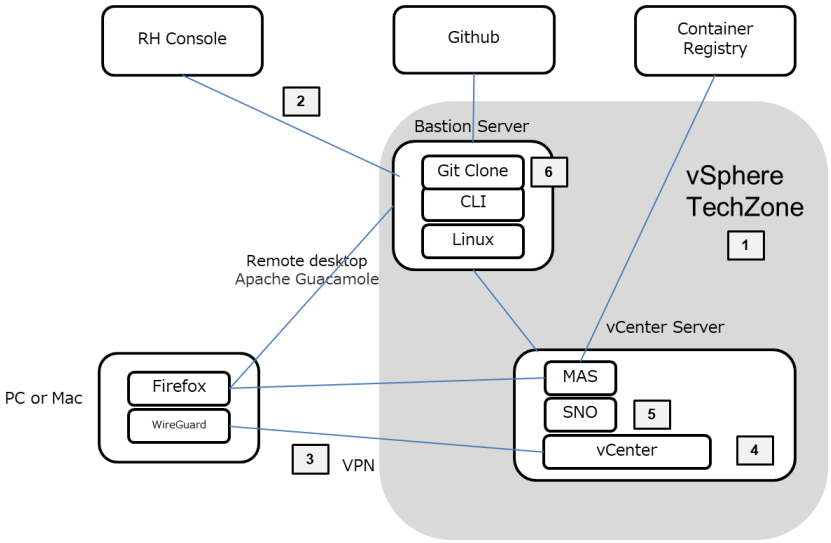
If you are an IBM Business Partner or an IBMer, this is a skinny but complete guide to create a MAS Manage environment in IBM TechZone.



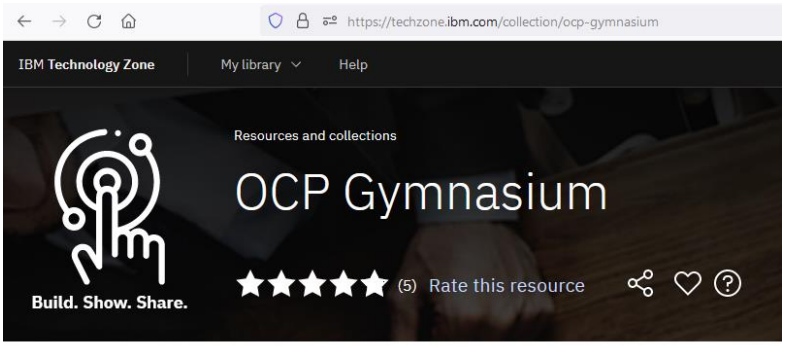
At high level, the following steps are going to be described in this guide:

1. How to create a vSphere-based environment in TechZone. This environment includes a Bastion Server and a Router with DHCP, NAT and DNS.
2. The creation of an SNO iso file using the Red Hat Console and its download into the Bastion Server
3. How to connect to the vSphere-based environment thru VPN
4. The upload of the SNO iso file from the Bastion Server into vCenter
5. How to create a VM instance that will run the SNO and use the uploaded iso file for booting
6. How to clone from GitHub the Ansible collection that will be use to install MAS and run it

Let's begin our journey.

Navigate to https://techzone.ibm.com/collection/ocp-gymnasium

Log into IBM and you should see:



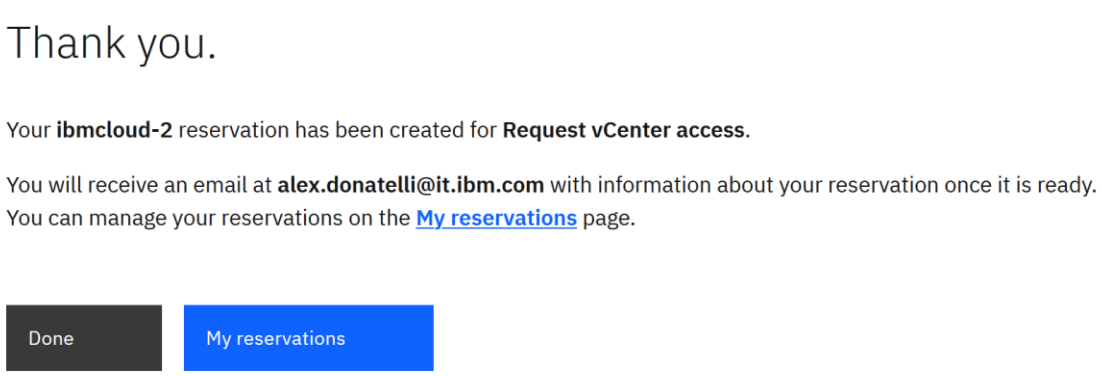
Scroll down till you see the environment section:

Click on the big Reserve button

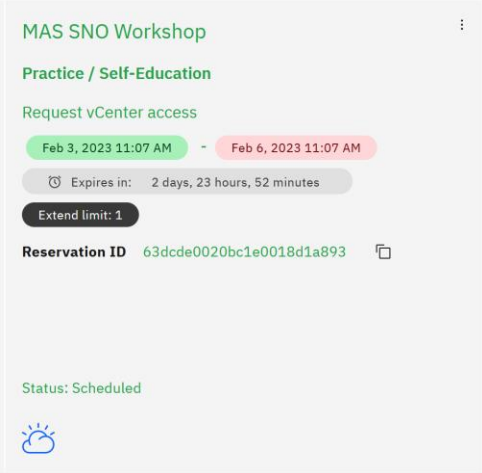
In the Create a Reservation page input:

Name: MAS SNO Workshop
Purpose: Practice / Self education
Purpose description: Educate myself how to install SNO and MAS
Preferred Geography: AMERICAS
VMware Datastore Size: 3 TB
VPN Access: Enable

Click Submit button, you will see this message:



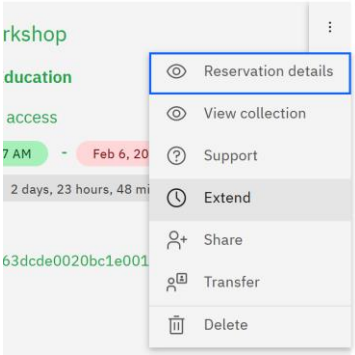
Click My reservations button. In the following screen you should see a tile like this:



You should also have received an email that “Your environment/access request is provisioning”

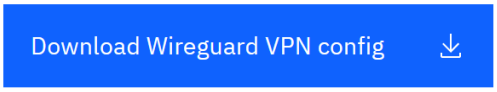
When the environment is ready, you will receive another email with subject “Your environment is ready”

If you want, you can extend the expiration using the 3 dots menu



The environment that is being create contains a Bastion computer (RHEL based) and a Router (pfSense based). When it will be available, you can VPN into it and directly access the computers running in it.

Setting up the VPN is very simple. When the environment will be ready, you can click on the tile and you will see a page with lots of useful information. At the bottom of that page, you will find the button to download the Wireguard VPN configuration:

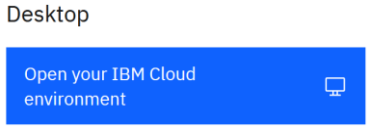


Download the configuration, install Wireguard (https://www.wireguard.com/install/) if you don’t have it already and import the configuration. You can activate the VPN as needed and access also the OpenShift cluster we are going to deploy.

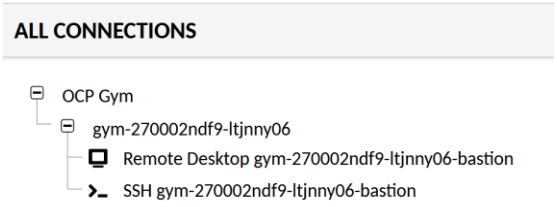
At this point we need to wait for the environment to actually become ready before continuing.

The next step is to use the Bastion computer that is part of the provisioned environment to prepare the OpenShift installation. Click on the reservation tile to open it.

At the top of the page you should see:



Click on the blue button, which will open a new browser window. Click on the + signs to expand the sections:



Click on the Remote Desktop option to open the Bastion remote desktop. The Bastion runs RHEL, therefore you can use the “Activities” button at the top left to open a tile and click on the Firefox icon.

Log into the Red Hat Console for OpenShift (https://console.redhat.com/openshift). You should see a blue “Create cluster” button. Click it.

In the following screen, click on the Datacenter tab, and click on the blue “Create cluster” button.

Fill the form that shows up in this way:

Cluster name: ocpgym
Base domain: gym.lan
OpenShift version: OCP 4.10.x
select “Install single node OpenShift (SNO)”
Hosts' network configuration: DHCP Only

Click the “Next” button. Don’t change anything in the next screen and click again “Next”.

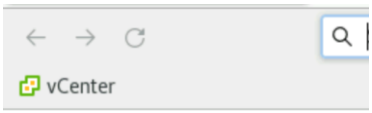
Click the “Add host” button.

In the dialog that will be shown, select “Full image file: Provision with physical media”, upload your SSH public key and click on the “Generate Discovery ISO” button.

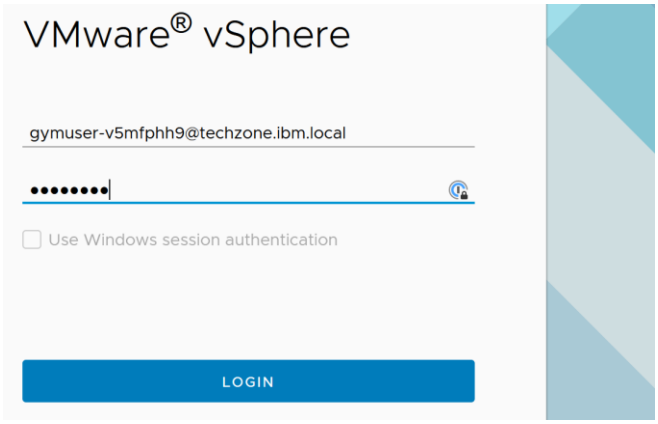
In the following dialog, click the “Download Discovery ISO” button and save the ISO file on the Bastion computer. It will have a filename like this: e430fdbb-8c63-4b42-b15f-62bd3d8fbef0-discovery.iso

Close the dialog. We’ll come back to this screen later, but now we want to upload the ISO into the TechZone vCenter.

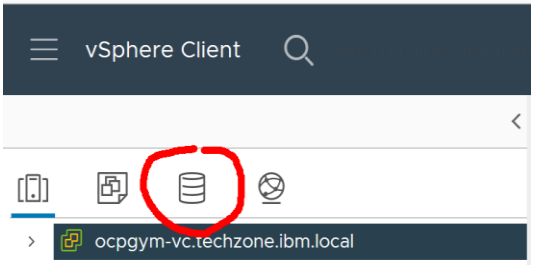
In the Firefox window, notice that there is a predefined button to access the vCenter.



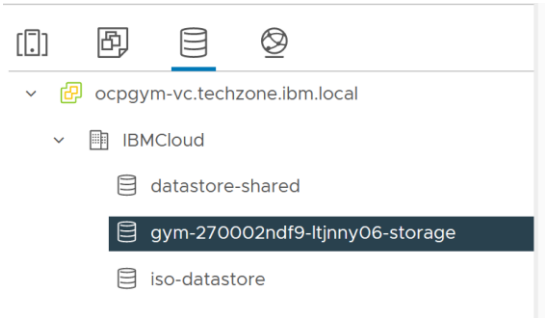
Click on that button. The credentials for accessing the vCenter should be pre-filled, but in cany case you can find them at the bottom of the reservation page.



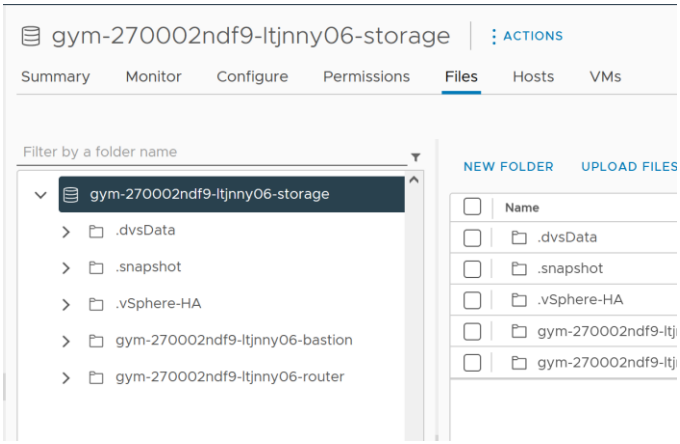
At the top left of the screen you should see a symbol of a drum disk. Click on it



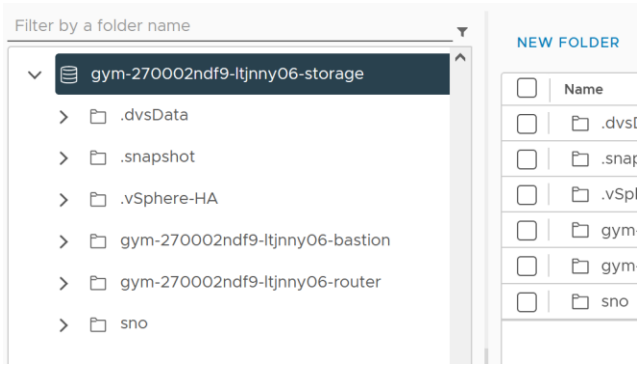
Open the pull down and select the storage with the name that start with “gym-“.



On the right side select “files”

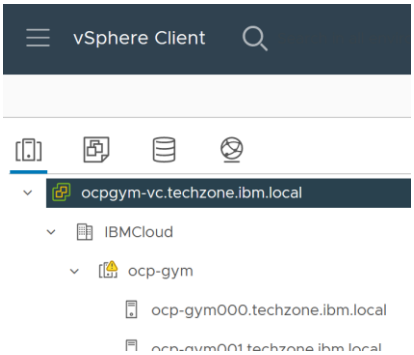


Create an iso folder called “sno” under the main storage element using the “NEW FOLDER” option also shown in the previous picture

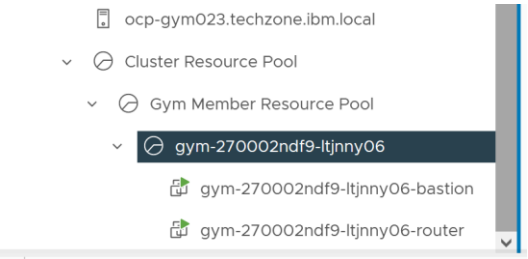


Click on the newly created “sno” folder and upload in it the ISO you downloaded from Red Hat using the “UPLOAD FILES” option. You can check the progress from the status window behind the sections we just used

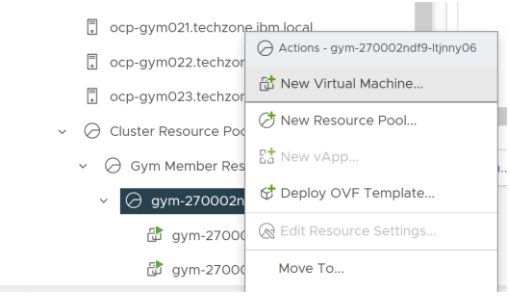
When the ISO has uploaded, we create a new VM that will become the Single Node OpenShift. Click on the servers icon at the top left of the screen and open all the sections



Scroll to the bottom and click on the resource pool where the bastion and the router are also contained.

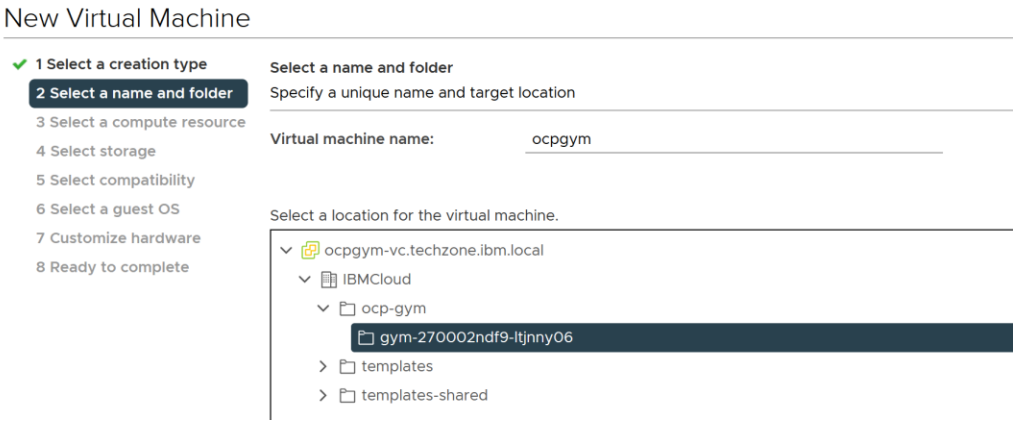


Right click on the resource pool highlighted and chose “New Virtual Machine…”

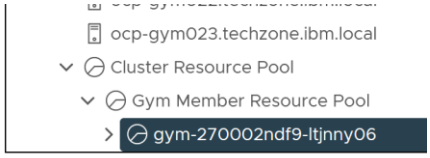


In the dialog that will be shown, select “Create a new virtual machine” and click Next

Set the virtual machine name as “ocpgym” and select the folder shown in the following picture (the one starting with gym-…)



Click Next. Select the compute resource starting with gym-…

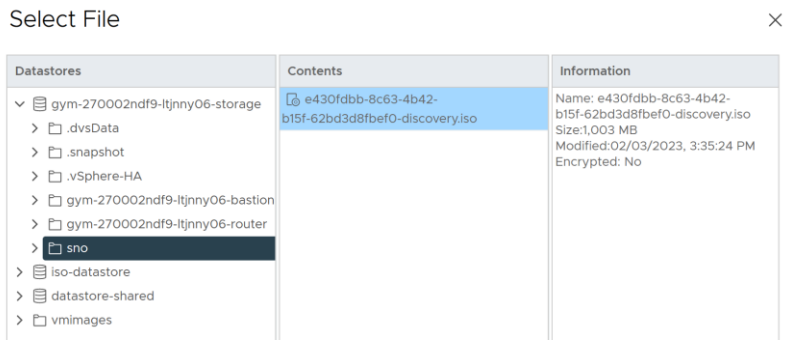


Click Next. Select the storage starting with gym-…

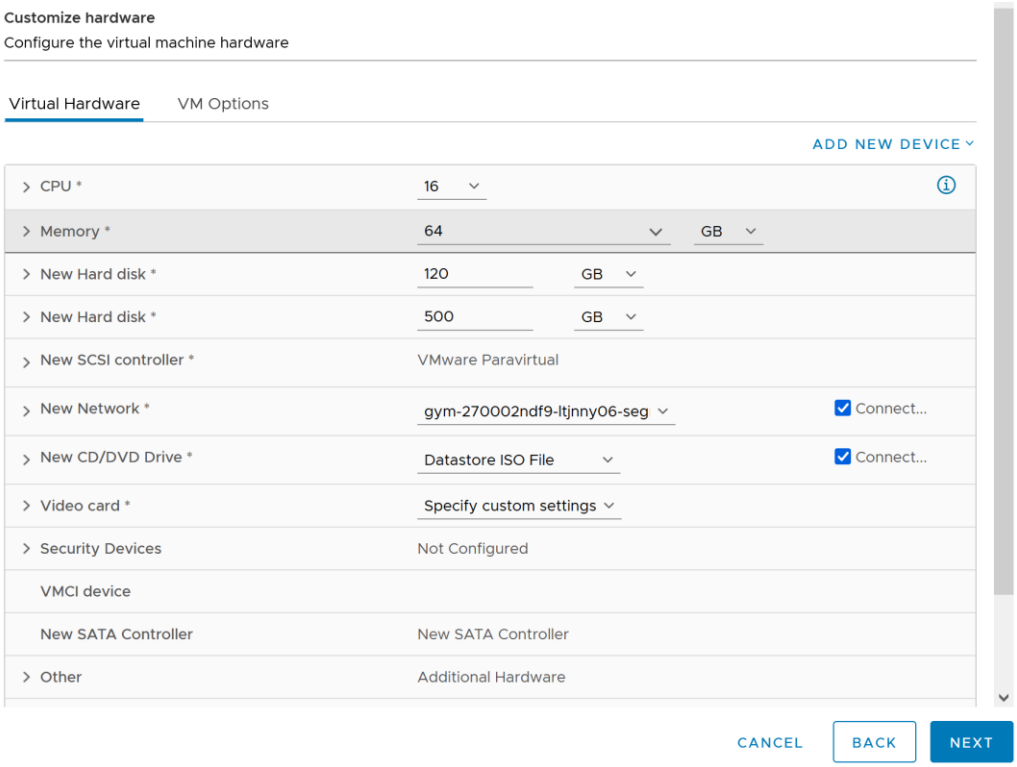
Click Next. Select compatibility ESXi 7.0 U2 and later.

Click Next. Select Guest OS Family Linux and Version RHEL 8 64 bit

In the next panel set CPU to 16, memory to 64, primary disk 120 GB, use the “ADD NEW DEVICE” to add a secondary Hard Disk of 500 GB, set the New CD/DVD Drive to “Datastore ISO File” and select the ISO you uploaded before.

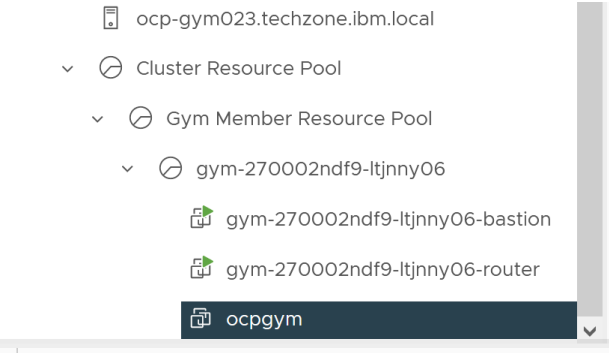


Make sure to select the “Connect” checkmark. The final result should look like the following picture.

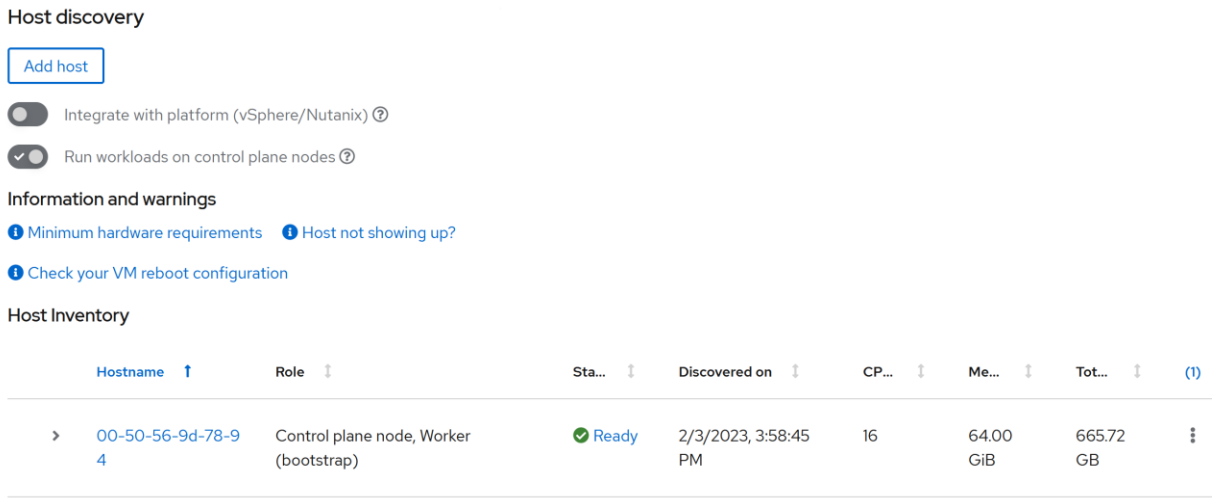


Click Next. Review one more time everything and click Finish

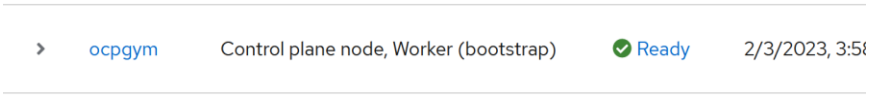
The new VM should now show in your pool under the bastion and the router. Select it by click on it and start it by either typing crtl+alt+b or by right clicking and using the Power->Power ON menu item.



Switch back to the RH Window

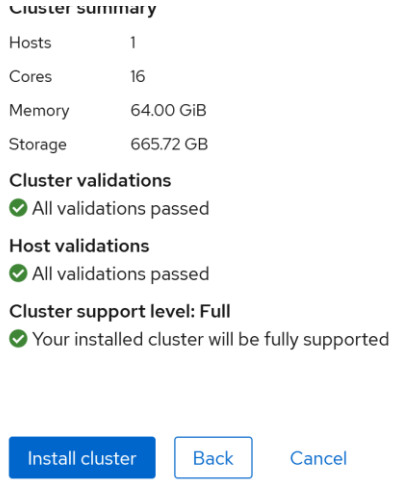


You should see a host appeared. Change its hostname to “ocpgym”. The line should look like this:

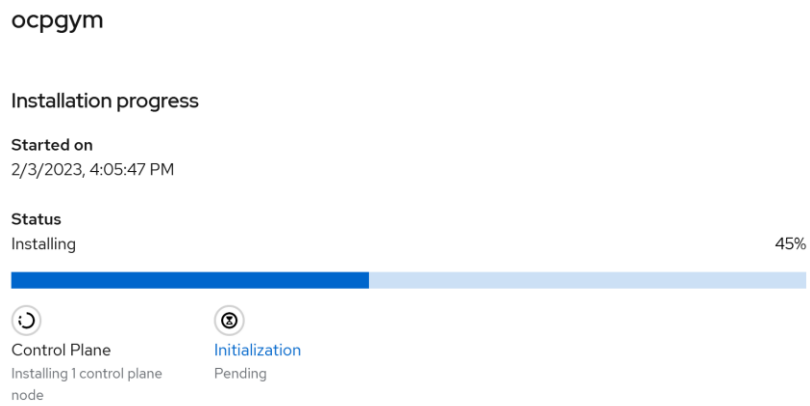


Click Next. In the Storage screen click Next. In the Networking screen don’t change anything and click Next. Some times it takes a bit of time to get to a “Ready” state, due to NTP to be unreachable. Don’t worry, be patient and wait for the state to become ready and then click next.

In the “Review and create” all the validations should be good and you can click the “Install Cluster” button.

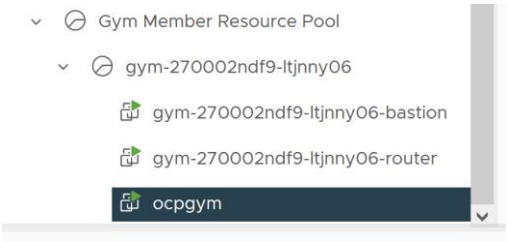


The next screen will allow you to follow the cluster installation till its end. It will take around 45 min to complete.



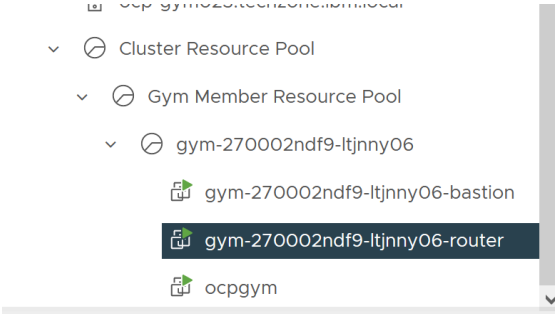
You can follow the details of the progress by using the “View Cluster Events” button at the bottom of the page.

While we are waiting for the SNO to be installed, let’s configure the router. Go back to the vCenter panel and click on the “ocpgym” VM

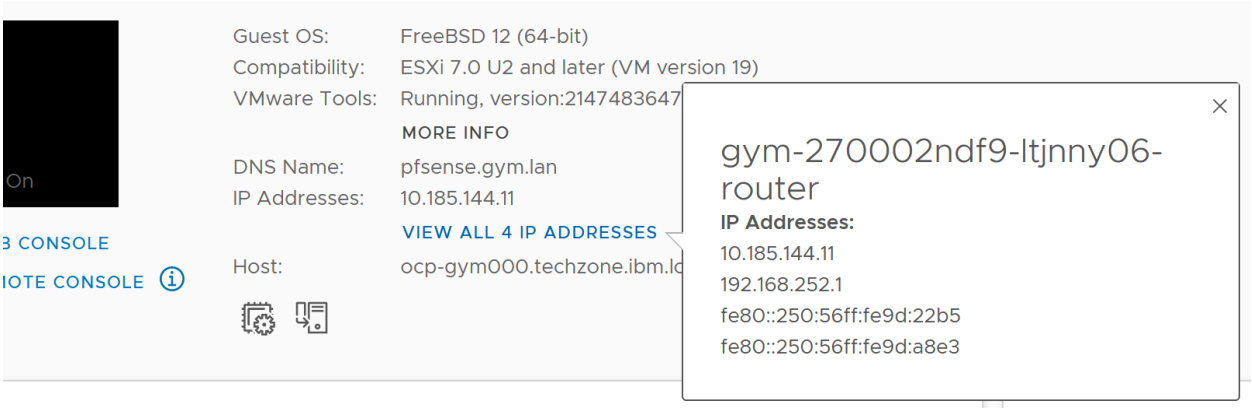


On the right panel that will be shown, note the IP address of the VM:

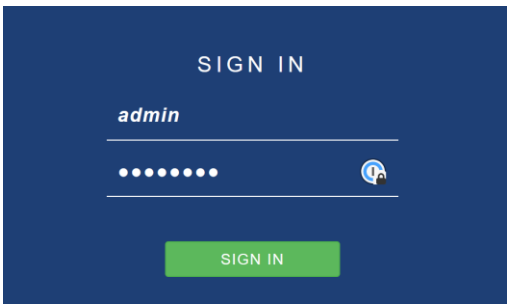
In this case the IP address is 192.168.252.104. Then click on the router VM in the left panel.



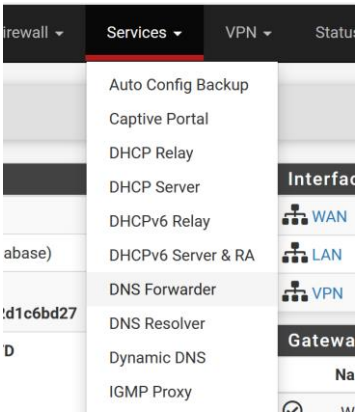
On the right panel that will be shown, click on the “VIEW ALL 4 IP ADDRESSES” and pick the one from the 192.168.252.x subnet.



In this case it's 192.168.252.1. Open a new browser window and navigate to that address. You should see the pfsense login panel. Use "admin" as username and the vCenter password you used before to login to vCenter (which is in the Reservation page).



At the top, use the "Services" pull down and chose "DNS Forwarder"

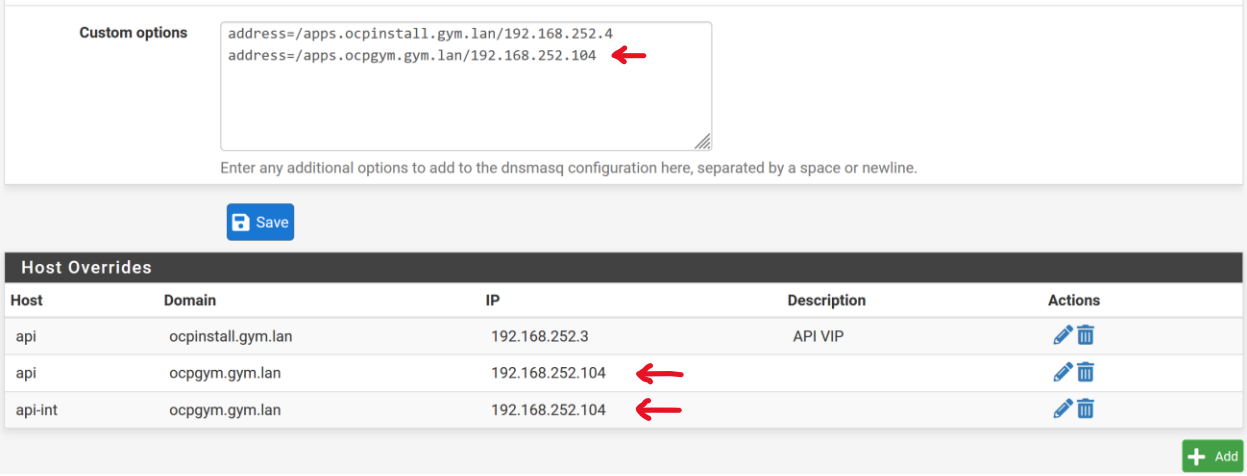


In the page that will be shown, there are a few configurations to make at the bottom of the page using the "ocpgym" IP address.

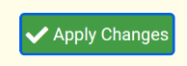
Add "address=/apps.ocpgym.gym.lan/192.168.252.104" to the "Custom options" and Save.

Add two Host Overrides using the Add button:
Host: api, Domain: ocpgym.gym.lan, IP Address: 192.168.252.104
Host: api-int, Domain: ocpgym.gym.lan, IP Address: 192.168.252.104

You page sould look like this in the end:

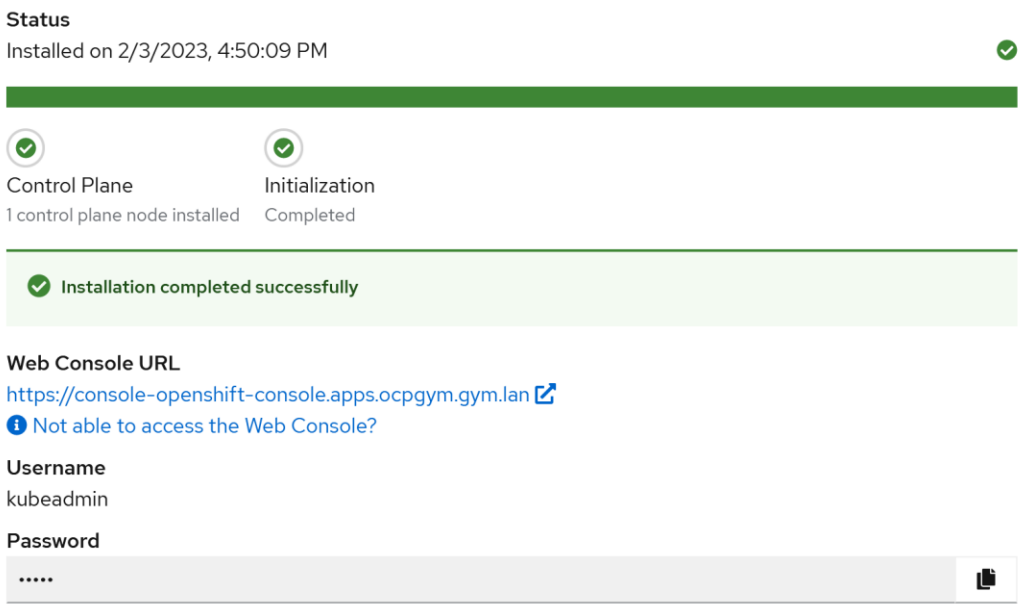


Go to the top of the page and apply changes using the button



You can log out from pfSense using the exit door icon at the top left of the page.

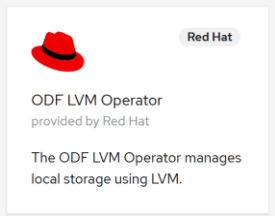
Hopefully at this time the cluster is installed. Go back to the Red Hat Cluster installation page and you should see a page including this:



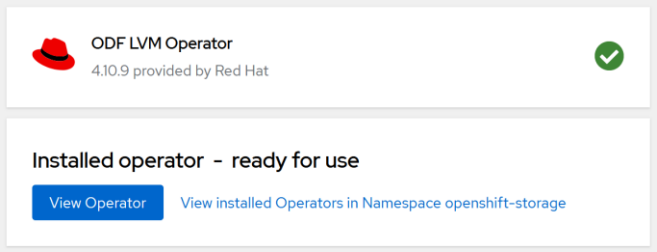
You can click the Web Control URL to access the Single Node OpenShift. Use the Username and Password in that page to log in.

Check around to see if everything is in shape. The next step is to provide the cluster with a storage class and related provisioner. Go to the OperatorHub (left menu under Operators) and search for LVM.

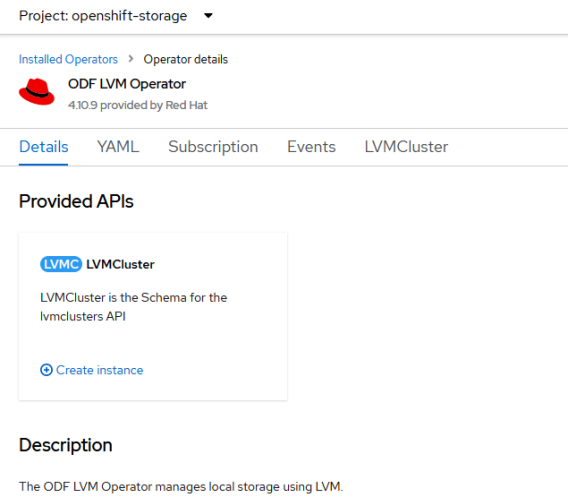
You should see the following tile:



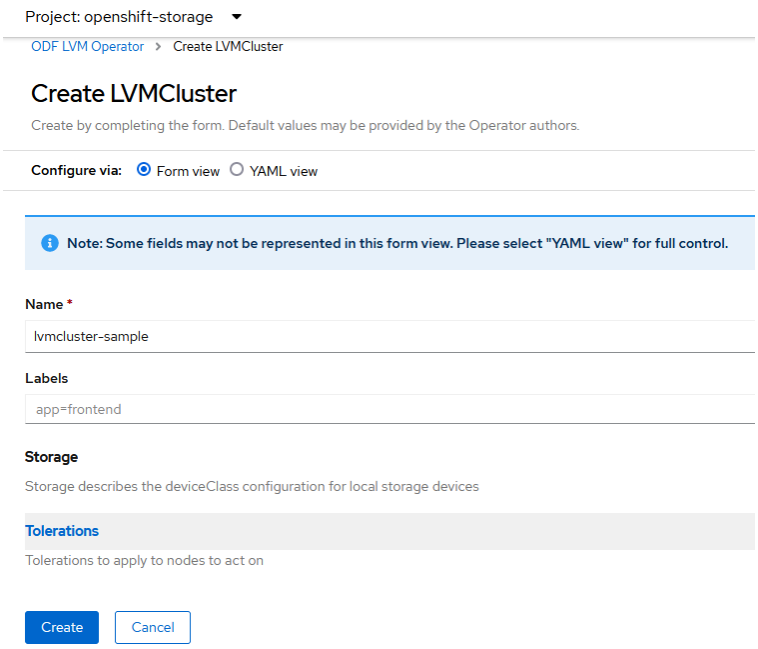
Click on it and install the operator using default parameters. When the operator becomes ready for use, click on the View Operator button



In the page that will appear, you should see the LVMCluster tile



Click on Create instance

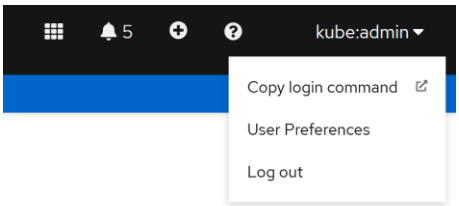


Click Create

At this point we will have to do some configurations, that can be done either via the OpenShift Console UI or via command line. Both will be described in this paper.

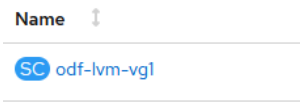
To use the command line, open a bash shell either on the bastion or a computer that has a VPN connection with the TechZone environment.

Use the OpenShift Console top right pulldown menu to grab the login command to OpenShift.



Click on the “Copy login command”, the click on the “Display Token” word that will be shown in the page that just opened, and then copy the login command shown under “Log in with this token”:

Now let’s proceed with the required configuration by making the LVM Operator storage class the default one. In the OpenShift Console UI, go to Storage -> StorageClasses using the left menu. You should see:



Click on it, in the next screen click on the YAML tab.

Add storageclass.kubernetes.io/is-default-class: "true" under the annotations.

The YAML should look like this:

```
  creationTimestamp: '2023-02-02T13:19:33Z'
  annotations:
    description: Provides RWO and RWOP Filesystem & Block volumes
    storageclass.kubernetes.io/is-default-class: 'true'
  managedFields:
provisioner: topolvm.cybozu.com
```

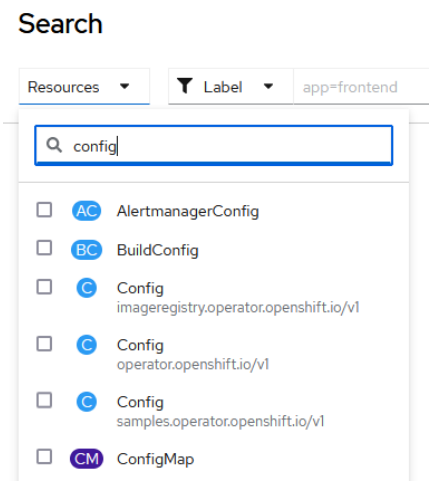
Now if you look back in the list of storage classes you should see that odf-lvm-vg1 is now the default.

If you want to do the same thing from the CLI, the command is:

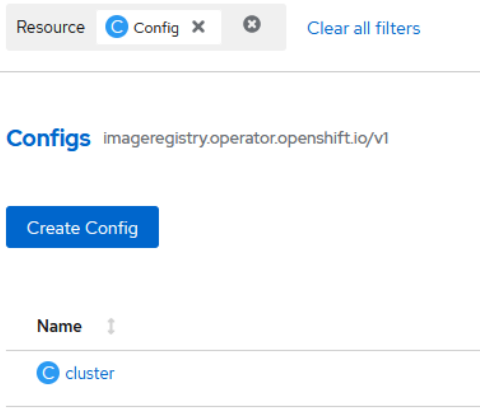
```
oc patch storageclass odf-lvm-vg1 -p '{"metadata":
{"annotations":{"storageclass.kubernetes.io/is-default-class":"true"}}}'
```

Next step is to enable the local image registry. Let's do it from the OpenShift Console UI.

Home -> Search, type "config" in the search field, you should see:



Choose the first config, which is the one for the image registry. You should see:



Click on the “cluster” resource and click on the YAML tab. Edit the yaml in the following way, save frequently otherwise you will get an error when the yaml has changed:

Modify rolloutStrategy from this:

```
  rolloutStrategy: RollingUpdate
```

to this:

```
  rolloutStrategy: Recreate
```

Save and then modify storage from this:

```
  storage: {}
```

to this:

```
  storage:
    pvc:
      claim: ''
```

Save and then modify managementState from this:

```
  managementState: Removed
```

to this:

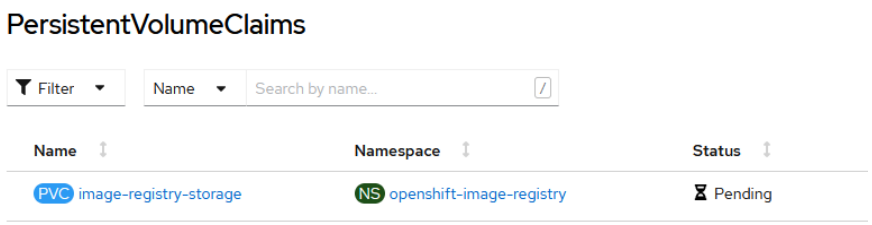
```
  managementState: Managed
```

Save then goto to Storage -> PersistentVolumeClaim.

The same set of changes can be done from the command line using the following command that will open a vi-like editor:

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

Unfortunately the registry operator has a bug and has created a wrong PVC, therefore you will find it that that PVC is pending and not bound:



To resolve this problem, click on the image-registry-storage PVC, click on the YAML tab, download the YAML and edit it to:

- Remove the metadata fields uid, resourceVersion, creationTimestamp
- Remove the manageFields section
- Remove the status section
- Modify the accessModes from ReadWriteMany to ReadWriteOnce

In the end it should look something like this:

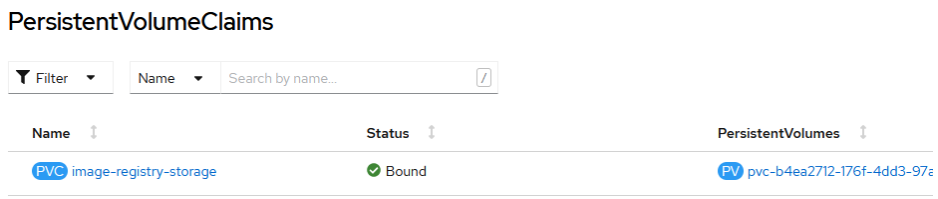
```
kind: PersistentVolumeClaim
apiVersion: v1
metadata:
  name: image-registry-storage
  namespace: openshift-image-registry

  annotations:
    imageregistry.openshift.io: 'true'
    volume.beta.kubernetes.io/storage-provisioner: topolvm.cybozu.com
    volume.kubernetes.io/selected-node: 00-50-56-9d-4e-28
    volume.kubernetes.io/storage-provisioner: topolvm.cybozu.com
  finalizers:
    - kubernetes.io/pvc-protection
spec:
  accessModes:
    - ReadWriteOnce
  resources:
    requests:
      storage: 100Gi
  storageClassName: odf-lvm-vg1
  volumeMode: Filesystem
```

Go back to the PersistentVolumeClaim list and delete the image-registry-storage PVC using the three dots pulldown.

Use the Create PersistentVolumeClaim button to create a new one (the project at the top right should still be openshift-image-registry). Click on the “Edit YAML” link at the top right of the screen. Replace the content of the yaml with the modified one you edited.

Click the Create button at the bottom. The new PVC should immediately go into the “bound” state.



At this point we are ready to install MAS and this will take more or less an hour.

Before starting this step, make sure you have two things:

1. The **Entitled Registry (ER) key**. With this key you must have access to the Maximo Application Suite and CloudPak for Data images. You can get it by logging into My IBM and click on *Container Software & Entitlement key*
2. A **MAS license file**. This file is named license.dat and you can get it from the License Key Server.

Open a terminal using the "Activities" button at the top left of the Bastion desktop. Issue the following commands to get a few files from GitHub

```
sudo su -
dnf -y install git-all
exit
git clone https://github.com/evilADevil/mas-techzone
cd mas-techzone
chmod 755 masinst.sh
```

In the same "mas-techzone" directory you need to put your license.dat file that you got from the License Key Server.

Note that you can transfer files from your computer to the bastion when the VPN is active by using SFTP and its IP address (192.168.252.2). The credentials are admin and the vCenter password. An example session looks like this:

```
adonatelli@ALEX-P15:~$ sftp admin@192.168.252.2
admin@192.168.252.2's password:
Connected to 192.168.252.2.
sftp> cd /home/admin/sno/mas-techzone
sftp> lcd /home/adonatelli/sno
sftp> lls
license.dat
sftp> put license.dat
Uploading license.dat to /home/admin/sno/mas-techzone/license.dat
license.dat                                   100% 8738    57.4KB/s   00:00
sftp> exit
```

Final step before starting the installation of MAS, is to customize the masocpl.yml.

Replace <<your ER key>> with your ER key from step 0 above.

Replace <<your license id>> with the license id of your license.dat file. You can find out what this is by opening the license file in an editor, and check the first line. The license id will be the second-last number. For example, if your first line is `SERVER sls-rlks-0.rlks 0272bc344002 27000` then your license id is `0272bc344002`.

You should have these 4 files in the current mas-techzone directory:

```
license.dat
masdevops.yaml
masinst.sh
masocpl.yml
```

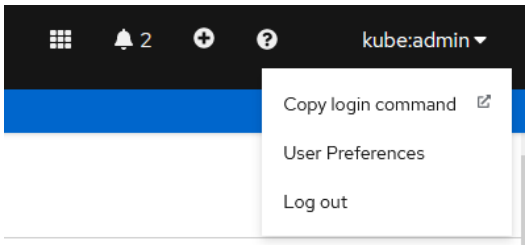
At this point we need to download the OpenShift command line. Use the following command:

```
curl -O https://mirror.openshift.com/pub/openshift-
v4/x86_64/clients/ocp/stable/openshift-client-linux.tar.gz
```

then untar the downloaded file in a directory on the path:

```
sudo tar -xf openshift-client-linux.tar.gz -C /usr/sbin
```

Now we want to log into the Single Node OpenShift cluster using the command line. To find the command to use, goto the OpenShift cluster console, and click on the top right pulldown:



Click on the “Copy login command” menu item. Re-authenticate in case it asks and then click on “Display token”. Copy the login command and issue it in the terminal window.

```
oc login --token=sha256~2gFkqieVhsRqtNPgUk2nsZdAvr0d8Ixk0TZGVwv563s --
server=https://api.ocpgym.gym.lan:6443
```

Now we are ready to launch the MAS installation. Issue the following command:

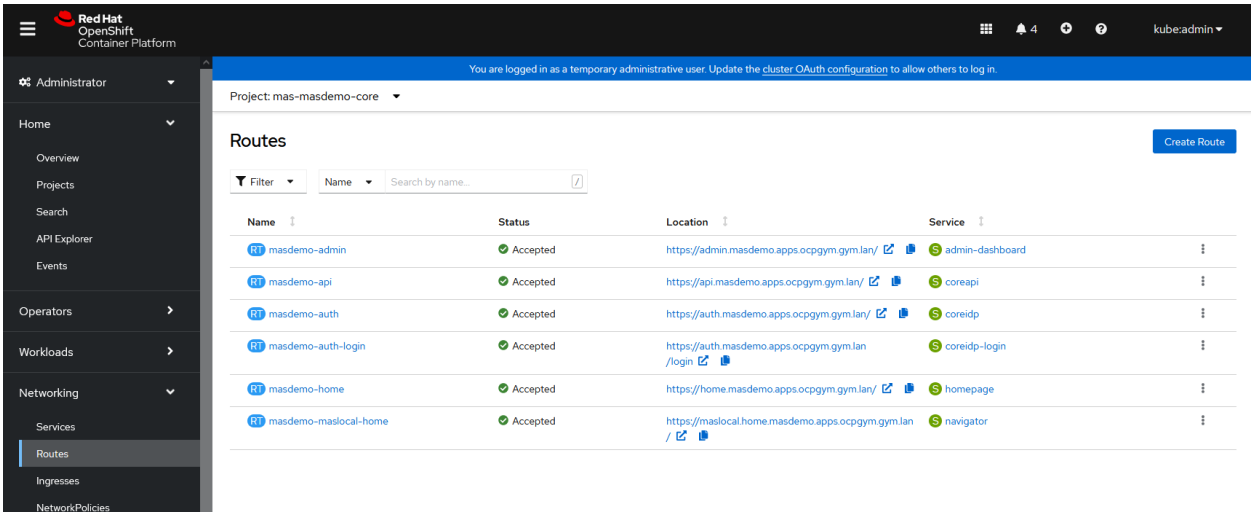
```
./masinst.sh
```

As the log proceed, pay attention to record the userid and password of the MAS superuser, that should look like this:

```
ok: [localhost] => {
    "msg": [
        "Maximo Application Suite is Ready, use the superuser credentials to
authenticate",
        "Admin Dashboard ... https://admin.masdemo.apps-crc.testing",
        "Username .......... DIZv7X2eavITxb3vKtf3XRsY85UYj7FV",
        "Password .......... 58Wi9n9U4yVgZ7AhXVRS4eIqEQSnMhsq"
    ]
}
```

In case you don't have the log anymore, you can always retrieve them from the `masdemo-credentials-superuser` secret in the `mas-masdemo-core` namespace.

After the installation completes successfully, you may want to log into MAS administration using the MAS superuser credentials. You can find the urls to use by navigating in the OpenShift cluster console to Networking -> Routes of the mas-masdemo-core namespace.

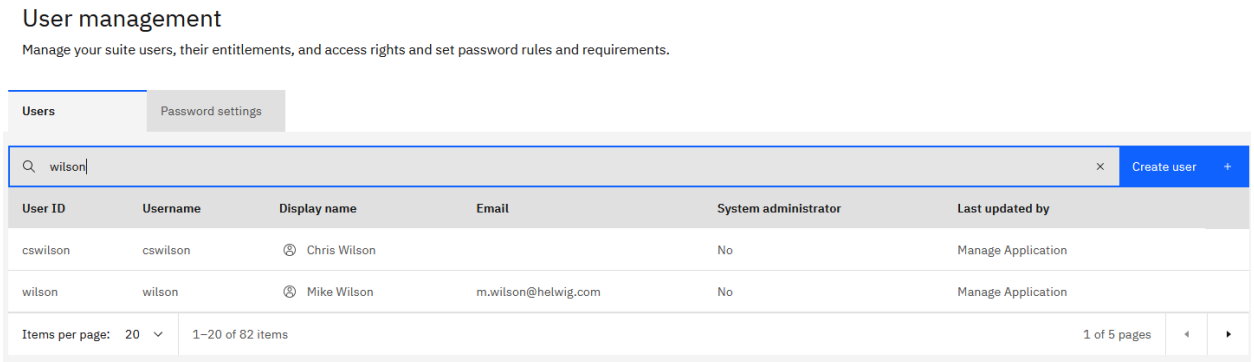


First of all click on the masdemo-api url (the one in the Location column) and accept the self-signed certificate. In this way your browser won't have a problem in accessing the MAS APIs later on. Ignore the exception you will get and close that window.

Then go back to the cluster UI and click the masdemo-admin url. Log into MAS.

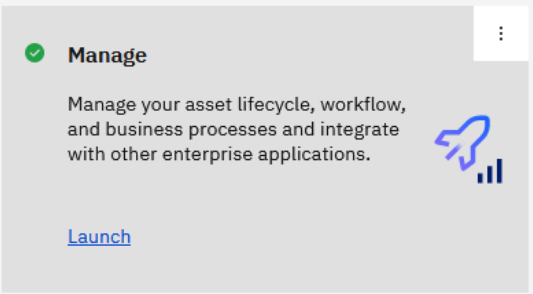
Once in MAS, click on the Users tile.

You should see the list of users that have been inherited by the Manage demo data. Filter by Wilson.



Click on the wilson user. Edit this user by using the pencil icon at the top right. Open the “Login details” section and click “Replace forgotten password”. Click on the “Custom” radio button and set a password. Save the changes and close the information dialog that follows.

Wait for the synchronization to finish. Log out and login as “Wilson”. Accept any self-signed certificate. In the MAS Navigator you should see the Manage tile and you should be able to launch into it. Hover your mouse on it to show the Launch link.



Remember that you can access these same urls from your computer instead of using the Bastion, by activating the VPN. Everything will work like it worked from the Bastion thanks to the pfSense configurations we have done previously.