logocover

**Runbook**

HCP Accelerator and Kubernetes Installation

**PRELIMINARY**

**FOR REVIEW ONLY**

Date Prepared: Jan 2020

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# DOCUMENT OBJECTIVE

This document is designed to presents the installation steps of HPE Container Platform Implementation service.

## Purpose

The purpose of this document is as follows:

The primary purpose of this document is to show the installation of the HPE Container Platform service.

To help the user to access the HPE Container Platform to exercise the K8s functionality.

# CUSTOMER INFORMATION

|  |  |
| --- | --- |
| **Customer Information** |  |
| Customer Company Name |  |
| Blue Data Customer Site ID |  |
| Customer Contact |  |
| Street Address |  |
| City, State, Zip |  |
| Country |  |

*Table 1. Customer Information*

# Lab configuration

## General Requirements for HCP

|  |  |
| --- | --- |
| **Items** | **Requirements** |
| IPs addresses | 10.0.30.114 (used for demo creation as controller)  10.0.30.108 (used for demo creation as worker1)  10.0.30.109 (used for demo creation as worker2)  10.0.30.115 (used for demo creation as gateway)  10.0.30.110 (used for demo creation as K8s host)  10.0.30.111 (used for demo creation as K8s host)  10.0.30.113 (used for demo creation as K8s host) |
| Raw Disks | OS - 350GB  Docker - 400 GB  MapR- 400 GB |
| Memory | 64 GB |
| Cores | 12 |
| Username/Password | root/admin123 |
| OS | CentOS 7 |

*Table 2. General Requirements for HCP*

# INSTALLATION METHODS

## Agent-less (SSH based) method

* Agent-less SSH method installs HCP software components on the controller.
* Once the controller is installed, nodes (workers or gateway) are added.
* The controller node pushes all the required HCP binaries and configuration files to the nodes using SSH and initiates the install process.
* After the install of the nodes (workers or gateway) is completed, they are automatically added to the HCP configuration by controller.

## Agent-based (non-SSH) method

* Agent based (non-SSH) method requires manual HCP installation software installation on each of the nodes (controller, gateway and workers).
* In this scenario, the controller is installed first (just like the SSH based, agentless install) with a special flag telling it that this will be an agent based installation.
* With the flag, the controller installation process not only installs the controller but also creates two additional files: a binary file and a configuration file to be copied to the worker or gateway nodes by means other than SSH.
* To install a gateway or worker node, these files are transferred to the respect node.
* The bin file (or parameters can be set in the configuration file) is run with special flags on these node making them aware of their role (gateway or worker) and which node in the controller node.
* Once these nodes are installed, the controller can add them to the HCP configuration just by their IP addresses.

## When to use this method?

* Customer doesn’t have SSH or got rid of it.
* Some customers don’t even want you to have pem key because of security requirements.
* Remote SSH mechanism for root is disabled or missing because of security requirements etc.

# AGENT-LESS (SSH BASED) INSTALLATION

## Installing HCP in Controller Node

* Obtain the bin file

In CLI, execute the following lines (this could take a while depending on network speeds):

wget <https://bluek8s.s3.amazonaws.com/bluedata-epic-entdoc-minimal-debug-5.0-3002.bin>

* Change the permissions

In the CLI, execute this command: chmod +x bluedata-epic-entdoc-minimal-debug-5.0-3002.bin

* Execute the bin

In the CLI, execute this command: ./bluedata-epic-entdoc-minimal-debug-5.0-3002.bin

It will give pre-checks results. Then it starts installing HCP.

Upon success, you should see an output as shown below with 0 warning

In the CLI, upon success of HCP installation, you should the output as shown below

Pre-checks should be successful if not verify if pre-requisites are met

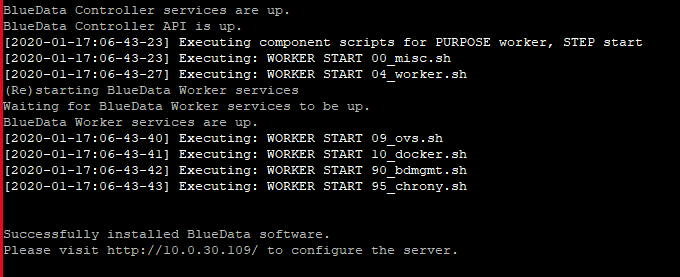
**

Figure 1.HCP Execution of Software

## Common Install/Set-up Errors:

If you get any installation failures, there should be helpful information describing the problem. For more details of the error, look at /tmp/pre\_check.\*.log and /tmp/bds-<time-stamp>.log.

Here are some common symptoms:

|  |  |
| --- | --- |
| **Symptom** | **Corrective Action** |
| No internet connectivity to do yum install of rpms | If you are behind a proxy, make sure you have set up proxy configuration properly. |
| Warning that SELINUX is detected to be disabled | Note that this is a warning, not an error. HPECP installation will not be blocked by this.  The main reason why it is a warning is to remind user that this hosts cannot change from SELINUX disabled to SELinux enforced AFTER HPECP is installed and running. If you need to enforce SELinux, then you will need to do it now before you install HPECP. If HPECP is already installed, remove it first. Then enable SELINUX, and then re-install HPECP. |

*Table 3. Common set up error in HCP*

# Logging into HCP for the first time!

Open a web browser and type in the host controller’s IP address

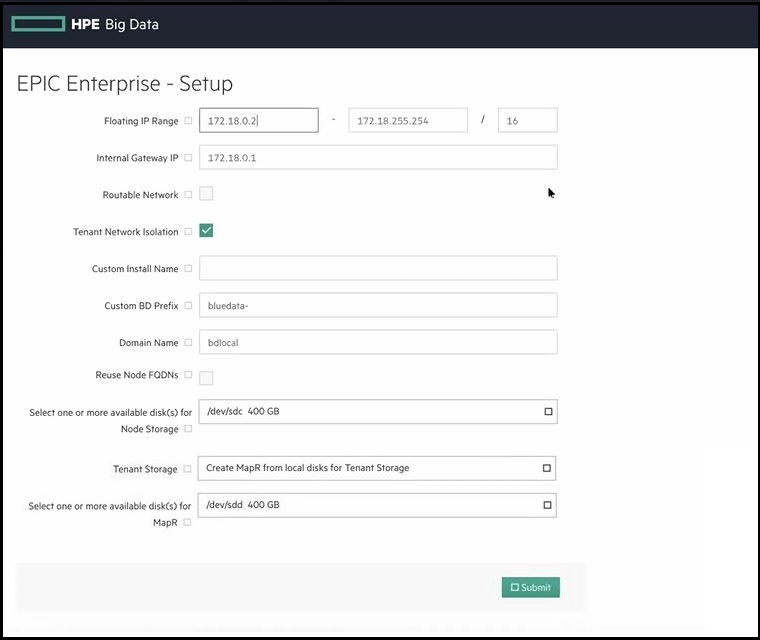


Figure 2. HCP Enterprises Setup

|  |  |
| --- | --- |
| **Symptom** | **Corrective Action** |
| Getting “/dev/mapper/mpatha failed. Error 19, No such device. Missing device file” error. | The "/dev/mapper/mpatha.... missing device file" was caused by the fact that /dev/dm-X links were not available inside the mapr container. To fix this, we need to make sure the mapr container see all the same "/dev" devices as it is seen on the host. This can be done by adding "-v /dev:dev" to the "docker run" command when launching the mapr docker container.  You can resolve this by making a simple code change in our mapr config code.  Edit the file:  /opt/bluedata/bundles/bluedata-HCP-entdoc-minimal-debug-5.0-1358/scripts/common/mapr-common.sh  Inside the "launch\_mapr()" function, please add the "-v /dev:/dev" option to the "docker run" command. Specifically, add this line:  launch\_mapr() {  <snip.....>  log\_exec docker run -d \  -v /var/log/bluedata/mapr:/opt/mapr/logs \  -v /var/log/bluedata/mapr:/opt/mapr/zookeeper/zookeeper-3.4.11/logs/ \  -v /var/log/bluedata/mapr:/opt/mapr/apiserver/logs/ \  -e oci-systemd-hook=disabled \  -v $SYS\_CLOCK -v $LOCAL\_TIME --uts=host --net=host --privileged \  -v $HOST\_MAPR\_DIR:/mapr:rshared \  -v /dev:/dev \ <==== Add this line  --name $MAPR\_CONTAINER\_NAME --restart=always \  --cgroup-parent=$CGROUP\_NAME $HCP\_MAPR\_STRING:$HCP\_MAPR\_VERSION  } |

*Table 4. General Error in HCP installation*

For our demo purposes, we don’t need to change anything here. We can go ahead and click submit at the bottom of this page

A continued installation process will continue as seen below

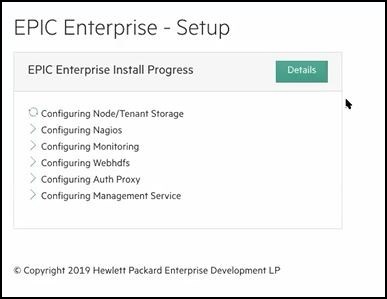


Figure 3. HCP *Enterprise* Installation

Once the configuring is complete, your controller will be set up and you can log in and see the dashboard (might need to refresh page)

Log in using username/password: admin/admin123

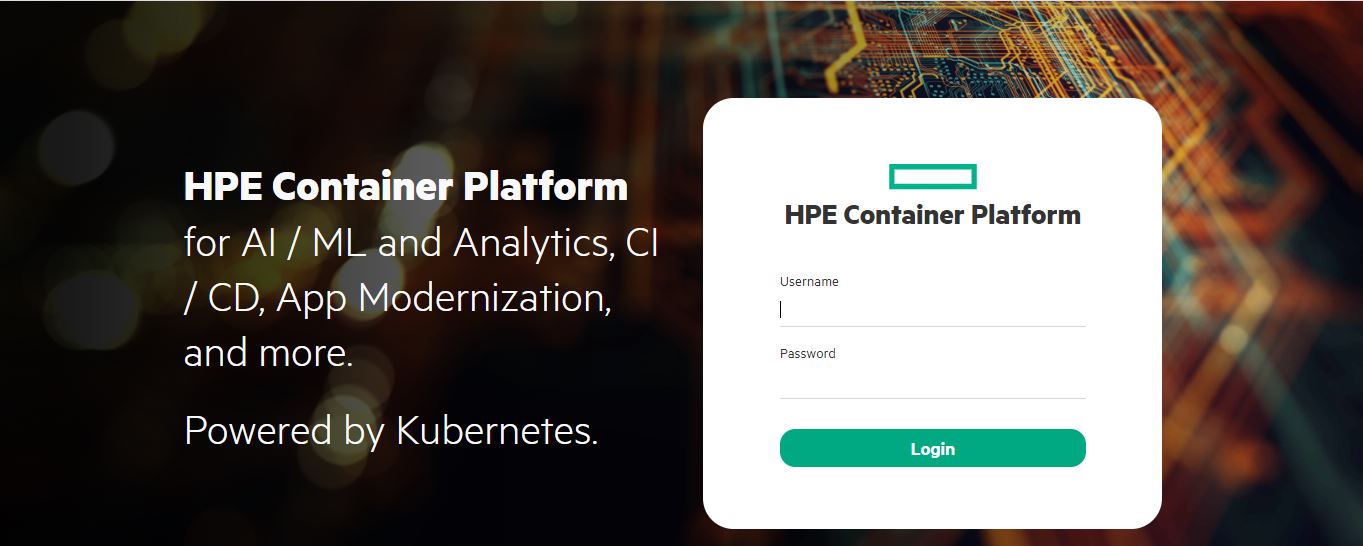
****

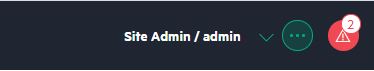
Figure 4. HCP Login Page

|  |  |
| --- | --- |
| **Symptom** | **Corrective Action** |
| Unable to login | Possible solution:   * Make sure you are using the correct http or https link depending on whether you set-up TLS or not. * Clear the browser cache and cookie and re-try. If you re-installed EPIC on the same server, then your browser may still have settings info linked to your previous EPIC instance. |

*Table 5. Common error in HCP Login*

# Add Gateway Node (recommended to have at least 1 gateway)

* Enter site lockdown mode first
* On the top right of your screen, you should see what is shown in the screen shot below



*Figure 5. Enter site lockdown*

* Click the circular icon which contains the 3 dots. A drop down should appear with the option “Enter site lockdown”
* Go to Gateway LB tab on the left navigation bar via Global Settings
* Type in the IP addresses of the Gateway you wish to add and input the password for Gateway on the right side and click add Gateway button
* Scroll down until you see the a list of the nodes

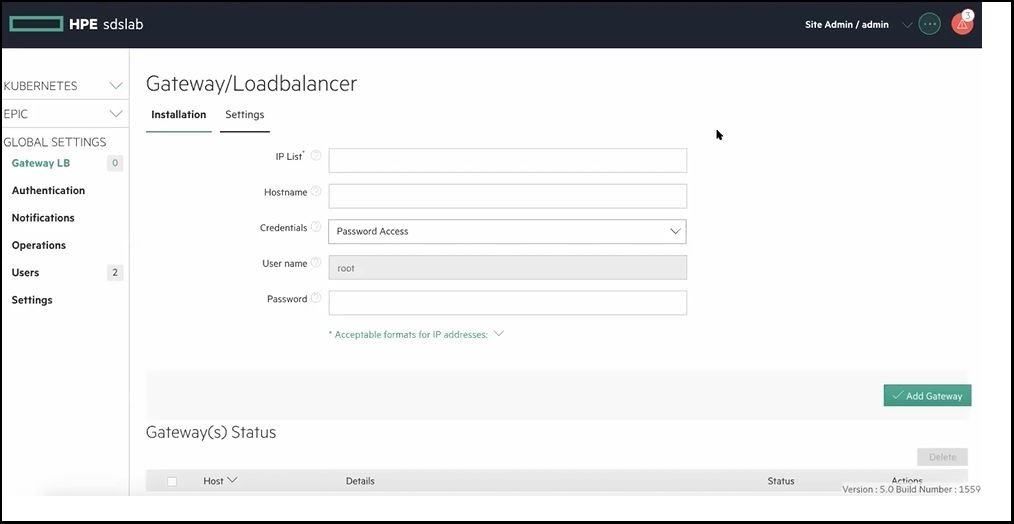


Figure 6. Adding Gateway Nodes

## Installing Gateway Nodes

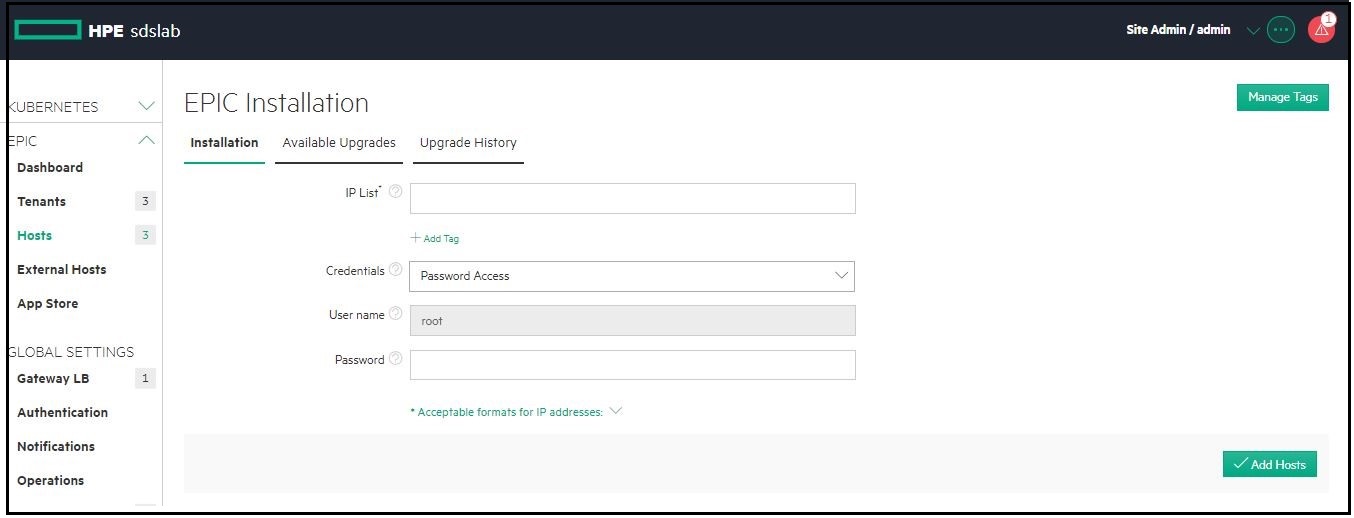
* Check the box of the nodes you wish to install
* The install button should be enabled for you to click and begin the installation process

****

*Figure 7. Installing Gateway Nodes*

# Add Worker Node (recommended to have at least 2 workers)

* Go to HOST page via HCP left navigation bar and click installation tab as seen below



*Figure 8. Adding Worker Nodes*

* Type in the IP addresses of the workers you wish to add and input the password for the workers on the right side
* Click “Add Hosts” to complete the process
* After adding nodes, you should be able to see the nodes being added as shown below

## Installing Worker Nodes

* Go to installation tab on the left navigation bar (same page as previously shown)
* Scroll down until you see the a list of the nodes
* Check the box of the nodes you wish to install
* The install button should be enabled for you to click and begin the installation process

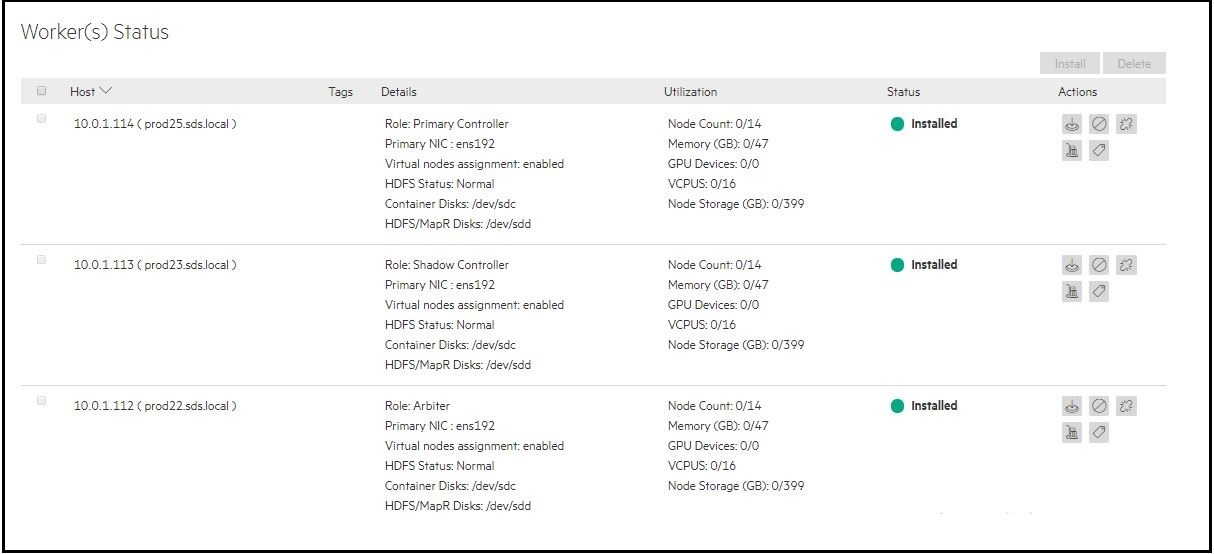
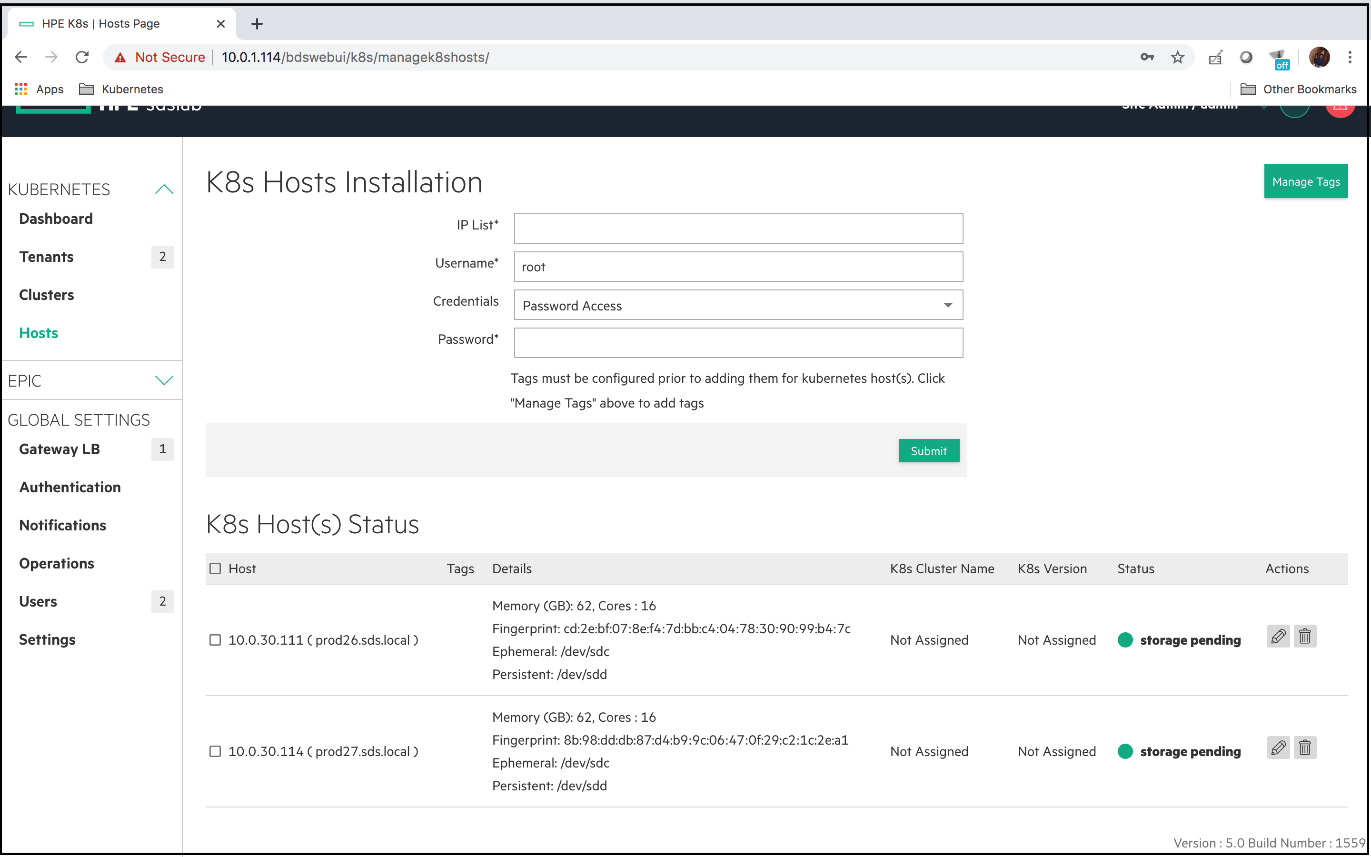


Figure 9. Installing Worker Nodes

# Add K8s Node

* Go to Host tab on the left navigation bar via kubernetes tab
* Type in the IP addresses of the k8 host you wish to add and input the password for K8s host on the right side and submit button
* Scroll down until you see the a list of the nodes
* Check the box of the nodes you wish to install
* The install button should be enabled for you to click and begin the installation process



*Figure 10. Adding K8s Nodes*

## Installing K8s Nodes

* Check the box of the nodes you wish to install
* The install button should be enabled for you to click and begin the installation process
* Once the K8s hosts came to ready state , you can create a K8s cluster and assign these host

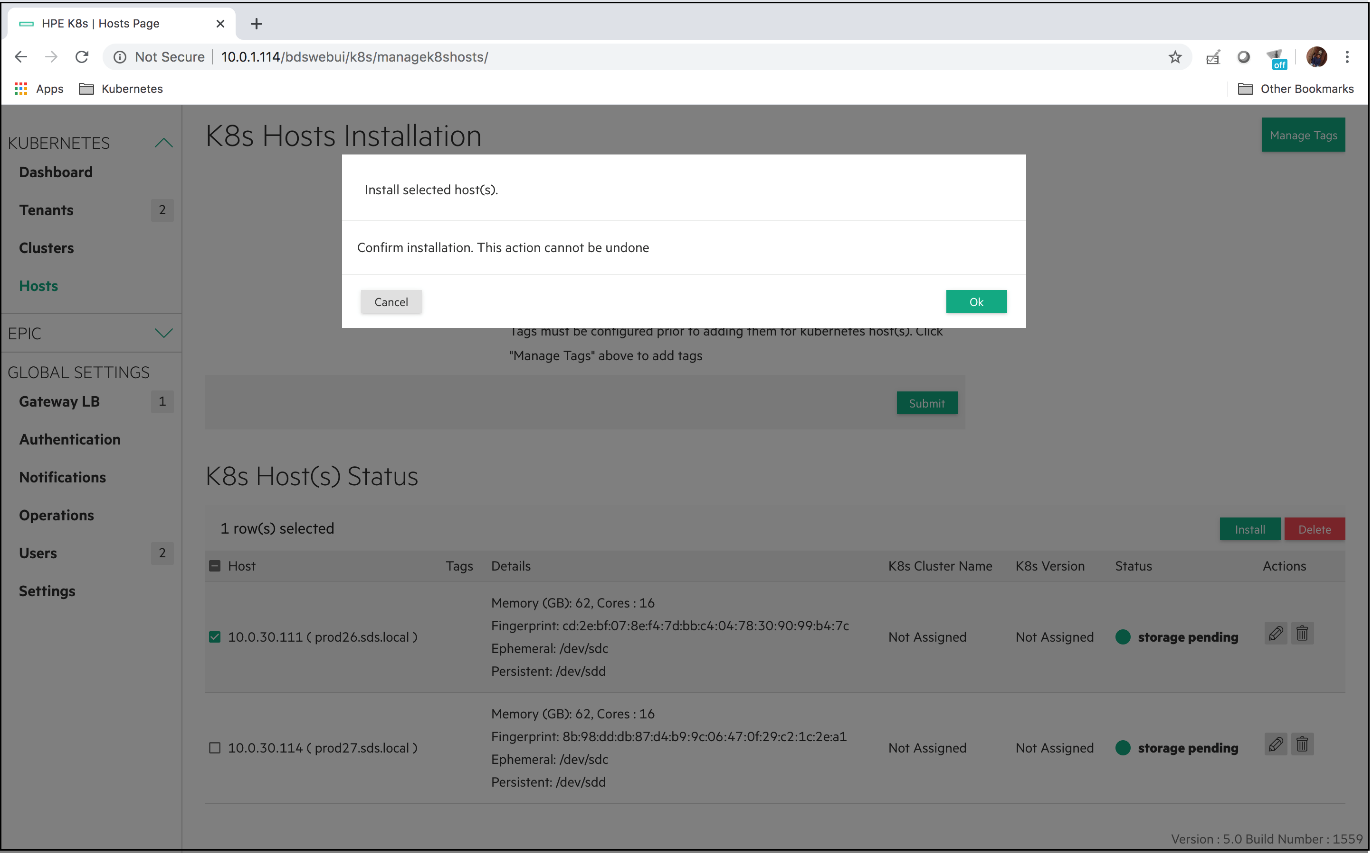


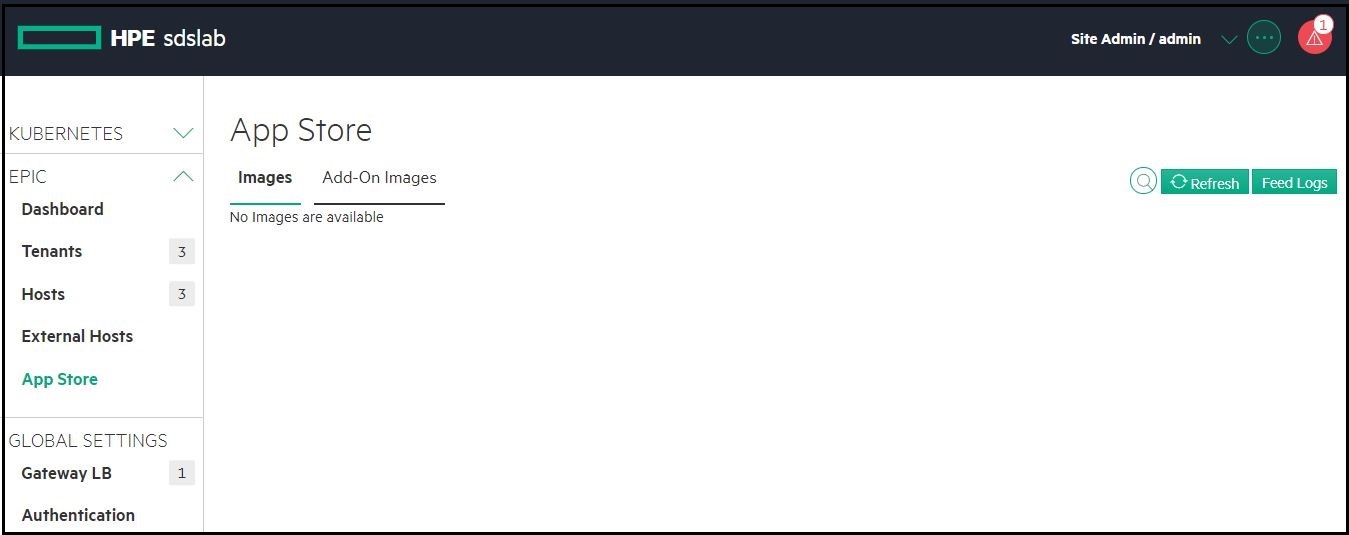
Figure 11. Installing K8s Nodes

|  |  |
| --- | --- |
| **Symptom** | **Corrective Action** |
| No internet connectivity to do yum install of rpms | If you behind proxy, make sure you have set-up proxy configuration properly. |
| [2019-11-28:14-45-06] Executing: STORAGE CONFIGURE 06\_docker.sh  Failed to exec: lvcreate --yes --wipesignatures y -l 100%FREE -n thinpool VolBDSCStore  Setup log: | Manually add libudev-devel RPM.  yum install libudev-devel  Already installed, remove it first. Then enable SELINUX, and then re-install HPECP. |
| Failed to exec: yum install -y etcd kubelet-1.15.3 kubeadm-1.15.3 kubectl-1.15.3 "kubernetes-cni >= 0.7.5"  ERROR: Failed executing 50\_kube.sh | Manually install kubectl packages:  # yum install kubectl-1.15.3  Loaded plugins: langpacks, product-id, search-disabled-repos, subscription-manager  Resolving Dependencies  --> Running transaction check  ---> Package kubectl.x86\_64 0:1.15.3-0 will be installed  --> Finished Dependency Resolution |

*Table 6. General Error in HCP K8s Nodes Installation*

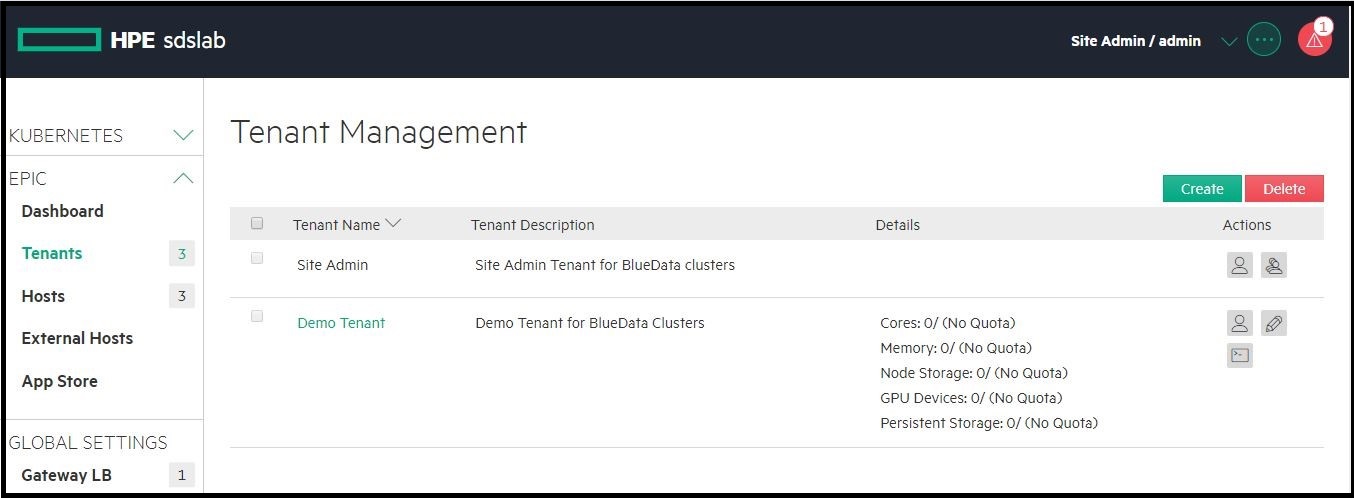
# Adding Clusters

* Navigating to the App store tab via HCP left navigation bar, you can see the app store as shown below



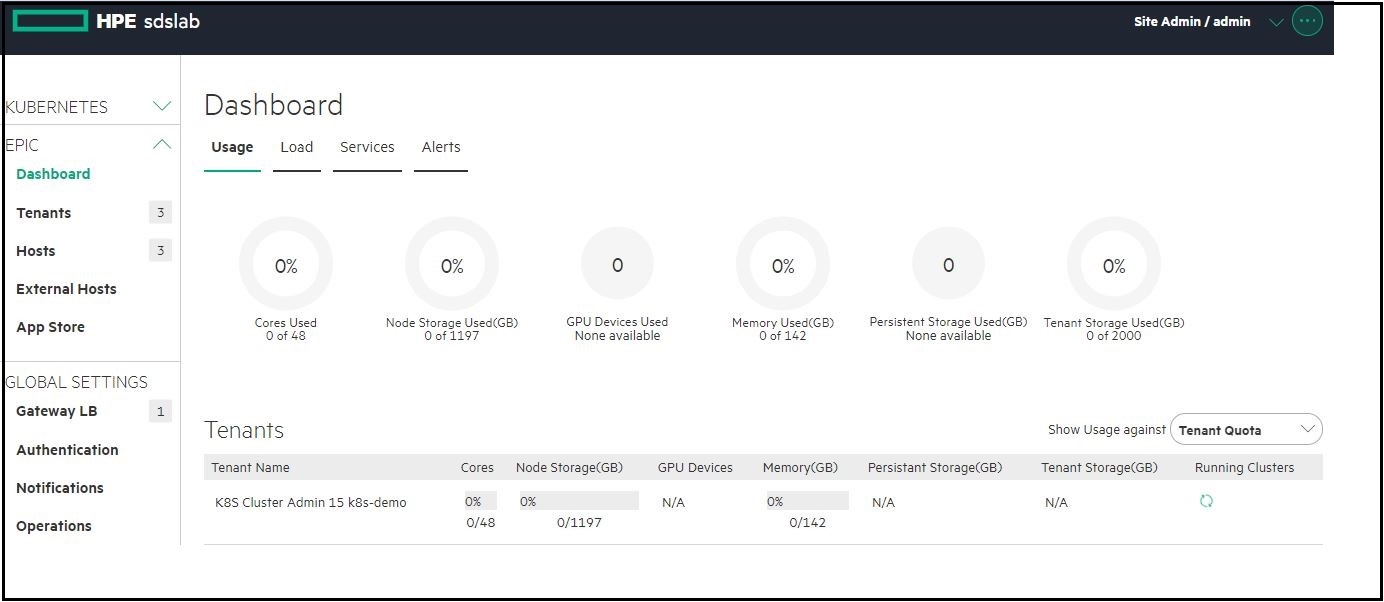
*Figure 12. Adding Clusters*

* In order to add clusters, you must be in the tenant admin role.
* Navigate to the tenants tab on the left and you will find a tenant admin named “demo tenant” that has been created by default.



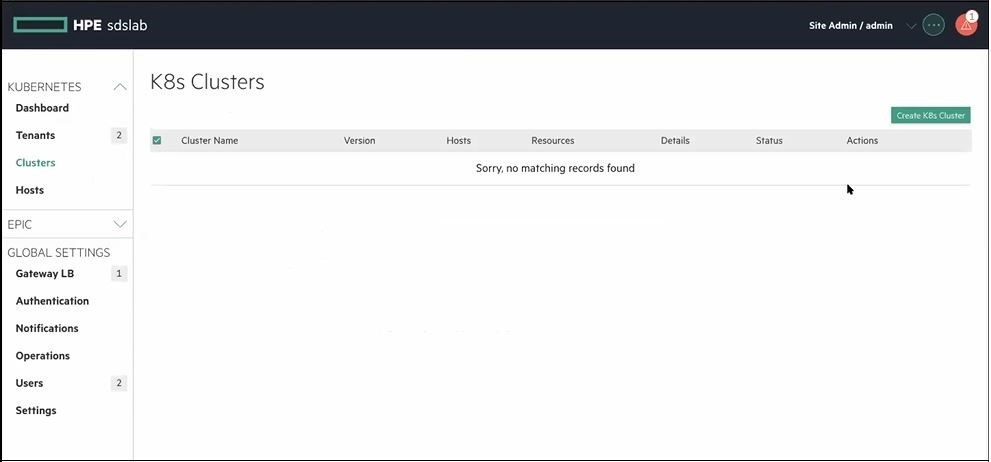
*Figure 13. Managing Tenant*

* Go ahead and click the demo tenant and you will get tenant storage ,loads and service information in dashboard



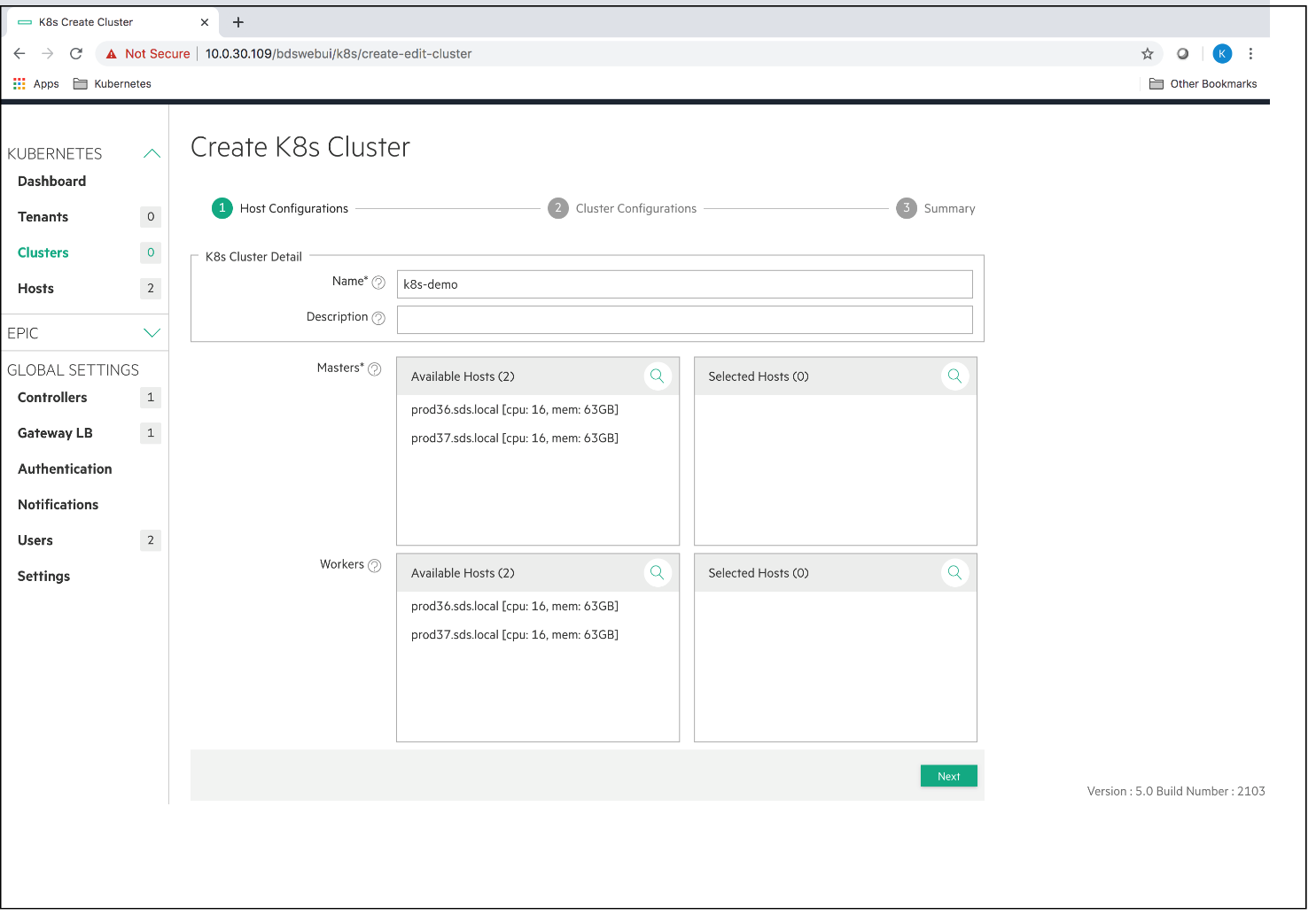
*Figure 14. HCP Dashboard*

* Navigate to the clusters tab on the left side of the kubernetes tab and you’ll be able to create a cluster

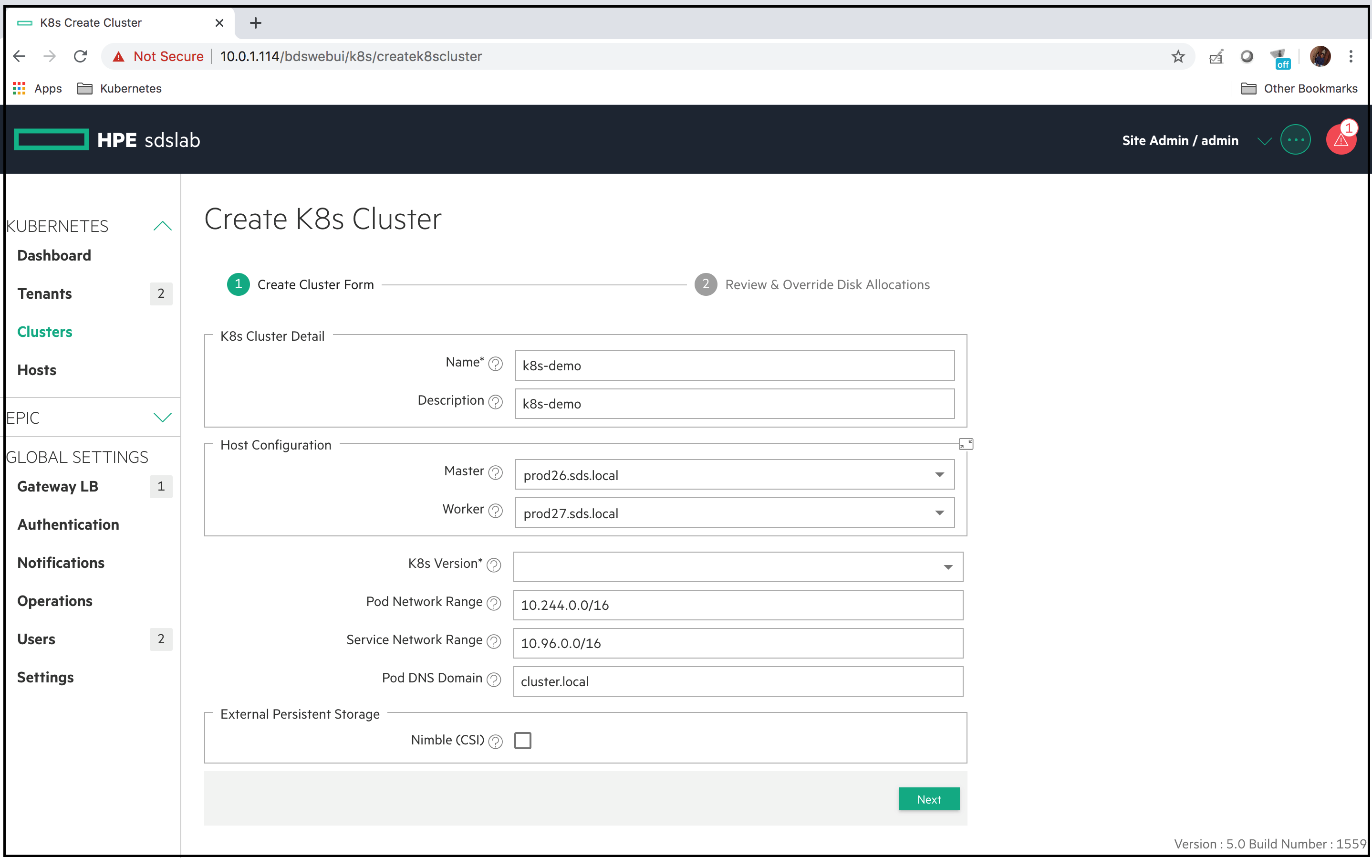


*Figure 15. K8s Cluster Creation-1*

* You will be brought to a page where you can customize your cluster before creating it as seen below by clicking on create K8s cluster button

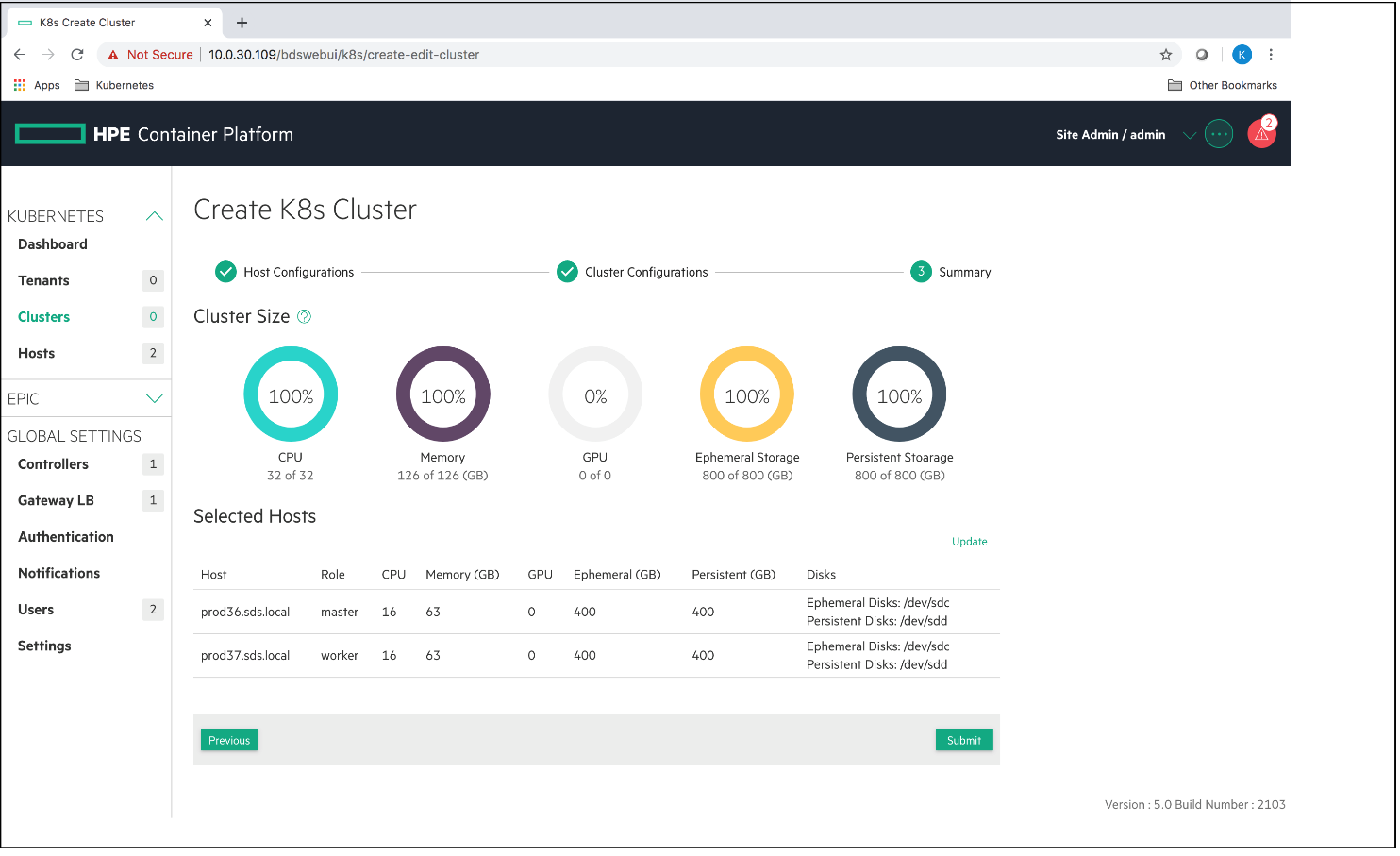


*Figure 16. K8s Cluster Creation-2*



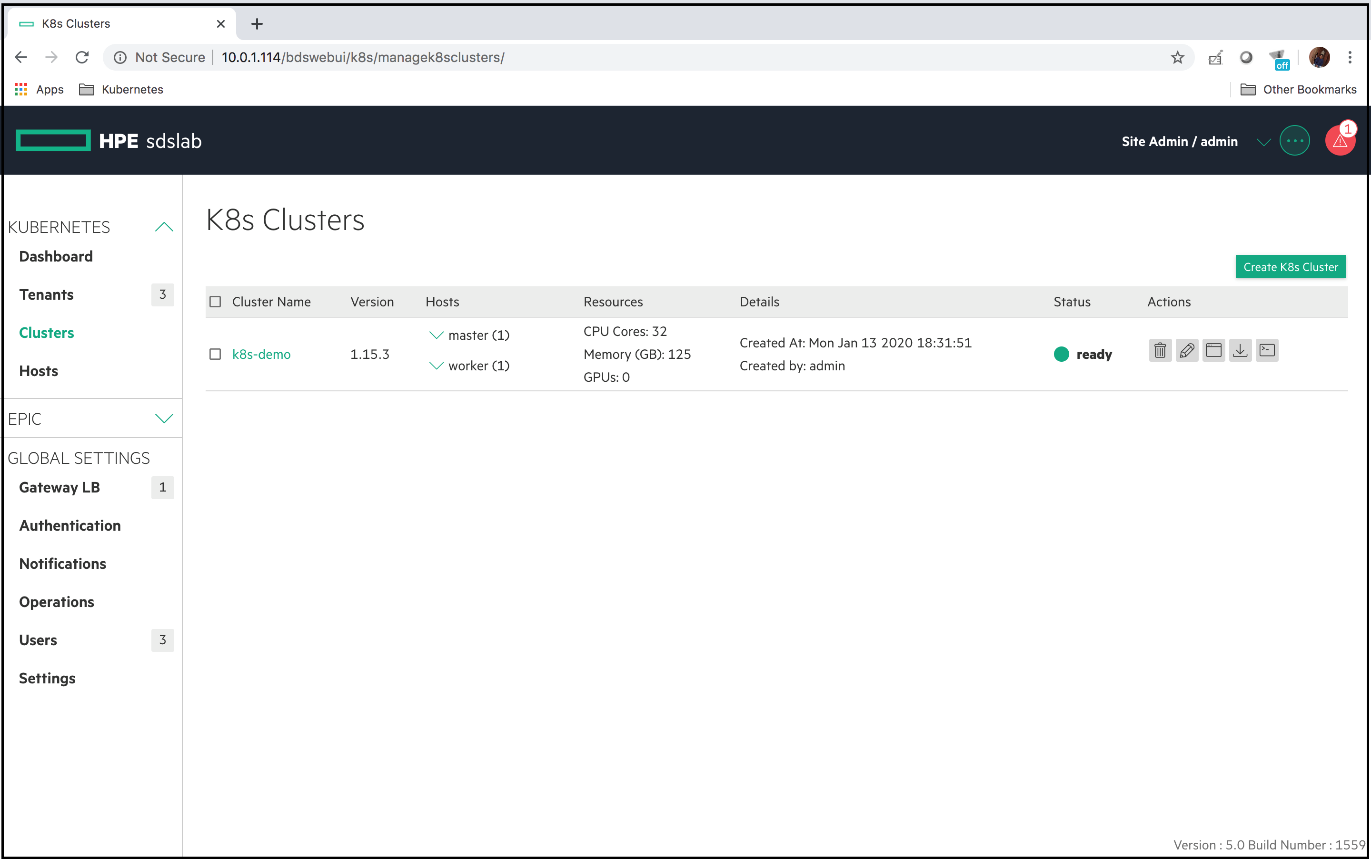
*Figure 17. K8s Cluster Creation-3*

* click on next button after entering all information about K8s cluster



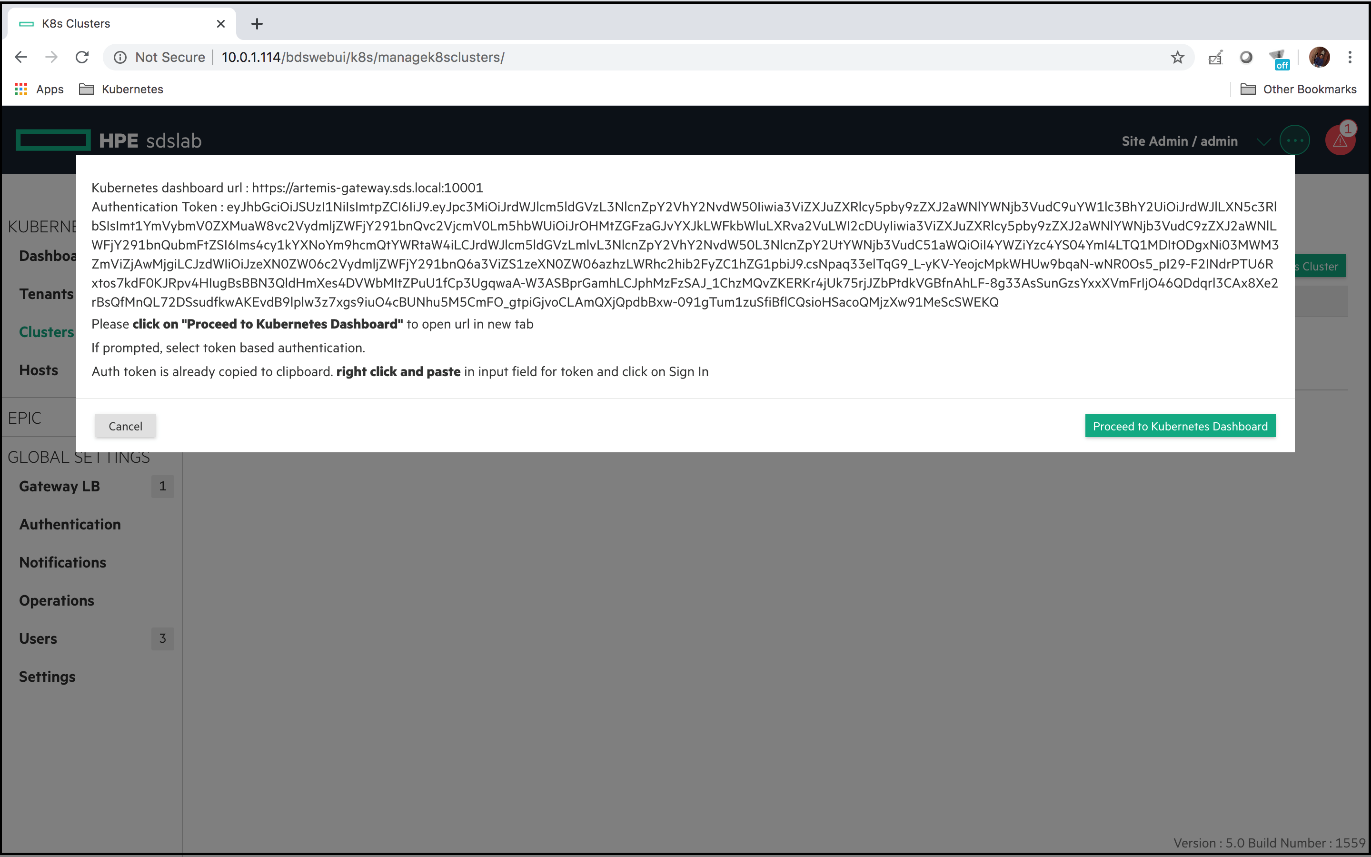
*Figure 18. K8s Cluster Creation-4*

* you can review the cluster configuration and you can finalize the cluster information by clicking Submit button



*Figure 19. K8s Cluster Creation-5*

* Now cluster has been created successfully as it in ready state. You can get kubernetes cluster dashboard by clicking on Access kubernetes dashboard option on the cluster
* Now you will get a page like this shown below

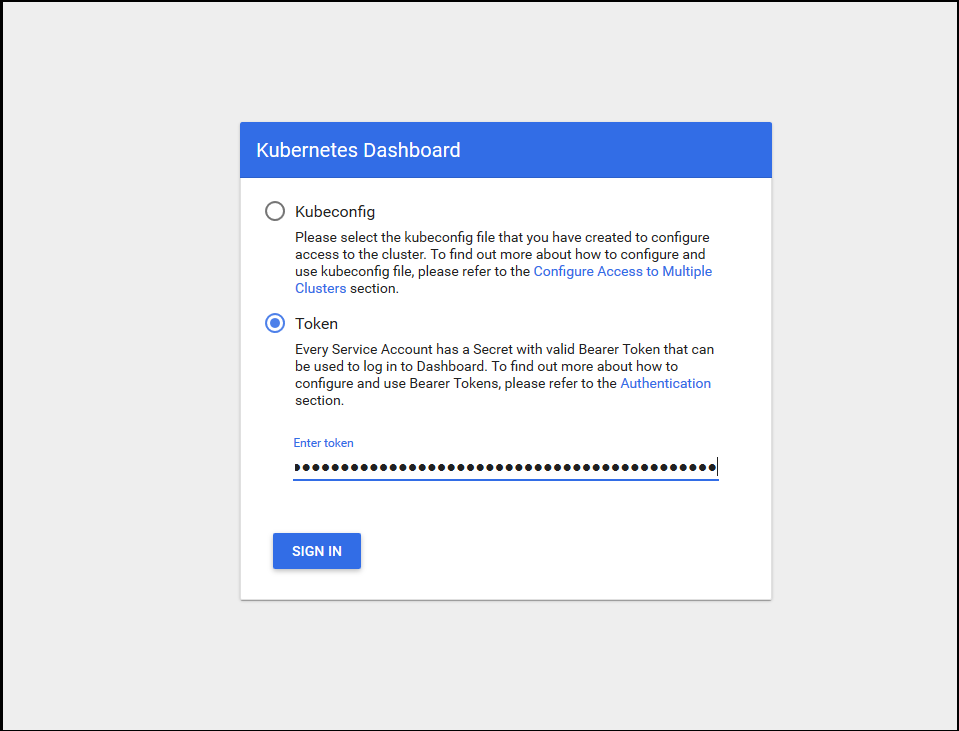


*Figure 20. K8s Cluster Configuration*

* Click on Proceed to Kubernetes Dashboard Button to get the cluster dashboard

|  |  |
| --- | --- |
| **Symptom** | **Corrective Action** |
| “Storage error” in the Status field.  22020-01-10:07-50-37 logging.sh 37: eval kubeadm join m24wn02.bluedata:10000 --token q5j9q6.3r431nmgqvkh4y2l --discovery-token-ca-cert-hash sha256:04988b334098f0375ef07014cbdcf653f23cbee517fefb1e39d95657304726e0 --ignore-preflight-errors Swap  22020-01-10:07-50-37 logging.sh 37: tee -a /var/log/bluedata/install/k8scluster\_  setup-2-2020-1-10-07-42-47222020-01-10:07-50-37 logging.sh 37: kubeadm join m24wn02.bluedata:10000 –token q5j9q6.3r431nmgqvkh4y2l --discovery-token-ca-cert-hash sha256:04988b334098f0375 ef07014cbdcf653f23cbee517fefb1e39d95657304726e0 --ignore-preflight-errors Swap | If this host was a HPECP worker before, then you are likely hit a known problem where the wrong driver (cgroupfs) was used instead of systemd, which is the default K8s driver.  If you had de-installed previous HPECP instance on the worker but did not reboot, please reboot the worker. Then go back to UI and retry adding the storage. |
| “Unable to join” error in bds-mgmt.log | One possible problem is when the worker is not able to contact the gatway as proxy server.  Run the command to verify:  curl --verbose -k <http://Gateway> FQAN>:10000/api/v1/namespaces/kube-system/secrets |

*Table 7. General Error in HCP K8s clusters*



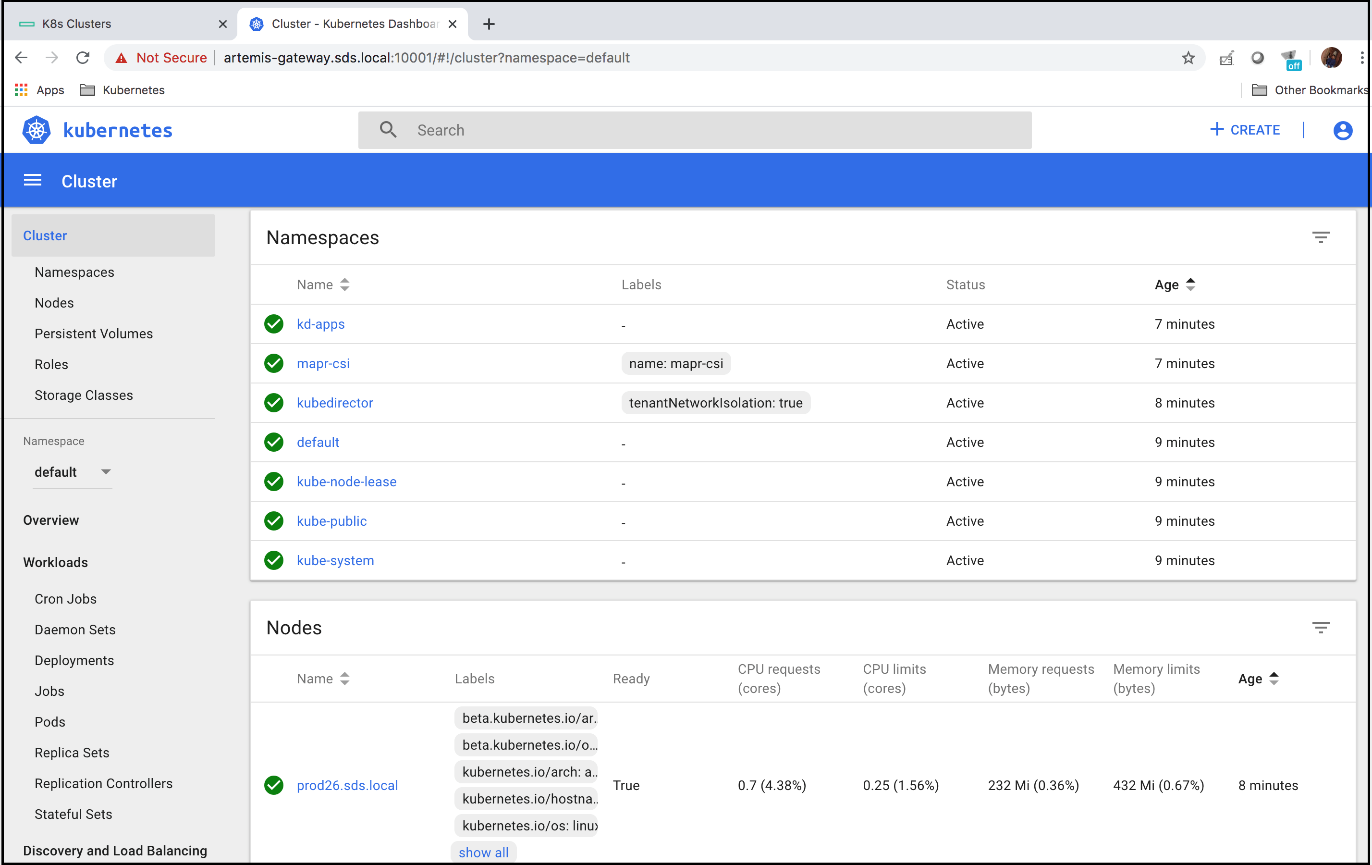


Figure 21. Kubernetes Cluster Dashboard

# Launching EPIC Application

## EPIC Image Application Cluster

To create cluster of the image use the following steps:

* Go to App Store and install the required image from the Catalog (Here, H2O image is used)
* Image will take depending the size of the image to get fully installed
* Once the image is installed, go to tenant where you want to create cluster from the installed image (Demo tenant is used here)
* Click on Clusters, you will get page like below
* Click on Create Cluster

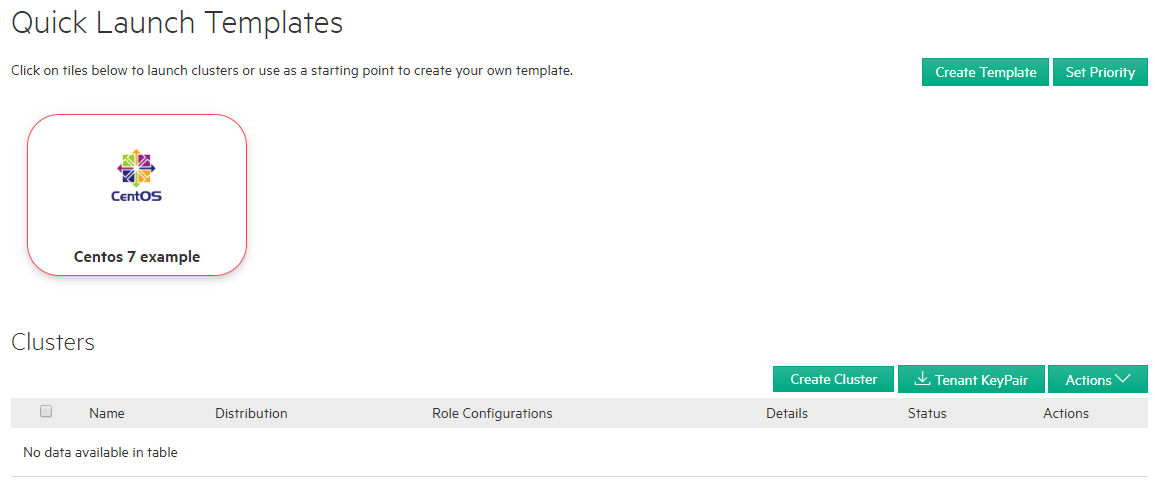


Figure 22. Demo Tenant Cluster Dashboard

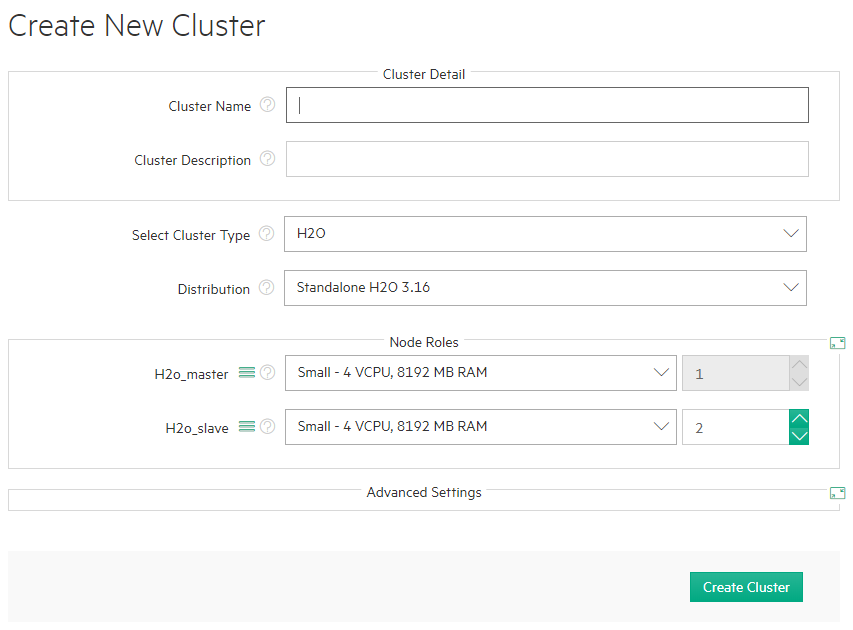


Figure 23. Create Cluster Page

Note: The above page may appear different depending on the Application image.

|  |  |
| --- | --- |
| **Option** | **Description** |
| Cluster Name | Provide a unique name for the cluster |
| Cluster Description | Provide some details about the cluster |
| Select Cluster Type | Select the type for cluster from the drop-down menu. The drop-down items consists of the category of the application image in App Store |
| Distribution | Select distribution type for cluster |
| Node Roles | It consists of the roles the image have. You can select and flavor and node count for the role(s) of the image |
| Debug Mode | Enables Debug Mode for the cluster. It does not allow the node to be fail |
| Isolated Mode | Prevents network access outside the cluster. Only SSH/SCP connections will be allowed from BlueData or AD/LDAP account |
| Two Phase Delete | If cluster is not in Isolated Mode, then it will be put in isolated mode when cluster deletion is requested |
| Bootstrap Action | Enabled to allow executing action script as the last step of cluster creation |

*Table 8. General Cluster Configuration*

* Click on Create Cluster
* You will see the cluster starting in Clusters section

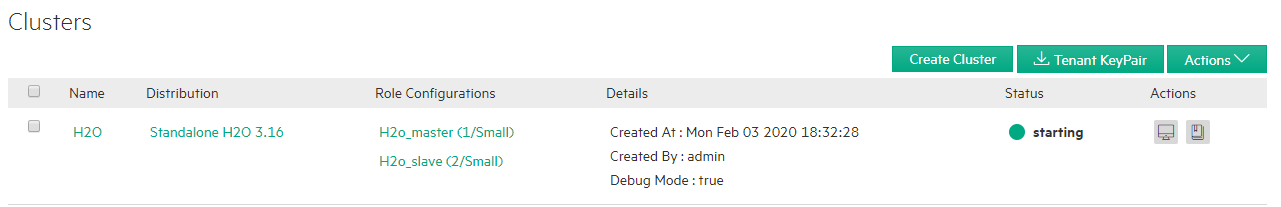


Figure 24. Application Image Cluster Page-1

* Cluster creation is successful when you see the Ready state

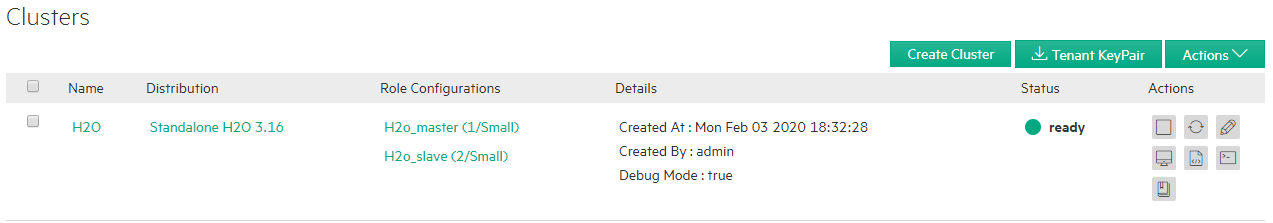


Figure 25. Application Image Cluster Page-1

* The cluster should be successfully created with all the service running.

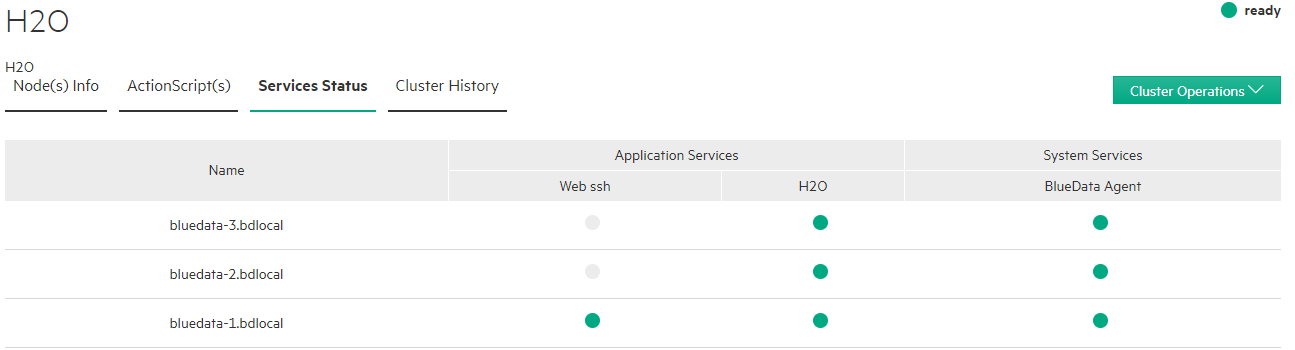


Figure 26. Application Image Service information

# Launching a Kubernetes Application

## Kubernetes Application Cluster

To create an application in Kubernetes use the following the procedure:

* Go into any Kubernetes Tenant

Note: Refer to the EPIC Accelerator Functional Test Plan to view, how tenants are created.

* From the left-hand menu, click on Applications

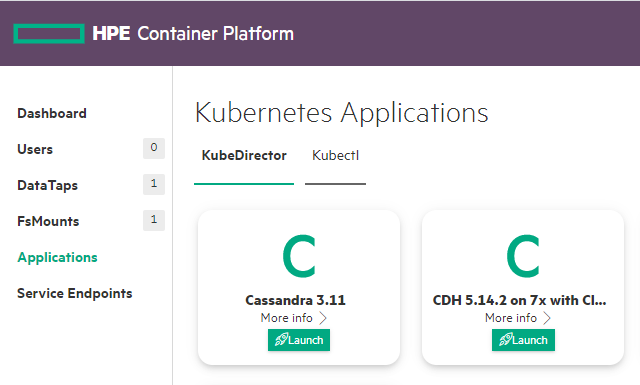


Figure 27. Kubernetes Appstore

* From the default Applications provided, click on Launch button of any image you like to deploy
* You will get a Launch Kubernetes Applications page, here you can edit the YAML file as per your requirement



Figure 28. Kubernetes application Yaml file

* Click on Submit to launch the app
* KubeDirector will start creating the application, see under KubeDirector Running Applications section

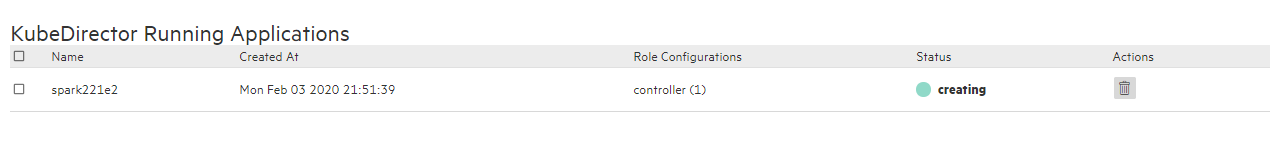


Figure 24. Kubernetes example cluster

* Once the application is successfully created, it will be in ready state

## Accessing a Kubernetes Application

* Once you have deployed the Application, to access it, go to Service Endpoints from the left-hand menu
* Kubernetes Service Endpoints page will appear, with the deployed application and its service endpoints



Figure 30. Kubernetes application cluster service endpoints

* To access any listed service from the Services column, click on the respective entry in Gateway Mappings column, it will open-up a new tab with the respective Service UI

# Kerberos settings in HCP

* Click on Tenants Tab and you have option to edit the tenant configuration. Click on Edit button

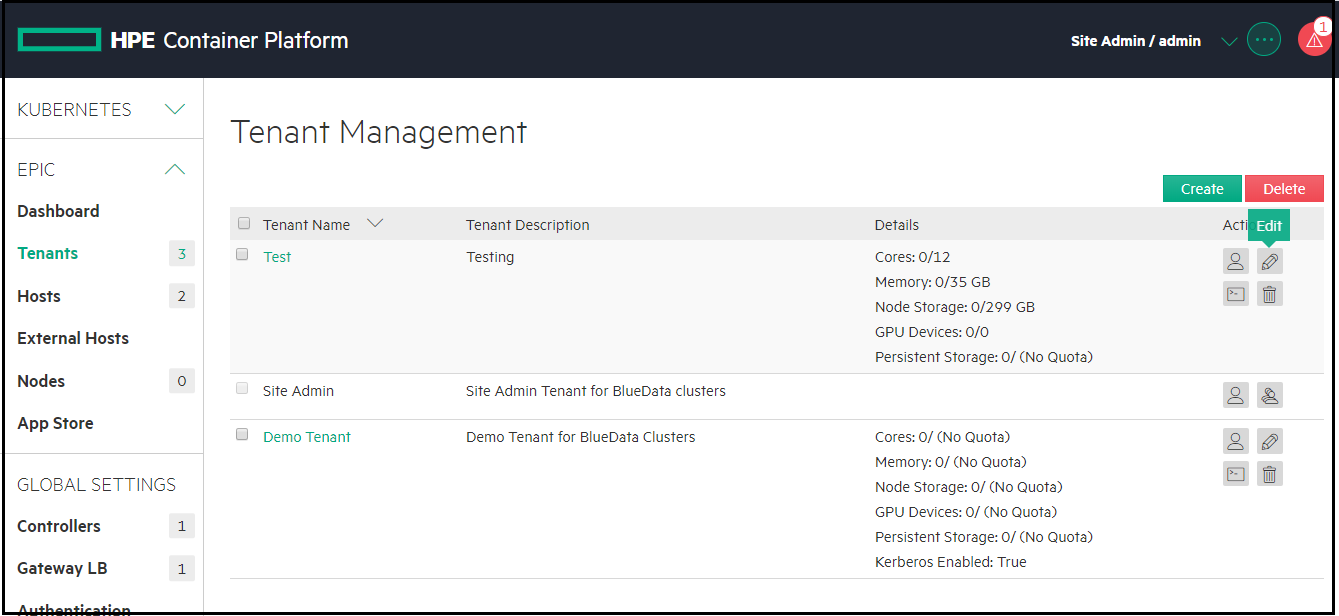


Figure 31. Edit HCP Tenant

* Click on Kerberos tab and select KDC type in tenant page. Here we are showing MIT KDC Type.
* After updating the KDC information click on submit button

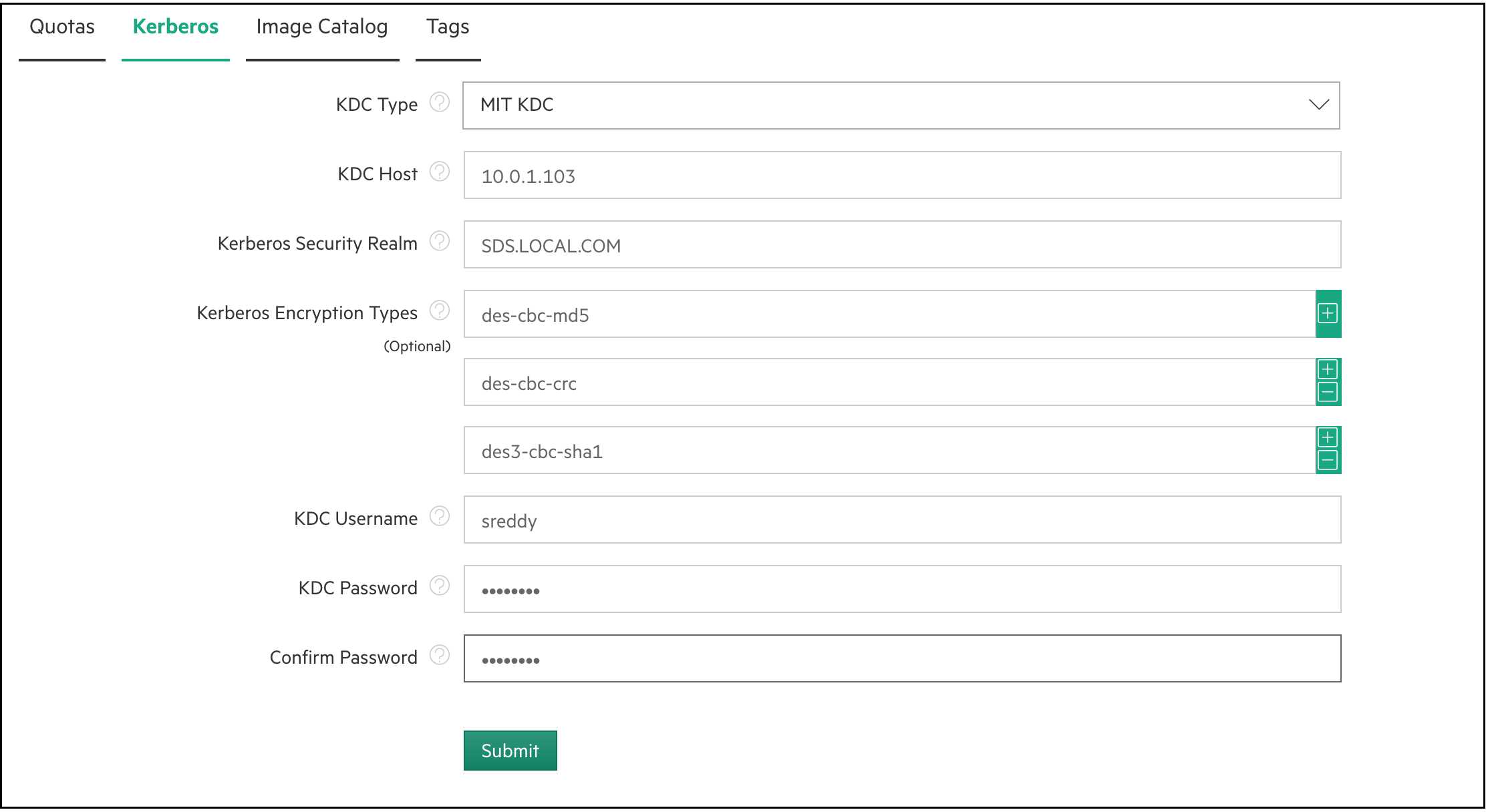


Figure 32. Update KDC Information

# Uninstalling HCP

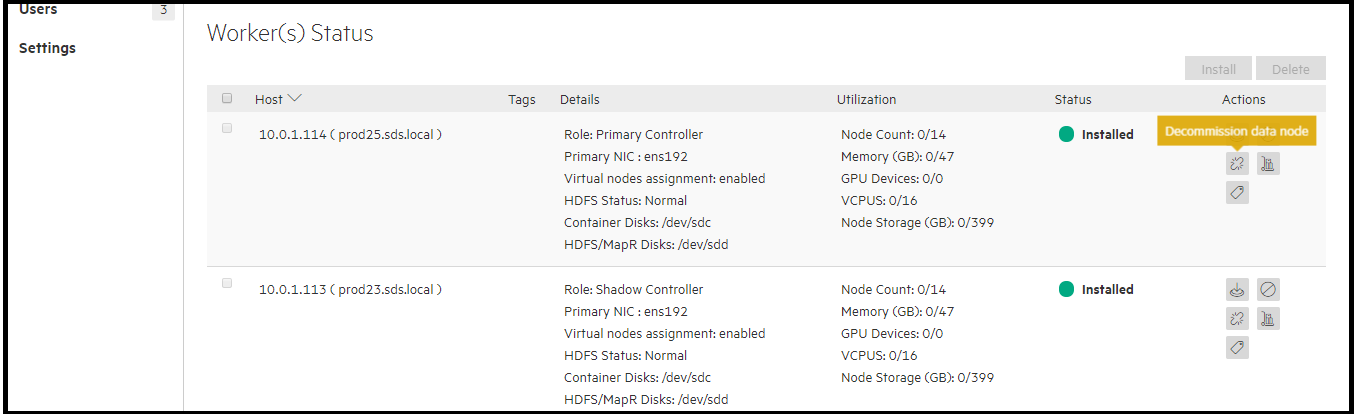
## Uninstallation methods

* SSH method (our demo will show this method)
* In SSH method, uninstall should begin at the controller and continues to uninstall on the rest of the nodes
* Non-SSH based
* Manually uninstall HCP on each node
* Reinitialize OS

## Preparation

If you have running clusters, need to stop them and delete them prior

* Unmount any existing external FS mounts (we don’t have it in this demo)
* Might want to run command fuser
* Different storage protocols (CEPH, NFS) have different ways of cleaning for unmount)
* Decommissioning nodes
* On the same installation page where you added nodes, you can hover over different options of the workers as seen below to decommission data nodes
* Good practice here just to free up resources in the data nodes.



*Figure 33. Decommissioning nodes*

* Disable virtual node assignment
* On the same installation page where you added nodes, you can hover over different options of the workers as seen below to disable virtual node assignment
* Disabling virtual node assignments prevents another user to add nodes. This is especially IMPORTANT in enterprise settings when there are multiple users who can potentially be adding nodes at the time of your uninstall.

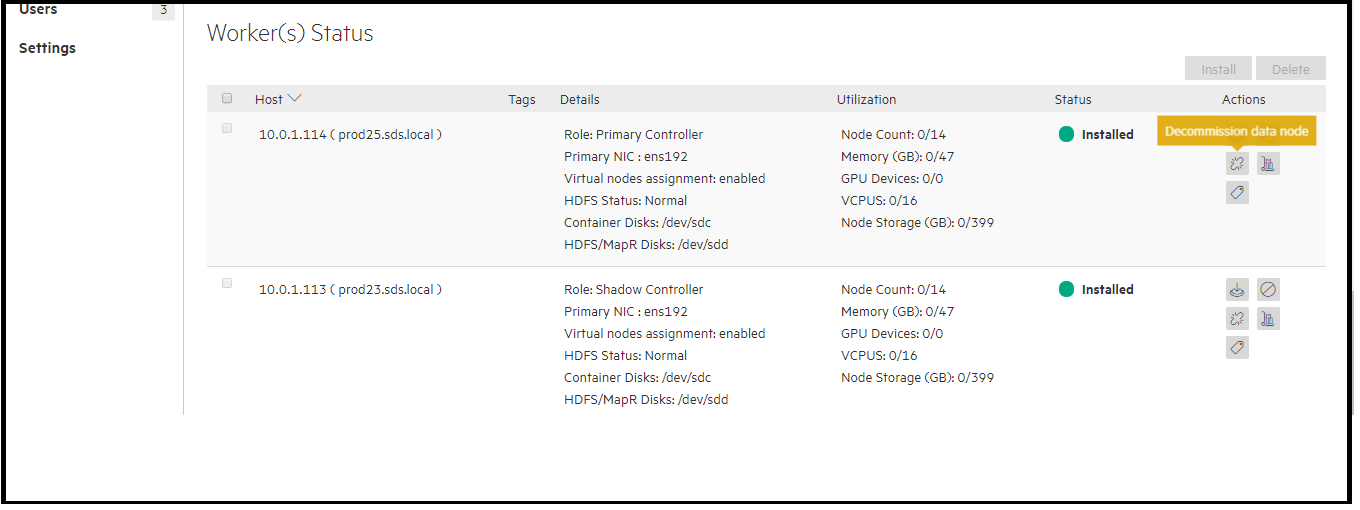


Figure 34. Delete the nodes

## Uninstall

* Execute the bin file with –erase: ./ bluedata-epic-entdoc-minimal-debug-5.0-2103.bin--erase
* Erase still doesn’t clean everything, might be some config files or leftover ports
* For this demo, we didn’t run into any issues
* If any fails occur, you will have to manually uninstall HCP on each of the nodes (this is essentially the non-SSH uninstall method)

## Post clean up

* Rpm checks in CLI to ensure that we’ve completed the erase process
* rpm -qa | grep bds
* rpm -qa | grep bluedata
* bdconfig --sysinfo
* Reboot host

# Reinstalling HCP

* Reinstalling HCP can be achieved the same way by restarting this guide with one caveat.
* When we tried to reinstall HCP on the same machines after uninstalling, we ran into an issue when adding a gateway node due to the fact that the Docker storage was already configured in the initial install.
* To fix this this: edit the /etc/sysconfig/docker-storage file in the gateway node to match the screen shot below



* Due to a bug in the HCP uninstallation, we have to add the proxy again in the /etc/yum.conf file
* proxy = http://web-proxy.corp.hpecorp.net:8080