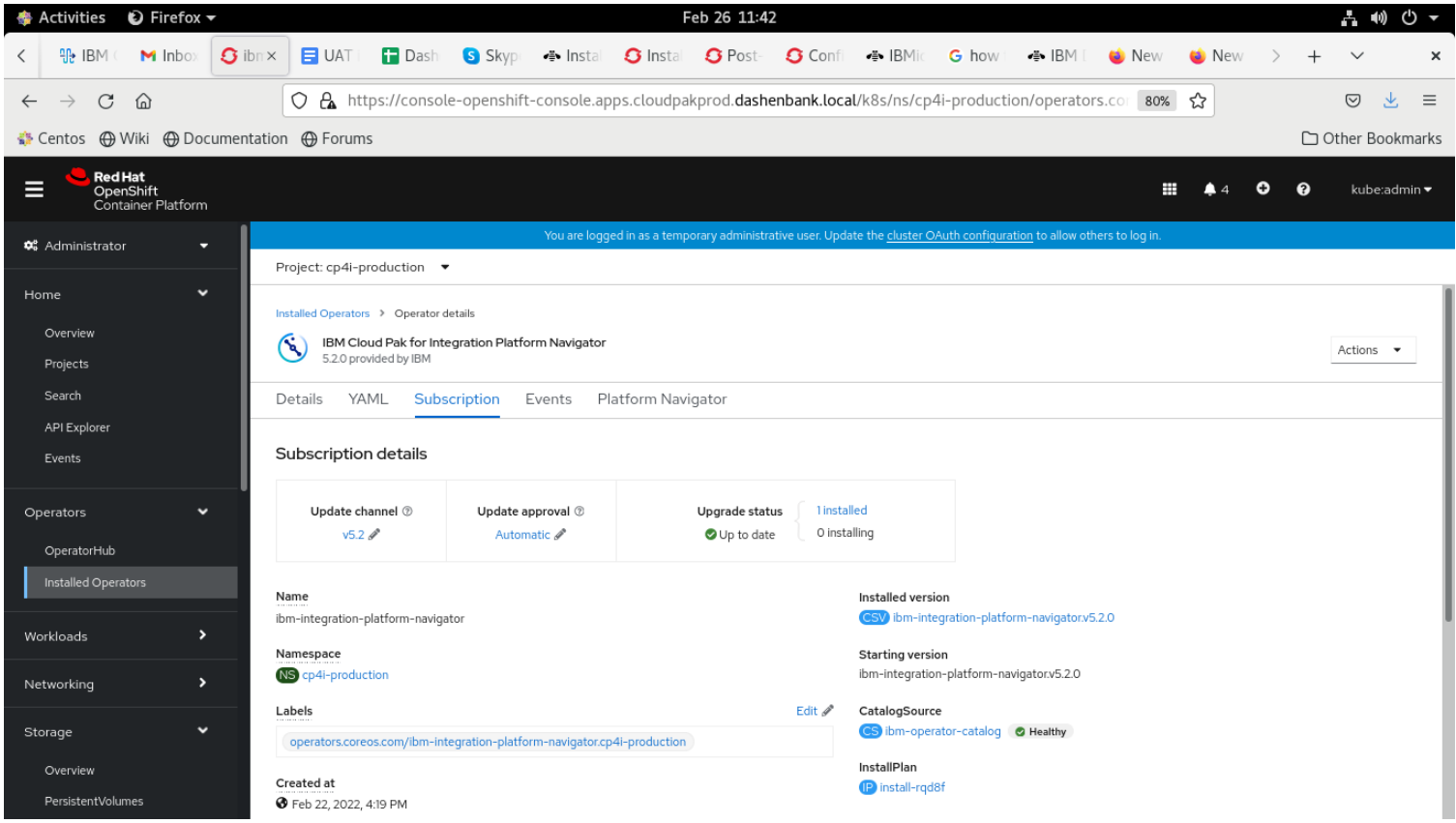
1 In the navigation panel, click Operators > Installed Operators.

2 Click IBM **Cloud Pak for Integration Platform Navigator.**

3 Click **Platform Navigator.**

4 Click Create Platform Navigator. Make sure the Form view is selected. You will use the form to

configure Platform Navigator.



12.2.1.2. Creating the Cloud Pak instance:

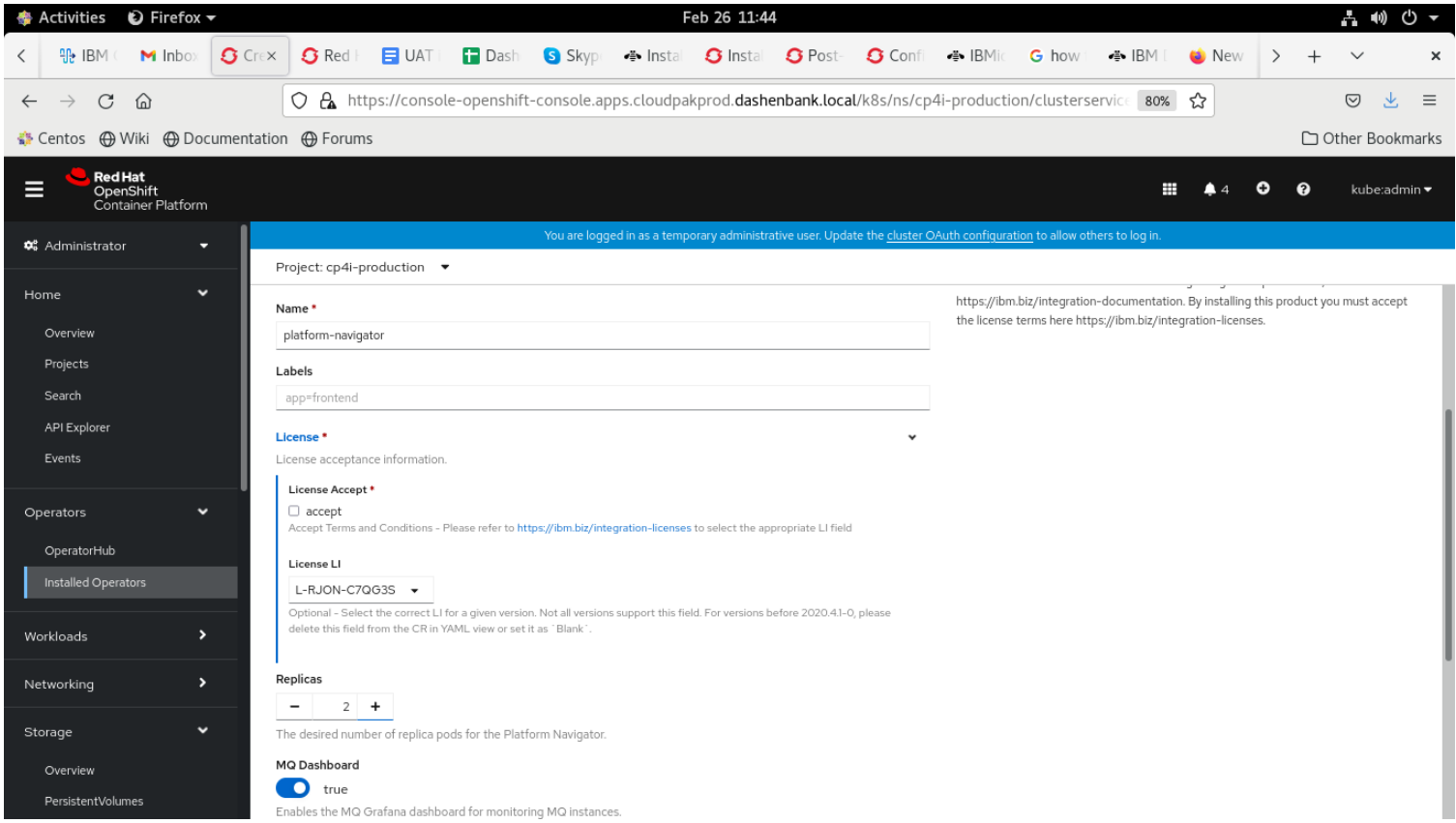
Log into the OpenShift web console with your OpenShift cluster admin credentials.

1. Change **Project** to the desired project/namespace name. Click the drop-down arrow and select your project name from the list. The project name in the example screens below is cp4i.
2. In the navigation panel, click **Operators > Installed Operators**.
3. In the list on the Installed Operators panel, find and click **IBM Cloud Pak for Integration Platform Navigator**.
4. Click the **Platform Navigator** tab.
5. Click **Create PlatformNavigator**. The **Create Platform Navigator** panel opens, and offers two methods for configuring the resource; the **Form view** and the **YAML view**. The **Form view** is selected by default:

12.2.1.3. Configuring in the Form view:

The Form view opens a form that lets you view or modify the resource configuration.

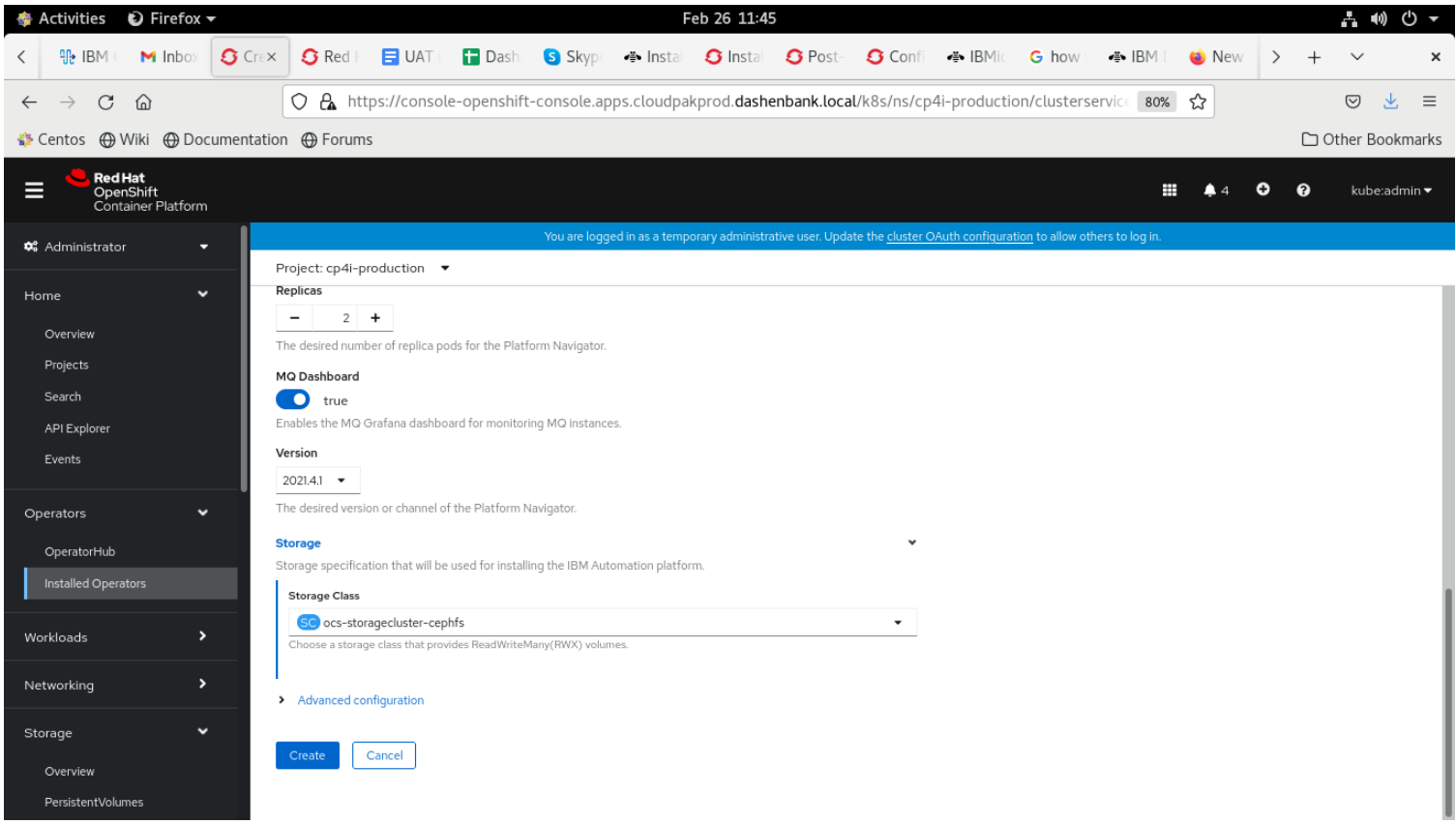
1. Change **Project** to your project (namespace) name. Click the drop-down arrow and select your project name from the list. The project name in the example screen below is cp4i.
2. In the **Name** field, enter a name for the new instance or leave the default.
3. Next to **License**, click the arrow to expand the license acceptance section.
4. Set **License Accept** to **true** if you accept the Cloud Pak for Integration license agreement.



For License LI, see Licensing to determine the license. Next, click the expand icon and select the license from the drop-down list.

Specify the Storage class: Click to expand the Storage section, then click to open a list of options for Select Storage Class. Choose a storage class that supports ReadWriteMany (RWX) and allows read and write

access to non-root users. Supported storage providers include ibmc-file-gold-gid, OpenShift Container Storage, Spectrum, and Portworx. In the case of Dashen Bank, use ocs-storagecluster-cephfs storage class.



Click **Create.**

Your instance of Platform Navigator is added to the list of instances in the current project (namespace).

12.2.1.4. Getting the admin password with the OpenShift Console:

To get the admin password in the OpenShift Console UI:

Log into the OpenShift cluster as a Cluster Administrator.

1 To switch to the **ibm-common-services** project, click the arrow to expand the Project list. 2 In the navigation menu, click Workloads to expand the selections, then select Secrets. Open the **platform-auth-idp-credentials secret.**

3 At the bottom of the Details page, in the Data section, click Reveal Values to get and copy the value for **admin_password.**

4 Save this password to use when logging in to Platform Navigator.

12.2.1.5. Logging in to Platform Navigator:

When the Platform Navigator status changes to Ready, you can access the Platform Navigator UI.

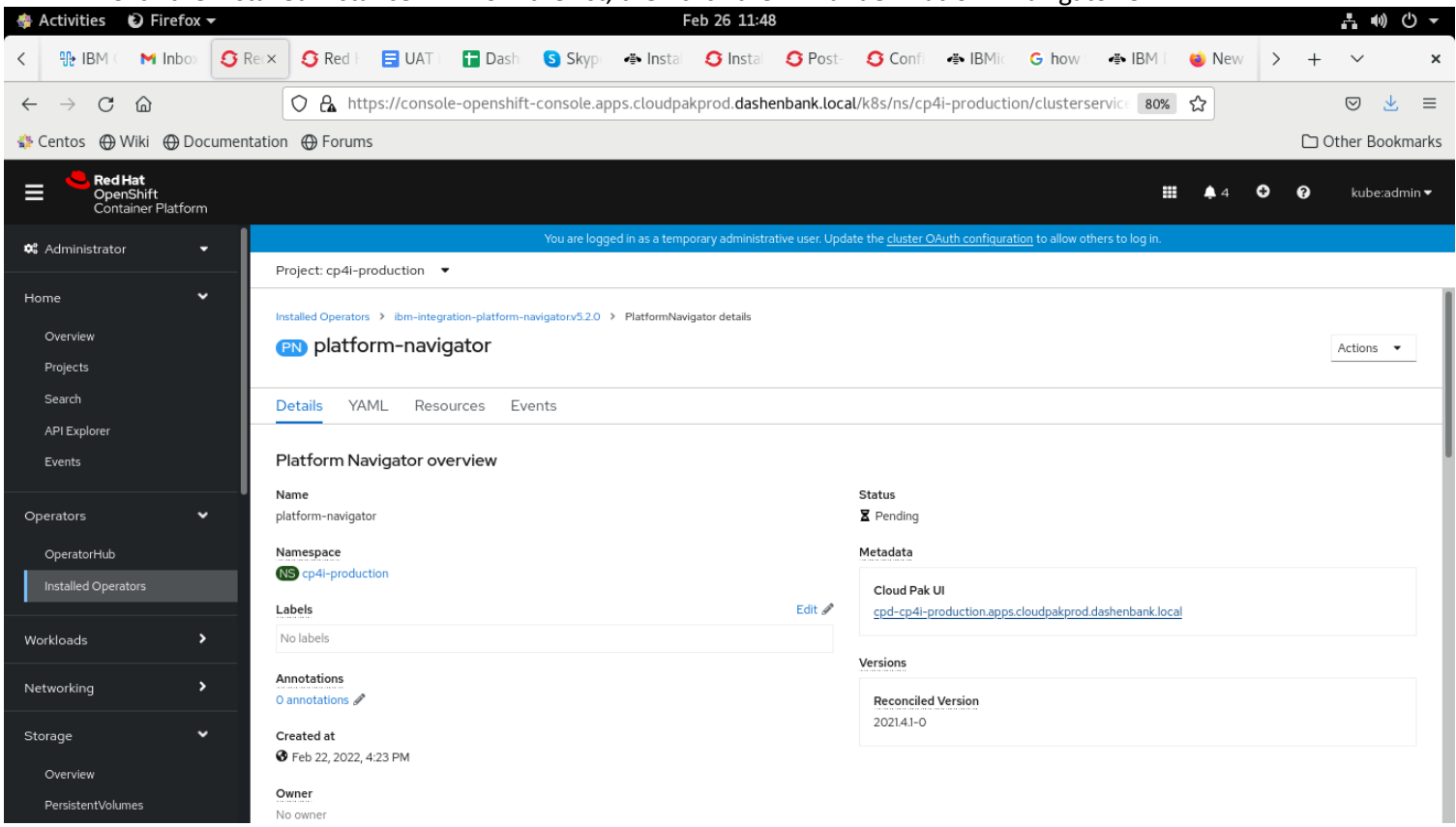
I Open the OpenShift web console.

I In the navigation panel, click Operators > **Installed Operators.**

II In the Installed Operators pane, click **IBM Cloud Pak for Integration Platform Navigator.**

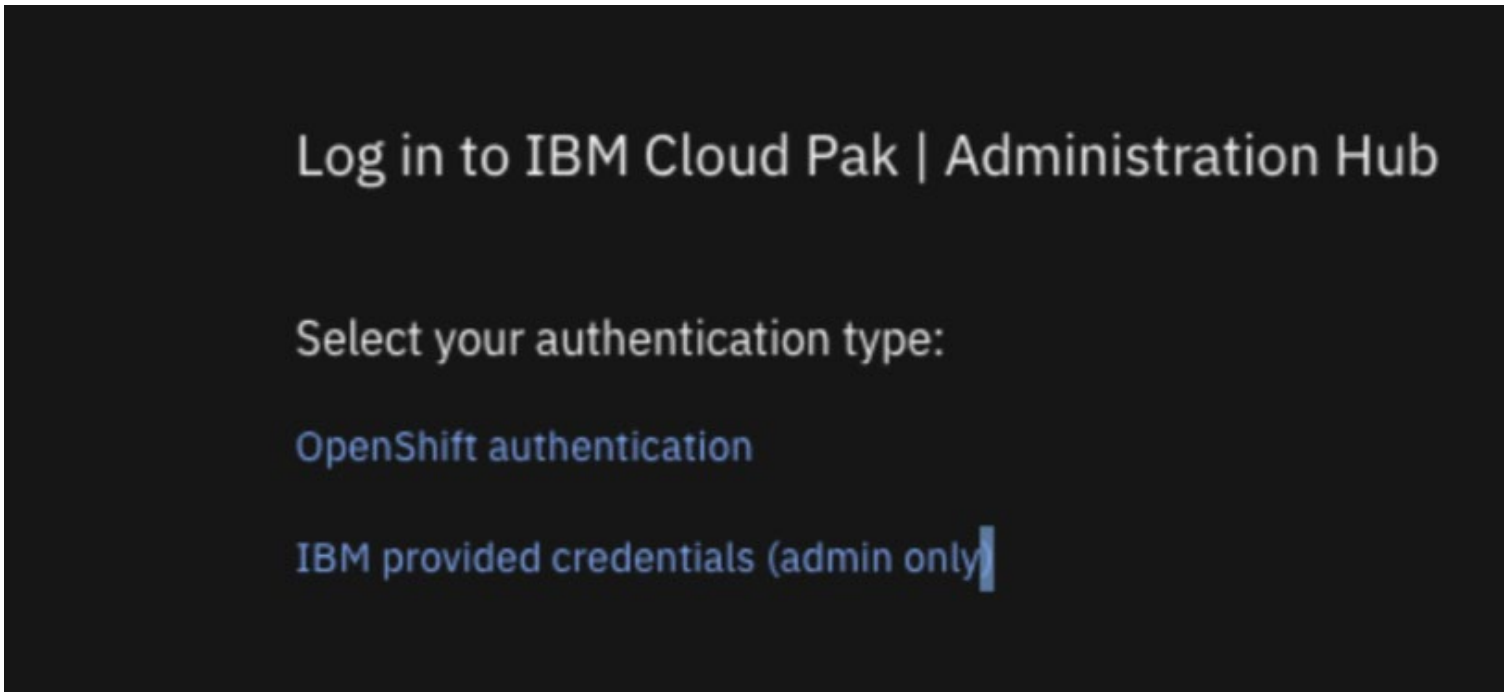
III Click **Platform Navigator.**

Click the installed instance link from the list, then click the link under Platform Navigator UI.



At the login screen, click **OpenShift authentication** and log in with your OpenShift cluster admin credentials

.



If you are unable to log in with your OpenShift credentials, click **IBM provided credentials (admin only)** and:

- For **Username**, enter admin.
- For **Password**, enter the IBM admin password you obtain in Getting the initial admin password.

Platform UI opens. You can now create users and permissions by clicking **Manage users**. For detailed information, see Adding users in the IBM Cloud Pak Platform UI and the other topics in the Identity and access management section.

https://www.ibm.com/docs/en/cloud-paks/cp-integration/2021.4?topic=installing-deploying-cloud-pak integration-using-openshift-console

12.2.2 API Management Deployment:

For more information regarding API-connect Deployment, please refer to the link below:

https://www.ibm.com/docs/en/cloud-paks/cp-integration/2021.4?topic=capabilities-api-management deployment

12.2.2.1. Deploying an instance of API Connect:

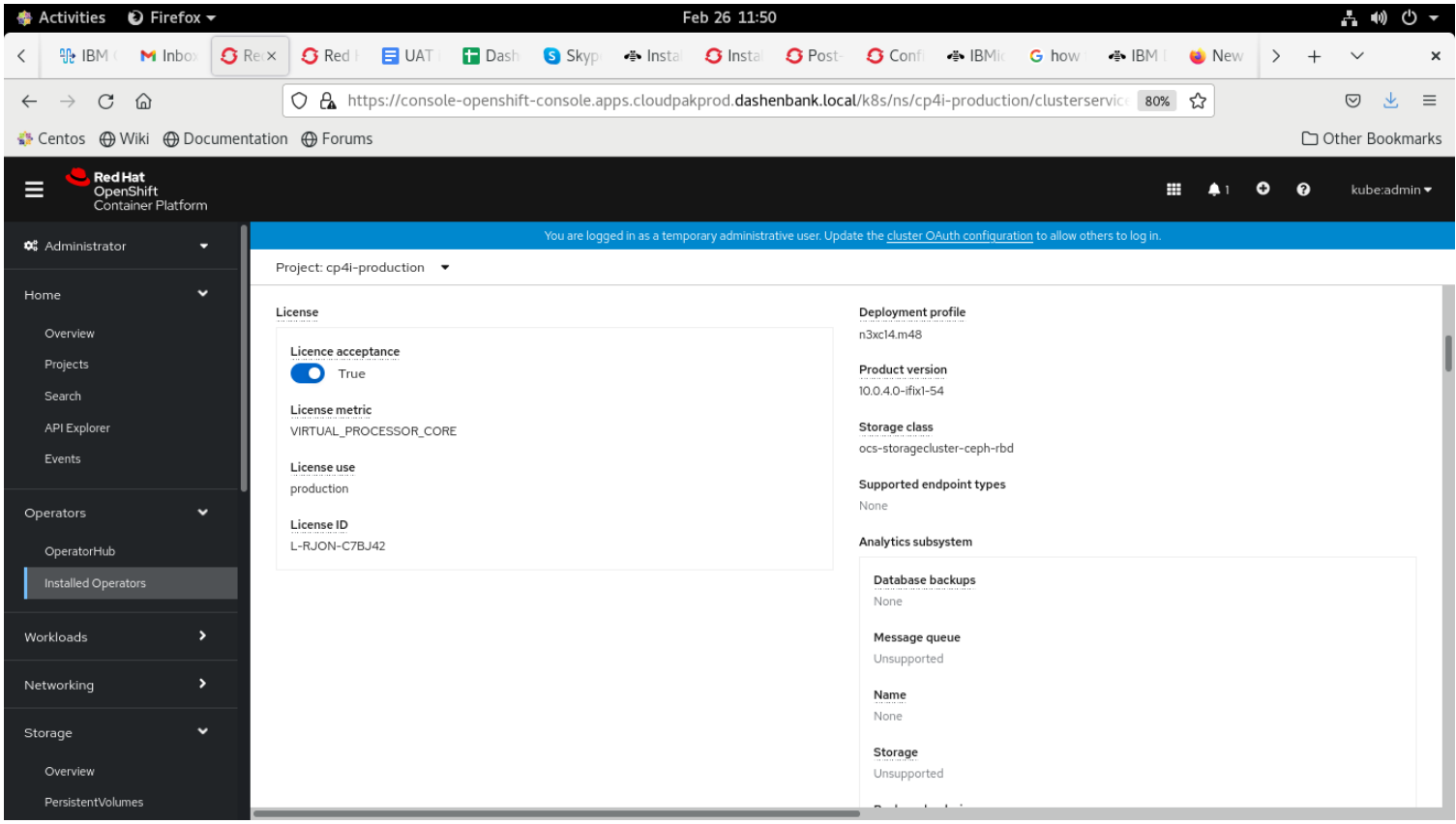
Complete the following steps to deploy the API Connect capability:

Attention: **When you deploy the API Connect operator, the DataPower operator is also deployed. The DataPower Gateway is a required component of API Connect. If you delete the DataPower operator, the API Connect installation will fail.**

Log in to the IBM Cloud Pak for Integration instance (IBM Automation Platform home page). Use the authentication method and credentials set by your administrator.

1. Click **IBM Automation**> **Administration** > **Integration instances.**
2. On the home page, click **Create instance.**
3. Select the **API management** tile and click **Next.**
4. On the Create an instance for API management page, select "**API Endpoints - Three Node – Production**" deployment type from the below list and click **Next**:
   - **API Endpoints** - **One Node - Minimum** represents a nonproduction deployment, which installs 1 node for each of the API Connect subsystems.
   - **API Endpoints - Three Node - Production** represents a production deployment, which installs 3 nodes for each of the API Connect subsystems.
   - **API Endpoints - Three Node - Minimum Gateway** represents a production deployment with a minimum requirement of 1 CPU per gateway instead of 4 CPUs.

   On the next page, fill in the configuration fields.



For more information, please follow the below link:

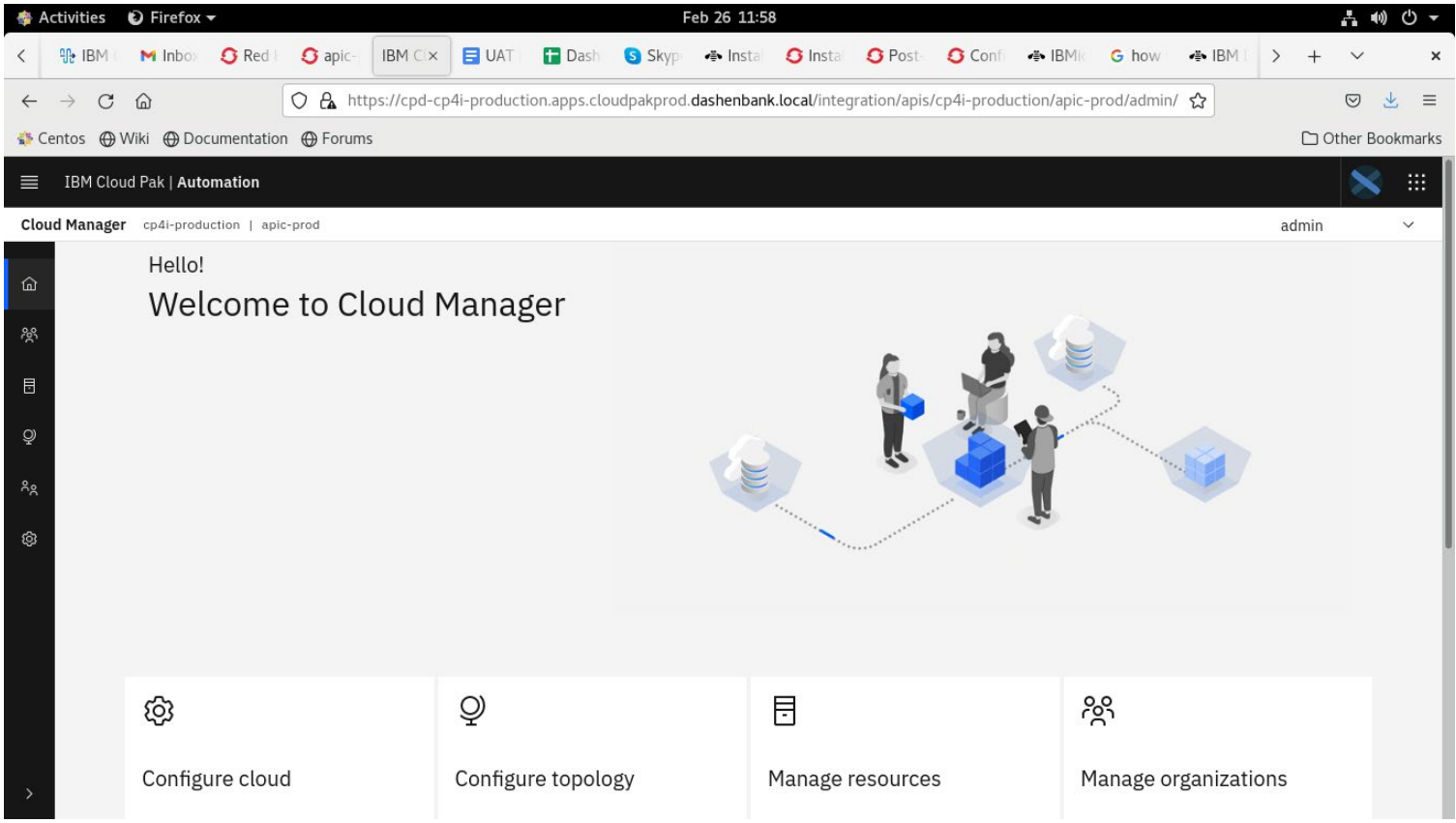
https://www.ibm.com/docs/en/cloud-paks/cp-integration/2021.4?topic=capabilities-api-management deployment

Click Create.

12.2.2.2. Configuring your API Connect instance:

Complete basic configuration settings for your instance of API Connect.

1. In the navigation UI, click > Administration > Integration instances.
2. Click the next to the API Connect instance name, and select Cloud Manager.
3. Log in to Cloud Manager with the Common Services user registry, using the same user name and password that you used for logging in to the Cloud Pak for Integration instance (IBM Automation UI).
   Starting with Cloud Pak for Integration 2021.1, users must log in to the Cloud Pak for Integration platform in order to access the Cloud Manager and API Manager user interfaces in API Connect.



For more information, please follow the below link:

https://www.ibm.com/docs/en/cloud-paks/cp-integration/2021.4?topic=capabilities-api-management-deployment

The API Connect instance requires further configuration before you can begin creating APIs. For information on what to do next with the API management features, which are provided by API Connect, see Managing your APIs.

12.2.3. Creating App-connect Instance:

Please follow the link below for future reference and information about APP-connect installation in CP4I.

https://www.ibm.com/docs/en/app-connect/containers_eus?topic=instances-dashboard-reference

12.2.3.1. Creating an instance from the IBM Cloud Pak Platform UI:

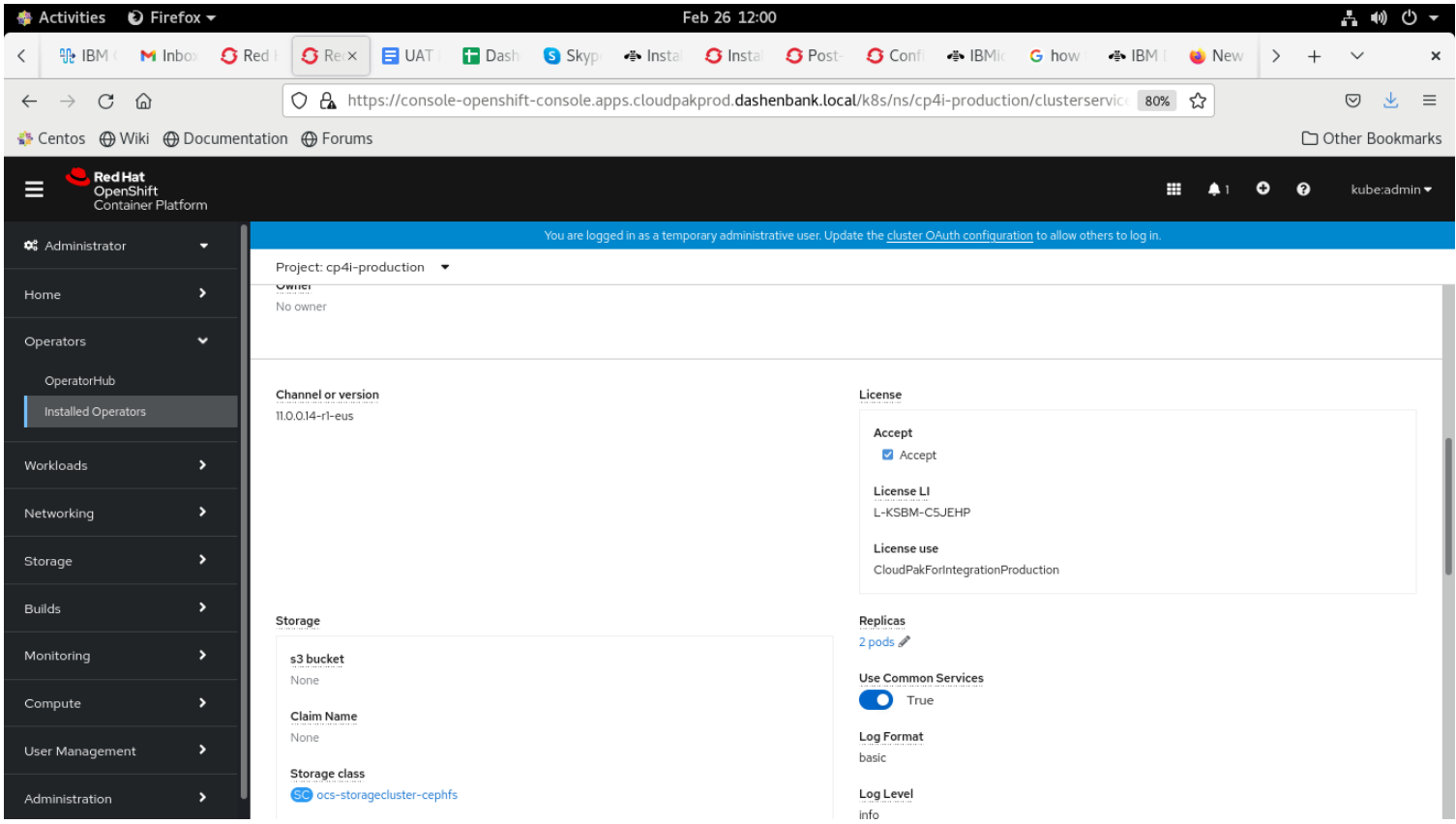
To create an App Connect Dashboard instance from the IBM Cloud Pak Platform UI, complete the following steps:

From a browser window, log in to the IBM Cloud Pak Platform UI.

1. Tip: You can use the generated URL for a deployed IBM Cloud Pak for Integration Platform Navigator instance

   to access the IBM Cloud Pak Platform UI.
   The Platform UI home page opens with cards and navigation menu options that provide access to the instances and other resources that you are authorized to create, manage, or use. For information about completing administration tasks (such as user management or platform customization) from this page, see Platform UI in the IBM Cloud Pak foundational services documentation.
2. From the navigation menu , expand Administration and click Integration instances.
3. From the "Integration instances" page, click Create an instance.
4. To create an App Connect Dashboard instance from the "**Create an instance**" page, click the Integration dashboard tile and click **Next**.
5. From the "**Create an integration dashboard**" page, click a tile to select the production type of instance want to create from the below options:
   - Quick start: Deploy a development dashboard with one replica pod.
   - Production: Deploy a production dashboard with multiple replica pods for resilience and high availability.

6. Click Next. A "UI form" view opens with the minimum configuration required to create the **instance**. 7. Click **Create**. You are redirected to the "Integration instances" page. An entry for the instance is shown in the table with an initial status of Pending, which you can click to check the progress of the deployment. When the deployment completes, the status changes to Ready.



Users with the required permission can access this Dashboard instance and use it to deploy Designer and Toolkit

integrations to integration servers.

For more information, please follow the below link:

```
https://www.ibm.com/docs/en/app-connect/containers_cd?topic=resources-dashboard-reference
```

13. Caching of Images

As requested by Dashen Bank to cache images for all the worker nodes incase of any internet interruptions, to maintain cluster in steady state, followed below procedure:

Login into each work node and run the following command to download the ACE integration images.

```
$ podman login -u cp -p <ibm-entitlementkey> cp.icr.io

$ podman pull cp.icr.io/cp/appc/ace-server
prod@sha256:891841a6a7e6996bd23fb8910972cd73005d2ffb507a1e8adea4319b322536fa
```

NOTE: Now, login into all the remaining 4 worker nodes and follow the same procedure for caching of images.

14. Installation of DataPower Gateway in DMZ

Initially we have to import the datapower idg ova file(10.0.1.5) in **vmware**. And that file belongs to the production department.

Link to ova file for DataPower 10.0.1.5 is below:

```
https://www.ibm.com/support/pages/fix-packs-datapower-gateway-version-1001x#10.0.1.5
```

Once to complete the import we have to configure the VMware hardware properties such as RAM size,CPU size and network adapter etc.

We are using 3 DataPower nodes for the high availability scenario in the DMZ zone.

14.1. Steps to follow the installation process:

First we need to give credentials for logging such as login id and password.
After that we have to choose the options yes/no for our WEBGUI DataPower configuration. Now follow the procedure of installing DataPower node by enabling below provided details.

Note: All these steps will be done in the CLI mode itself when you log in into the datapower by using credentials that we are going to use further.

Enable secure backup mode ?

Select yes

Confirm secure backup mode ?

Select yes

Enable common criteria compatibility mode ?

Select no

Please enter a new password

To use your own password

Please re enter the password to confirm

Confirm password again

Do you want to run the install wizard ?

Select yes

14.2. Mention below points are the major steps to be followed for the installation of DataPower:

1. Do you want to configure network interfaces ?

Select yes

Do you have this information?

Select yes

Do you want to configure the eth0 interface ?

Select yes

Do you want to enable DHCP?

Select yes

Do you want to configure the eth1 interface?

Select yes

Do you want to enable DHCP?

Select yes

Do you want to configure the eth2 interface?

Select yes

Do you want to enable DHCP?

Select yes

Do you want to configure the eth3 interface?

Select yes

Do you want to enable DHCP?

Select yes

2. Do you want to configure network services ?

Select yes

Do you want to configure DNS?

Select no

3. Do you want to define a unique system identifier ?

Select yes

--Enter the name and confirm

4. Do you want to configure remote management access ?

Select yes

Do you have this information?

Select yes

Do you want to enable SSH?

Select yes

Enter the local IP address[0 for all]

Select 0

Enter the port number[22]

Select [22] default

Do you want to enable WEBGUI access?

Select yes

Enter the port number

Select 9090(default)

Note : if you want to configure the backup user for resetting the password select "yes" for step 5 otherwise select "no"

5. Do you want to configure user account that can reset password

Select yes

6. Do you want to configure the RAID array?

Select no

7. Do you want to review the current configuration?

Select yes

```
Do you want to save the current configuration?
Select yes

Override previously saved configuration?
Select yes

ctrl+G -->openInput & ctrl+alt-->closeInput
```

- And to view all configuration of datapower gateway just give a command

```
show int
```

- It shows the information of the network and ip address.
- Later we have to send the request from any browser with an ip address, port number along with security: https:10.0.20.10:9090
- After that we need to access a license agreement for that.Once complete credentials will get WEBGUI datapower gateway interface.

NOTE: **As we have discussed and agreed on the DataPower Highly availability scenario, repeat the installation procedure for 2 more nodes and install them.**

15. Upgrading DataPower fix pack from 10.0.1.5 to 10.0.4.0 & High Availability scenario

Upgrading DataPower fix pack from 10.0.1.5 to 10.0.4.0 as we have API-connect, which is installed in the OpenShift, is of version 10.0.4.0.

15.1. Procedure:

Prerequisites:

1. Here we want Idg DataPower script file for the desired version of (idg 10.0.4.0)

2. Internet connectivity

Procedure to upgrade DataPower fix pack :

- Login into datapower idg webgui
- Go to the default domain
- From the control panel select system control.
- In system control select boot image, here we need to upload data power upgrade fix pack script file(10.0.1.5).
- Then we have to accept the license and click on the boot image.

NOTE: **As we have discussed and agreed on the DataPower Highly availability scenario, repeat the upgradation procedure for 2 more nodes and upgrade them.**

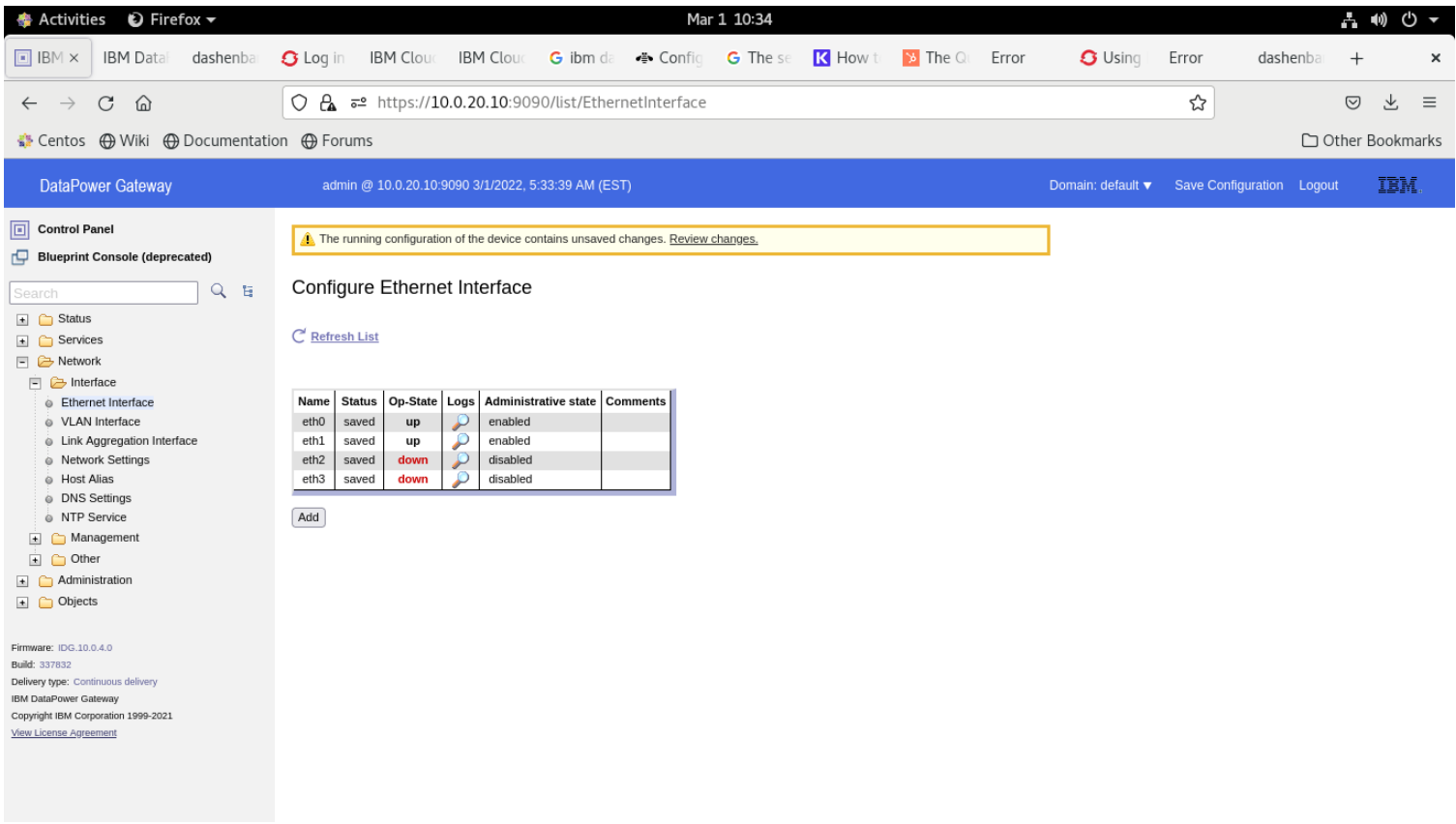
15.2. High Availability Case:

Now, to set up highly availability case with the installed 3 DataPower nodes, follow the below procedure:

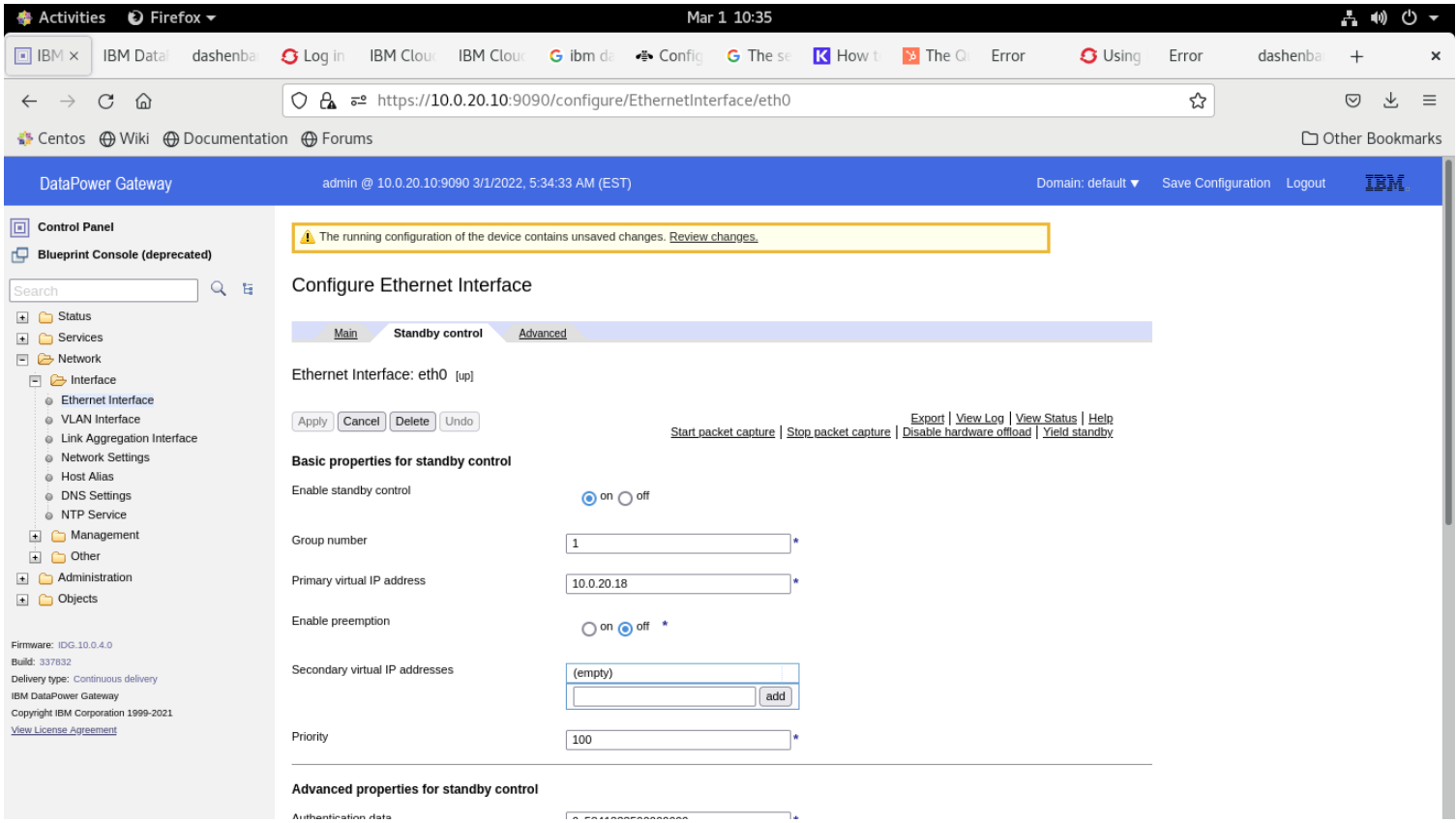
Step 1: Create a Virtual IP address having connectivity with all three DataPower nodes.

Step 2: Login into one of the WEBGUI interface of the DataPower nodes ie., https://10.0.20.10:9090 by placing this in the browser.

Step 3: Navigate to Network → Ethernet Interface, Click on the eth0


Activities
Firefox
Mar 1 10:34
https://10.0.20.10:9090/list/EthernetInterface
Centos
Wiki
Documentation
Forums
Other Bookmarks
DataPower Gateway
admin @ 10.0.20.10:9090 3/1/2022, 5:33:39 AM (EST)
Domain: default
Save Configuration
Logout
IBM
Control Panel
Blueprint Console (deprecated)
Search
Status
Services
Network
Interface
Ethernet Interface
VLAN Interface
Link Aggregation Interface
Network Settings
Host Alias
DNS Settings
NTP Service
Management
Other
Administration
Objects
Firmware: IDG.10.0.4.0
Build: 337832
Delivery type: Continuous delivery
IBM DataPower Gateway
Copyright IBM Corporation 1999-2021
View License Agreement
The running configuration of the device contains unsaved changes. Review changes.
Configure Ethernet Interface
Refresh List
Name
Status
Op-State
Logs
Administrative state
Comments
eth0
saved
up
enabled
eth1
saved
up
enabled
eth2
saved
down
disabled
eth3
saved
down
disabled
Add

Step 4: Navigate to the “Standby Control”

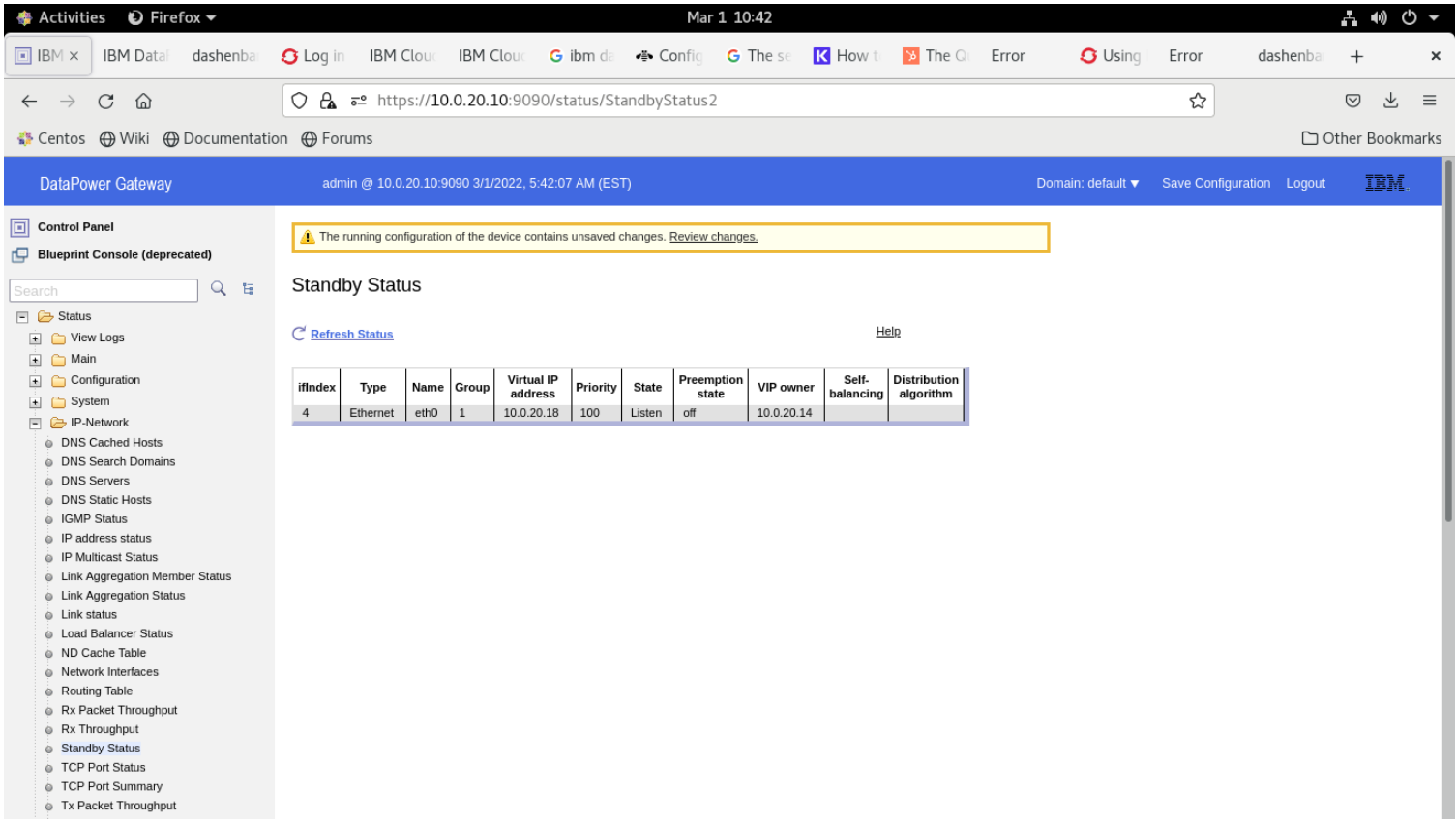


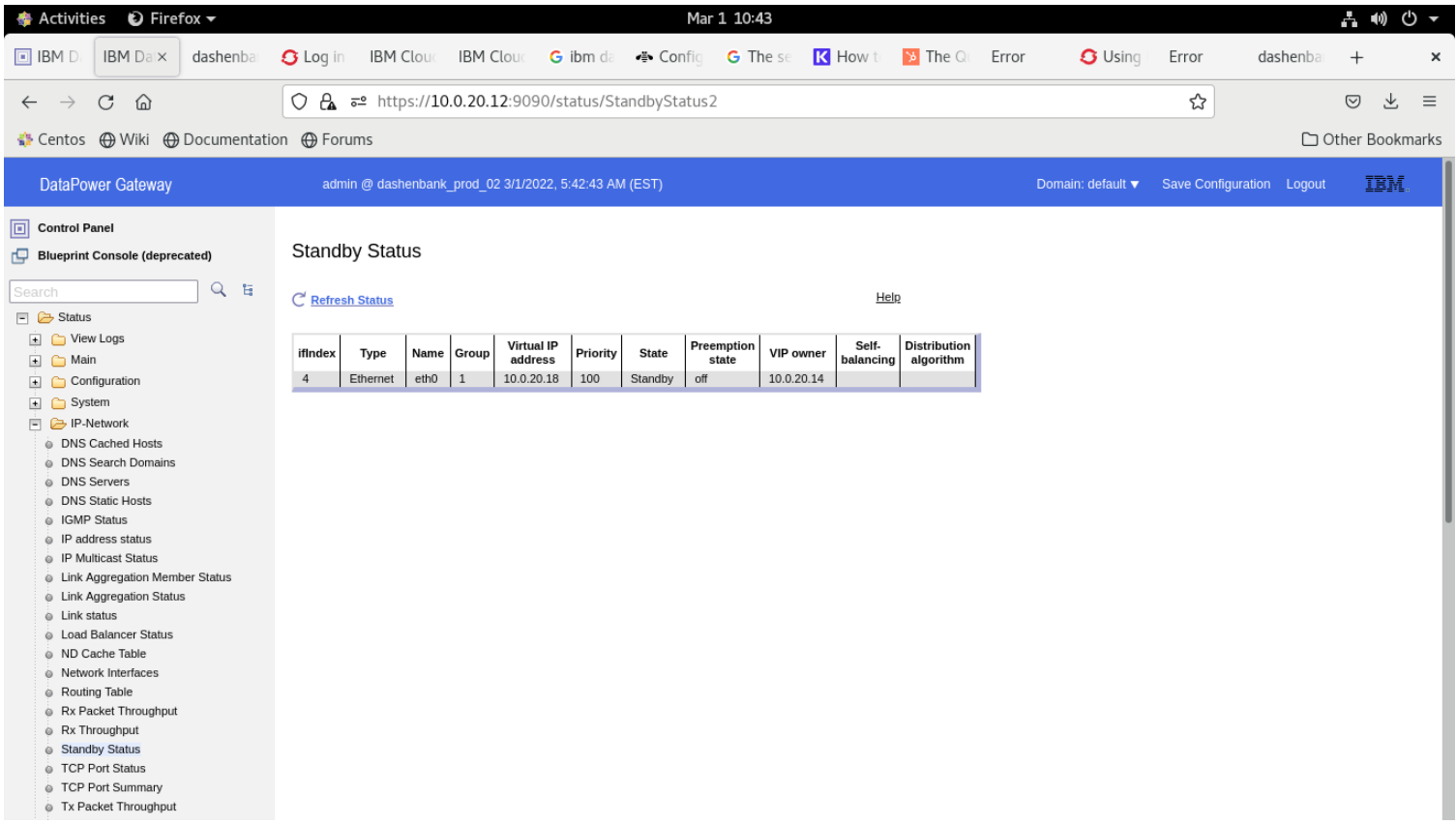
Step 5: Configure the virtual IP and set priority based on the performance of the nodes.

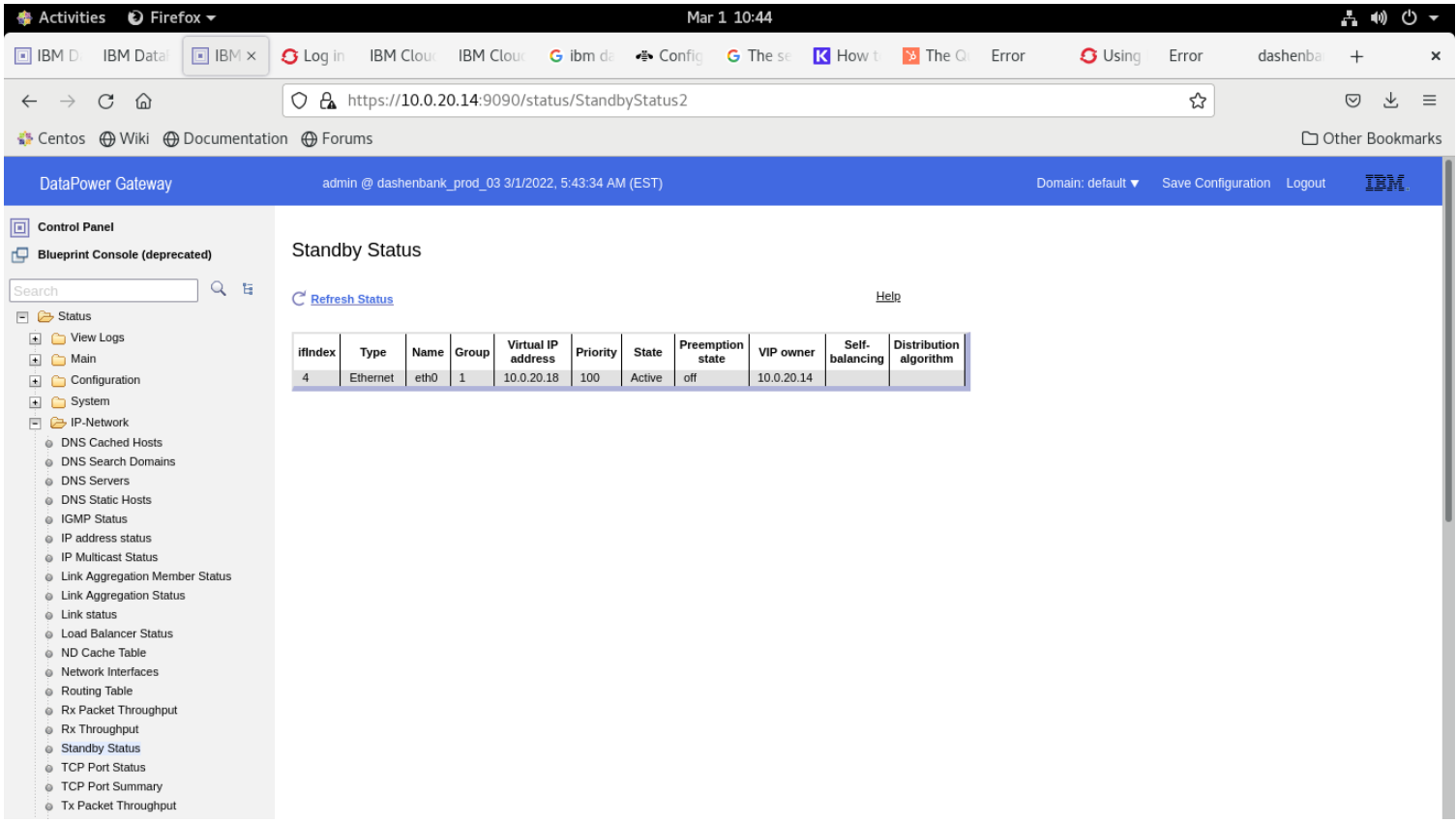
Step 6: Apply the changes and save the configuration.

NOTE: **Now, repeat the same procedure for the remaining 2 DataPower nodes and place the priority level accordingly.**

After configuring the remaining nodes, now navigate to the “standby status” and verify all the nodes.


Activities
Firefox
Mar 1 10:42
https://10.0.20.10:9090/status/StandbyStatus2
Centos
Wiki
Documentation
Forums
Other Bookmarks
DataPower Gateway
admin @ 10.0.20.10:9090 3/1/2022, 5:42:07 AM (EST)
Domain: default
Save Configuration
Logout
IBM
Control Panel
Blueprint Console (deprecated)
Search
Status
View Logs
Main
Configuration
System
IP-Network
DNS Cached Hosts
DNS Search Domains
DNS Servers
DNS Static Hosts
IGMP Status
IP address status
IP Multicast Status
Link Aggregation Member Status
Link Aggregation Status
Link status
Load Balancer Status
ND Cache Table
Network Interfaces
Routing Table
Rx Packet Throughput
Rx Throughput
Standby Status
TCP Port Status
TCP Port Summary
Tx Packet Throughput
The running configuration of the device contains unsaved changes. Review changes.
Standby Status
Refresh Status
Help
ifIndex
Type
Name
Group
Virtual IP address
Priority
State
Preemption state
VIP owner
Self-balancing
Distribution algorithm
4
Ethernet
eth0
1
10.0.20.18
100
Listen
off
10.0.20.14


Activities
Firefox
Mar 1 10:43
https://10.0.20.12:9090/status/StandbyStatus2
Centos
Wiki
Documentation
Forums
Other Bookmarks
DataPower Gateway
admin @ dashenbank_prod_02 3/1/2022, 5:42:43 AM (EST)
Domain: default
Save Configuration
Logout
IBM
Control Panel
Blueprint Console (deprecated)
Search
Status
View Logs
Main
Configuration
System
IP-Network
DNS Cached Hosts
DNS Search Domains
DNS Servers
DNS Static Hosts
IGMP Status
IP address status
IP Multicast Status
Link Aggregation Member Status
Link Aggregation Status
Link status
Load Balancer Status
ND Cache Table
Network Interfaces
Routing Table
Rx Packet Throughput
Rx Throughput
Standby Status
TCP Port Status
TCP Port Summary
Tx Packet Throughput
Standby Status
Refresh Status
Help
ifIndex
Type
Name
Group
Virtual IP address
Priority
State
Preemption state
VIP owner
Self-balancing
Distribution algorithm
4
Ethernet
eth0
1
10.0.20.18
100
Standby
off
10.0.20.14



16. Configuring DataPower API Gateway

- Configuring a gateway service with a single gateway server. The lowest-level configuration objects are created first, then used in other configuration objects.

- Adding gateways to configure a peering environment is similar to creating the first gateway, and is recommended for resiliency in a production environment.

- A minimum of three gateway servers in a gateway service is recommended for high availability. ●

See below link for more information about configuring additional gateways for peering.

> https://www.ibm.com/docs/en/datapower-gateway/10.0.x?topic=gateway-peering

16.1. Steps to Configure DataPower API Gateway:

1. Open the DataPower WebGUI interface.Most of the configuration procedure is done in the DataPower WebGUI interface, not in the Blueprint Console.

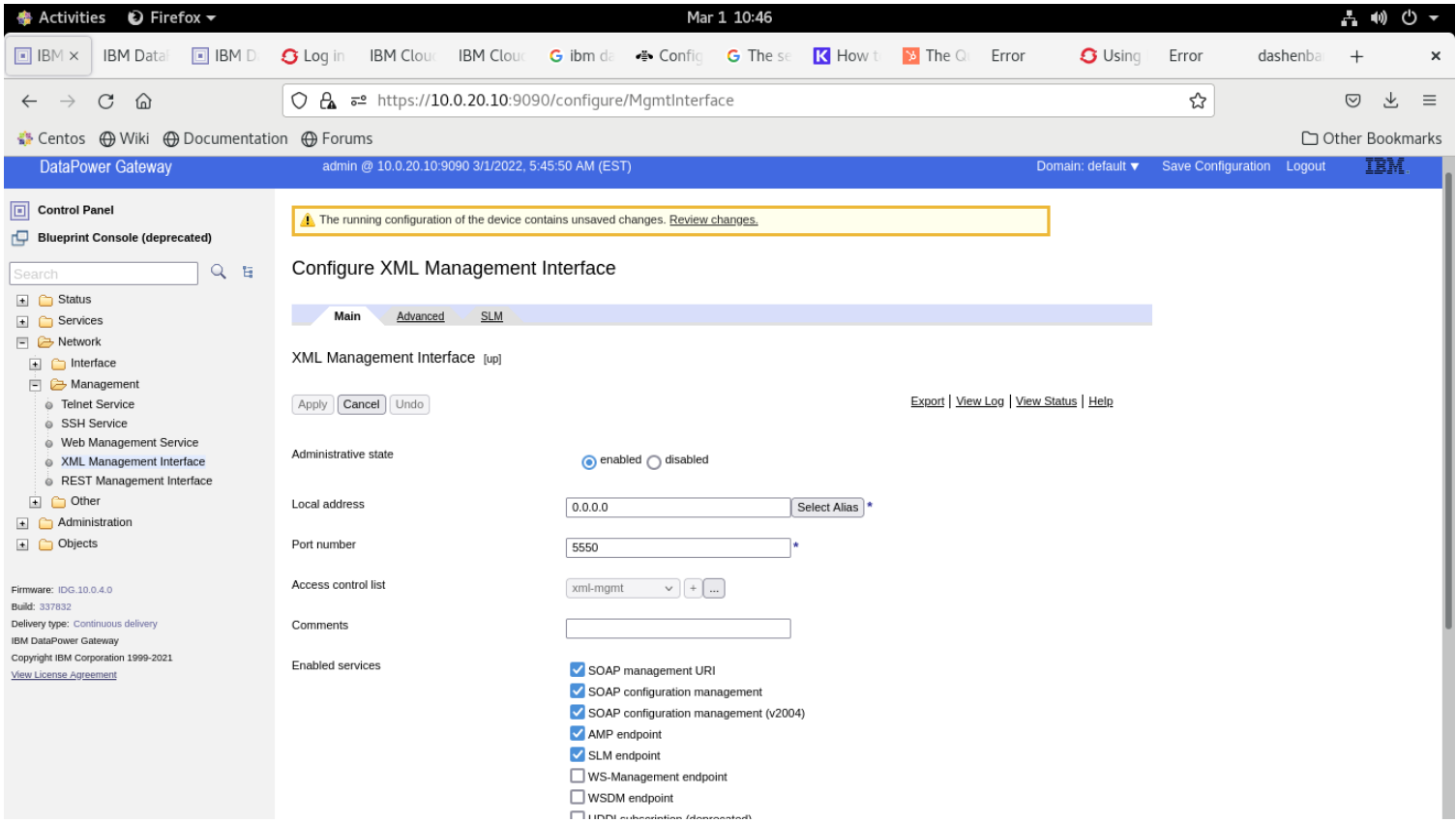
1. Enable the XML management interface in the default domain. The XML management interface is optional for DataPower API Gateway. If enabled, this interface allows you to send status and configuration requests to the DataPower appliance through a standard SOAP interface, using SOAP messages.
    a. Search for the XML management interface in the navigation search bar, and select it.

b. Set the Administrative state to enabled.

c. You can specify a different port number if you do not want to use the default of 5550.

d. Select Apply to make the changes

e. Save changes to the default domain by selecting Save Configuration.



2. Enable the REST management interface in the default domain. The REST management interface is required if you want to enable the Trace feature in the assembly Test tab in the API Manager.

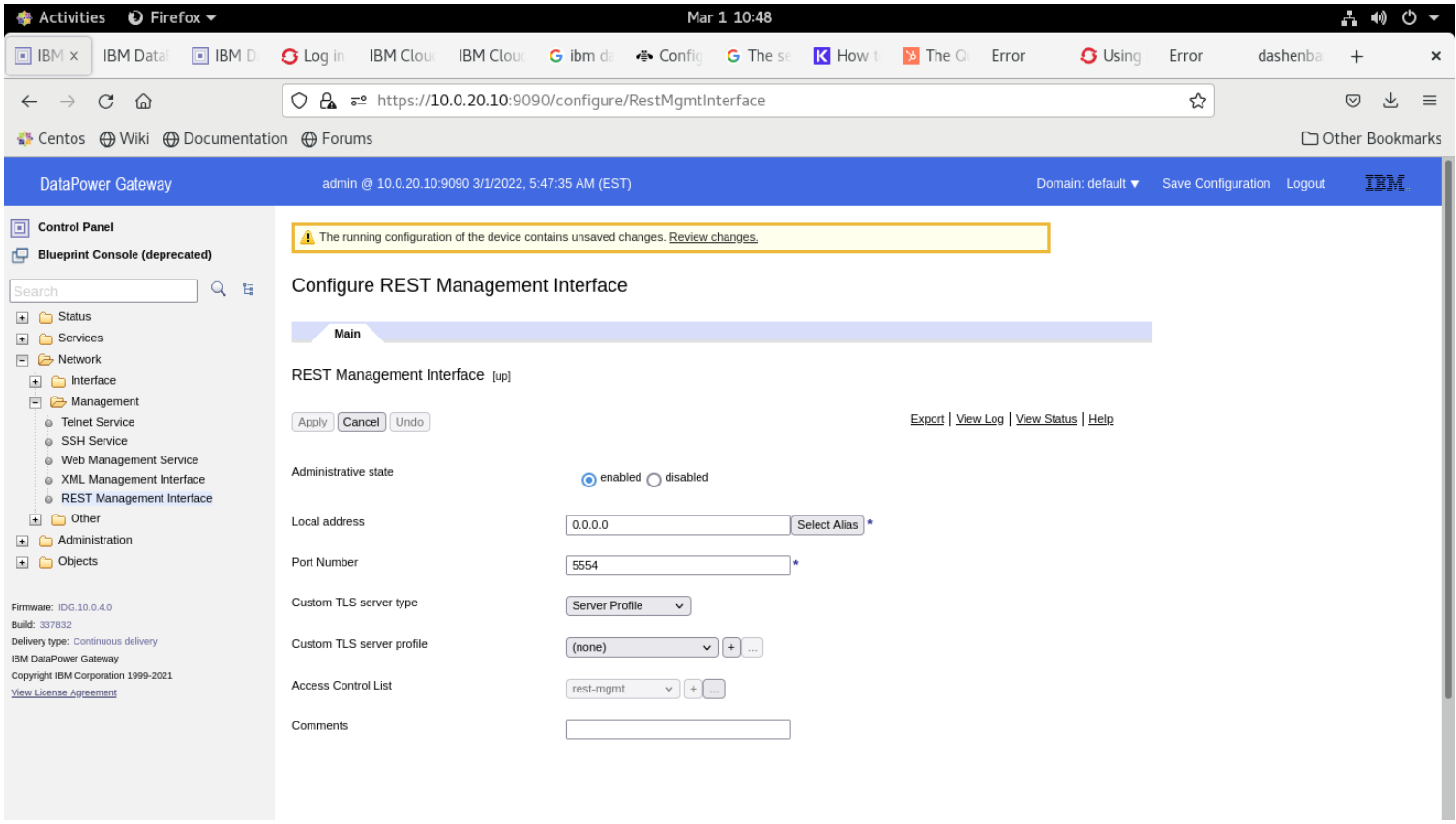
a. Search for the REST management interface in the navigation search bar, and select it.

b. Set the Administrative state to enabled.

c. You can specify a different port number if you do not want to use the default of 5554.

d. Select Apply to make the changes

e. Save changes to the default domain by selecting Save Configuration.



3. Create an application domain. This domain receives your traffic.

a. Search for Application domain in the navigation search bar, and select it.

b. Select Add to create the application domain.

c. Enter a unique name for your domain.

d. Ensure that enabled is selected for the Administrative state.

e. Ensure that the default domain is listed in the Visible application domain list.

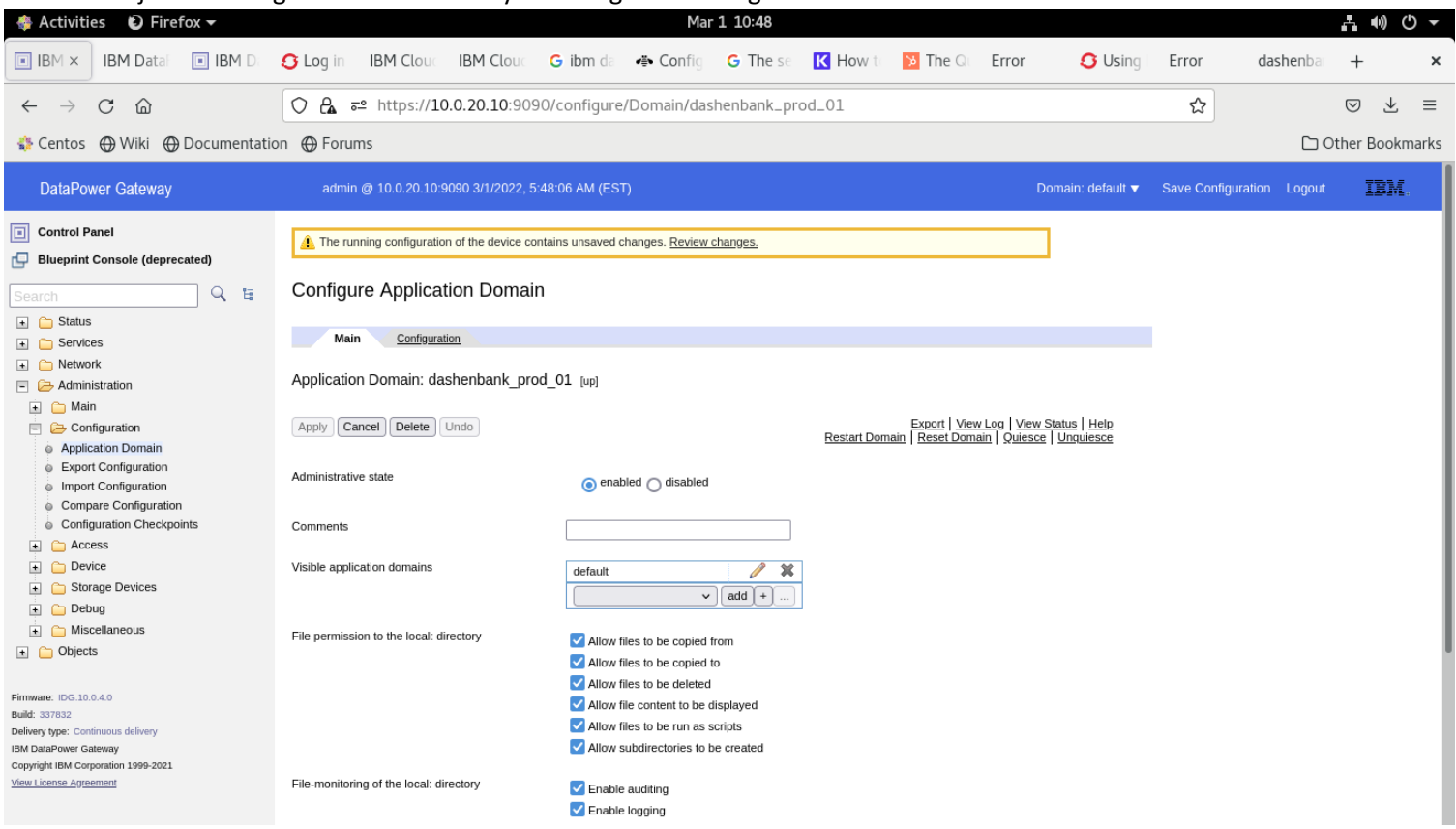
f. Select Apply.

g. Change to your new application domain by selecting Domain in the menu bar, and selecting the domain that you created.

h. Select Save changes and switch domains.

i. All of the remaining steps on the DataPower gateway must be done in the application domain that you created.

j. Save changes to the domain by selecting Save Configuration.



4. Ensure that your deployment includes an NTP server to synchronize time between each of the DataPower Gateways .

5. Ensure that you have set a unique System Identifier for each v10 DataPower gateway. 6.

Upload your private crypto key file to the domain.

a. Search for the Crypto key in the navigation search bar, and select it.

b. Select Add to create a key object.

c. Create a unique name for the key object in the Name field.

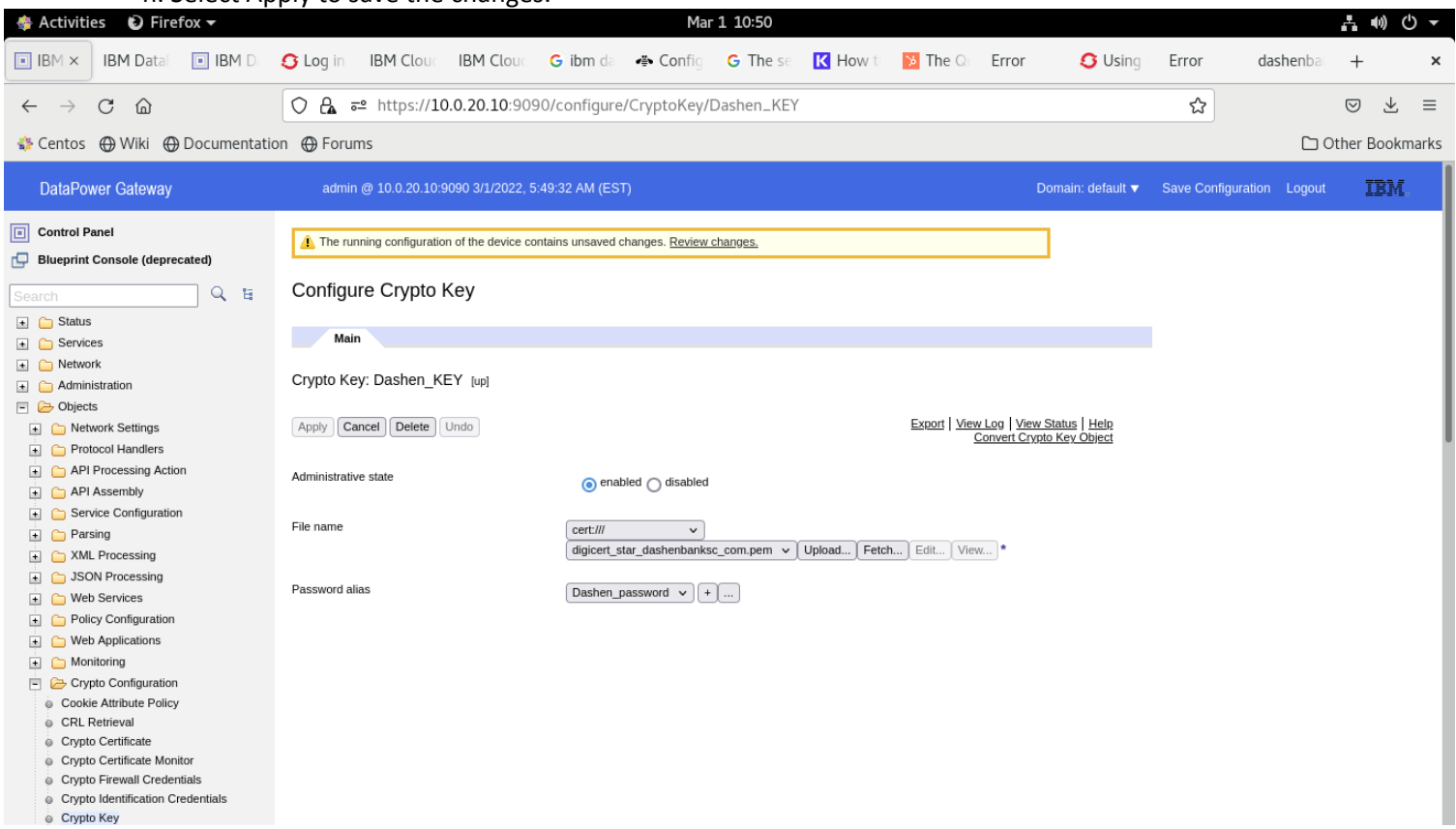
d. Select Upload.

e. Browse for the key file (which must be a .pem or .p12 file) and select it.

f. If you want to rename it, enter a new name for the file.

g. Select Upload to move it to the server in the cert:// folder.

h. Select Apply to save the changes.



7. Upload your crypto certificate file to the domain.

a. Search for a Crypto certificate in the navigation search bar, and select it.

b. Select Add to create a certificate object.

c. Create a unique name for the certificate object in the Name field.

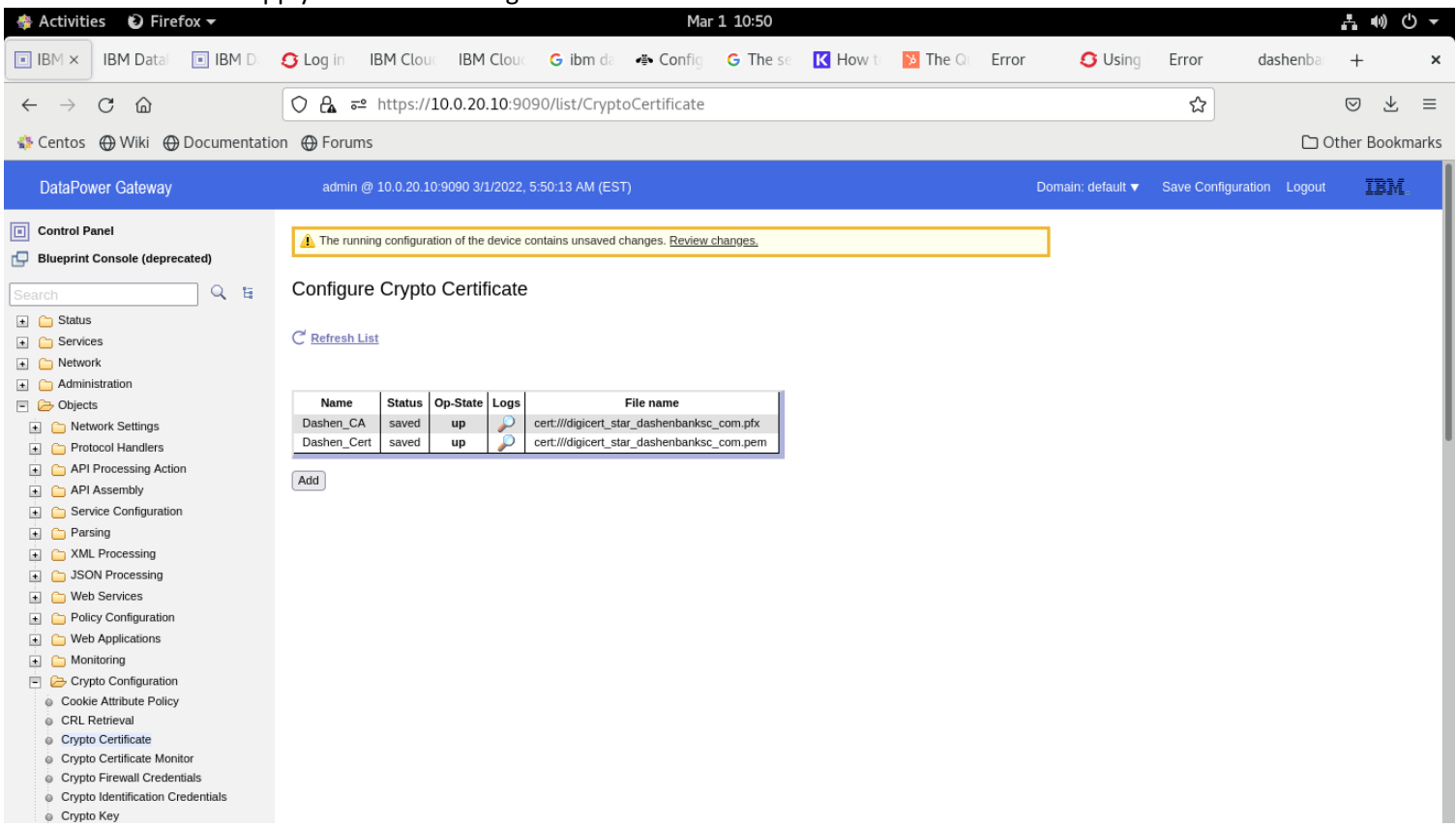
d. Select Upload....

e. Browse for the key file (which must be a .pem or .p12 file) and select it.

f. If you want to rename it, enter a new name for the file.

g. Select Upload to move it to the server in the cert:// folder.

h. Select Apply to save the changes.



8. Associate the Crypto key with the Crypto certificate by setting the Identification credential. a. Search for Crypto Identification Credentials in the navigation search bar, and select it. b. Select Add.

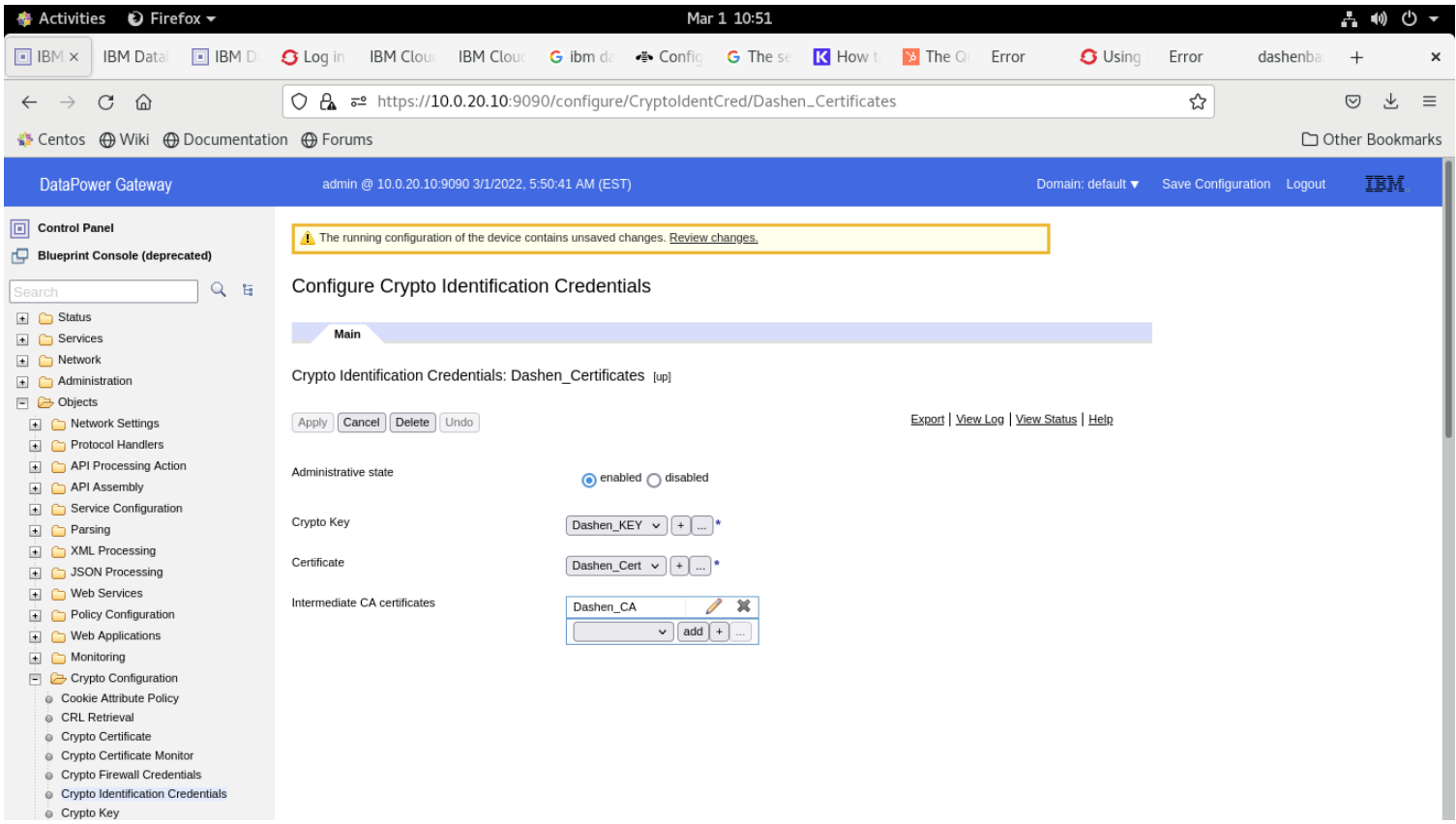
c. Enter a name for your credential.

d. Ensure that the Administrative state has a value of enabled.

e. In the Crypto Key field, select the name of the key object that you created from the drop-down menu.

f. In the Certificate object field, select the name of the certificate object that you created from the drop down menu.

g. Select Apply to commit your changes.



9. Create your TLS Client profile.

a. Search for TLS Client profile in the navigation search bar, and select it.

b. Select Add to create a client profile.

c. Create a unique name for the profile in the Name field.

d. Select your Identification credential from the drop-down list.

e. Ensure that the value of the Validate server certificate is set to off.

f. Ensure that the value of Use SNI is set to on.

g. Select Apply to save the changes.

10. Create your TLS Server profile.

a. Search for TLS Server Profile in the navigation search bar, and select it.

b. Select Add to create a server profile.

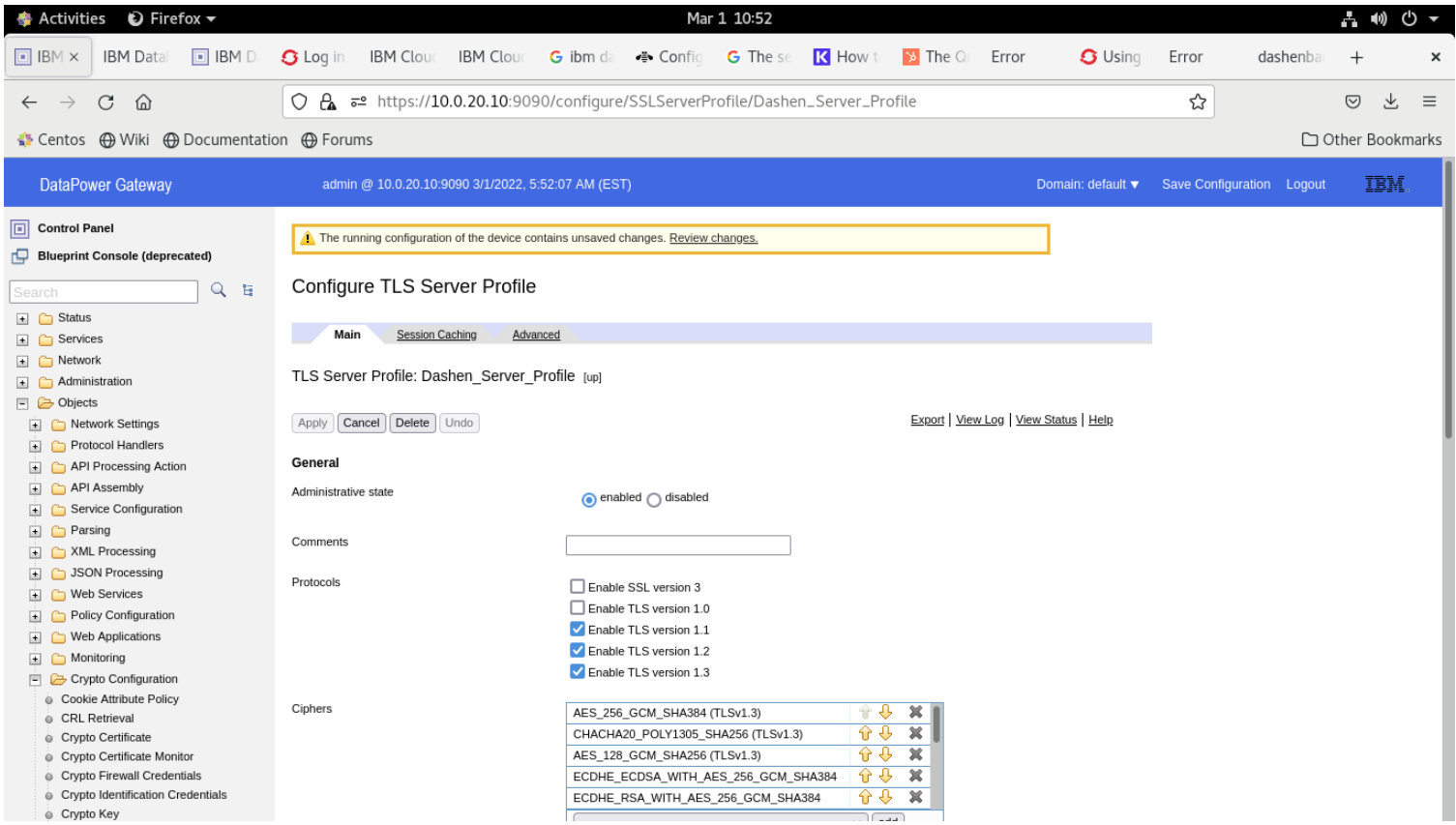
c. Create a unique name for the profile in the Name field.

d. Select your Identification credential from the drop-down list.

e. Ensure that the value of Request client authentication is set to off.

f. Disabling the request for client authentication for the TLS client profile and the validation of server certificates for the TLS server profile disables security for the ease of configuring the gateway. To enable the secure communication using mutual TLS between IBM API Connect and Gateway, see Binding a TLS server profile to a gateway service.

g. Select Apply to save the changes.



11. Configure your gateway peering object for the API Connect Gateway Service. This step is required when you set up a peer group of gateways, even if there is only a single gateway server in the gateway service.

a. Search for Gateway peering in the navigation search bar, and select it.

b. Select Add.

c. Enter a unique name for your gateway peering object.

d. Ensure that the Administrative state has a value of enabled.

e. Select a local address for the communications among the members of the peer group. f.

Select a local port for the communication. You can use the default value of 16380.

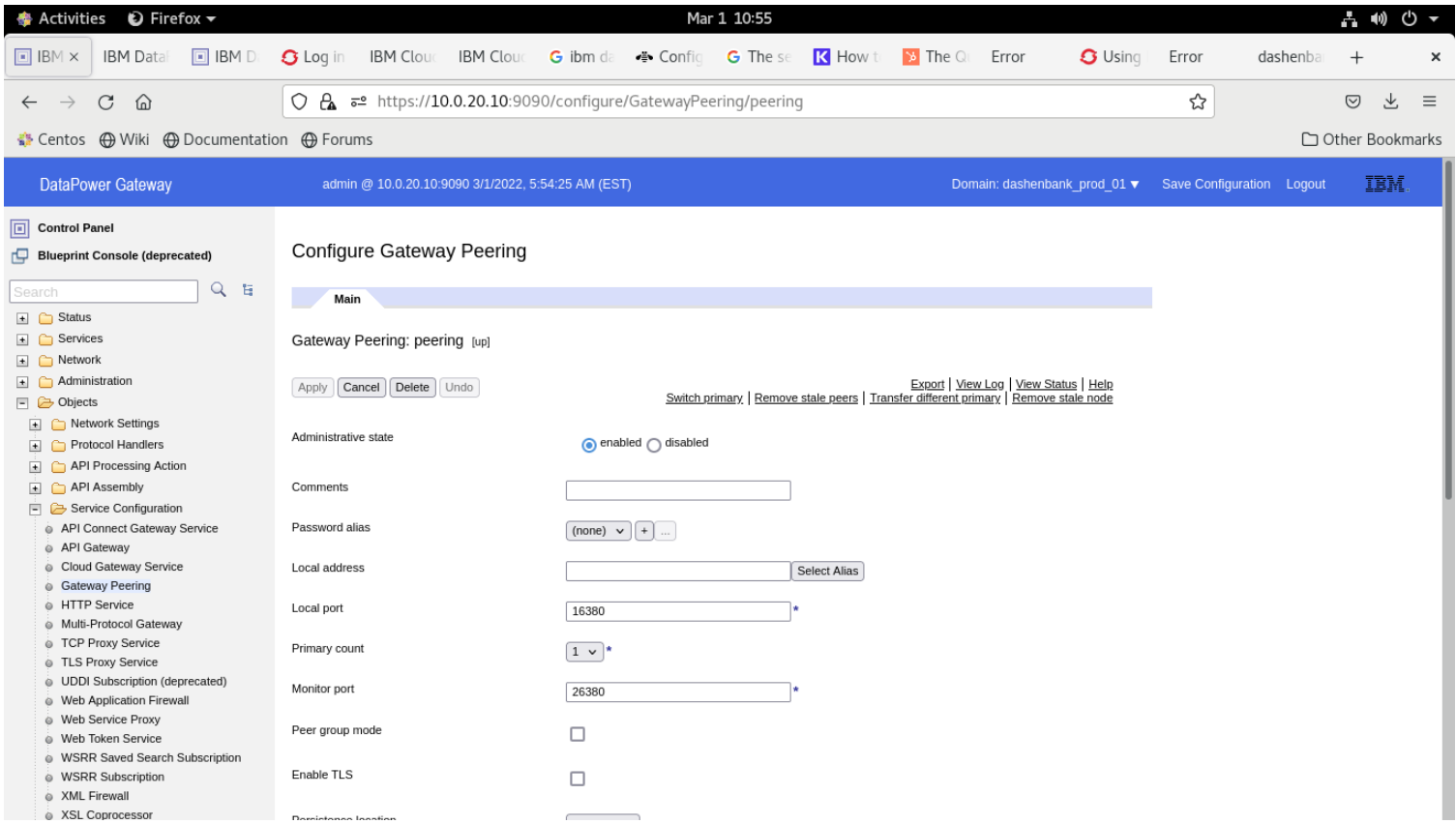
g. Select a monitor port for the communication. You can use the default value of 26380. h.

Because this procedure uses only one gateway, ensure that Peer group mode is not selected. i.

Clear the Enable TLS check box. TLS is not needed for a single peer.

j. Set the Persistence location value to Memory for either physical DataPower appliance or virtual DataPower appliance.

k. Select Apply to commit your changes.



12. Configure your gateway peering object for rate limit information.

a. Search for Gateway peering in the navigation search bar, and select it.

b. Select Add.

c. Enter a unique name for your gateway peering object.

d. Ensure that the Administrative state has a value of enabled.

e. Select a local address for the communications among the members of the peer group.

f. Select a local port for the communication. Use a unique port, different than the ports used for communication by other gateway peering objects.

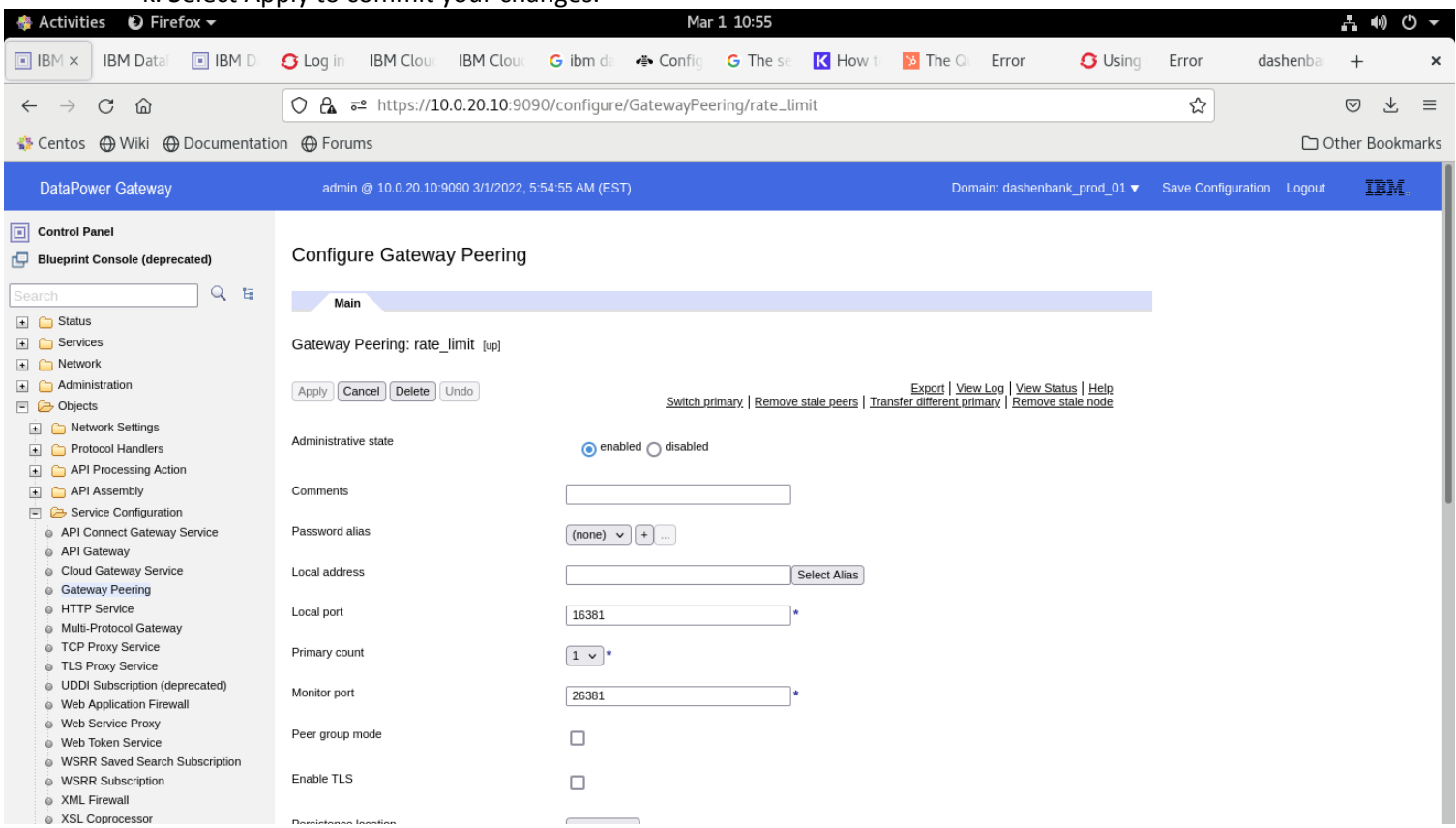
g. Select a monitor port for the communication. Use a unique port, different than the ports used for monitoring by other gateway peering objects.

h. Because this procedure uses only one gateway, ensure that Peer group mode is not selected. i.

Clear the Enable TLS check box. TLS is not needed for a single peer.

j. Set the Persistence location value to Memory for either physical DataPower appliance or virtual DataPower appliance.

k. Select Apply to commit your changes.



13. Configure your gateway peering object for script rate limit information.

a. Search for Gateway peering in the navigation search bar, and select it.

b. Select Add.

c. Enter a unique name for your gateway peering object.

d. Ensure that the Administrative state has a value of enabled.

e. Select a local address for the communications among the members of the peer group.

f. Select a local port for the communication. Use a unique port, different from the ports used for

communication by other gateway peering objects.

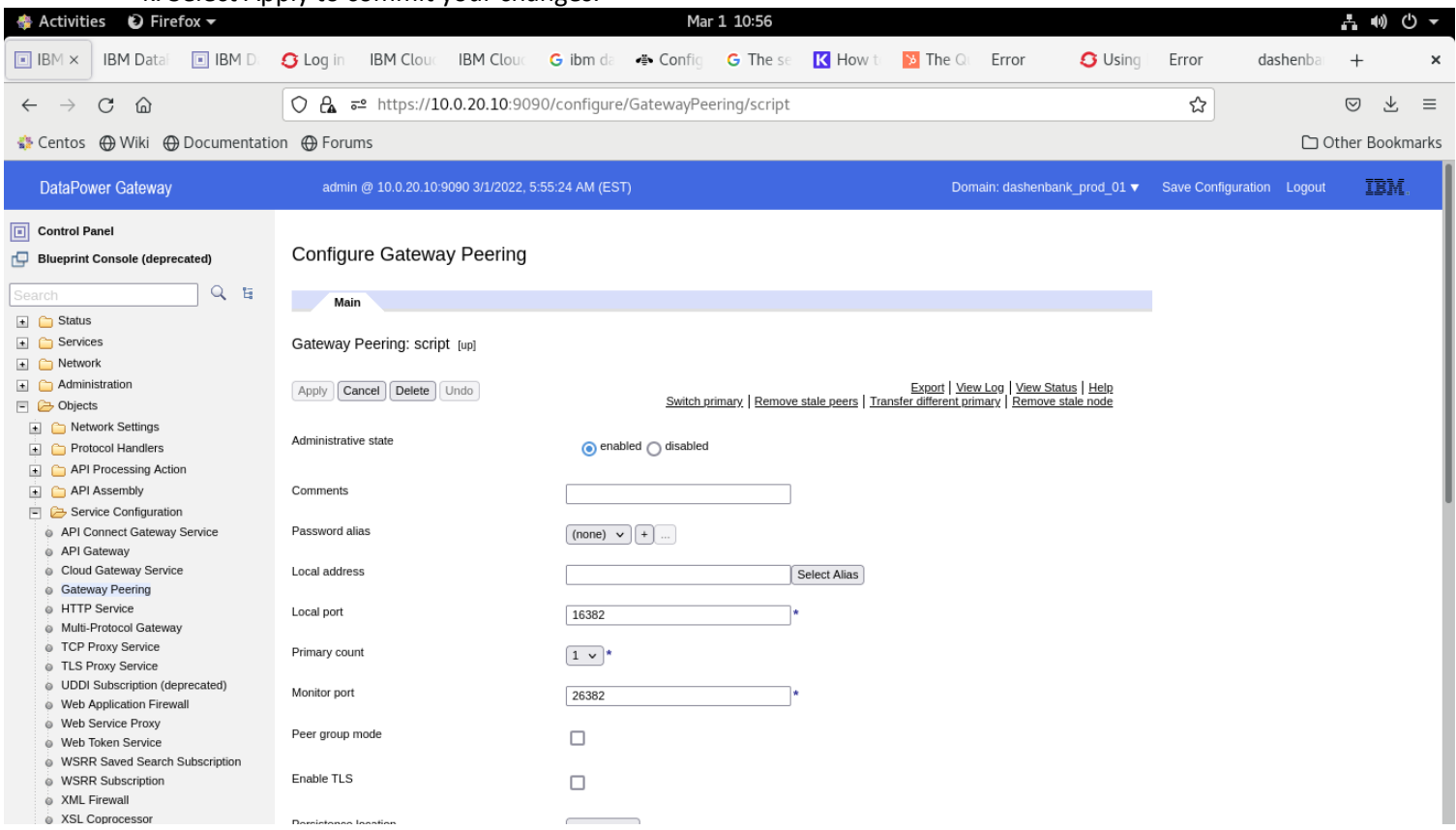
g. Select a monitor port for the communication. Use a unique port, different from the ports used for monitoring by other gateway peering objects.

h. Because this procedure uses only one gateway, ensure that Peer group mode is not selected. i.

Clear the Enable TLS check box. TLS is not needed for a single peer.

j. Set the Persistence location value to Memory for either physical DataPower appliance or virtual DataPower appliance.

k. Select Apply to commit your changes.



14. Configure your gateway peering object for subscription information.

a. Search for Gateway peering in the navigation search bar, and select it.

b. Select Add.

c. Enter a unique name for your gateway peering object.

d. Ensure that the Administrative state has a value of enabled.

e. Select a local address for the communications among the members of the peer group.

f. Select a local port for the communication. Use a unique port, different than the ports used for communication by other gateway peering objects.

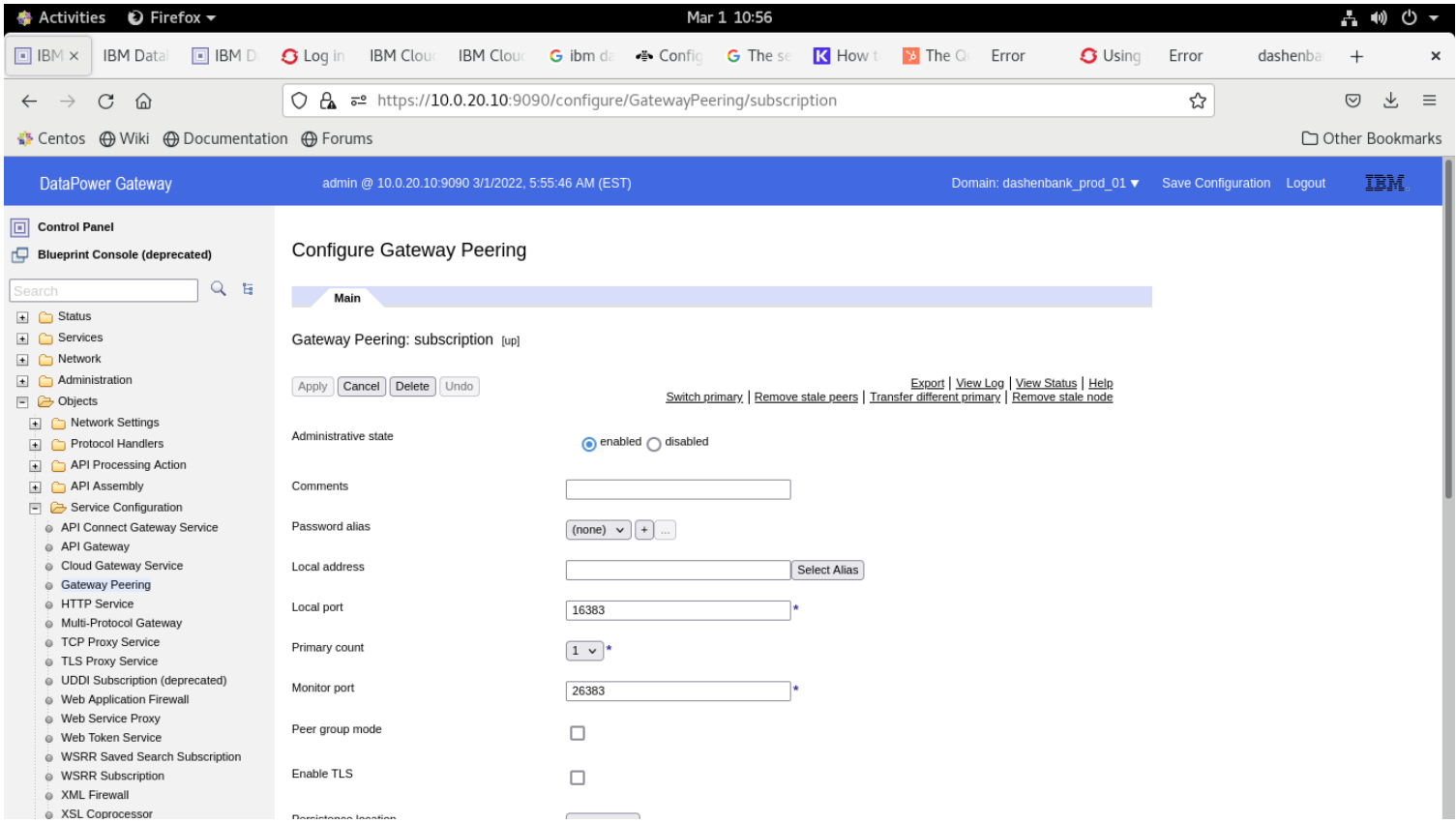
g. Select a monitor port for the communication. Use a unique port, different than the ports used for monitoring by other gateway peering objects.

h. Because this procedure uses only one gateway, ensure that Peer group mode is not selected. i.

Clear the Enable TLS check box. TLS is not needed for a single peer.

j. Set the Persistence location value to Memory for either physical DataPower appliance or virtual DataPower appliance.

k. Select Apply to commit your changes.



15. Configure the gateway peering object for the API probe. In order for API Connect to receive trace data in the Test tab's debugger, the DataPower API Gateway must be configured to support the API probe.

a. Search for Gateway peering in the navigation search bar, and select it.

b. Select Add.

c. Enter a unique name for your gateway peering object.

d. Ensure that the Administrative state has a value of enabled.

e. Select a local address for the communications among the members of the peer group.

f. Select a local port for the communication. Use a unique port, different from the ports used for communication by other gateway peering objects.

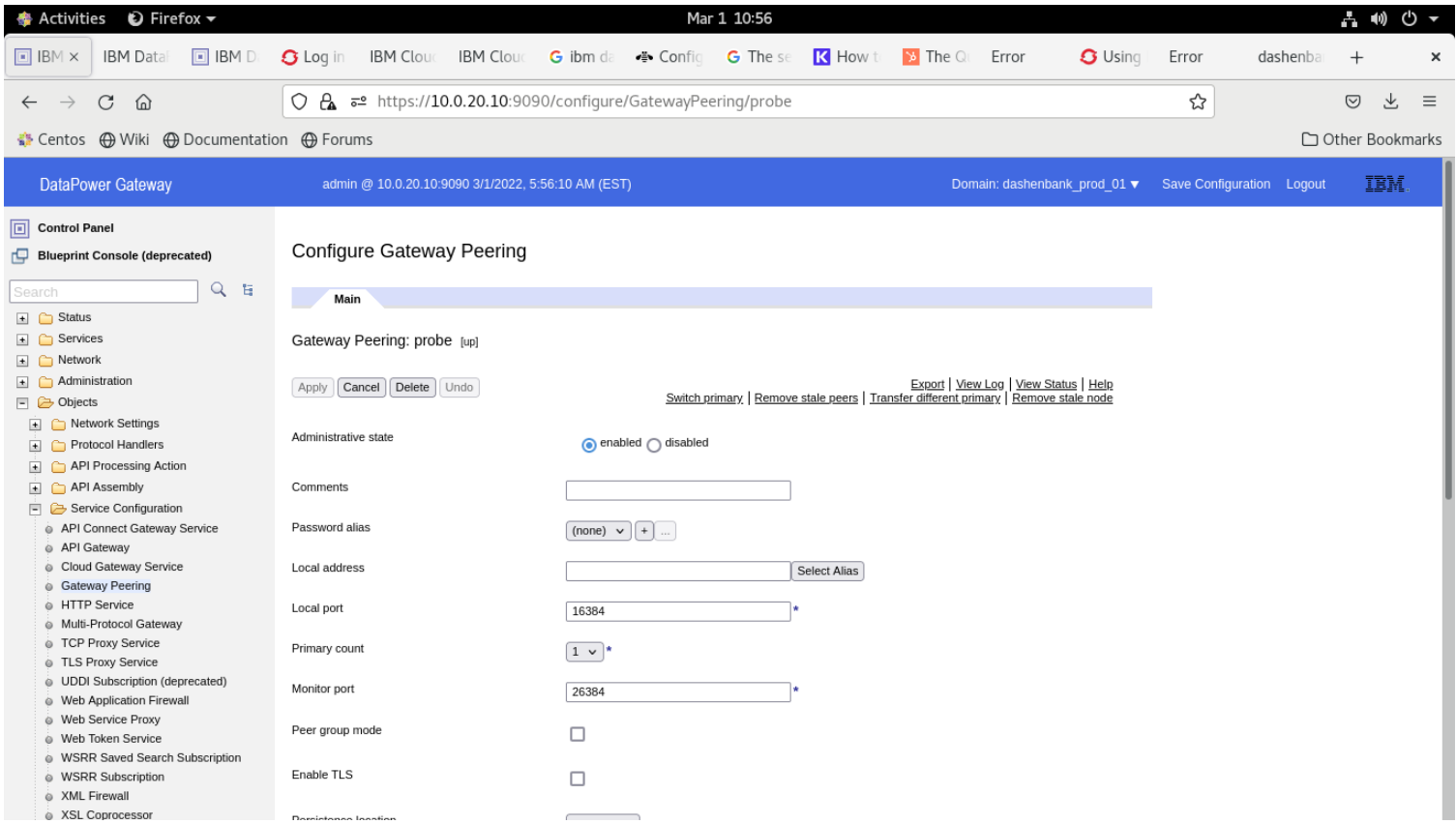
g. Select a monitor port for the communication. Use a unique port, different from the ports used for monitoring by other gateway peering objects.

h. Because this procedure uses only one gateway, ensure that Peer group mode is not selected. i.

Clear the Enable TLS check box. TLS is not needed for a single peer.

j. Set the Persistence location value to Memory for either physical DataPower appliance or virtual DataPower appliance.

k. Select Apply to commit your changes.



16. Configure the gateway peering manager.

a. Search for Gateway Peering Manager in the navigation search bar, and select it.

b. Set the Administrative state to enabled.

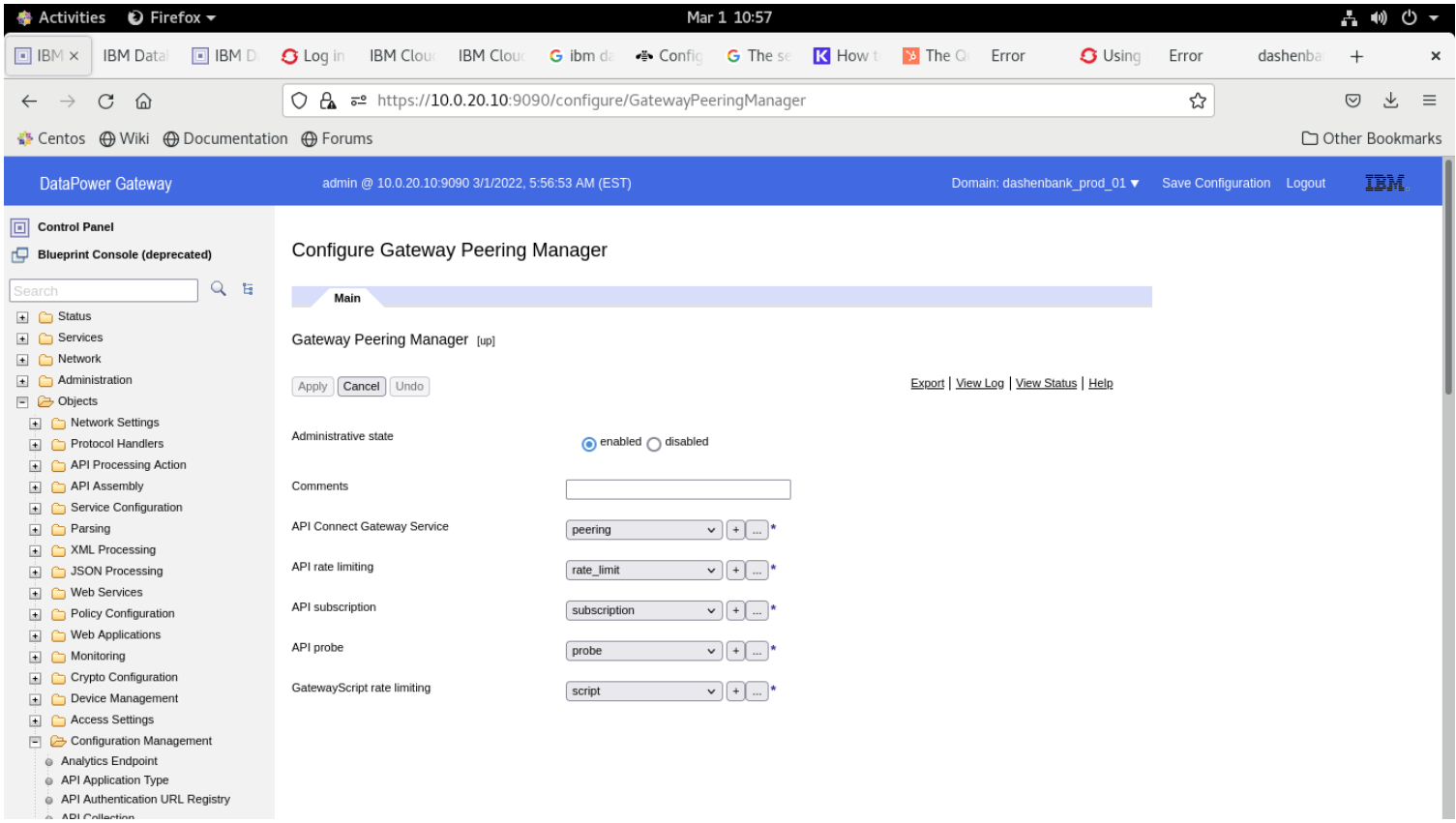
c. In the pull-down menu next to API Connect Gateway Service, select the gateway peering object configured for the API Connect Gateway Service.

d. In the pull-down menu next to Rate Limit, select the gateway peering object configured for rate limit information.

e. In the pull-down menu next to Subscription, select the gateway peering object configured for subscription.

f. In the pull-down menu next to API Probe, select the gateway peering object that you configured for the API probe.

g. Select Apply to commit your changes.



17. Configure the API probe settings object.

a. Search for API probe settings in the navigation search bar, and select it.

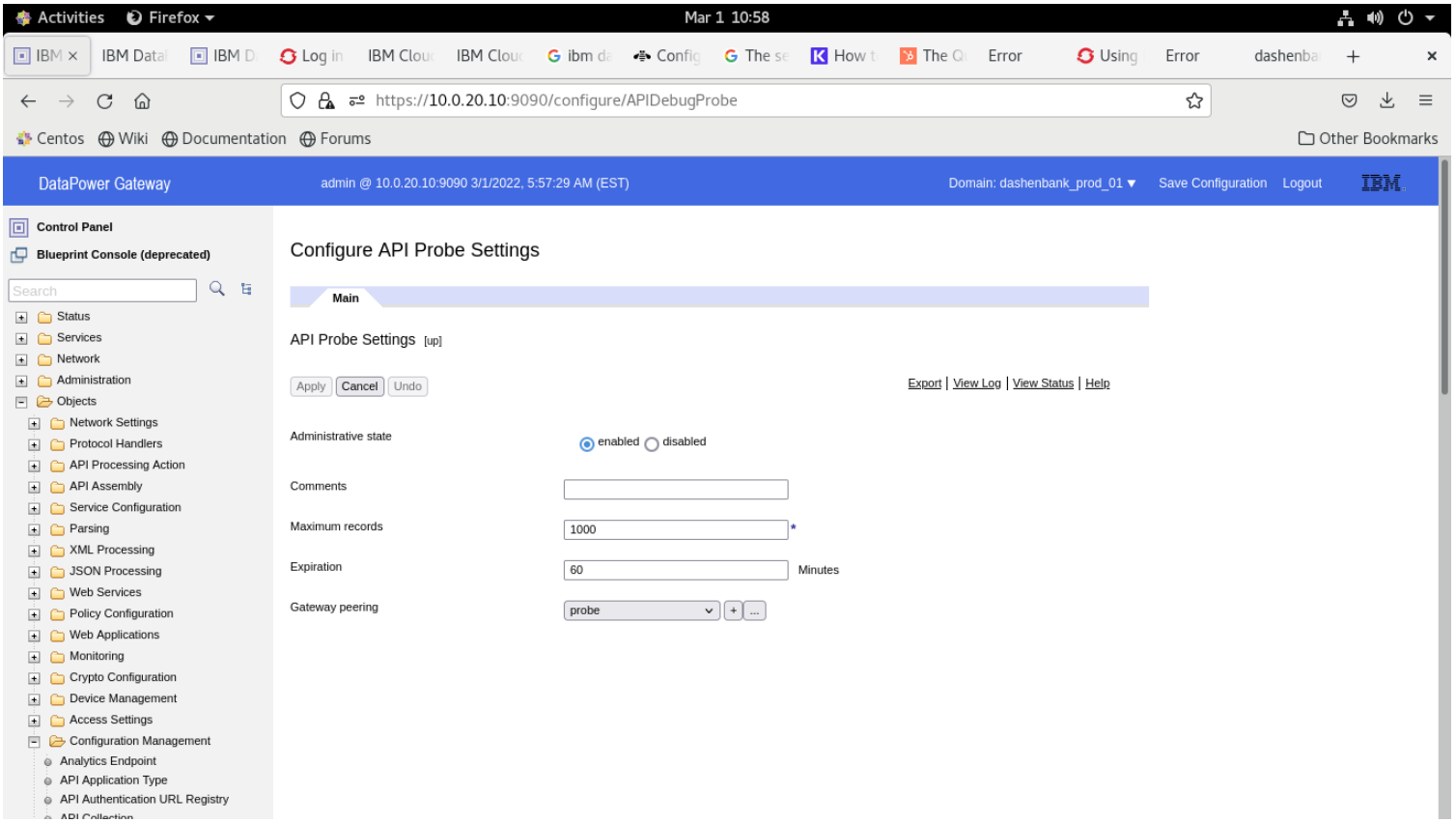
b. Set the Administrative state to enabled.

c. Set the maximum number of records to 1000.

d. Set the expiration to 60 minutes.

e. In the pull-down menu next to Gateway Peering, select the gateway peering object that you configured for the API probe.

f. Select Apply to commit your changes.



18. Set the API Connect Gateway service to define the communication interface with the API Connect Management server and for API transactions.

a. Search for API Connect Gateway service in the navigation search bar, and select it.

b. Ensure that the Administrative state is set to enabled.

c. In the Local address field, enter the IP address of the DataPower gateway to which you want the traffic from the API Connect Management server to be sent.

d. Specify a value for Local port. You can use the default value of 3000, or specify a different port value.

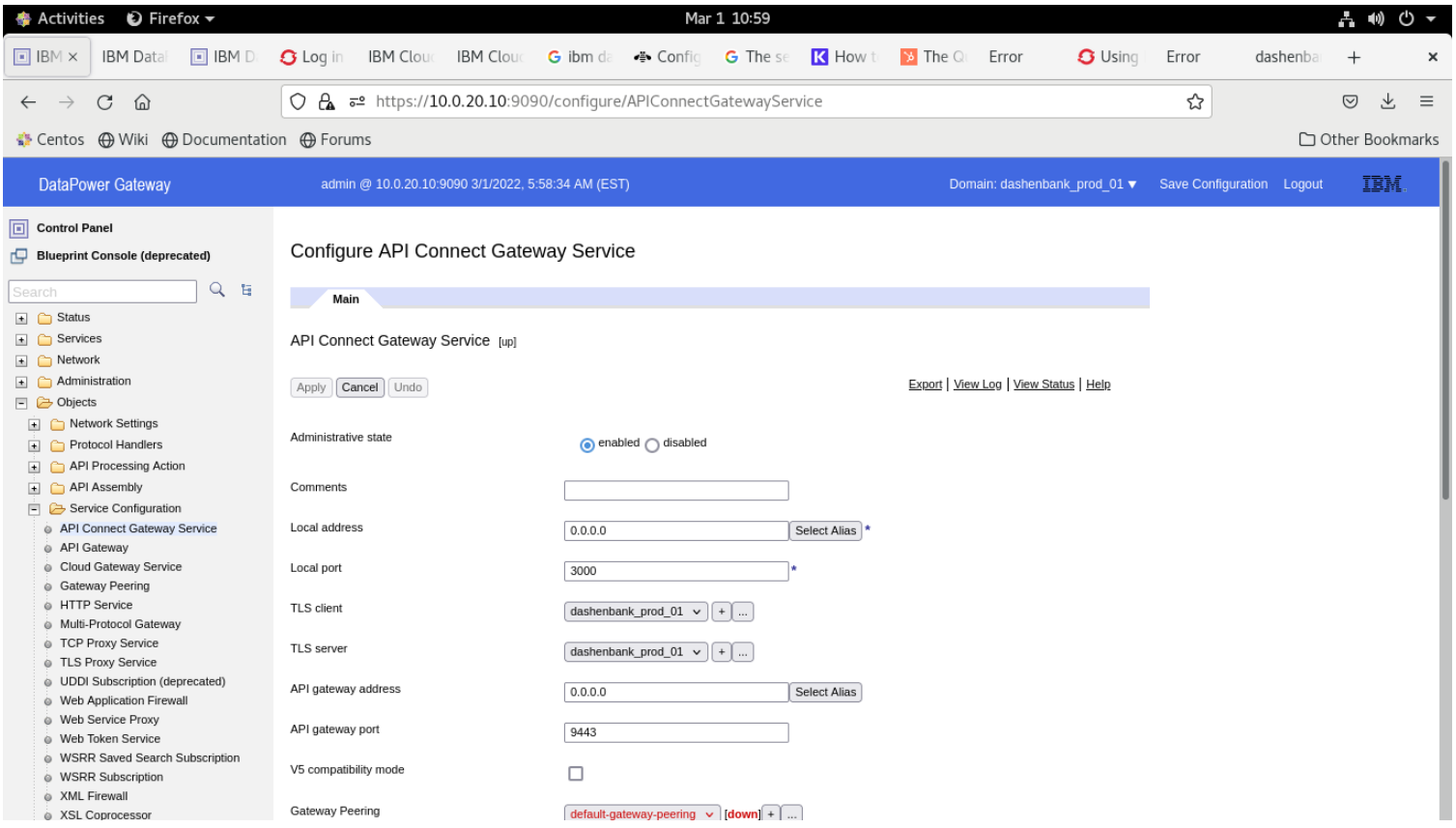
e. In the TLS client field drop-down list, select the name of the TLS client profile that you created.

f. In the TLS server field drop-down list, select the name of the TLS server profile that you created.

g. In the API gateway address field, enter the IP address for the DataPower gateway to which you want the API traffic sent.

h. Use the default port value of 9443 for the API gateway port. If the port is not being used by another service, you can also change it to port 443 if you want API transactions to be sent to the default port for HTTPS.

i. For DataPower API Gateway, set the Gateway Peering to (none). When no gateway peering object is configured for the DataPower API Gateway, the peering configuration defined in the Gateway Peering Manager configuration is used.



16.2. Register the gateway service in the API Connect Cloud Manager console:

a. Open the API Connect Cloud Manager console.

b. Navigate to Configure Topology.

a Select Register Service.

b Select DataPower API Gateway for the DataPower API Gateway.

c Add a title, name, and summary for the gateway connection.

d Enter the following values in the API Invocation Endpoint field:

IP address or host name of one of the gateways

https://10.0.20.18:9443/

e. Enter the one of the following values in the Management Endpoint field:

IP address or hostname of one of the gateways

https://10.0.20.18:3000/

f. Select the default TLS Client Profileg

Click the Save button.

Note : Configure Server Name Indication (SNI) profiles.SNI profiles allow different TLS certificates to be used for API transaction requests from different host names.