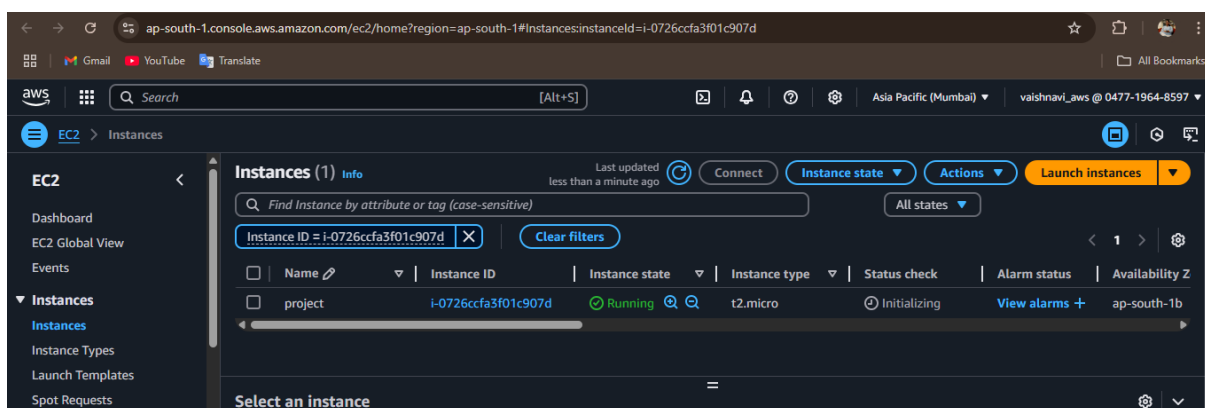


# Deploying Spring Boot application on Kubernetes

## Step-by-Step Implementation :-

- Create an t2.medium Instance
- Install Required Dependencies
  - Docker
  - Minikube
  - Contrack
  - Kubectl
  - maven
- Clone Git Repo
  - [https://github.com/sushantkapare-dev/SpringBootOnK8S\\_PS.git](https://github.com/sushantkapare-dev/SpringBootOnK8S_PS.git)
- Setting up Database
- Create an image from Dockerfile & push image to dockerhub
- Apply app-deployment.yml , check pods , deployment and svc
- Port Forwarding
- Check k8s dashboard

## 1. Create t2.medium Instance on aws



## 2. Install Required Dependencies

### 1. Install docker

```
ubuntu@ip-172-31-3-70:~$ docker --version
Docker version 26.1.3, build 26.1.3-0ubuntu1~24.04.1
ubuntu@ip-172-31-3-70:~$ sudo systemctl status docker
● docker.service - Docker Application Container Engine
   Loaded: loaded (/usr/lib/systemd/system/docker.service; enabled; preset: enabled)
   Active: active (running) since Thu 2025-03-20 09:14:31 UTC; 2min 57s ago
   TriggeredBy: ● docker.socket
     Docs: https://docs.docker.com
    Main PID: 2101 (dockerd)
      Tasks: 8
     Memory: 35.3M (peak: 35.4M)
        CPU: 300ms
     CGroup: /system.slice/docker.service
            └─2101 /usr/bin/dockerd -H fd:// --containerd=/run/containerd/containerd.sock

Mar 20 09:14:31 ip-172-31-3-70 systemd[1]: Starting docker.service - Docker Application Container Engine...
Mar 20 09:14:31 ip-172-31-3-70 dockerd[2101]: time="2025-03-20T09:14:31.328502746Z" level=info msg="Starting up"
Mar 20 09:14:31 ip-172-31-3-70 dockerd[2101]: time="2025-03-20T09:14:31.329763308Z" level=info msg="detected 127.0.0.53 nameserver, assuming sys
Mar 20 09:14:31 ip-172-31-3-70 dockerd[2101]: time="2025-03-20T09:14:31.536503748Z" level=info msg="Loading containers: start."
Mar 20 09:14:31 ip-172-31-3-70 dockerd[2101]: time="2025-03-20T09:14:31.828259985Z" level=info msg="Loading containers: done."
Mar 20 09:14:31 ip-172-31-3-70 dockerd[2101]: time="2025-03-20T09:14:31.849053201Z" level=info msg="Docker daemon" commit="26.1.3-0ubuntu1~24.04
Mar 20 09:14:31 ip-172-31-3-70 dockerd[2101]: time="2025-03-20T09:14:31.849430479Z" level=info msg="Daemon has completed initialization"
Mar 20 09:14:31 ip-172-31-3-70 dockerd[2101]: time="2025-03-20T09:14:31.895387807Z" level=info msg="API listen on /run/docker.sock"
Mar 20 09:14:31 ip-172-31-3-70 systemd[1]: Started docker.service - Docker Application Container Engine.
lines 1-21/21 (END)
```

### 2. Install Contract

```
ubuntu@ip-172-31-3-70:~$ conntrack --version
conntrack v1.4.8 (conntrack-tools)
ubuntu@ip-172-31-3-70:~$
```

## 3. Install Minikube

```
ubuntu@ip-172-31-3-70:~$ curl -LO https://storage.googleapis.com/minikube/releases/latest/minikube-linux-amd64
% Total % Received % Xferd Average Speed Time Time Time Current
 Dload Upload Total Spent Left Speed
100 119M 100 119M 0 0 11.9M 0 0:00:09 0:00:09 --:--:-- 16.2M
ubuntu@ip-172-31-3-70:~$ sudo install minikube-linux-amd64 /usr/local/bin/minikube
ubuntu@ip-172-31-3-70:~$ sudo /usr/local/bin/minikube start --force --driver=docker
* minikube v1.35.0 on Ubuntu 24.04 (xen/amd64)
! minikube skips various validations when --force is supplied; this may lead to unexpected behavior
* Using the docker driver based on user configuration

X Docker has less than 2 CPUs available, but Kubernetes requires at least 2 to be available

X Requested cpu count 2 is greater than the available cpus of 1

* The "docker" driver should not be used with root privileges. If you wish to continue as root, use --force.
* If you are running minikube within a VM, consider using --driver=none:
* https://minikube.sigs.k8s.io/docs/reference/drivers/none/

X docker only has 957MiB available, less than the required 1800MiB for Kubernetes

X System only has 957MiB available, less than the required 1800MiB for Kubernetes

X Requested memory allocation 957MiB is less than the usable minimum of 1800MB

X Requested memory allocation (957MB) is less than the recommended minimum 1900MB. Deployments may fail.

X The requested memory allocation of 957MiB does not leave room for system overhead (total system memory: 957MiB). You may face stability issues.
* Suggestion: Start minikube with less memory allocated: 'minikube start --memory=957mb'

* Using Docker driver with root privileges
* Starting "minikube" primary control-plane node in "minikube" cluster
* Pulling base image v0.0.46 ...
* Downloading Kubernetes v1.32.0 preload ...
```

## 4. Install kubectl

```
ubuntu@ip-172-31-3-70:~$ curl -LO "https://dl.k8s.io/release/$(curl -L -s https://dl.k8s.io/release/stable.txt)/bin/linux/amd64/kubectl"
% Total    % Received % Xferd  Average Speed   Time    Time     Time  Current
           Dload  Upload   Total   Spent    Left   Speed
100 138    100 138      0     0    411      0 --:--:-- --:--:-- --:--:--  411
100 54.6M  100 54.6M      0     0   16.4M      0  0:00:03  0:00:03 --:--:-- 18.4M
ubuntu@ip-172-31-3-70:~$ sudo install -o root -g root -m 0755 kubectl /usr/local/bin/kubectl
ubuntu@ip-172-31-3-70:~$ sudo /usr/local/bin/kubectl version
Client Version: v1.32.3
Kustomize Version: v5.5.0
Server Version: v1.32.0
ubuntu@ip-172-31-3-70:~$
```

## 5. Install Maven

```
ubuntu@ip-172-31-3-70:~$ mvn --version
Apache Maven 3.8.7
Maven home: /usr/share/maven
Java version: 21.0.6, vendor: Ubuntu, runtime: /usr/lib/jvm/java-21-openjdk-amd64
Default locale: en, platform encoding: UTF-8
OS name: "linux", version: "6.8.0-1021-aws", arch: "amd64", family: "unix"
ubuntu@ip-172-31-3-70:~$
```

## 3. Clone Git Repo

```
ubuntu@ip-172-31-3-70:~$ sudo apt-get install git -y
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
git is already the newest version (1:2.43.0-1ubuntu7.2).
git set to manually installed.
0 upgraded, 0 newly installed, 0 to remove and 144 not upgraded.
ubuntu@ip-172-31-3-70:~$
```

```
ubuntu@ip-172-31-3-70:~$ git clone git@github.com:VAISHNAVIP0419/springbootonk8s.git
Cloning into 'springbootonk8s'...
remote: Enumerating objects: 74, done.
remote: Counting objects: 100% (74/74), done.
remote: Compressing objects: 100% (48/48), done.
remote: Total 74 (delta 2), reused 73 (delta 1), pack-reused 0 (from 0)
Receiving objects: 100% (74/74), 33.04 MiB | 7.54 MiB/s, done.
Resolving deltas: 100% (2/2), done.
ubuntu@ip-172-31-3-70:~$
```

## 4. Setting up Database

```
ubuntu@ip-172-31-3-70:~/springbootonk8s$ kubectl apply -f config.yml
configmap/mysql-config created
ubuntu@ip-172-31-3-70:~/springbootonk8s$ kubectl apply -f secrete.yml
secret/mysql-secret created
ubuntu@ip-172-31-3-70:~/springbootonk8s$ kubectl apply -f db-pvc.yml
persistentvolumeclaim/mysql-pv-claim created
ubuntu@ip-172-31-3-70:~/springbootonk8s$ kubectl apply -f db-statefulset.yml
statefulset.apps/mysql created
ubuntu@ip-172-31-3-70:~/springbootonk8s$ kubectl apply -f db-svc.yml
service/mysql created
ubuntu@ip-172-31-3-70:~/springbootonk8s$ kubectl get po
NAME      READY   STATUS    RESTARTS   AGE
mysql-0   1/1     Running   0           43s
```

```

ubuntu@ip-172-31-2-70:~/springbootonk8s$ kubectl exec -it mysql-0 -- /bin/bash
bash-4.2# mysql -u root -p
Enter password:
Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 3
Server version: 5.7.44 MySQL Community Server (GPL)

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affiliates. Other names may be trademarks of their respective
owners.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

mysql> SHOW DATABASES;
+-----+
| Database |
+-----+
| information_schema |
| mysql |
| performance_schema |
| singamlabs |
| sys |
+-----+
5 rows in set (0.01 sec)

mysql> USE singamlabs;
Database changed
mysql> SHOW TABLES;
Empty set (0.00 sec)

```

```

mysql> CREATE TABLE orders_tbl (
->   id INT AUTO INCREMENT PRIMARY KEY,
->   name VARCHAR(255) NOT NULL,
->   price DECIMAL(10,2) NOT NULL,
->   qty INT NOT NULL
-> );
Query OK, 0 rows affected (0.03 sec)

mysql> SELECT * FROM orders_tbl;
Empty set (0.00 sec)

mysql> SHOW TABLES;
+-----+
| Tables_in_singamlabs |
+-----+
| orders_tbl |
+-----+
1 row in set (0.00 sec)

mysql> INSERT INTO orders_tbl (name, price, qty) VALUES ('Laptop', 50000, 2);
Query OK, 1 row affected (0.01 sec)

mysql> █

```

```

mysql> SELECT * FROM orders_tbl;
+----+-----+-----+-----+
| id | name      | price  | qty |
+----+-----+-----+-----+
| 1  | Laptop    | 50000.00 | 2 |
| 2  | Mobile    | 20000.00 | 5 |
| 3  | Tablet    | 15000.00 | 3 |
| 4  | Headphones | 3000.00  | 10 |
+----+-----+-----+-----+
4 rows in set (0.00 sec)

```

## 5. Create an image from Dockerfile & push image to dockerhub

```
ubuntu@ip-172-31-3-70:~/springbootonk8s$ docker build -t vaishnavi2301/springboot-crud-k8s:1.0 .
DEPRECATED: The legacy builder is deprecated and will be removed in a future release.
Install the buildx component to build images with BuildKit:
https://docs.docker.com/go/buildx/

Sending build context to Docker daemon 73.35MB
Step 1/4 : FROM openjdk:8
8: Pulling from library/openjdk
001c52e26ad5: Pull complete
d9d4b9b6e964: Pull complete
2068746827ec: Pull complete
9daef329d350: Pull complete
d85151f15b66: Pull complete
52a8c426d30b: Pull complete
8754a66e0050: Pull complete
Digest: sha256:86e863cc57215cfb181bd319736d0baf625fe8f150577f9eb58bd937f5452cb8
Status: Downloaded newer image for openjdk:8
--> b273004037cc
Step 2/4 : EXPOSE 8080
--> Running in 23fca43aca60
--> Removed intermediate container 23fca43aca60
--> 7aa497a38fa4
Step 3/4 : ADD target/springboot-crud-k8s.jar springboot-crud-k8s.jar
--> 16a84bba5dae
Step 4/4 : ENTRYPOINT ["java","-jar","/springboot-crud-k8s.jar"]
--> Running in 6c0abcd165ab
--> Removed intermediate container 6c0abcd165ab
--> 2d7578c56fb0
Successfully built 2d7578c56fb0
Successfully tagged vaishnavi2301/springboot-crud-k8s:1.0
ubuntu@ip-172-31-3-70:~/springbootonk8s$
```

## 6. Apply app-statefulset.yml and check pods

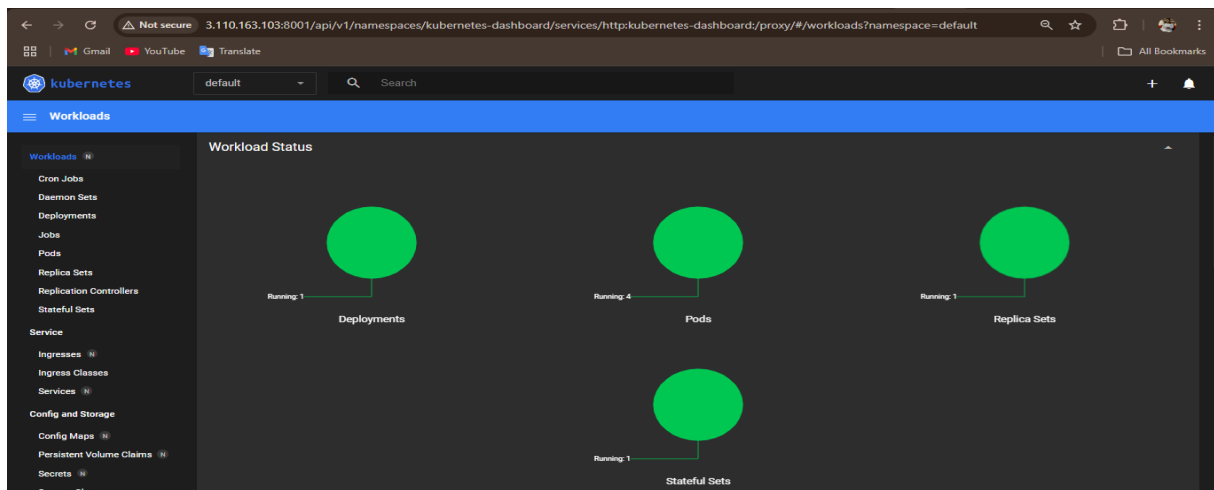
```
ubuntu@ip-172-31-3-70:~/springbootonk8s$ kubectl apply -f app-deployment.yml
deployment.apps/springboot-crud-deployment created
ubuntu@ip-172-31-3-70:~/springbootonk8s$ kubectl apply -f app-svc.yml
service/springboot-crud-svc created
ubuntu@ip-172-31-3-70:~/springbootonk8s$ kubectl get po
NAME                                READY   STATUS             RESTARTS   AGE
mysql-0                             1/1     Running            0           26m
springboot-crud-deployment-f6b9c8f46-6tmf8  0/1     PodInitializing    0           22s
springboot-crud-deployment-f6b9c8f46-lm4pd  0/1     PodInitializing    0           22s
springboot-crud-deployment-f6b9c8f46-m5z86  0/1     PodInitializing    0           22s
ubuntu@ip-172-31-3-70:~/springbootonk8s$ kubectl get deployment
NAME                                READY   UP-TO-DATE   AVAILABLE   AGE
springboot-crud-deployment          3/3     3             3           61s
ubuntu@ip-172-31-3-70:~/springbootonk8s$ kubectl get svc
NAME                                TYPE        CLUSTER-IP   EXTERNAL-IP   PORT(S)          AGE
kubernetes                          ClusterIP   10.96.0.1     <none>         443/TCP           28m
mysql                                ClusterIP   None          <none>         3306/TCP          27m
springboot-crud-svc                  NodePort    10.109.13.106 <none>         8080:30770/TCP   54s
ubuntu@ip-172-31-3-70:~/springbootonk8s$
```

## 7. Port-Forwarding

```
ubuntu@ip-172-31-3-70:~$ kubectl port-forward --address 0.0.0.0 svc/springboot-crud-svc 8080:8080 &
[1] 22880
ubuntu@ip-172-31-3-70:~$ Forwarding from 0.0.0.0:8080 -> 8080
Handling connection for 8080
Handling connection for 8080
```

```
Not secure 3.110.163.103:8080/orders
Gmail YouTube Translate
Pretty-print
[{"id":1,"name":"Laptop","qty":2,"price":50000.0}, {"id":2,"name":"Mobile","qty":5,"price":20000.0}, {"id":3,"name":"Tablet","qty":3,"price":15000.0}, {"id":4,"name":"Headphones","qty":10,"price":3000.0}]
```

## 8. Check k8s dashboard



The screenshot shows the 'Pods' list view in the Kubernetes dashboard. The table below lists the pods in the default namespace.

Name	Images	Labels	Node	Status	Restarts	CPU Usage (cores)	Memory Usage (bytes)	Created
springboot-crud-deployment-f6b9c8f46-6tmf8	vaishnavi2301/springboot-crud-k8s:1.0	app: springboot-k8s pod-template-hash: f6b9c8f46	minikube	Running	0	-	-	an hour ago
springboot-crud-deployment-f6b9c8f46-lm4pd	vaishnavi2301/springboot-crud-k8s:1.0	app: springboot-k8s pod-template-hash: f6b9c8f46	minikube	Running	0	-	-	an hour ago
springboot-crud-deployment-f6b9c8f46-m5z86	vaishnavi2301/springboot-crud-k8s:1.0	app: springboot-k8s pod-template-hash: f6b9c8f46	minikube	Running	0	-	-	an hour ago
mysql-0	mysql:5.7	app: mysql apps.kubernetes.io/pod-in-dex: 0 controller-revision-hash: mysql-5454445f5b	minikube	Running	0	-	-	an hour ago

← → ↻ ⚠ Not secure 3.110.163.103:8001/api/v1/namespaces/kubernetes-dashboard/services/http:kubernetes-dashboard/proxy/#/deployment?namespace=default 🔍 ☆ 📁 All Bookmarks

🔧 **kubernetes** default 🔍 Search + 🔔

☰ Workloads > Deployments

Workloads ⓘ

- Cron Jobs
- Daemon Sets
- Deployments
- Jobs
- Pods
- Replica Sets
- Replication Controllers
- Stateful Sets
- Service
- Ingresses ⓘ
- Ingress Classes

### Deployments

Name	Images	Labels	Pods	Created ↑
springboot-crud-deployment	vaishnavi2301/springboot-crud-k8s:1.0	app: springboot-k8s	3 / 3	an hour ago

← → ↻ ⚠ Not secure 3.110.163.103:8001/api/v1/namespaces/kubernetes-dashboard/services/http:kubernetes-dashboard/proxy/#/replicaset?namespace=default 🔍 ☆ 📁 All Bookmarks

🔧 **kubernetes** default 🔍 Search + 🔔

☰ Workloads > Replica Sets

Workloads ⓘ

- Cron Jobs
- Daemon Sets
- Deployments
- Jobs
- Pods
- Replica Sets
- Replication Controllers
- Stateful Sets
- Service
- Ingresses ⓘ
- Ingress Classes
- Services ⓘ

### Replica Sets

Name	Images	Labels	Pods	Created ↑
springboot-crud-deployment-f6b9c8f46	vaishnavi2301/springboot-crud-k8s:1.0	app: springboot-k8s pod-template-hash: f6b9c8f46	3 / 3	an hour ago

← → ↻ ⚠ Not secure 3.110.163.103:8001/api/v1/namespaces/kubernetes-dashboard/services/http:kubernetes-dashboard/proxy/#/statefulset?namespace=default 🔍 ☆ 📁 All Bookmarks

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☰ Workloads > Stateful Sets

Workloads ⓘ

- Cron Jobs
- Daemon Sets
- Deployments
- Jobs
- Pods
- Replica Sets
- Replication Controllers
- Stateful Sets
- Service
- Ingresses ⓘ

### Stateful Sets

Name	Images	Labels	Pods	Created ↑
mysql	mysql:5.7	app: mysql tier: database	1 / 1	an hour ago

← → ↻ ⚠ Not secure 3.110.163.103:8001/api/v1/namespaces/kubernetes-dashboard/services/http:kubernetes-dashboard/proxy/#/service?namespace=default 🔍 ☆ 📁 All Bookmarks

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☰ Service > Services

Workloads ⓘ  
Cron Jobs  
Daemon Sets  
Deployments  
Jobs  
Pods  
Replica Sets  
Replication Controllers  
Stateful Sets  
Service  
Ingresses ⓘ  
Ingress Classes

### Services

Name	Labels	Type	Cluster IP	Internal Endpoints	External Endpoints	Created ↑
springboot-crud-svc	app: springboot-k8s	NodePort	10.109.13.106	springboot-crud-svc:8080 TCP springboot-crud-svc:30770 TCP	-	an hour ago ⋮
mysql	app: mysql tier: database	ClusterIP	None	mysql:3306 TCP mysql:0 TCP	-	an hour ago ⋮
kubernetes	component: apiserver provider: kubernetes	ClusterIP	10.96.0.1	kubernetes:443 TCP kubernetes:0 TCP	-	an hour ago ⋮

← → ↻ ⚠ Not secure 3.110.163.103:8001/api/v1/namespaces/kubernetes-dashboard/services/http:kubernetes-dashboard/proxy/#/configmap?namespace=default 🔍 ☆ 📁 All Bookmarks

🔧 **kubernetes** default 🔍 Search + 🔔

☰ Config And Storage > Config Maps

Pods  
Replica Sets  
Replication Controllers  
Stateful Sets  
Service  
Ingresses ⓘ  
Ingress Classes  
Services ⓘ  
Config and Storage  
Config Maps ⓘ

### Config Maps

Name	Labels	Created ↑
mysql-config	-	an hour ago ⋮
kube-root-ca.crt	-	an hour ago ⋮

← → ↻ ⚠ Not secure 3.110.163.103:8001/api/v1/namespaces/kubernetes-dashboard/services/http:kubernetes-dashboard/proxy/#/persistentvolumeclaim?namespace=d... 🔍 ☆ 📁 All Bookmarks

🔧 **kubernetes** default 🔍 Search + 🔔

☰ Config And Storage > Persistent Volume Claims

Pods  
Replica Sets  
Replication Controllers  
Stateful Sets  
Service  
Ingresses ⓘ  
Ingress Classes  
Services ⓘ  
Config and Storage  
Config Maps ⓘ  
Persistent Volume Claims ⓘ  
Secrets ⓘ  
Storage Classes

### Persistent Volume Claims

Name	Labels	Status	Volume	Capacity	Access Modes	Storage Class	Created ↑
mysql-persistent-storage-mysql-0	app: mysql tier: database	Bound	pvc-e0d78791-9612-481e-8bc0-a0355b236be4	1Gi	ReadWriteOnce	standard	an hour ago ⋮
mysql-pv-claim	app: mysql tier: database	Bound	pvc-f4ca2ce-83e2-4cc2-b586-f4e5f7f86267	1Gi	ReadWriteOnce	standard	an hour ago ⋮



← → ↻ ⚠ Not secure 3.110.163.103:8001/api/v1/namespaces/kubernetes-dashboard/services/http:kubernetes-dashboard:/proxy/#/secret?namespace=default 🔍 ☆ 📁 All Bookmarks

🔌 **kubernetes** default 🔍 Search + 🔔

☰ **Config And Storage > Secrets**

Pods

Replica Sets

Replication Controllers

Stateful Sets

Service

Ingresses ⓘ

Ingress Classes

Services ⓘ

Config and Storage

Config Maps ⓘ

Persistent Volume Claims ⓘ

**Secrets ⓘ**

Storage Classes

### Secrets

Name	Labels	Type	Created ↑
mysql-secret	-	Opaque	an hour ago

← → ↻ ⚠ Not secure 3.110.163.103:8001/api/v1/namespaces/kubernetes-dashboard/services/http:kubernetes-dashboard:/proxy/#/namespace?namespace=default 🔍 ☆ 📁 All Bookmarks

🔌 **kubernetes** default 🔍 Search + 🔔

☰ **Cluster > Namespaces**

Stateful Sets

Service

Ingresses ⓘ

Ingress Classes

Services ⓘ

Config and Storage

Config Maps ⓘ

Persistent Volume Claims ⓘ

Secrets ⓘ

Storage Classes

**Cluster**

Cluster Role Bindings

Cluster Roles

Events ⓘ

**Namespaces**

### Namespaces

Name	Labels	Phase	Created ↑
addonmanager.kubernetes.io/mode: Reconcile			
🟢 kubernetes-dashboard	kubernetes.io/metadata.name: kubernetes-dash-board	Active	33 minutes ago
kubernetes.io/minikube-addons: dashboard			
🟢 default	kubernetes.io/metadata.name: default	Active	an hour ago
🟢 kube-node-lease	kubernetes.io/metadata.name: kube-node-lease	Active	an hour ago
🟢 kube-public	kubernetes.io/metadata.name: kube-public	Active	an hour ago
🟢 kube-system	kubernetes.io/metadata.name: kube-system	Active	an hour ago

