Multicluster Management with IBM Cloud Pak for Multicloud Management

IBM

Contents

Introduction

To meet the unique needs of your business and remain competitive in today's fast-moving environment, you may find yourself adopting infrastructure and solutions from a wide range of cloud vendors.

A hybrid, multicloud world is quickly becoming the new normal. But managing your cloud-based services and data across multiple providers can feel overwhelming. With each set of cloud services coming with its own tools, you're likely facing increased complexity and cost. New management solutions and delivery methods can help optimize performance, control costs, provide quick cloud access and secure your mix of applications, environments, and data, whether they are inside your data center or in the cloud.

IBM Cloud Pak for Multicloud Management can manage Kubernetes clusters that are deployed on any target infrastructure - either in your own data center or in a public cloud. IBM Cloud Pak for Multicloud Management includes IBM Cloud App Management to simplify monitoring your applications across any cloud environment.

IBM Cloud Pak for Multicloud Management helps companies make the transition from traditional monitoring systems to cloud-based ones more easily. It effectively monitors all kinds of IT resources in a hybrid environment. It helps Operation teams manage hybrid environments without hiring new personnel to support each new technology that is being used by developers.

Cloud Pak for Multicloud Management provides consistent visibility, automation, and governance across a range of multicloud management capabilities such as cost and asset management, infrastructure management, application management, multi-cluster management, edge management, and integration with existing tools and processes. Customers can leverage Cloud Pak for Multicloud Management to simplify their IT and application ops management, while increasing flexibility and cost savings with intelligent data analysis driven by predictive signals.

In this tutorial, you will explore the following key capabilities:

- Understand Cloud Pak for Multicloud Management
- Learn how to add a managed cluster
- Learn how to deploy an application chart from catalog
- Learn how to manage cluster objects spanning multiple clusters

For more information about IBM Cloud Pak for Multicloud Management, visit:
https://www.ibm.com/cloud/cloud-pak-for-management

Business Scenario

As a member of the Cloud Operation team, you are having problems to manage your multicloud hybrid world. Operate your cloud-based services and data across multiple providers is overwhelming your team. Your company is deploying multiple Kubernetes clusters to address their specific needs. Some Dev teams are deploying clusters across public and private clouds, and some are deploying clusters across regions, and some are deploying clusters to support the development and test needs.

As different teams deploy more clusters, new challenges are introduced:

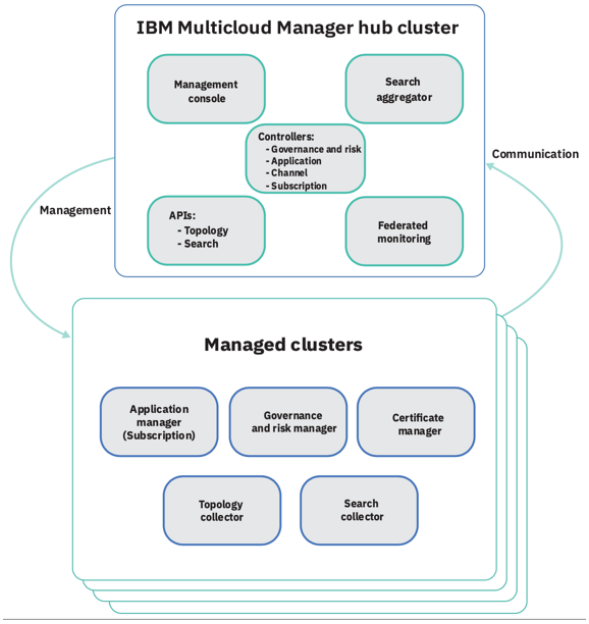
- Where are my services running?
- How can I monitor applications across clusters and clouds?
- How can I manage clusters as if they were one environment?
- How do I monitor usage across clouds?
- Where are the failed components?
- How do I deploy applications across these environments?
- How do I move workloads across environments?
- How do I set consistent security policies across environments?
- Which clusters are compliant?
- How can I place workloads based on capacity, policy?

Because of that, you want to explore how IBM Cloud Pak for Multicloud Management, provides consistent visibility, governance and automation of your complex environment.

In this tutorial, you use two Red Hat OpenShift clusters.

- **Hub cluster** includes management console, federated monitoring, and all the controllers. In this tutorial, you identify Hub cluster as *local-cluster*.
- **Managed cluster** includes klusterlet components that communicate status back to the Hub cluster. In this tutorial, you identify managed cluster as *managed-cluster*.

The relationship between hub and managed clusters is shown in the diagram below:



In this tutorial, you will log in to the Hub cluster to do cluster management.

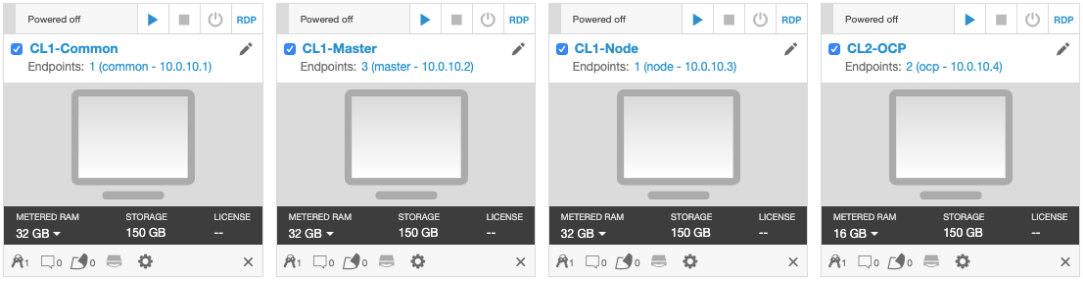
You will complete the following tasks:

- Add a managed cluster
- Visualize cluster topology
- Visualize clusters and launch to each cluster
- Deploy an application chart to remote cluster
- Manage cluster objects

Tutorial Environment

Environment Overview

Four virtual machines have been provided for this tutorial.

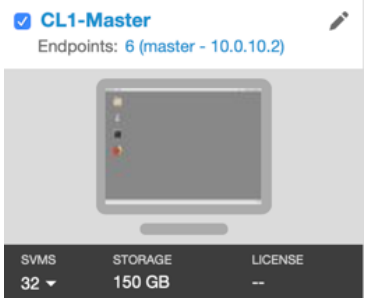


- CL1 is the Hub Cluster. It is an OpenShift Container Platform, **OCP.** It is installed in three VMs, the **CL1-Master** VM with master node, **CL1-Common** VM with all common services, and one compute node VM: **CL1-Node**. As part of this tutorial, you use CL1-Master as workstation too.
- CL2 is the Managed Cluster. It is an All-in-One OpenShift cluster. Here you have **CL2-OCP** VM.

Starting your Environment

__1. Follow the instructions on the right to provision the lab environment.
__2. If the environment is not started automatically, click the play button in the upper right to start all four virtual machines. This takes approximately 15 minutes.

__3. Click **CL1-Master** to access the desktop of the server



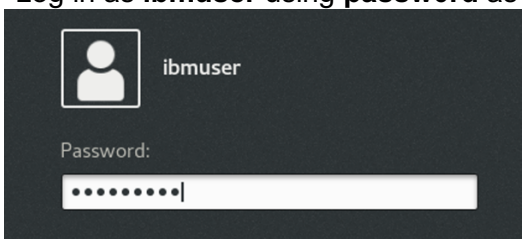
__4. A Linux desktop appears in your browser tab. Feel free to resize the window for a better view.

Lab - IBM Cloud Pak for Multicloud Management Cluster Management

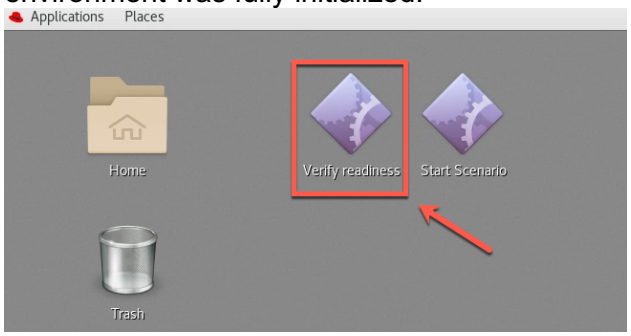
1.1 Accessing the IBM Cloud Pak for Multicloud Management

In this section, you explore your IBM Cloud Pak for Multicloud Management environment.

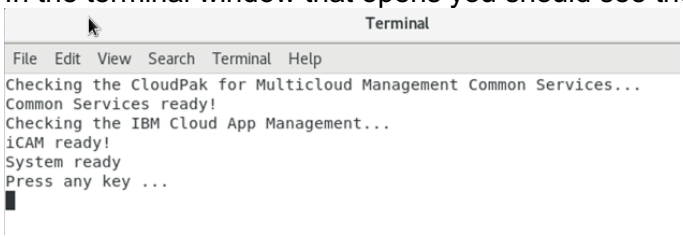
__1. Log in as **ibmuser** using **passw0rd** as a password.



__2. Verify that the environment was fully initialized. On the desktop, you should see an icon named **Verify readiness**. Double-click on the icon to run the verification script that checks if the environment was fully initialized.

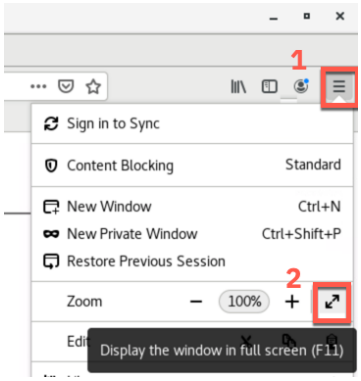


__3. In the terminal window that opens you should see the following text:

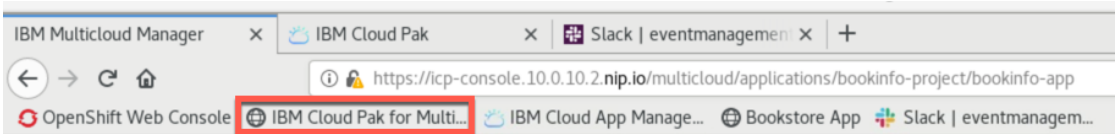


If the environment is not ready, wait until the "System ready" message is displayed.

__4. Start the **Firefox** browser (link is on the desktop). For better viewing, switch the browser in the virtual machine into the "Fullscreen" mode.

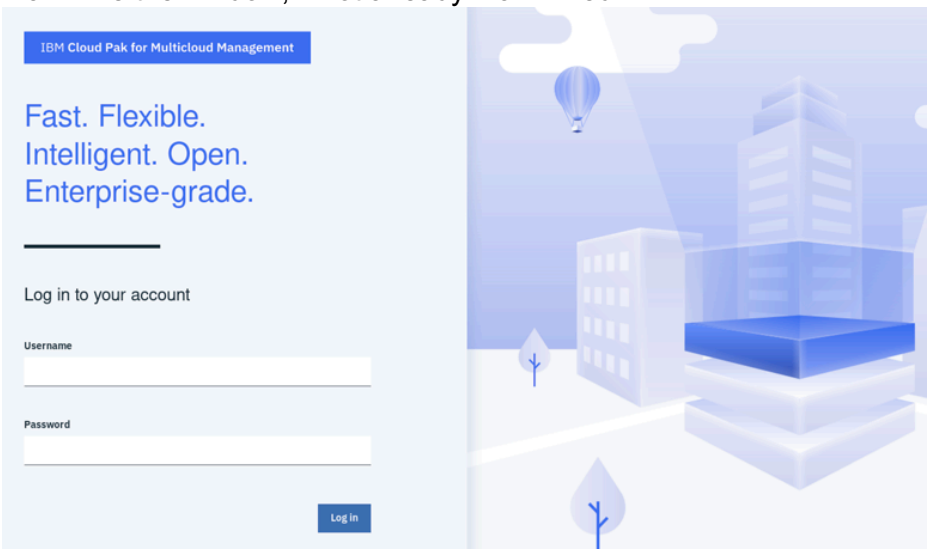


__5. The link to the IBM Cloud Pak for Multicloud Management is added to the Bookmark toolbar. Click the bookmark to open the UI.

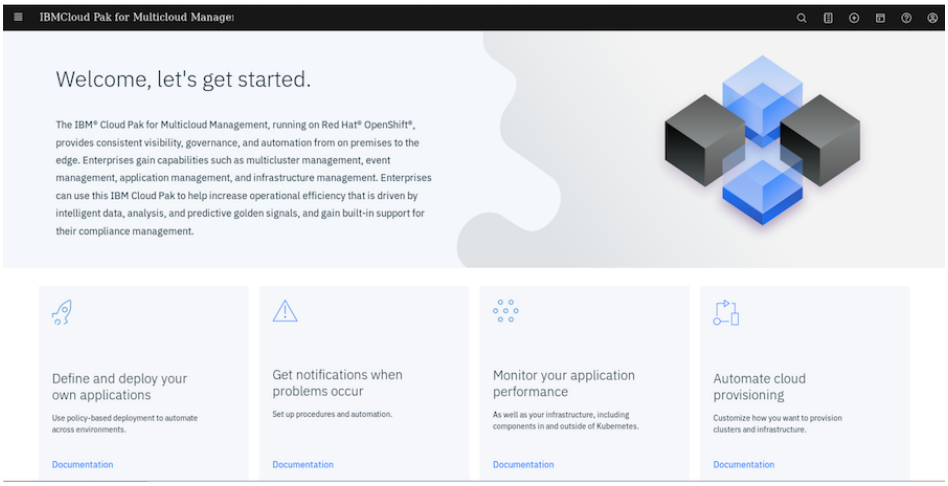


HINT: At any point during the lab, if you are lost navigating in the Cloud Pak UI you can click the link again to return to the main product screen.

__6. Log in as **admin** with a password of **Passw0rd!**
Maximize the window, if not already maximized.



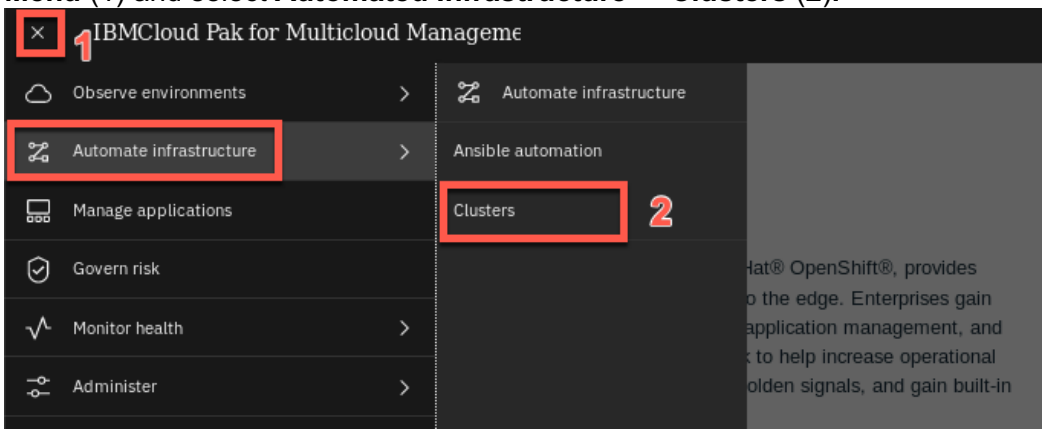
__7. After you log in, you are presented with a Welcome screen. If you see a different screen (Authentication), click again on the IBM Cloud Pak for Multicloud Management link on the bookmark toolbar.



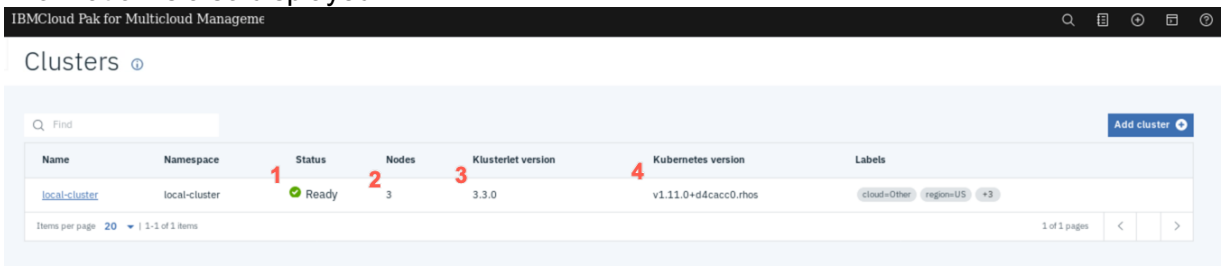
1.2 Add a Managed Cluster

IBM Cloud Pak for Multicloud Management provides consistent visibility, governance and automation from on premises to the edge. Enterprises gain capabilities such as multicluster management, event management, application management and infrastructure management. In this section, you add a new managed cluster in your Control Panel.

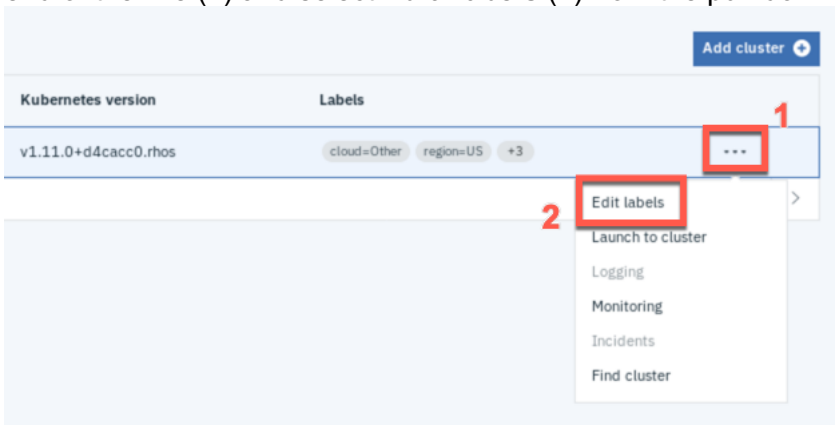
__1. To view the cluster information available in your Management environment, click the hamburger **Menu** (1) and select **Automated Infrastructure -> Clusters** (2).



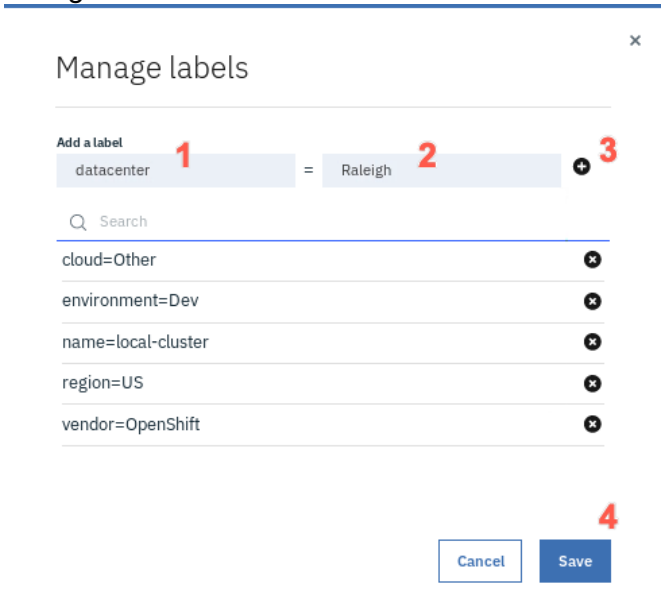
__2. Initially, only one cluster is shown in the list, which is the local-cluster (hub cluster). The cluster has three nodes (2) and the status is Ready (1). Kubernetes (4) and Klusterlet (3) version information is also displayed.



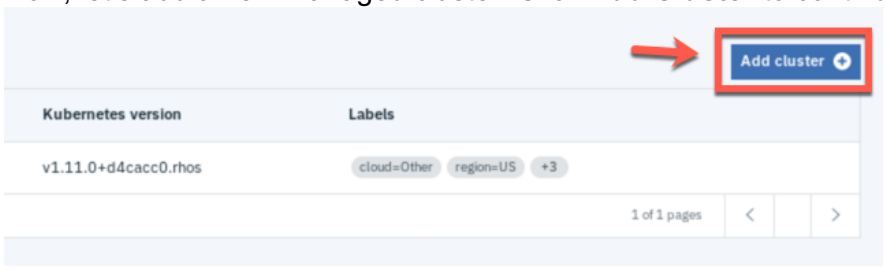
__3. You are able to add new labels to identify your cluster. To edit labels, click on three dots at the end of the line (1) and select **Edit Labels** (2) from the pull-down menu.



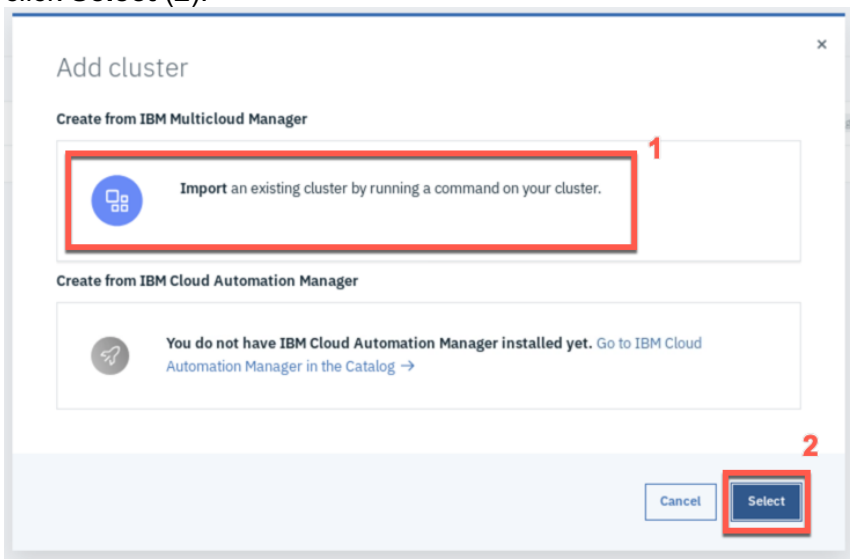
__4. Add a new label, **datacenter** (1), and give a value **Raleigh** (2). Click **+** (3) and **save** (4) the changes.



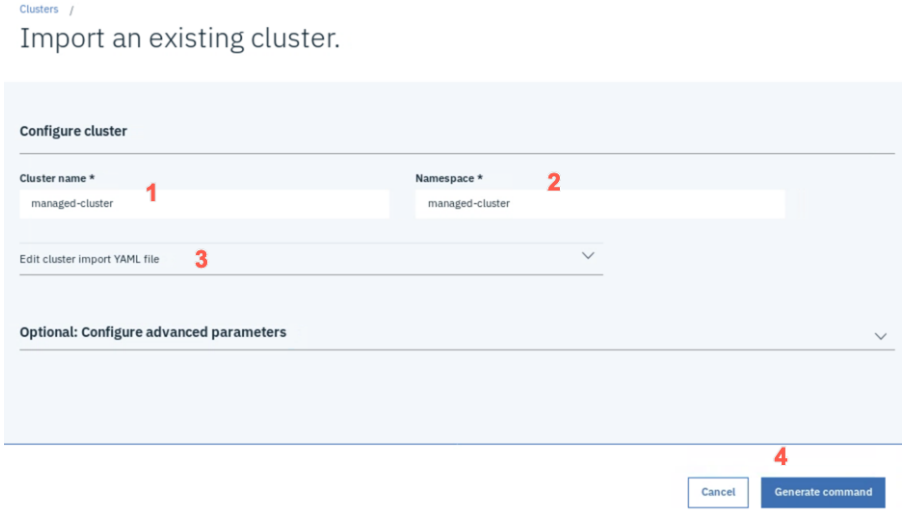
__5. Now, let's add a new managed cluster. Click **Add Cluster** to continue.



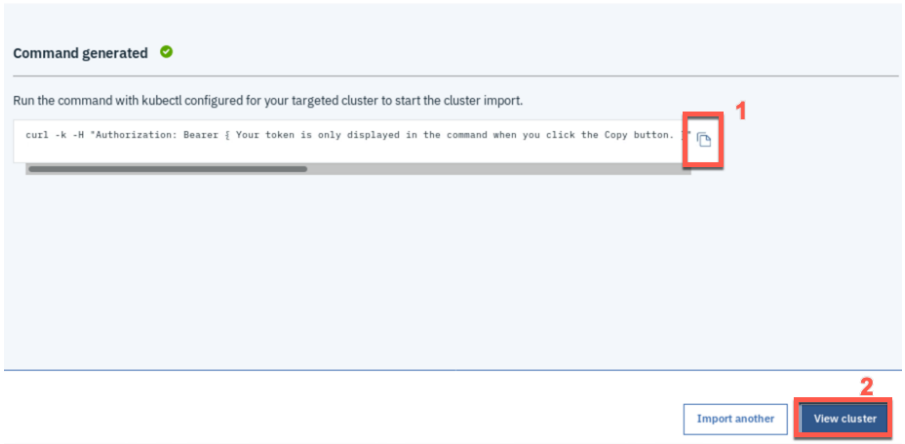
__6. You can add a cluster by Importing an existing cluster or provisioning a new cluster that uses Cloud Automation Manager. We use the first option. Select **Import an Existing cluster** (1) and click **Select** (2).



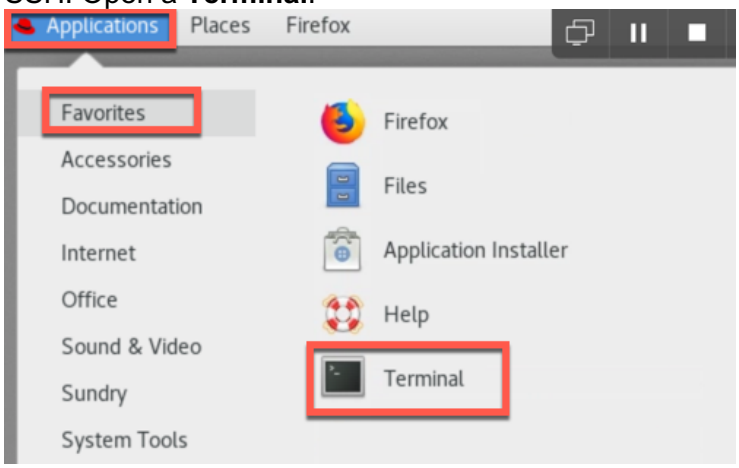
__7. Enter **managed-cluster** for cluster name (1) and **managed-cluster** for namespace (2). You can view the yaml file and change the settings as needed (3). To import an OpenShift cluster no further changes are needed. Click **Generate command** to continue (4).



__8. A curl command is generated that you will use to add the new cluster. Click **Copy command** button (1) and click **View cluster** (2) to see the new managed-cluster details page.



__9. You need to access your managed-cluster to execute the import command. Let's do it using SSH. Open a **Terminal**.



__10. Your managed server (CL2-OCP VM) has a DNS name: OCP. Issue these commands bellow to access the managed server and connect as root user.

ssh ocp

oc login -u admin -p passw0rd https://ocp.ibm.demo:8443

```
[ibmuser@master ~]$ ssh ocp
Last login: Thu Apr  9 14:39:32 2020 from master.ibm.demo
[ibmuser@ocp ~]$ oc login -u admin -p passw0rd https://ocp.ibm.demo:8443
Login successful.

You have access to the following projects and can switch between them with 'oc
project <projectname>':

    default
    kube-public
    kube-service-catalog
```

__11. **Paste** the generated command that you previously copied in the clipboard (Edit -> Paste or Shift+Ctrl+V). When you run the command, several Kubernetes objects are created in the multicluster-endpoint namespace.

```
1/clusters/managed-cluster/managed-cluster/import.yaml | kubectl apply -f -
  % Total    % Received % Xferd  Average Speed   Time    Time     Time  Current
                                 Dload  Upload   Total   Spent    Left  Speed
100  6270    0  6270    0     0   4185      0 --:--:--  0:00:01 --:--:--  4185
customresourcedefinition.apiextensions.k8s.io/endpoints.multicloud.ibm.com creat
ed
namespace/multicluster-endpoint created
secret/klusterlet-bootstrap created
secret/multicluster-endpoint-operator-pull-secret created
serviceaccount/ibm-multicluster-endpoint-operator created
endpoint.multicloud.ibm.com/endpoint created
```

If you receive the following error, run the command again:
error: unable to recognize "STDIN": no matches for kind "Endpoint" in version "multicloud.ibm.com/v1beta1"

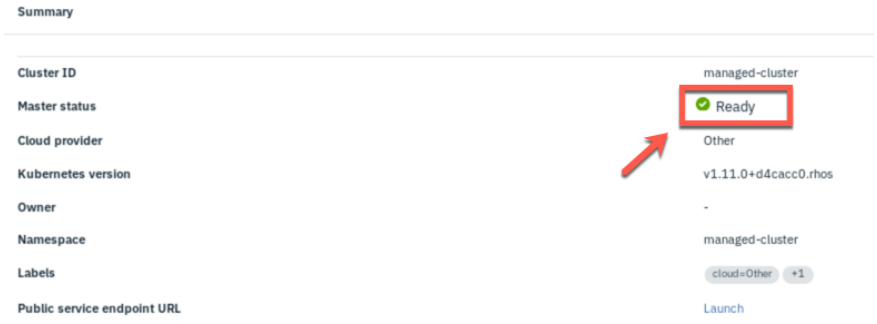
__12. You can view the progress by entering the command:

oc get pods -n multicluster-endpoint

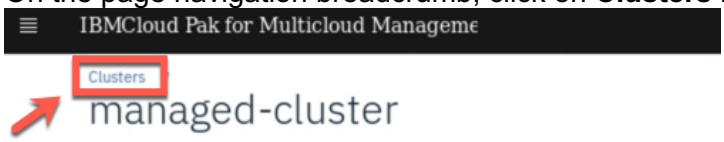
Make sure all the pods are in the running state.

```
[root@ocp ~]# oc get pods -n multicluster-endpoint
NAME                                              READY     STATUS    RESTARTS   AGE
endpoint-appmgr-564d67bc5-mmlsg                   1/1       Running   0          4m
endpoint-certmgr-55fc77fcdf-c7dwl                 1/1       Running   0          4m
endpoint-component-operator-b889dc78-prprx        1/1       Running   0          4m
endpoint-connmgr-57fdbc94cf-mxkh9                 1/1       Running   0          4m
endpoint-policyctrl-55bdf4b5d9-4ctxp              2/2       Running   0          4m
endpoint-search-558c88bd6c-ghc6c                  1/1       Running   0          4m
endpoint-svcreg-b5765895c-z9ftb                   1/1       Running   0          4m
endpoint-svcreg-coredns-547f764d9c-lvj7x          1/1       Running   0          4m
endpoint-tiller-6568dccbbd-fhqpl                  1/1       Running   0          4m
endpoint-topology-weave-collector-564dd856b-zjbpx 1/1       Running   0          4m
endpoint-topology-weave-scope-app-54f776489c-68rrz 2/2      Running   0          4m
endpoint-topology-weave-scope-xrgsm               1/1       Running   0          3m
endpoint-workmgr-7994bb4698-5mm89                 1/1       Running   0          4m
ibm-multicluster-endpoint-operator-598559cf69-fgfm9 1/1     Running   0          4m
```

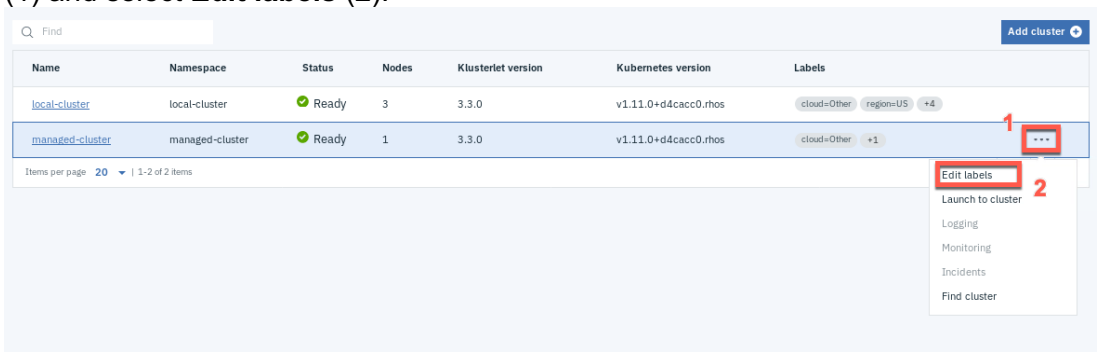
__13. The cluster end point is ready when all the Pods are in Running state. Back to the Firefox windows, make sure that the cluster status is **Ready** now (if necessary, refresh the managed-cluster details page).



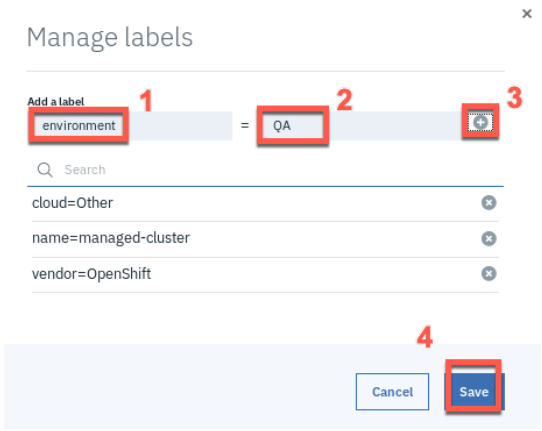
__14. On the page navigation breadcrumb, click on **Clusters** link.



__15. You notice that a second cluster with the name managed-cluster is added to the list. You can add labels to identify your new cluster. On the managed-cluster row, click on the three dots icon (1) and select **Edit labels** (2).



__16. Repeat the step 4 to add a label named **environment** (1) with a value of **QA** (2). Click **+** (3) and click **Save (4)**.

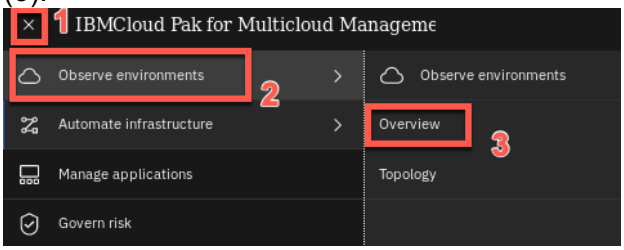


You have successfully added a cluster. Using Multicloud Management you will be able to manage both the clusters from a single pane of glass. Let's check it in the next section.

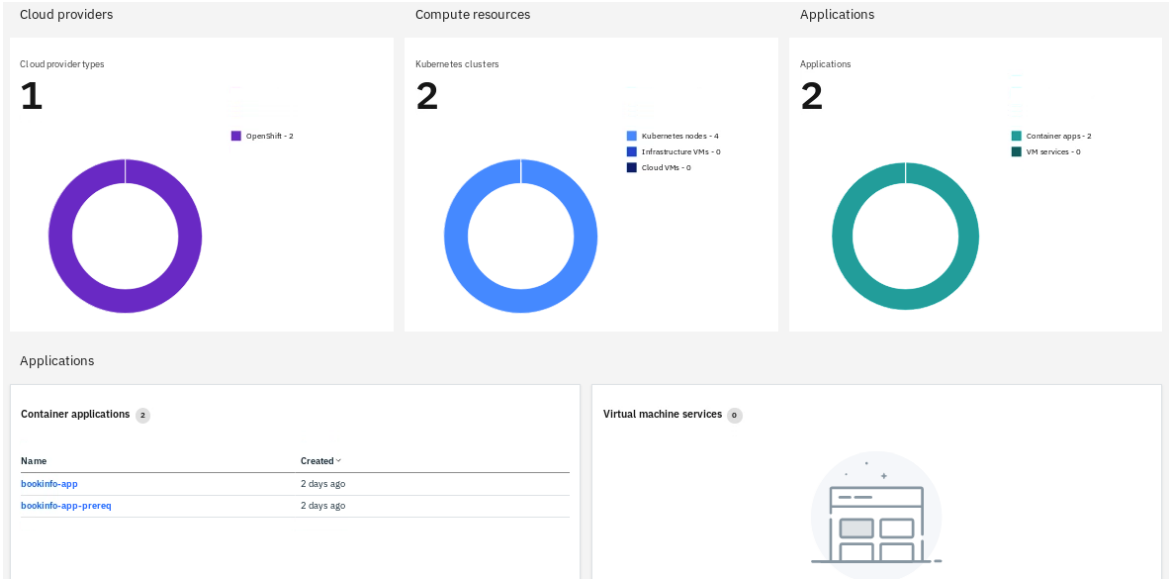
1.3 Visualize Clusters

In this step, you visualize clusters in a tabular view and topology view in your environment with hotlinks to start to each cluster.

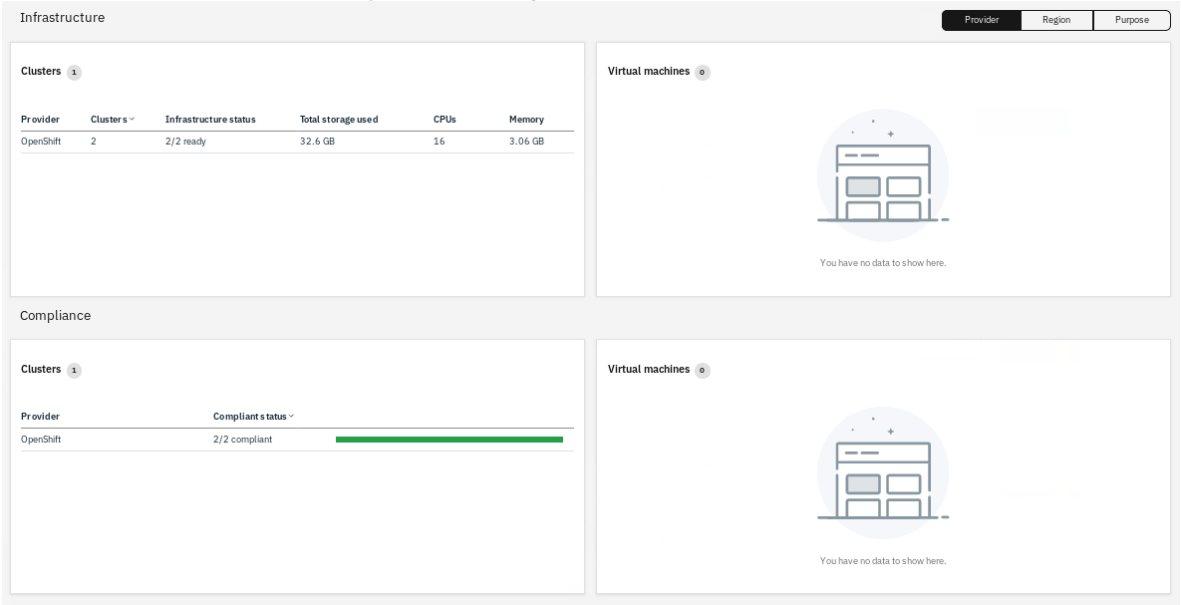
__1. With IBM Cloud Pak for Multicloud Management you are able to manage all your cluster from a single control panel. Open the **Menu** button (1) and click **Observe environments** (2) **> Overview** (3).



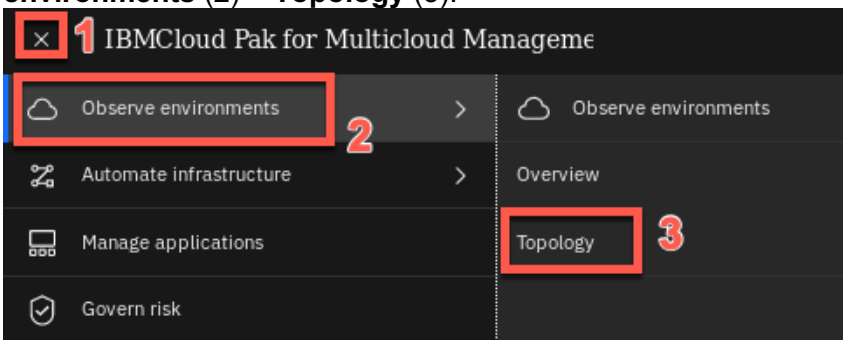
__2. The Overview menu option displays the status of all clusters including the health and resource metrics. The top section shows the operations details across all your cloud providers. In the first section, you can see information about cloud providers, compute resources, applications and infrastructure.



__3. The bottom section shows Resource Overview. Here you can see Cluster Compliance status, Cluster status, CPU, Memory, and Storage Resource View.



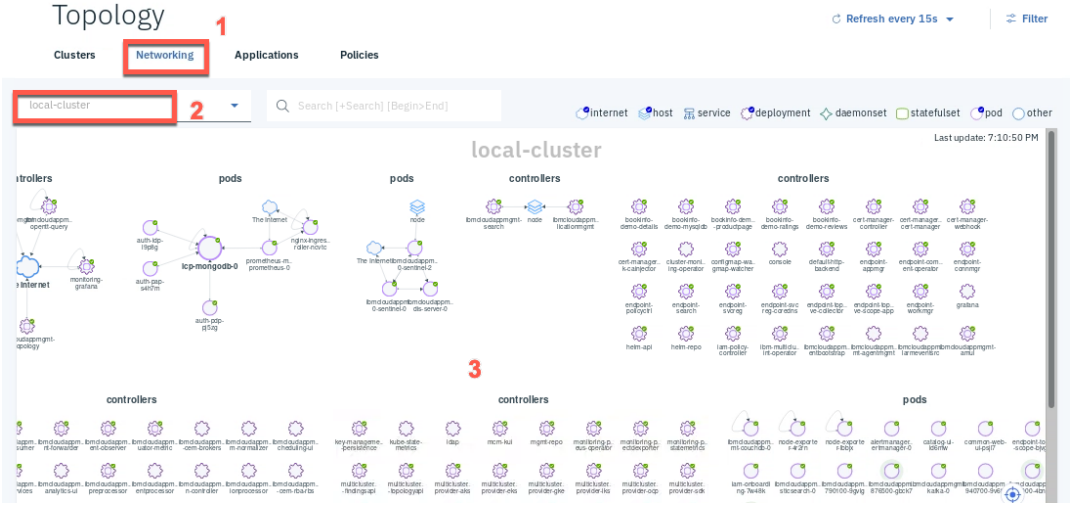
__4. Cluster topology gives a graphical view of clusters and associated networking, applications and polices. Let's explore the Cluster topology. Open the **Menu** (1) and click on **Observe environments** (2) **> Topology** (3).



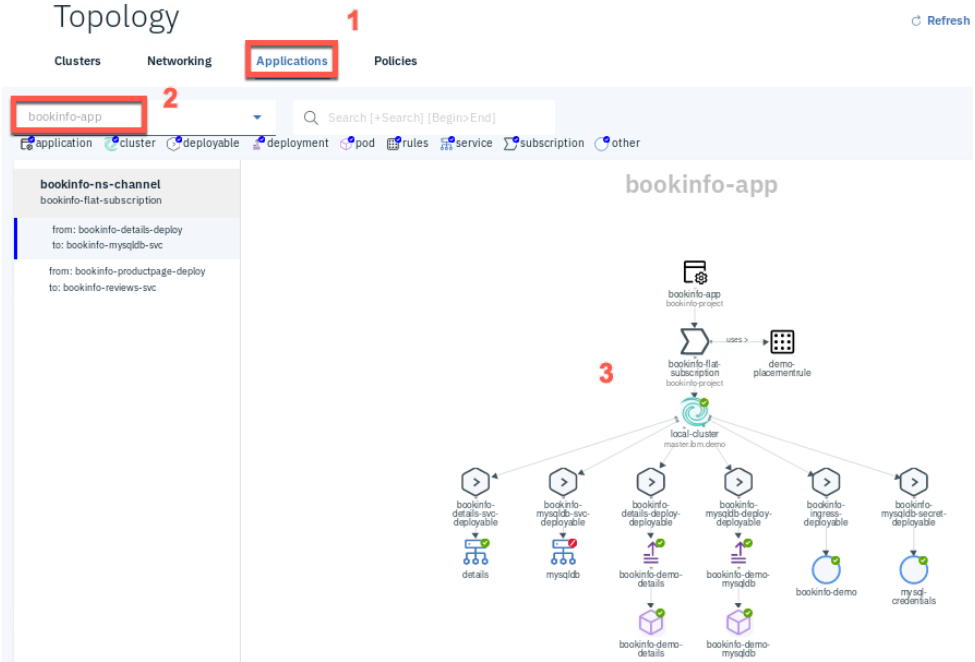
__5. You see a graphical view of your two clusters (local-cluster and managed-cluster). Click **on local-cluster (Demo)** icon to view more details.

__6. Here, you can review cluster information in a graphical view.

__7. Back to the Topology page, open the **Networking** page (1) and select the **local-cluster** (2). In this area (3), you can have details about the cluster network.



__8. Now, click on **Applications (1)** and select **bookinfo-app (2)**. In this area (3), you can see information about the deployment of an application. Don't worry about it now, you will explore it later.



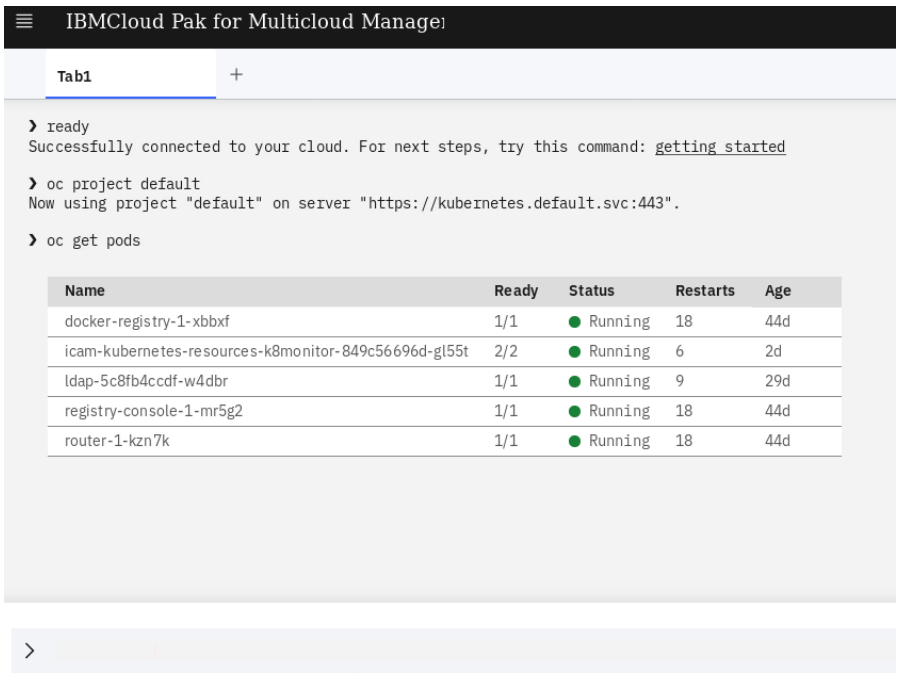
__9. Now, let's explore a really good feature of Multicloud Management: Visual Web Terminal. On the top right navigator, click on **Visual Web Terminal** button.

__10. You can use the Visual Web Terminal to run many commands across your environment. When categorized data is returned, such as when you enter a search command, it is returned in an interactive tabular format.

The Visual Web Terminal is particularly useful when troubleshooting issues that require running multiple commands and navigating the results of the commands in an easy way. Let's try something simple! Enter the command bellow:

oc project default

oc get pods



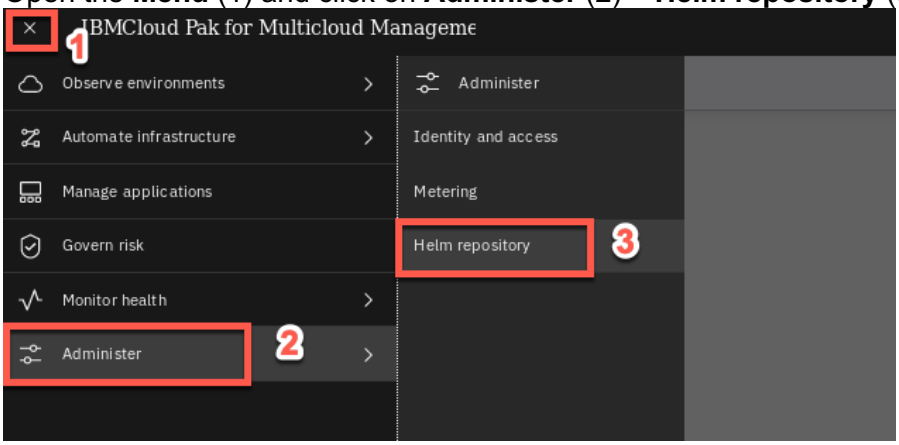
The information that is provided in the Visual Web Terminal is limited by the permissions of the user. When you run a command, only the items that you have permission to view are displayed.

Next section, you learn how to deploy an application to the local or remote cluster.

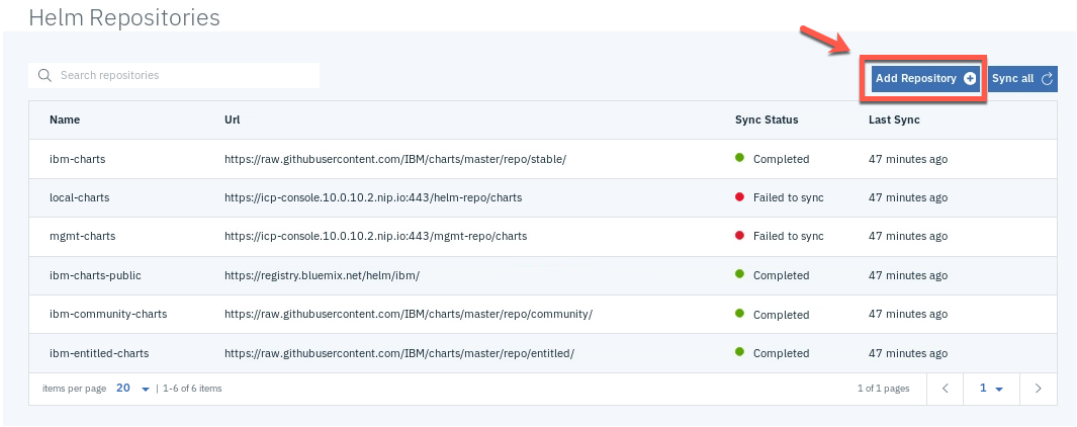
1.4 Deploy an application to the local or remote Cluster

In this step, you install a helm chart from the catalog to a local or remote cluster.

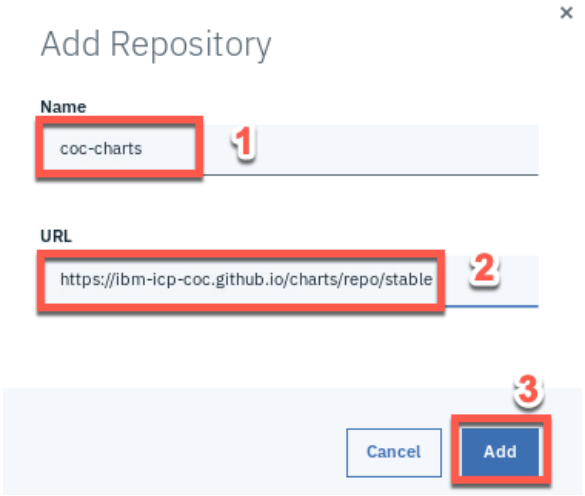
__1. Open the **Menu** (1) and click on **Administer** (2) **> Helm repository** (3).



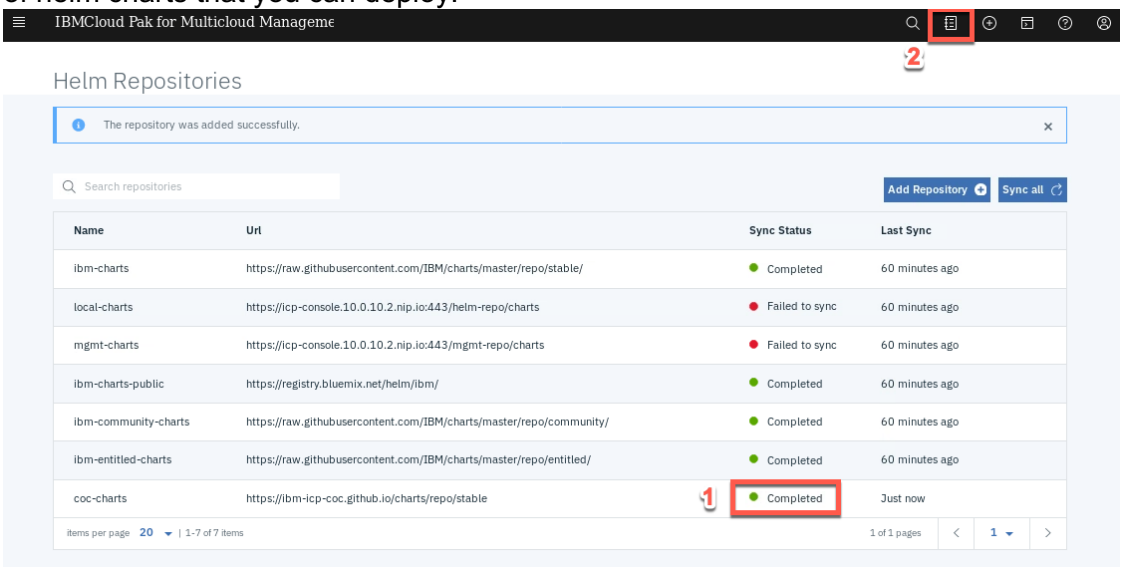
__2. On the Helm Repositories page, click **Add Repository** to register a new Helm Repository.



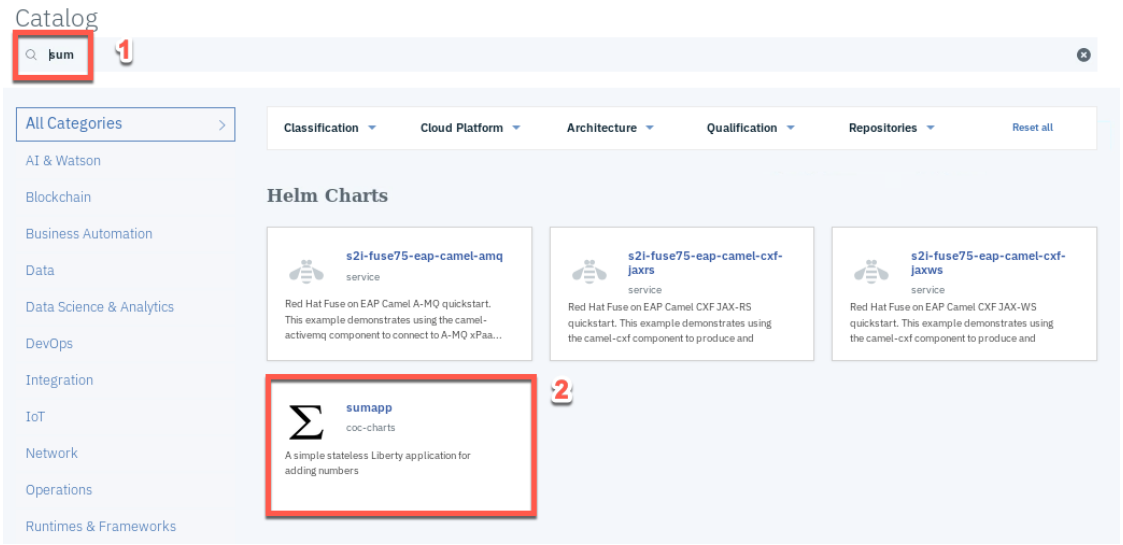
__3. Type **coc-charts** (1) as repository Name, and enter **https://ibm-icp-coc.github.io/charts/repo/stable** as URL (2). Click **Add** (3).



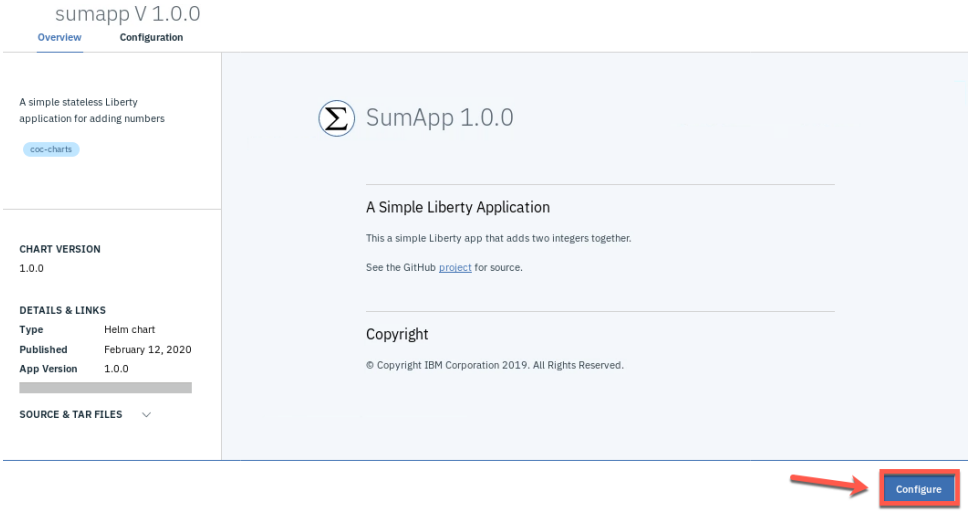
__4. After few seconds, you should see Sync Status as **Completed** (1). Now, let's deploy an application from this new Helm repository. Click **Catalog** (2) on upper right corner of the page to view the list of helm charts that you can deploy.



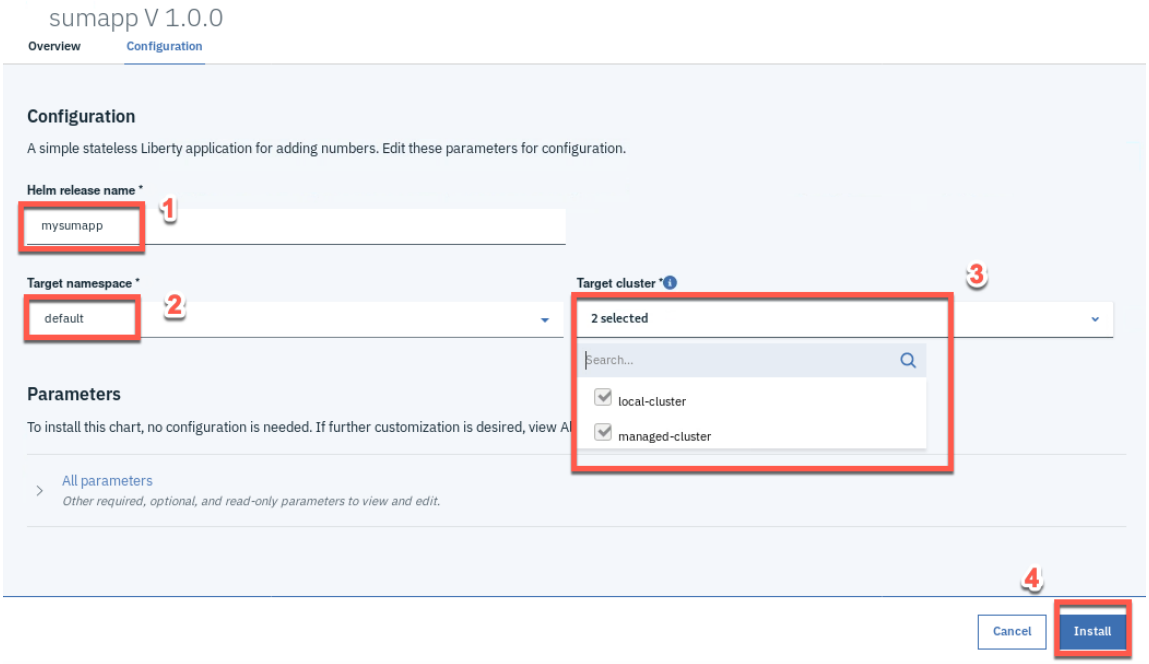
__5. Once the page is loaded search for **sum** (1) and select **sumapp** (2) application.



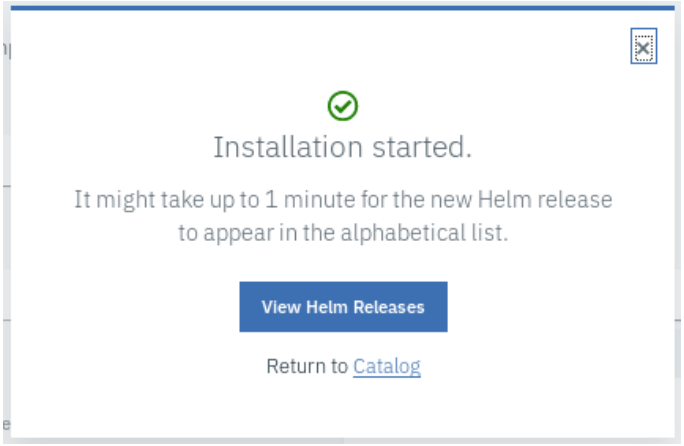
__6. The chart deploys a simple Liberty web application for demonstration purposes. Select **Configure** to continue.



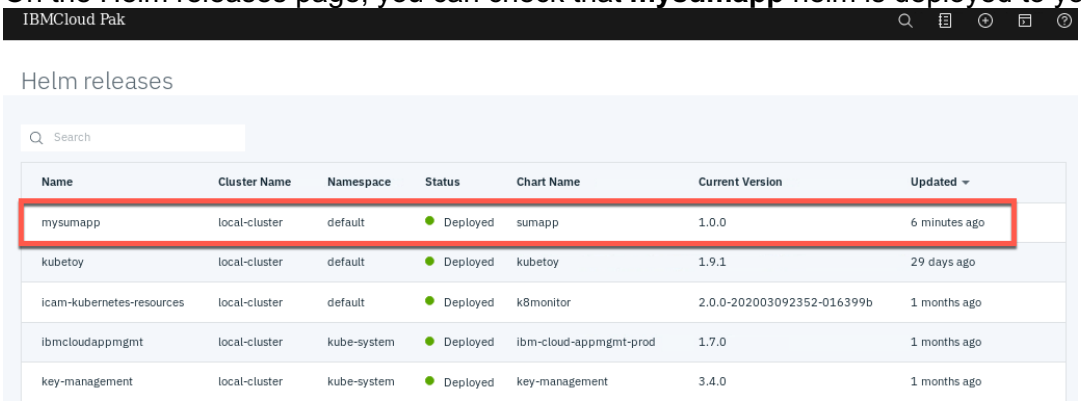
__7. Enter **mysumapp** as Helm release name (1), select **default** as Target namespace (2). On Target cluster, select both **local-cluster** and **managed-cluster** (3). Then click **Install** (4).



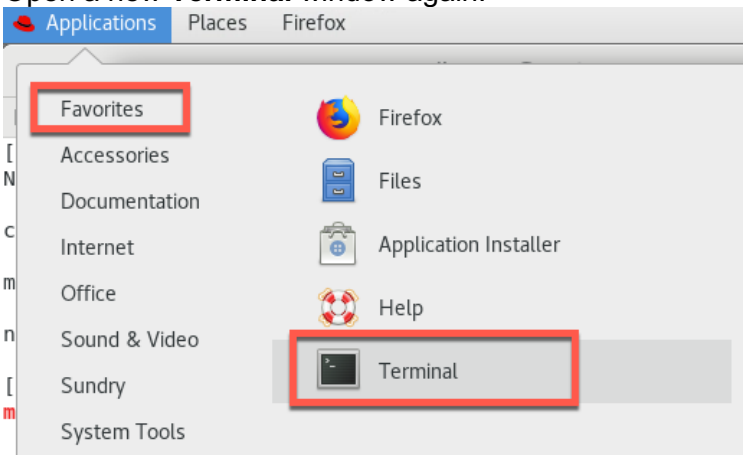
__8. The installation starts immediately but it takes a few minutes to deploy the application to remote cluster. Click **View Helm Releases** to view the status.



__9. On the Helm releases page, you can check that **mysumapp** helm is deployed to your clusters.



__10. Open a new **Terminal** window again.



__11. From the command line window, check if the new pod is created and it is in **Running** state. Execute the command below:

oc project default

```
[ibmuser@master ~]$ oc project default
Now using project "default" on server "https://master.ibm.demo:8443".
```

oc get pods | grep mysumapp

```
ibmuser@master:~
File  Edit  View  Search  Terminal  Help
[ibmuser@master ~]$ oc get pods | grep mysumapp
mysumapp-sumapp-664675cdd6-qh5tx                  1/1       Running   0
      7m
[ibmuser@master ~]$
```

__12. Now, let's define a route for our web application. First, let's get the service name created for your application. Execute the command below to capture the Service's name.

oc get services | grep mysumapp

```
[ibmuser@master ~]$ oc get services | grep mysumapp
mysumapp-sumapp-service   NodePort    172.30.104.156   <none>        80:30703/TCP             9m
[ibmuser@master ~]$
```

__13. Now that you know the service name (my*sumapp-sumapp-service*), let's create a route by exposing our service using the command below:

oc expose service mysumapp-sumapp-service

```
[ibmuser@master ~]$ oc expose service mysumapp-sumapp-service
route.route.openshift.io/mysumapp-sumapp-service exposed
[ibmuser@master ~]$
```

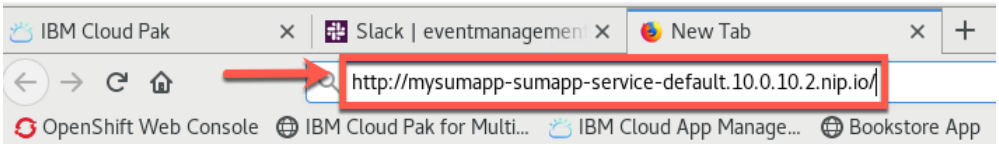
__14. View your new route:

oc get route | grep mysumapp

```
[ibmuser@master ~]$ oc get route | grep mysumapp
mysumapp-sumapp-service   mysumapp-sumapp-service-default.10.0.10.2.nip.io
  mysumapp-sumapp-service   http                    None
[ibmuser@master ~]$
```

__15. Back to the **Firefox** window, open a **new tab** and navigate to your application route hostname:

http://mysumapp-sumapp-service-default.10.0.10.2.nip.io

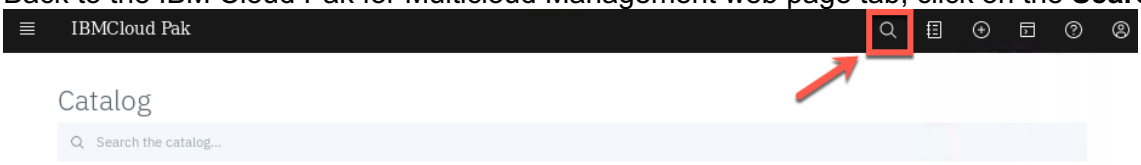


__16. Great! Your Liberty application is available on your OpenShift cluster.
There is another lab that explains more advanced techniques about Application Management in a Multicluster scenario, visit [IBM Demos – Cloud Pak for Multicloud Management page] to check other labs.

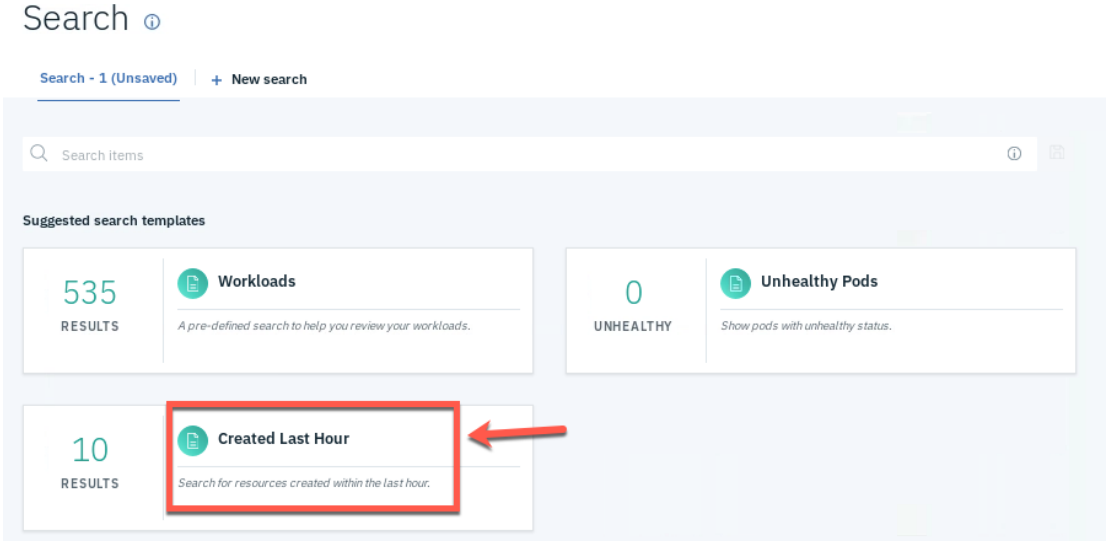
1.5 Manage cluster objects

You can use the management console to create, manage, view details, and troubleshoot application resources and Kubernetes objects in all clusters from a single interface. The management console search page supports searching for application resources by the component kind for each resource.

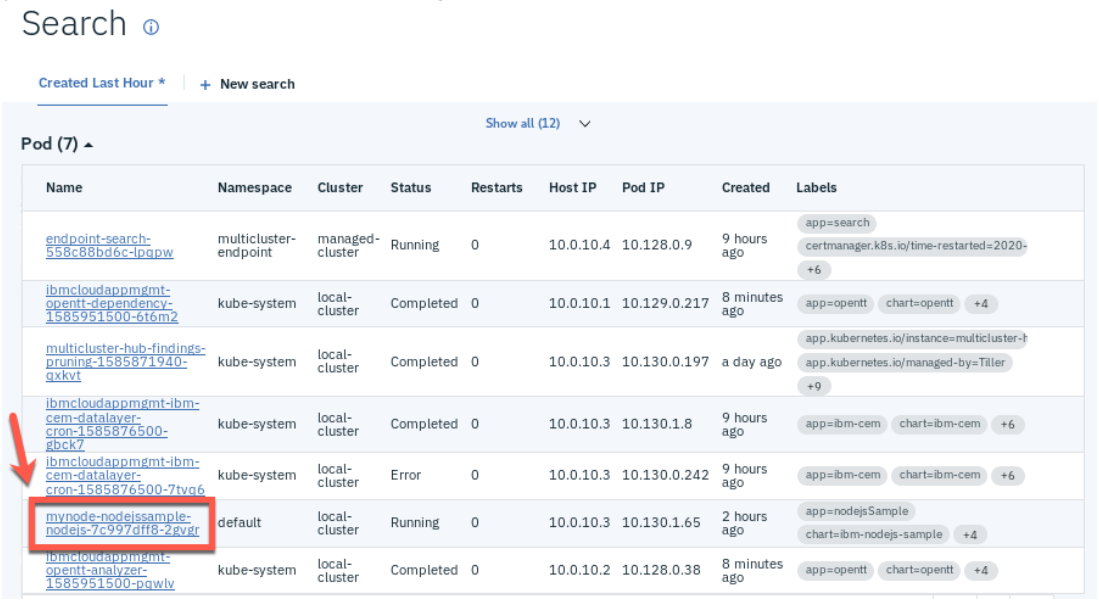
__1. Back to the IBM Cloud Pak for Multicloud Management web page tab, click on the **Search** button.



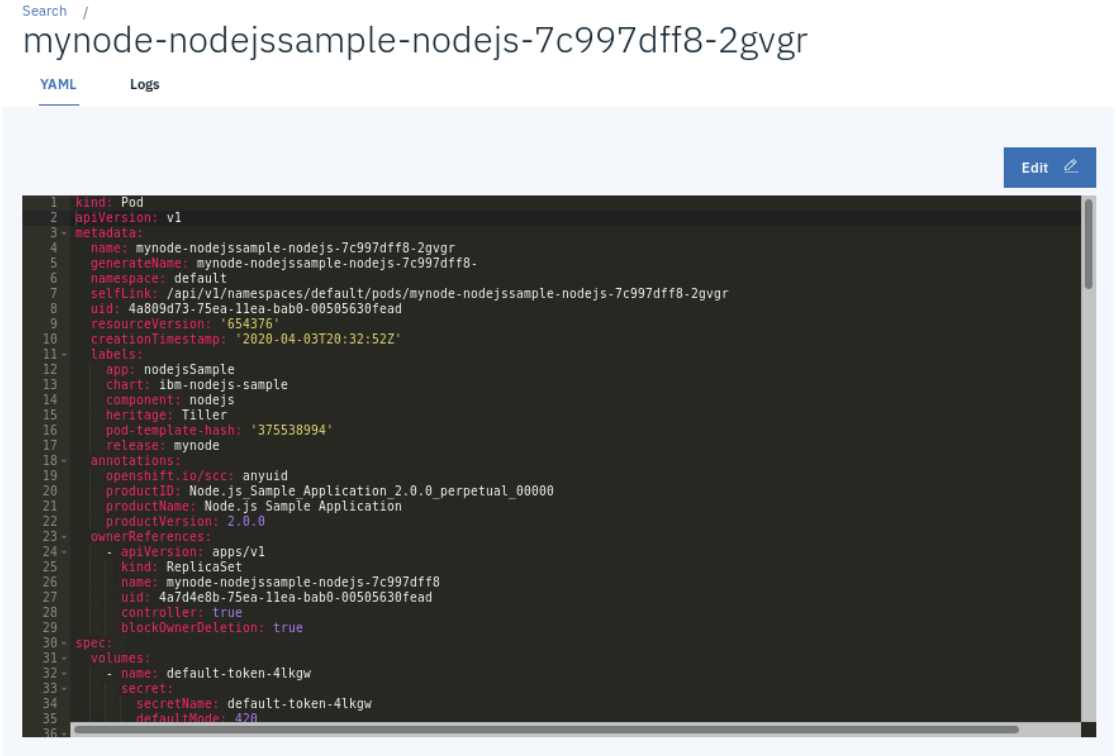
__2. The Search menu gives access to application resources and Kubernetes objects. The Search overview screen displays commonly used search templates - a pre-defined template to view workloads, unhealthy pods and workloads created in last hour. You can also create your own search templates. Click on **Created Last Hour** button.



__3. If you scroll down to the **Pod** section, you should see the **mynode-nodejssample-nodejs** pod that you created earlier in the list along with other pods. Click on the pod name.



__4. From this screen you can open Pod definition, edit the values and view logs. You are able to do this for any objects, in any managed cluster.



Congratulations! You have successfully completed the lab “Cluster Management with IBM Cloud Pak for Multicloud Management”.

Summary

You completed the Cloud Pak for Multicloud Management tutorial: Multi-cluster Management. Throughout the tutorial, you explored the key takeaways:

- Understand Cloud Pak for Multicloud Management;
- Add a managed cluster;
- Deploy an application chart;
- Manage and monitor application resources of local and remote clusters;

If you would like to learn more about Cloud Pak for Multicloud Management, please refer:

- Cloud Pak for Multicloud Management home page
- Cloud Pak for Multicloud Management Demos

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