



# Deploying Applications on Kubernetes Clusters

Once you have created Kubernetes cluster using the Cisco Container Platform web interface, you can deploy containerized applications on top of it.

This chapter contains the following topics:

- [Workflow of Deploying Applications, on page 1](#)
- [Downloading Kubeconfig File, on page 1](#)
- [Sample Scenarios, on page 2](#)

## Workflow of Deploying Applications

Task	Related Section
Create Kubernetes clusters using the Cisco Container Platform web interface.	<a href="#">Creating Kubernetes Clusters on vSphere On-prem Clusters</a>
Download the kubeconfig file that contains the cluster information and the certificates required to access clusters.	<a href="#">Downloading Kubeconfig File, on page 1</a>
Use the kubectl utility to deploy the application and test the scenario.	<a href="#">Sample Scenarios, on page 2</a>

## Downloading Kubeconfig File

You must download the cluster environment to access the Kubernetes clusters using command line tools such as `kubectl` or using APIs.

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**Step 1** From the left pane, click **Clusters**.

**Step 2** Click the **Download** icon corresponding to the cluster environment that you want to download.

The `kubeconfig` file that contains the cluster information and the certificates required to access clusters is downloaded to your local system.

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# Sample Scenarios

This topic contains a few sample scenarios of deploying applications.

## Deploying a Pod with Persistent Volume

Tenant clusters are deployed with a default storage class named **standard**, and a default storage class provider named **vSphere provider**.

If you select a HyperFlex local network during cluster creation, HyperFlex storage class and storage class provisioner are created by default.

In Cisco container Platform 4.0+, when deployed with Hyperflex 4.0+, the following two HyperFlex provisioners are supported:

- **hyperflex**, the HyperFlex FlexVolume provisioner available with HyperFlex 3.5+
- **hyperflex-csi**, the HyperFlex Container Storage Interface (CSI) provisioner available with HyperFlex 4.0+




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**Note** We recommended that you use the HyperFlex Container Storage Interface (CSI) plugin, which is a more robust framework.

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**Step 1** Configure a tenant Kubernetes cluster.

```
export KUBECONFIG=<Path to kubeconfig file>
```

**Step 2** Verify if the storage cluster is created.

```
kubectl describe storageclass standard
```

```
Name:                standard
IsDefaultClass:      Yes
Provisioner:         kubernetes.io/vsphere-volume
Parameters:          diskformat=thin
ReclaimPolicy:       Delete
VolumeBindingMode:   Immediate
```

On HyperFlex 4.0+, if you have selected a HyperFlex local network, additional storage classes are displayed when you run the following command:

```
kubectl get sc
```

```
NAME                PROVISIONER                AGE
hyperflex            hyperflex.io/hxvolume      22h
hyperflex-csi        csi-hxcsi                  22h
standard (default)  kubernetes.io/vsphere-volume 22h
```

**Step 3** Create the persistent volume claim to request for storage.

```
cat <<EOF > pvc.yaml
kind: PersistentVolumeClaim
apiVersion: v1
metadata:
```

```

  name: pv-claim
spec:
  storageClassName: standard
  accessModes:
    - ReadWriteOnce
  resources:
    requests:
      storage: 3Gi
EOF

```

**Note** The `storageClassName` field is optional. For HyperFlex 4.0+, you must use **hyperflex-csi** as the storage class.

```

kubect1 create -f pvc.yaml
persistentvolumeclaim "pv-claim" created

```

**Note** The HyperFlex storage class supports the `ReadWriteOnce` or `ReadOnlyMany` access modes and the vSphere storage class supports the `ReadWriteOnce` access mode.

#### Step 4 Verify if the persistent volume claim (pvc) is created.

```

kubect1 describe pvc pv-claim
Name:          pv-claim
Namespace:    default
StorageClass: standard
Status:       Bound
Volume:       hx-default-pv-claim-5c4e8978-cdd2-11e8-9a07-005056b8fd7b
Labels:
Annotations:  pv.kubernetes.io/bind-completed=yes
              pv.kubernetes.io/bound-by-controller=yes
Finalizers:   [kubernetes.io/pvc-protection]
Capacity:     3Gi
Access Modes: RWO,ROX
Events:       \

```

Persistent Volume is automatically created and is bounded to this pvc.

**Note** When **VSPHERE** is used as the default storage class, a VMDK file is created inside the **kubevols** folder in the datastore which is specified during the creation of the tenant Kubernetes cluster.

#### Step 5 Create a pod that uses persistent volume claim with storage class.

```

cat <<EOF > pvc-pod.yaml
kind: Pod
apiVersion: v1
metadata:
  name: pvc-pod
spec:
  volumes:
    - name: pvc-storage
      persistentVolumeClaim:
        claimName: pv-claim
  containers:
    - name: pvc-container
      image: nginx
      ports:
        - containerPort: 80
          name: "http-server"
      volumeMounts:
        - mountPath: "/usr/share/nginx/html"
          name: pvc-storage
EOF

```

```

kubect1 create -f pvc-pod.yaml
pod "pvc-pod" created

```

**Step 6** Verify if the pod is up and running.

```
kubectl get pod pvc-pod
```

NAME	READY	STATUS	RESTARTS	AGE
pvc-pod	1/1	Running	0	16s

When **VSPHERE** is used as the default storage class, you can access vCenter and view the dynamically provisioned VMDKs of the pod.

## Deploying Cafe Application with Ingress

This scenario describes deploying and configuring the *Cafe application* with Ingress rules to manage incoming HTTP requests. It uses a **Simple fanout with SSL termination Ingress**.

For more information on Ingress, see [Load Balancing Kubernetes Services using NGINX](#).

**Step 1** Go to the following URL:

<https://github.com/nginxinc/kubernetes-ingress/tree/master/examples/complete-example>

**Step 2** Download the following yaml files:

- tea-rc.yaml
- tea-svc.yaml
- coffee-rc.yaml
- coffee-svc.yaml
- cafe-secret.yaml
- cafe-ingress.yaml

**Step 3** Open the **kubectl** utility.

**Step 4** Obtain the IP address of the L7 NGINX load balancer that Cisco Container Platform automatically installs:

```
kubectl get pods --all-namespaces -l app=nginx-ingress -o wide
```

NAMESPACE	NAME	READY	STATUS	RESTARTS	AGE	IP	NODE
ingressnginx	nginx-ingresscontroller-66974b775-jnmp1	1/1	Running	0	3d	10.10.45.235	test-clusterwrc5729f9ce2

**Step 5** Deploy the Cafe application.

a) Create the coffee and the tea services and replication controllers:

```
kubectl create -f tea-rc.yaml<br>
kubectl create -f tea-svc.yaml<br>
kubectl create -f coffee-rc.yaml<br>
kubectl create -f coffee-svc.yaml
```

**Step 6** Configure load balancing.

a) Create a Secret with an SSL certificate and a key:

```
kubectl create -f cafe-secret.yaml
```

## b) Create an Ingress Resource:

```
kubectl create -f cafe-ingress.yaml
```

**Step 7** Verify that the Cafe application is deployed.

```
kubectl get pods -o wide
```

NAMESPACE	READY	STATUS	RESTARTS	AGE	IP	NODE
coffee-rc-jb9sx	1/1	Running	0	3d	192.168.151.134	test-cluster-wb3d42afeff
coffee-rc-tjwgj	1/1	Running	0	3d	192.168.44.133	test-cluster-wc5729f9ce2
tea-rc-6qvmv	1/1	Running	0	3d	192.168.44.132	test-cluster-wc5729f9ce2
tea-rc-ms46j	1/1	Running	0	3d	192.168.151.132	test-cluster-wb3d42afeff
tea-rc-tnftv	1/1	Running	0	3d	192.168.151.133	test-cluster-wb3d42afeff

**Step 8** Verify if the coffee and tea services are deployed.

```
kubectl get svc
```

NAME	TYPE	CLUSTER-IP	EXTERNAL-IP	PORT(S)	AGE
coffee-svc	ClusterIP	10.105.139.1	80/TCP	3d	
kubernetes	ClusterIP	10.96.0.1	443/TCP	4d	
tea-svc	ClusterIP	10.109.34.129	80/TCP	3d	

**Step 9** Verify if the Ingress is deployed.

```
kubectl describe ing
```

```
Name: cafe-ingress
Namespace: default
Address:
Default backend: default-http-backend:80 (<none>)
TLS: cafe-secret terminates cafe.example.com
Rules:

Host          Path          Backends
cafe.example.com
              /tea          tea-svc:80 (<none>)
              /coffee      coffee-svc:80 (<none>)

Annotations:
Events: <none>
```

**Step 10** Test the application.

a) Access the load balancer IP address 10.10.45.235, which is obtained in Step2.

b) Test if the Ingress controller is load balancing as expected.

```
curl --resolve cafe.example.com:443:10.10.45.235 https://cafe.example.com/coffee --insecure
<!DOCTYPE html>
...
<p><span>Server&nbsp;address:</span> <span>192.168.151.134:80</span></p>
...
curl --resolve cafe.example.com:443:10.10.45.235 https://cafe.example.com/coffee --insecure
<!DOCTYPE html>
...
<p><span>Server&nbsp;address:</span> <span>192.168.44.133:80</span></p>
...

```

