Container Service

Best Practices

MORE THAN JUST CLOUD | Alibaba Cloud

Best Practices

Kubernetes

Implement blue-green release by using an Ingress in a Kubernetes cluster

Generally, before releasing an application, you must bring a new version online and test the availability of this new version with low traffic. The Ingress resource of Kubernetes cannot control and segment the traffic. Therefore, only one service works under the path of the same domain name, which is not good for gray release. This document introduces how to implement the blue-green release and segment the traffic in an easy way by using the Alibaba Cloud Container Service Ingress.

Prerequisites

You have created a Kubernetes cluster. For more information, see Create a cluster.

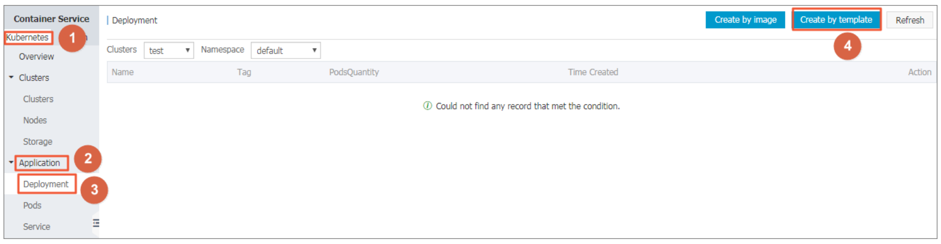
You have connected to the master node by using SSH. For more information, see Access Kubernetes clusters by using SSH.

Step 1 Create an application

Log on to the Container Service console.

Click **Kubernetes** > **Application** > **Deployment** in the left-side navigation pane.

Click **Create by template** in the upper-right corner.

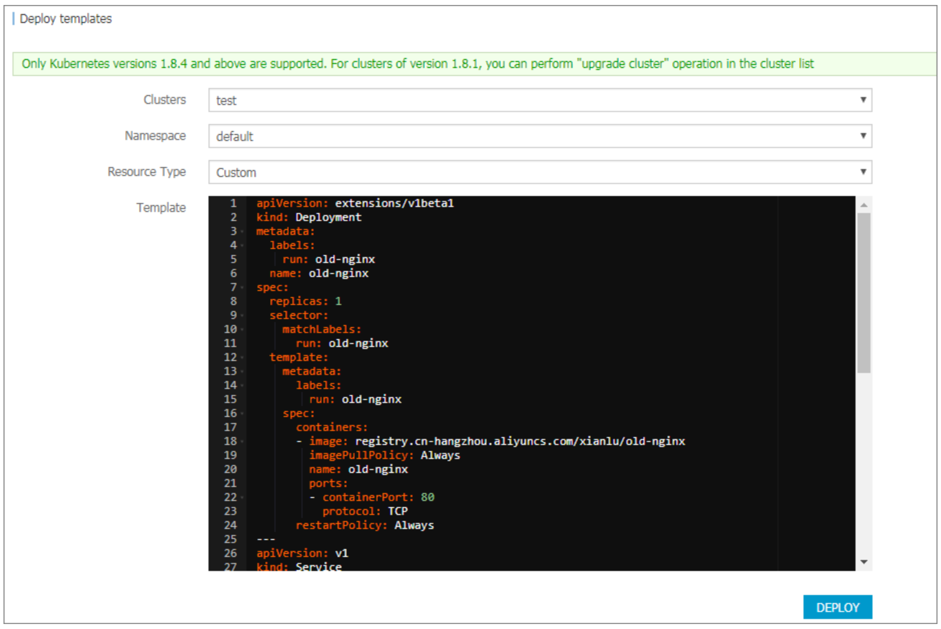


Could not find any record that met the condition.

Select the cluster and namespace from the **Clusters** and **Namespace** drop-down lists.

Select a sample template or **Custom** from the **Resource Type** drop-down list.

Click **DEPLOY**.



Only Kubernetes versions 1.8.4 and above are supported. For clusters of version 1.8.1, you can perform "upgrade cluster" operation in the cluster list

Clusters	test
Namespace	default
Resource Type	Custom
Template	

```
apiVersion: extensions/v1beta1
kind: Deployment
metadata:
  labels:
    run: old-nginx
  name: old-nginx
spec:
  replicas: 1
  selector:
    matchLabels:
      run: old-nginx
  template:
    metadata:
      labels:
        run: old-nginx
    spec:
      containers:
      - image: registry.cn-hangzhou.aliyuncs.com/xianlu/old-nginx
        imagePullPolicy: Always
        name: old-nginx
        ports:
        - containerPort: 80
          protocol: TCP
      restartPolicy: Always
---
apiVersion: v1
kind: Service
```

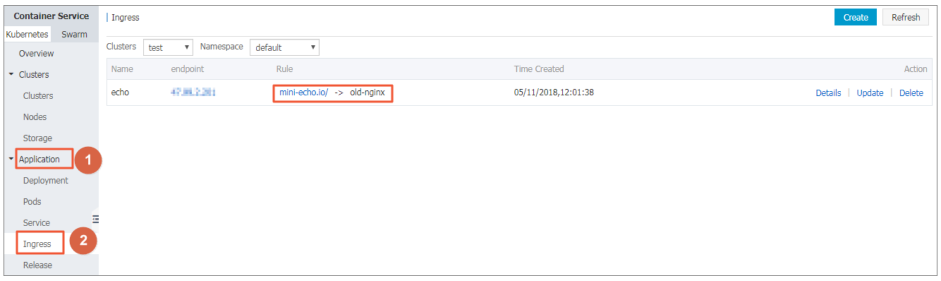
In this example, deploy an Nginx application that contains a deployment, a service, and an Ingress. The deployment exposes the port by using NodePort and an Ingress is providing the external service. The orchestration template is as follows:

```
 apiVersion: extensions/v1beta1
kind: Deployment
metadata:
labels:
run: old-nginx
name: old-nginx
spec:
replicas: 1
selector:
matchLabels:
run: old-nginx
template:
metadata:
```

```
labels:
run: old-nginx
spec:
containers:
- image: registry.cn-hangzhou.aliyuncs.com/xianlu/old-nginx
imagePullPolicy: Always
name: old-nginx
ports:
- containerPort: 80
protocol: TCP
restartPolicy: Always
---
apiVersion: v1
kind: Service
metadata:
labels:
run: old-nginx
name: old-nginx
spec:
ports:
- port: 80
protocol: TCP
targetPort: 80
selector:
run: old-nginx
sessionAffinity: None
type: NodePort
---
apiVersion: extensions/v1beta1
kind: Ingress
metadata:
name: echo
spec:
backend:
serviceName: default-http-backend
servicePort: 80
rules:
- host: mini-echo.io ##The virtual hostname.
http:
paths:
- path: /
backend:
serviceName: old-nginx
servicePort: 80
```

After the successful deployment, click **Application** > **Ingress** in the left-side navigation pane.

You can see that the virtual hostname points to old-nginx.



Clusters test Namespace default

Name	endpoint	Rule	Time Created	Action
echo	[redacted]	mini-echo.io/ -> old-nginx	05/11/2018,12:01:38	Details | Update | Delete

Log on to the master node and run the curl commnad to check the Ingress access.

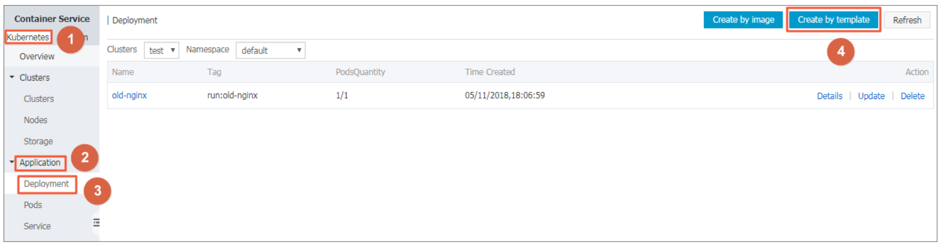
```
# curl -H "Host: mini-echo.io" http://101.37.224.229              ##The Ingress access address.
old
```

Step 2 Create new deployment and service

Log on to the Container Service console.

Click **Kubernetes** > **Application** > **Deployment** in the left-side navigation pane.

Click **Create by template** in the upper-right corner.



Clusters test Namespace default

Name	Tag	PodsQuantity	Time Created	Action
old-nginx	run:old-nginx	1/1	05/11/2018,18:06:59	Details | Update | Delete

Select the cluster and namespace from the **Clusters** and **Namespace** drop-down lists.

Select a sample template or **Custom** from the **Resource Type** drop-down list.

Click **DEPLOY**.

The orchestration of the new deployment and service is as follows:

```
 apiVersion: extensions/v1beta1
kind: Deployment
metadata:
labels:
run: new-nginx
name: new-nginx
```

```
spec:
replicas: 1
selector:
matchLabels:
run: new-nginx
template:
metadata:
labels:
run: new-nginx
spec:
containers:
- image: registry.cn-hangzhou.aliyuncs.com/xianlu/new-nginx
imagePullPolicy: Always
name: new-nginx
ports:
- containerPort: 80
protocol: TCP
restartPolicy: Always
---
apiVersion: v1
kind: Service
metadata:
labels:
run: new-nginx
name: new-nginx
spec:
ports:
- port: 80
protocol: TCP
targetPort: 80
selector:
run: new-nginx
sessionAffinity: None
type: NodePort
```

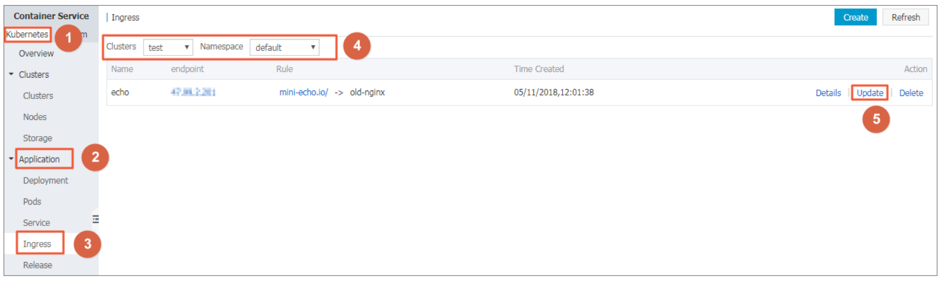
Step 3 Modify Ingress to implement blue-green release

Log on to the Container Service console.

Click **Kubernetes** > **Application** > **Ingress** in the left-side navigation pane.

Select the cluster and namespace from the **Clusters** and **Namespace** drop-down lists.

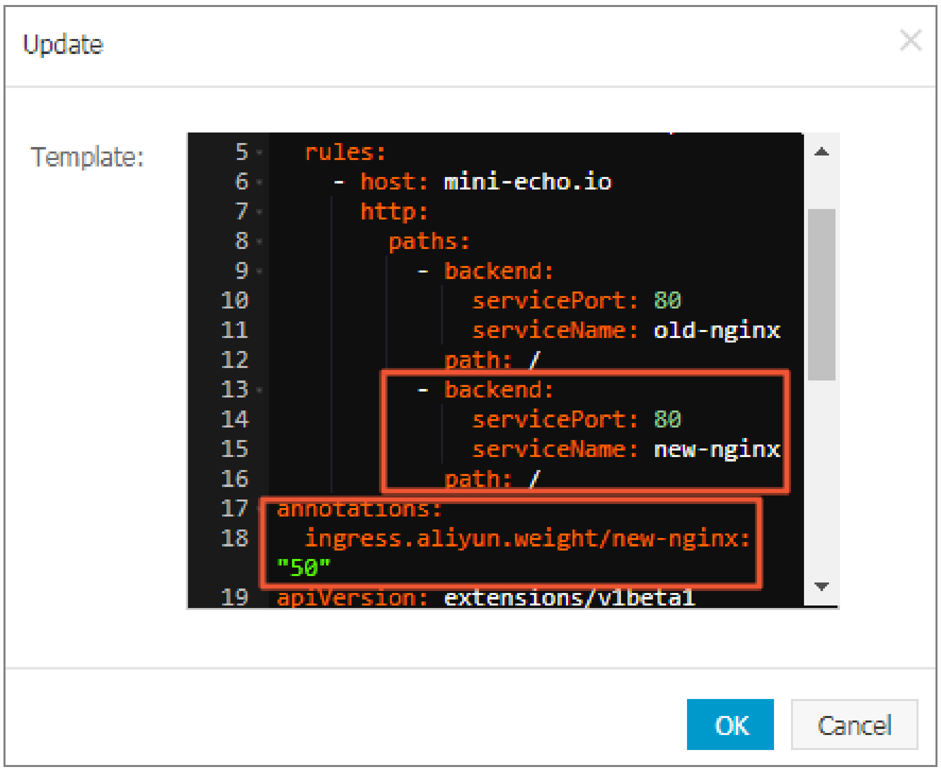
Click **Update** at the right of the Ingress created in the preceding step.



Clusters: test Namespace: default

Name	endpoint	Rule	Time Created	Action
echo	[redacted]	mini-echo.io/ -> old-nginx	05/11/2018,12:01:38	Details | Update | Delete

In the displayed dialog box, modify the Ingress and then click **OK**.

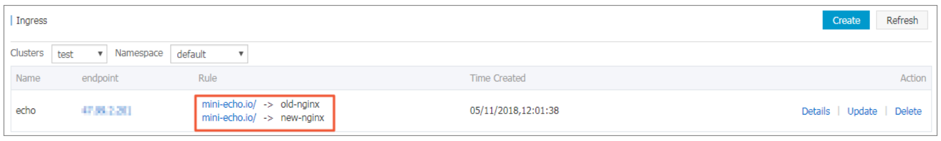


```
  rules:
    - host: mini-echo.io
      http:
        paths:
          - backend:
              servicePort: 80
              serviceName: old-nginx
            path: /
          - backend:
              servicePort: 80
              serviceName: new-nginx
            path: /
annotations:
  ingress.aliyun.weight/new-nginx:
"50"
apiVersion: extensions/v1beta1
```

Add annotations: The name of the new service new-nginx is after the /. 50 is the traffic value, representing 50%. The label ingress.aliyun.weight/new-nginx: "50" indicates to bring 50% of the traffic to the pod of the new service.

Configure new serviceName: Parallel to the old service, configure the new serviceName, which indicates to mount two services under the same path to correspond to the new application and old application respectively.

On the **Ingress** page, you can see a new rule pointing to the new service new-nginx is added to the Ingress.



Clusters: test Namespace: default

Name	endpoint	Rule	Time Created	Action
echo	[redacted]	mini-echo.io/ -> old-nginx mini-echo.io/ -> new-nginx	05/11/2018,12:01:38	Details | Update | Delete

Log on to the master node and run the curl command to check the Ingress access.

```
 # curl -H "Host: mini-echo.io" http://101.37.224.229            ##The Ingress access address.
old
# curl -H "Host: mini-echo.io" http://101.37.224.229
new
# curl -H "Host: mini-echo.io" http://101.37.224.229
old
# curl -H "Host: mini-echo.io" http://101.37.224.229
new
# curl -H "Host: mini-echo.io" http://101.37.224.229
old
# curl -H "Host: mini-echo.io" http://101.37.224.229
new
```

In this example, run the curl command for six times and you get the new service for three times and old service for three times as the returned results respectively, which indicates that the weight configuration takes effect.

You can configure the traffic ratio of the blue-green release by adjusting the value in the Ingress annotations ingress.aliyun.weight/new-nginx: "50" flexibly.

After completing the test of the new application version, you can configure the Ingress weight to 100 to bring traffic to the new service completely, or delete the annotations and old service version in the Ingress to implement the blue-green release.

Implement four-layer canary release by using Alibaba Cloud Server Load Balancer in Kubernetes clusters

In Kubernetes clusters, seven-layer Ingress cannot meet the requirements of gray release well for services accessed by using TCP/UDP. This document introduces how to implement four-layer canary release by using Server Load Balancer.

Prerequisites

You have created a Kubernetes cluster. For more information, see Create a cluster.

You have connected to the master node by using SSH. For more information, see Access

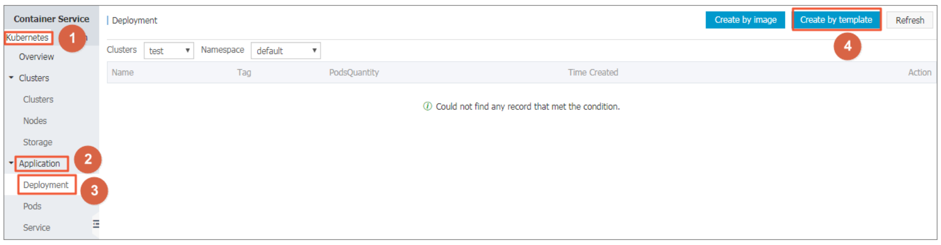
Kubernetes clusters by using SSH.

Step 1 Deploy old service version

Log on to the Container Service console.

Click **Kubernetes** > **Application** > **Deployment** in the left-side navigation pane.

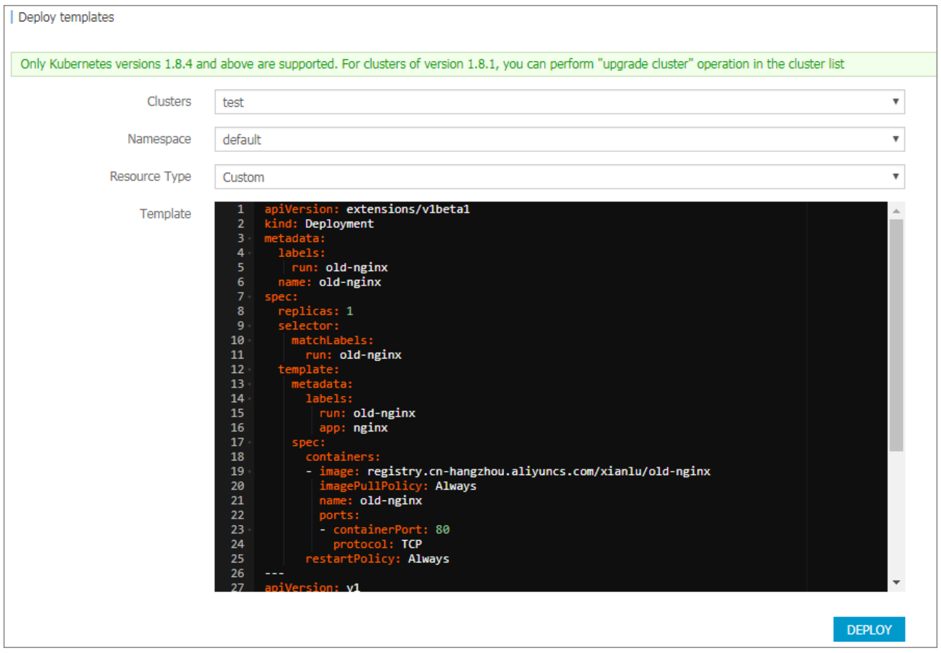
Click **Create by template** in the upper-right corner.



Select the cluster and namespace from the **Clusters** and **Namespace** drop-down lists.

Select a sample template or **Custom** from the **Resource Type** drop-down list.

Click **DEPLOY**.



Deploy templates

Only Kubernetes versions 1.8.4 and above are supported. For clusters of version 1.8.1, you can perform "upgrade cluster" operation in the cluster list

Clusters: test

Namespace: default

Resource Type: Custom

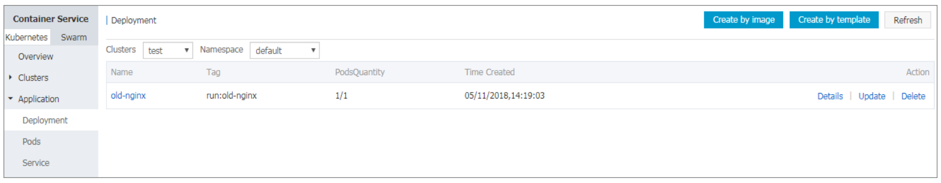
Template:

```
apiVersion: extensions/v1beta1
kind: Deployment
metadata:
  labels:
    run: old-nginx
  name: old-nginx
spec:
  replicas: 1
  selector:
    matchLabels:
      run: old-nginx
  template:
    metadata:
      labels:
        run: old-nginx
        app: nginx
    spec:
      containers:
      - image: registry.cn-hangzhou.aliyuncs.com/xianlu/old-nginx
        imagePullPolicy: Always
        name: old-nginx
        ports:
        - containerPort: 80
          protocol: TCP
      restartPolicy: Always
---
apiVersion: v1
```

In this example, expose the Nginx service by using Server Load Balancer.

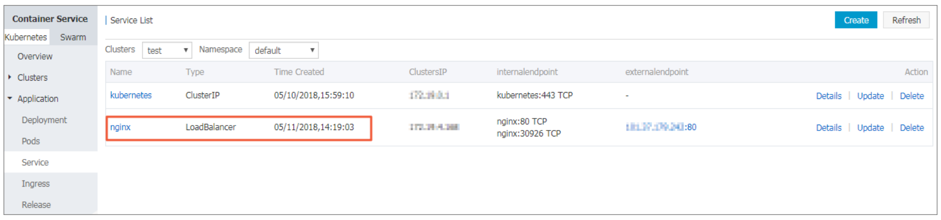
```
 apiVersion: extensions/v1beta1
kind: Deployment
metadata:
labels:
run: old-nginx
name: old-nginx
spec:
replicas: 1
selector:
matchLabels:
run: old-nginx
template:
metadata:
labels:
run: old-nginx
app: nginx
spec:
containers:
- image: registry.cn-hangzhou.aliyuncs.com/xianlu/old-nginx
imagePullPolicy: Always
name: old-nginx
ports:
- containerPort: 80
protocol: TCP
restartPolicy: Always
---
apiVersion: v1
kind: Service
metadata:
labels:
run: nginx
name: nginx
spec:
ports:
- port: 80
protocol: TCP
targetPort: 80
selector:
app: nginx
sessionAffinity: None
type: LoadBalancer ##Expose the service by using Alibaba Cloud Server Load Balancer.
```

Click **Application** > **Deployment** and **Application** > **Service** in the left-side navigation pane to check the deployment and service.



Clusters test Namespace default

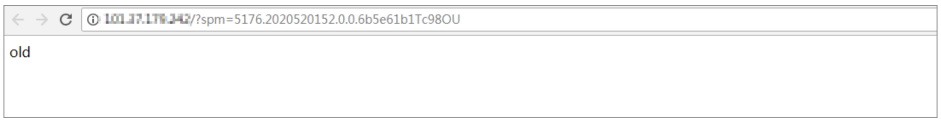
Name	Tag	PodsQuantity	Time Created	Action
old-nginx	run:old-nginx	1/1	05/11/2018,14:19:03	Details | Update | Delete



Clusters: test Namespace: default

Name	Type	Time Created	ClustersIP	internalendpoint	externalendpoint	Action
kubernetes	ClusterIP	05/10/2018,15:59:10	[redacted]	kubernetes:443 TCP	-	Details | Update | Delete
nginx	LoadBalancer	05/11/2018,14:19:03	[redacted]	nginx:80 TCP nginx:30926 TCP	[redacted]:80	Details | Update | Delete

Click the external endpoint at the right of the service to go to the Nginx default welcome page. In this example, **old** is displayed on the Nginx welcome page, which indicates that the currently accessed service corresponds to the backend pod old-nginx.



```
[redacted]/?spm=5176.2020520152.0.0.6b5e61b1Tc98OU
old
```

To display the results of multiple releases conveniently, we recommend that you log on to the master node and run the curl command to check the deployment results.

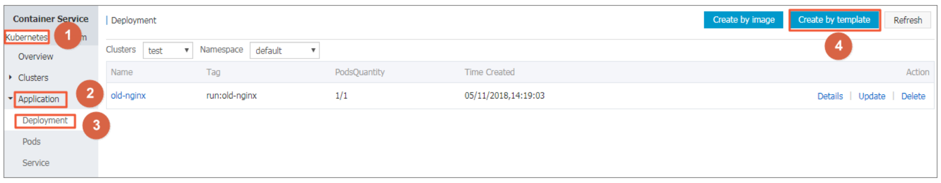
```
# bash
# for x in {1..10} ; do curl EXTERNAL-IP; done ##EXTERNAL-IP is the external endpoint of the service.
old
old
old
old
old
old
old
old
old
old
```

Step 2 Bring new deployment version online

Log on to the Container Service console.

Click **Kubernetes** > **Application** > **Deployment** in the left-side navigation pane.

Click **Create by template** in the upper-right corner.



Clusters: test Namespace: default

Name	Tag	PodsQuantity	Time Created	Action
old-nginx	run:old-nginx	1/1	05/11/2018,14:19:03	Details | Update | Delete

Select the cluster and namespace from the **Clusters** and **Namespace** drop-down lists.

Select a sample template or **Custom** from the **Resource Type** drop-down list.

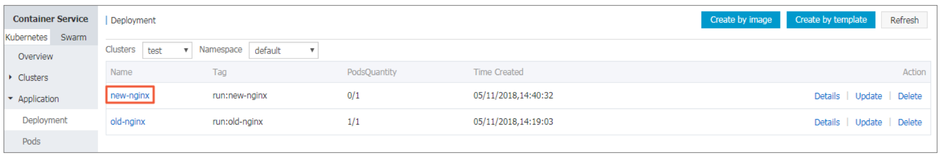
Click **DEPLOY**.

In this example, create a new version of Nginx deployment that contains the app:nginx label. The app:nginx label is used to use the same Nginx service as that of the old deployment version to bring the corresponding traffic.

The orchestration template in this example is as follows:

```
 apiVersion: extensions/v1beta1
kind: Deployment
metadata:
labels:
run: new-nginx
name: new-nginx
spec:
replicas: 1
selector:
matchLabels:
run: new-nginx
template:
metadata:
labels:
run: new-nginx
app: nginx
spec:
containers:
- image: registry.cn-hangzhou.aliyuncs.com/xianlu/new-nginx
imagePullPolicy: Always
name: new-nginx
ports:
- containerPort: 80
protocol: TCP
restartPolicy: Always
```

Click **Deployment** in the left-side navigation pane. The deployment new-nginx is displayed on the **Deployment** page.



Clusters: test   Namespace: default

Name	Tag	PodsQuantity	Time Created	Action
new-nginx	run:new-nginx	0/1	05/11/2018,14:40:32	Details | Update | Delete
old-nginx	run:old-nginx	1/1	05/11/2018,14:19:03	Details | Update | Delete

Log on to the master node and run the curl command to check the service access.

```
# bash
# for x in {1..10} ; do curl EXTERNAL-IP; done ##EXTERNAL-IP is the external endpoint of the service.
new
new
new
old
new
old
new
new
old
old
```

You can see that the old service and new service are accessed for five times respectively. This is mainly because the service follows the Server Load Balancer policy for traffic requests, and the old deployment and new deployment are the same pod, which makes their traffic ratio as 1:1.

Step 3 Adjust traffic weight

You must adjust the number of pods in the backend to adjust the corresponding weight for the canary release based on Server Load Balancer. For example, to make the new service to have higher weight, you can adjust the number of new pods to four.

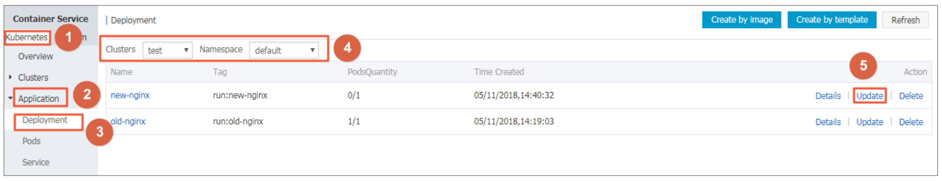
> **Note:** If the old application version and new application version coexist, the results returned after running the curl command of a sample do not conform to the configured weight strictly. In this example, run the curl command for 10 times to obtain the approximate effect by observing more samples.

Log on to the Container Service console.

Click **Kubernetes** > **Application** > **Deployment** in the left-side navigation pane.

Select the cluster and namespace from the **Clusters** and **Namespace** drop-down lists.

Click **Update** at the right of the deployment.

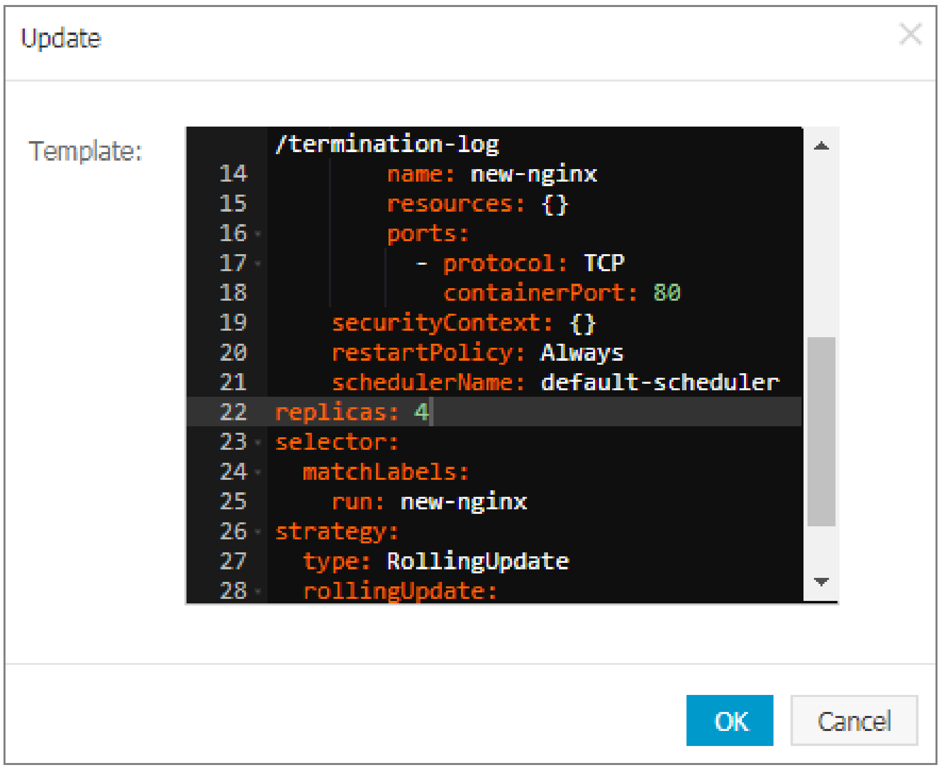


Clusters: test Namespace: default

Name	Tag	PodsQuantity	Time Created	Action
new-nginx	run:new-nginx	0/1	05/11/2018,14:40:32	Details | Update | Delete
old-nginx	run:old-nginx	1/1	05/11/2018,14:19:03	Details | Update | Delete

In the displayed dialog box, modify the number of pods to four.

Note: The update method of Kubernetes deployment resources is rollingUpdate by default. Therefore, during the update process, the minimum number of pods that provide the service is guaranteed and this number can be adjusted in the template.



```
/termination-log
          name: new-nginx
          resources: {}
          ports:
            - protocol: TCP
              containerPort: 80
      securityContext: {}
      restartPolicy: Always
      schedulerName: default-scheduler
replicas: 4
selector:
  matchLabels:
    run: new-nginx
strategy:
  type: RollingUpdate
  rollingUpdate:
```

After the deployment, log on to the master node and run the curl command to check the effect.

```
 # bash
# for x in {1..10} ; do curl EXTERNAL-IP; done ##EXTERNAL-IP is the external endpoint of the service.
new
new
new
new
new
old
new
new
new
old
```

You can see the new service is requested for eight times and the old service is requested twice among the 10 requests.

You can dynamically adjust the number of pods to adjust the weights of the new service and old service and implement the canary release.

Deploy high-reliability Ingress Controller

In Kubernetes clusters, Ingress is a collection of rules that authorize the inbound access to the cluster and provide you with Layer-7 Server Load Balancer capabilities. You can provide the externally accessible URL, Server Load Balancer, SSL, and name-based virtual host by using the Ingress configurations. As the access layer of the cluster traffic, the high reliability of Ingress is important. This document introduces how to deploy a set of high-reliability Ingress access layer with good performance.

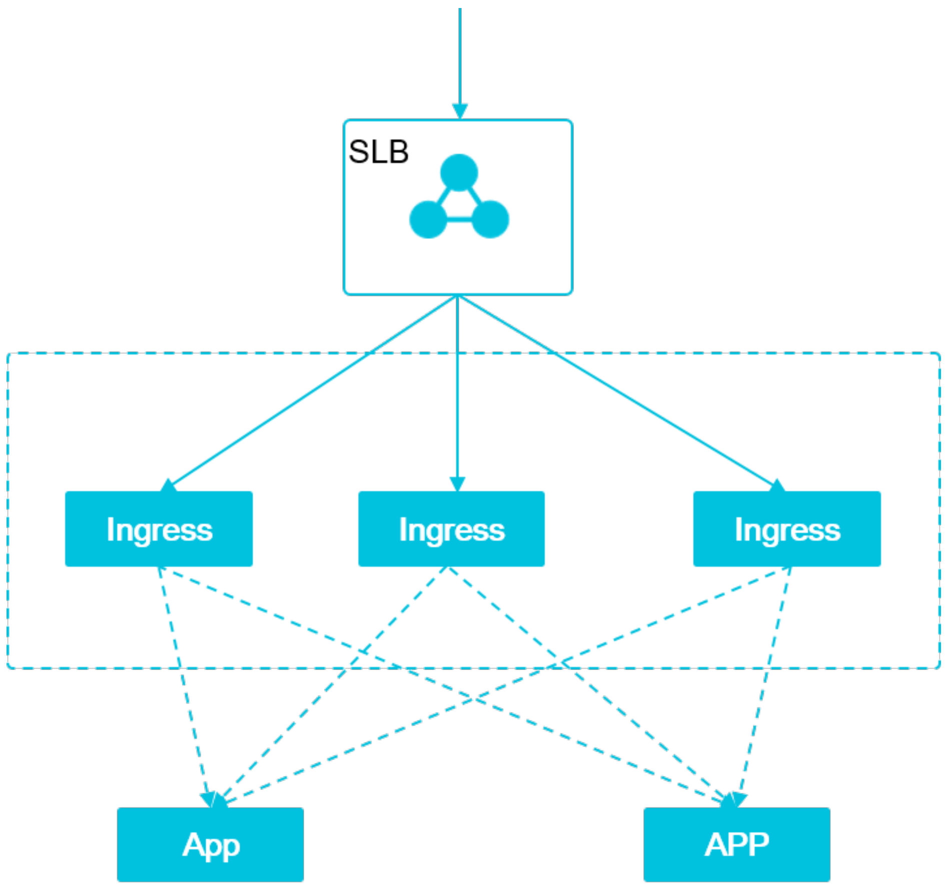
Prerequisites

You have created a Kubernetes cluster. For more information, see Create a cluster.

You have connected to the master node by using SSH. For more information, see Access Kubernetes clusters by using SSH.

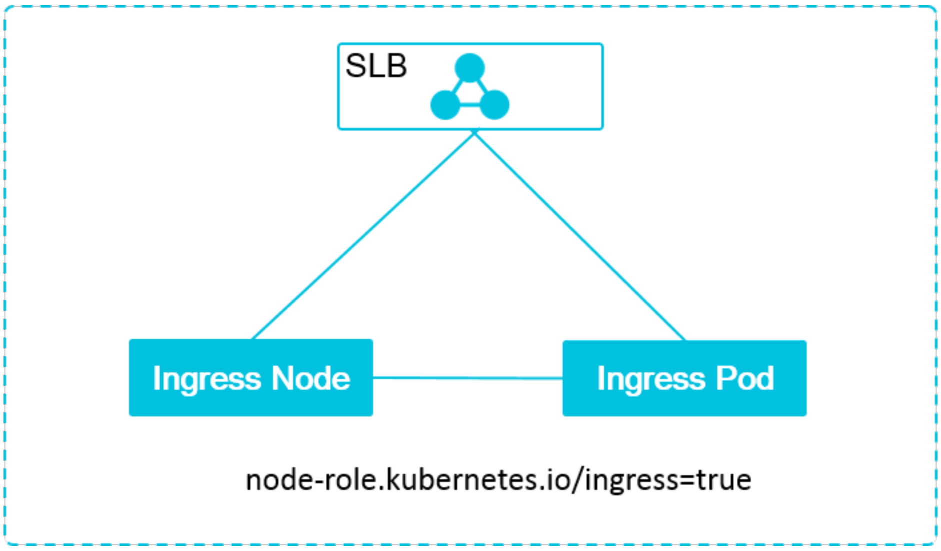
High-reliability deployment architecture

To implement high reliability, the single point of failure must be solved first. Generally, the single point of failure is solved by deployment with multiple copies. Similarly, use the multi-node deployment architecture to deploy the high-reliability Ingress access layer in Kubernetes clusters. As Ingress is the access point of the cluster traffic, we recommend that you have the Ingress node exclusive to you to avoid the business applications and Ingress services from competing for resources.



As mentioned in the preceding deployment architecture figure, multiple exclusive Ingress instances form a unified access layer to carry the traffic at the cluster entrance and expand or contract the Ingress nodes based on the backend business traffic. If your cluster scale is not large in the early stage, you can also deploy the Ingress services and business applications in the hybrid mode, but we recommend that you limit and isolate the resources.

Instructions on deploying high-reliability Ingress access layer



Ingress Server Load Balancer: The frontend Server Load Balancer instance of the Ingress access layer.

Ingress node: The cluster node in which the Ingress pod is deployed.

Ingress pod: The Ingress service.

The Ingress Server Load Balancer, Ingress node, and Ingress pod are associated based on the tag node-role.kubernetes.io/ingress=true:

The Ingress Server Load Balancer backend only mounts the cluster nodes with the tag node-role.kubernetes.io/ingress=true.

The Ingress pod is only deployed to the cluster nodes with the tag node-role.kubernetes.io/ingress=true.

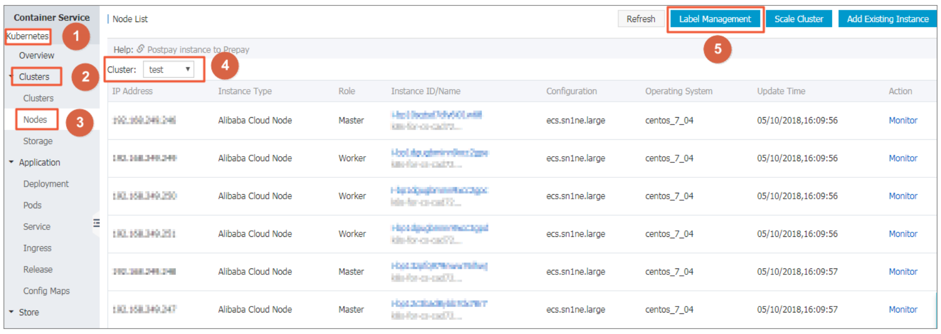
Step 1 Add a label for Ingress nodes

Log on to the Container Service console.

Click **Kubernetes** > **Clusters** > **Nodes** in the left-side navigation pane.

Select the cluster from the **Cluster** drop-down list.

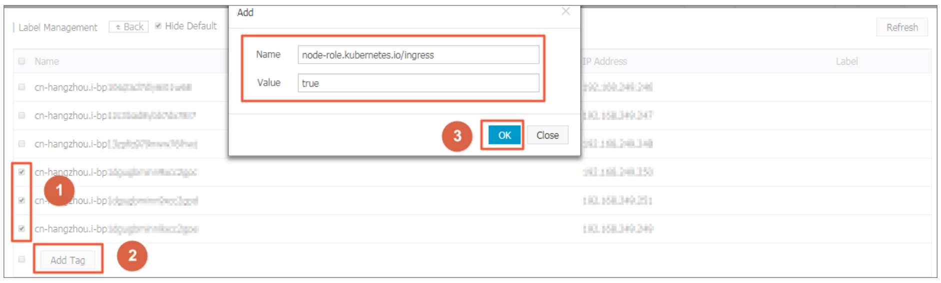
View the instance IDs of the worker nodes and then click **Label Management** in the upper-right corner.



IP Address	Instance Type	Role	Instance ID/Name	Configuration	Operating System	Update Time	Action
[redacted]	Alibaba Cloud Node	Master	[redacted]	ecs.sn1ne.large	centos_7_04	05/10/2018,16:09:56	Monitor
[redacted]	Alibaba Cloud Node	Worker	[redacted]	ecs.sn1ne.large	centos_7_04	05/10/2018,16:09:56	Monitor
[redacted]	Alibaba Cloud Node	Worker	[redacted]	ecs.sn1ne.large	centos_7_04	05/10/2018,16:09:56	Monitor
[redacted]	Alibaba Cloud Node	Worker	[redacted]	ecs.sn1ne.large	centos_7_04	05/10/2018,16:09:56	Monitor
[redacted]	Alibaba Cloud Node	Master	[redacted]	ecs.sn1ne.large	centos_7_04	05/10/2018,16:09:57	Monitor
[redacted]	Alibaba Cloud Node	Master	[redacted]	ecs.sn1ne.large	centos_7_04	05/10/2018,16:09:57	Monitor

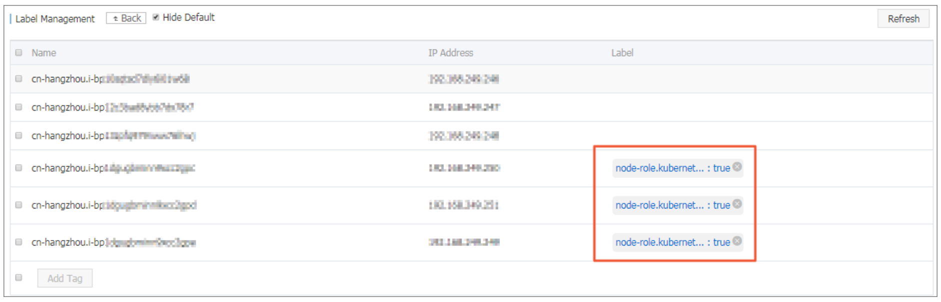
The **Label Management** page appears. Select the worker nodes and then click **Add Tag**.

Add the label node-role.kubernetes.io/ingress:true to the worker nodes and then click **OK**.



Name: node-role.kubernetes.io/ingress
Value: true

On the **Label Management** page, you can see the label is added to the worker nodes.



Name	IP Address	Label
cn-hangzhou.i-bp[redacted]	[redacted]	
cn-hangzhou.i-bp[redacted]	[redacted]	
cn-hangzhou.i-bp[redacted]	[redacted]	
cn-hangzhou.i-bp[redacted]	[redacted]	node-role.kubernet... : true
cn-hangzhou.i-bp[redacted]	[redacted]	node-role.kubernet... : true
cn-hangzhou.i-bp[redacted]	[redacted]	node-role.kubernet... : true

You can also log on to the master node and run the command kubectl label no nodeID node-role.kubernetes.io/ingress=true to add the label to the worker nodes quickly.

Step 2 Create an Ingress service

Log on to the Container Service console.

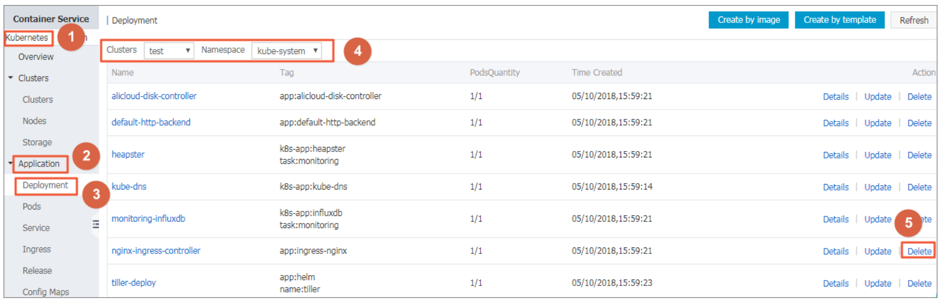
Click **Kubernetes** > **Application** > **Deployment** in the left-side navigation pane.

Select the cluster from the **Clusters** drop-down list and **kube-system** from the **Namespace** drop-down list.

Click **Delete** at the right of nginx-ingress-controller and then click **OK** in the displayed dialog box.

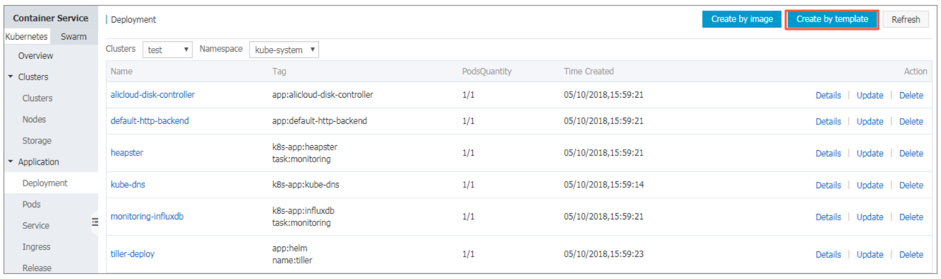
An Ingress Controller is deployed by default when the cluster is initialized. For more information, see ingress-nginx. You must delete the Ingress Controller deployed by default first and then deploy a new set of high-reliability Ingress Controller access layer.

> **Note:** The Ingress Controller deployed by default is associated with the nginx-ingress-lb service. Do not delete the associated service when deleting the deployment. The nginx-ingress-lb service is about to be updated later.



Name	Tag	PodsQuantity	Time Created	Action
alicloud-disk-controller	app:alicloud-disk-controller	1/1	05/10/2018,15:59:21	Details | Update | Delete
default-http-backend	app:default-http-backend	1/1	05/10/2018,15:59:21	Details | Update | Delete
heapster	k8s-app:heapster task:monitoring	1/1	05/10/2018,15:59:21	Details | Update | Delete
kube-dns	k8s-app:kube-dns	1/1	05/10/2018,15:59:14	Details | Update | Delete
monitoring-influxdb	k8s-app:influxdb task:monitoring	1/1	05/10/2018,15:59:21	Details | Update | ete
nginx-ingress-controller	app:ingress-nginx	1/1	05/10/2018,15:59:21	Details | Update | Delete
tiller-deploy	app:helm name:tiller	1/1	05/10/2018,15:59:23	Details | Update | Delete

Click **Create by template** in the upper-right corner.

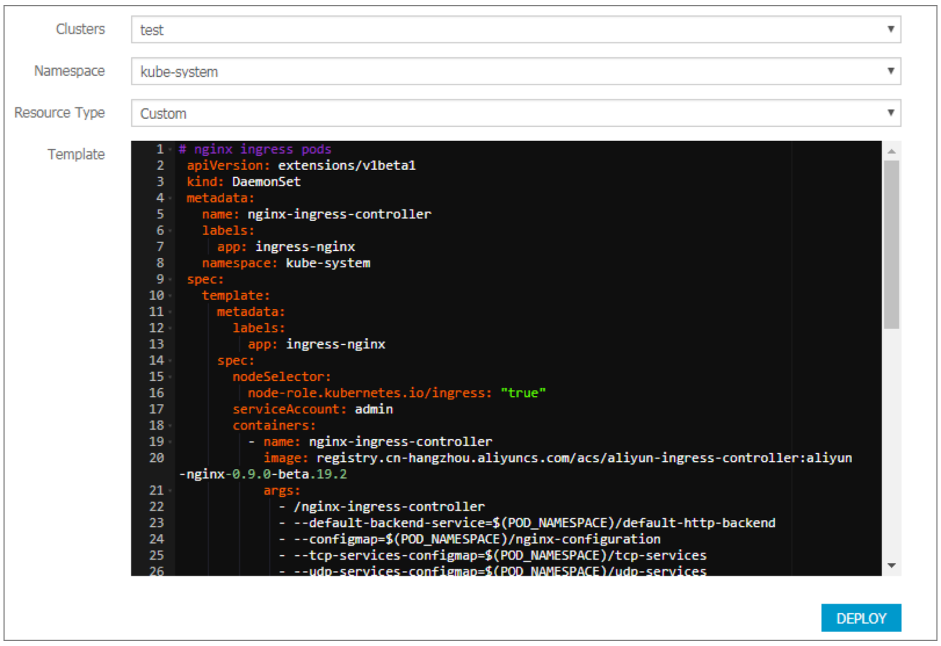


Name	Tag	PodsQuantity	Time Created	Action
alicloud-disk-controller	app:alicloud-disk-controller	1/1	05/10/2018,15:59:21	Details | Update | Delete
default-http-backend	app:default-http-backend	1/1	05/10/2018,15:59:21	Details | Update | Delete
heapster	k8s-app:heapster task:monitoring	1/1	05/10/2018,15:59:21	Details | Update | Delete
kube-dns	k8s-app:kube-dns	1/1	05/10/2018,15:59:14	Details | Update | Delete
monitoring-influxdb	k8s-app:influxdb task:monitoring	1/1	05/10/2018,15:59:21	Details | Update | Delete
tiller-deploy	app:helm name:tiller	1/1	05/10/2018,15:59:23	Details | Update | Delete

Select the cluster from the **Clusters** drop-down list and **kube-system** from the **Namespace** drop-down list.

Select a sample template or **Custom** from the **Resource Type** drop-down list.

Click **DEPLOY**.



Clusters: test

Namespace: kube-system

Resource Type: Custom

Template

```
# nginx ingress pods
 apiVersion: extensions/v1beta1
 kind: DaemonSet
 metadata:
   name: nginx-ingress-controller
   labels:
     app: ingress-nginx
   namespace: kube-system
 spec:
   template:
     metadata:
       labels:
         app: ingress-nginx
     spec:
       nodeSelector:
         node-role.kubernetes.io/ingress: "true"
       serviceAccount: admin
       containers:
         - name: nginx-ingress-controller
           image: registry.cn-hangzhou.aliyuncs.com/acs/aliyun-ingress-controller:aliyun
-nginx-0.9.0-beta.19.2
           args:
             - /nginx-ingress-controller
             - --default-backend-service=$(POD_NAMESPACE)/default-http-backend
             - --configmap=$(POD_NAMESPACE)/nginx-configuration
             - --tcp-services-configmap=$(POD_NAMESPACE)/tcp-services
             - --udp-services-configmap=$(POD_NAMESPACE)/udp-services
```

In this example, redeploy the Ingress Controller to the target Ingress node in the DaemonSet method. You can also deploy the Ingress Controller by using deployment together with the affinity.

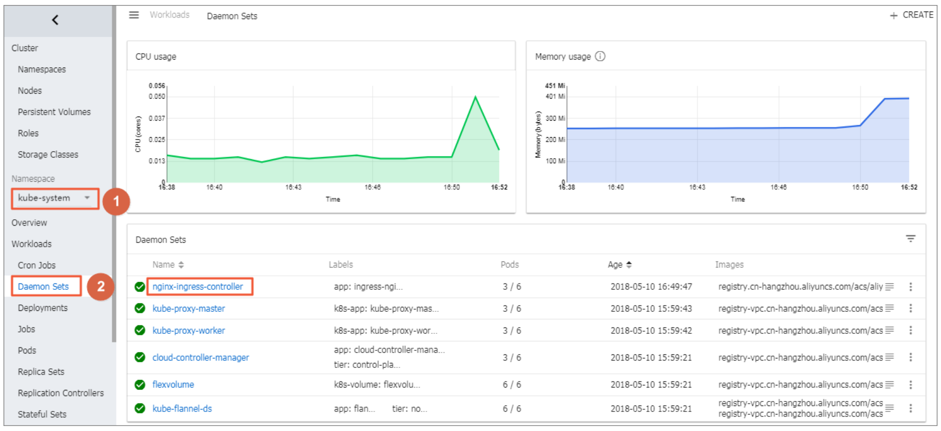
```
 # nginx ingress pods
apiVersion: extensions/v1beta1
kind: DaemonSet
metadata:
name: nginx-ingress-controller
labels:
app: ingress-nginx
namespace: kube-system
spec:
template:
metadata:
labels:
app: ingress-nginx
spec:
nodeSelector:
node-role.kubernetes.io/ingress: "true" ##Deploy the pod to the corresponding node by using the label
selector.
serviceAccount: admin
containers:
- name: nginx-ingress-controller
image: registry.cn-hangzhou.aliyuncs.com/acs/aliyun-ingress-controller:aliyun-nginx-0.9.0-beta.19.2
args:
- /nginx-ingress-controller
- --default-backend-service=$(POD_NAMESPACE)/default-http-backend
- --configmap=$(POD_NAMESPACE)/nginx-configuration
- --tcp-services-configmap=$(POD_NAMESPACE)/tcp-services
- --udp-services-configmap=$(POD_NAMESPACE)/udp-services
- --annotations-prefix=nginx.ingress.kubernetes.io
- --publish-service=$(POD_NAMESPACE)/nginx-ingress-lb
- --v=2
```

```
env:
- name: POD_NAME
valueFrom:
fieldRef:
fieldPath: metadata.name
- name: POD_NAMESPACE
valueFrom:
fieldRef:
fieldPath: metadata.namespace
ports:
- name: http
containerPort: 80
- name: https
containerPort: 443
livenessProbe:
failureThreshold: 3
httpGet:
path: /healthz
port: 10254
scheme: HTTP
initialDelaySeconds: 10
periodSeconds: 10
successThreshold: 1
timeoutSeconds: 1
readinessProbe:
failureThreshold: 3
httpGet:
path: /healthz
port: 10254
scheme: HTTP
periodSeconds: 10
successThreshold: 1
timeoutSeconds: 1
```

A message indicating the deployment status is displayed after you click **DEPLOY**. After the successful deployment, click **Kubernetes Dashboard** in the message to go to the dashboard.

Select **kube-system** as the namespace in the left-side navigation pane.

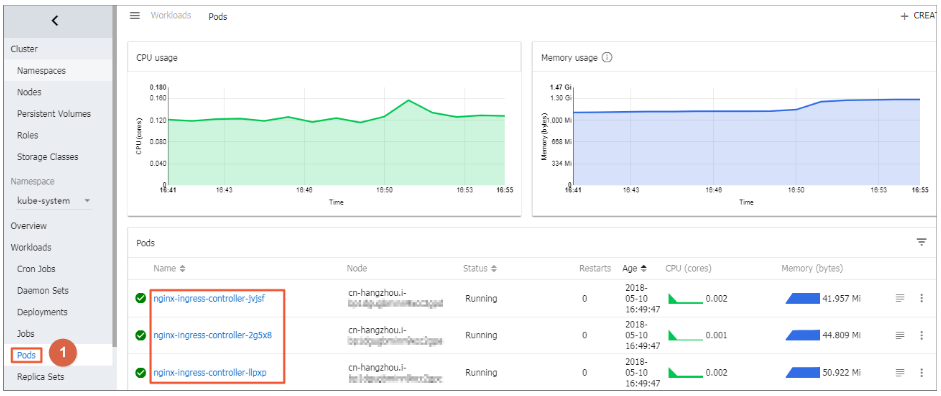
Click **Daemon Sets** in the left-side navigation pane and view the nginx-ingress-controller.



Daemon Sets

Name	Labels	Pods	Age	Images
nginx-ingress-controller	app: ingress-ngi...	3 / 6	2018-05-10 16:49:47	registry.cn-hangzhou.aliyuncs.com/acs/aliy
kube-proxy-master	k8s-app: kube-proxy-mas...	3 / 6	2018-05-10 15:59:43	registry-vpc.cn-hangzhou.aliyuncs.com/acs
kube-proxy-worker	k8s-app: kube-proxy-wor...	3 / 6	2018-05-10 15:59:42	registry-vpc.cn-hangzhou.aliyuncs.com/acs
cloud-controller-manager	app: cloud-controller-mana... tier: control-pla...	3 / 6	2018-05-10 15:59:21	registry-vpc.cn-hangzhou.aliyuncs.com/acs
flexvolume	k8s-volume: flexvolu...	6 / 6	2018-05-10 15:59:21	registry-vpc.cn-hangzhou.aliyuncs.com/acs
kube-flannel-ds	app: flan... tier: no...	6 / 6	2018-05-10 15:59:21	registry-vpc.cn-hangzhou.aliyuncs.com/acs registry-vpc.cn-hangzhou.aliyuncs.com/acs

Click **Pods** in the left-side navigation pane to view the pods of nginx-ingress-controller.



Pods

Name	Node	Status	Restarts	Age	CPU (cores)	Memory (bytes)
nginx-ingress-controller-jvjsf	cn-hangzhou.i-[redacted]	Running	0	2018-05-10 16:49:47	0.002	41.957 Mi
nginx-ingress-controller-2g5x8	cn-hangzhou.i-[redacted]	Running	0	2018-05-10 16:49:47	0.001	44.809 Mi
nginx-ingress-controller-llpxp	cn-hangzhou.i-[redacted]	Running	0	2018-05-10 16:49:47	0.002	50.922 Mi

Step 3 Update Ingress Server Load Balancer service

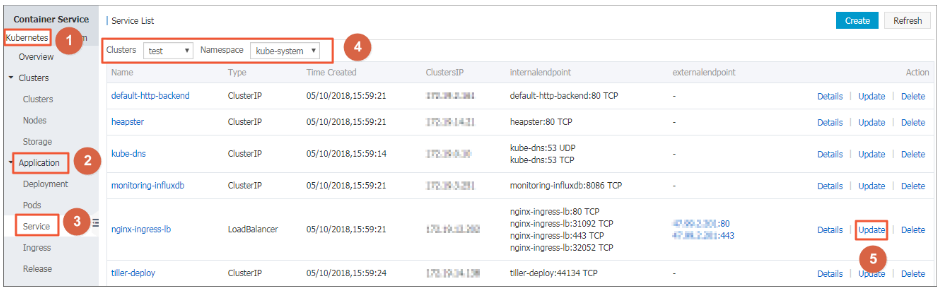
Log on to the Container Service console.

Click **Kubernetes** > **Application** > **Service** in the left-side navigation pane.

Select the cluster from the **Clusters** drop-down list and **kube-system** from the **Namespace** drop-down list.

Click **Update** at the right of nginx-ingress-lb.

An Ingress Server Load Balancer service is deployed by default when the cluster is initialized. For more information, see ingress-nginx. You must update the Ingress Server Load Balancer service to automatically identify the Ingress nodes with the tag node-role.kubernetes.io/ingress=true.

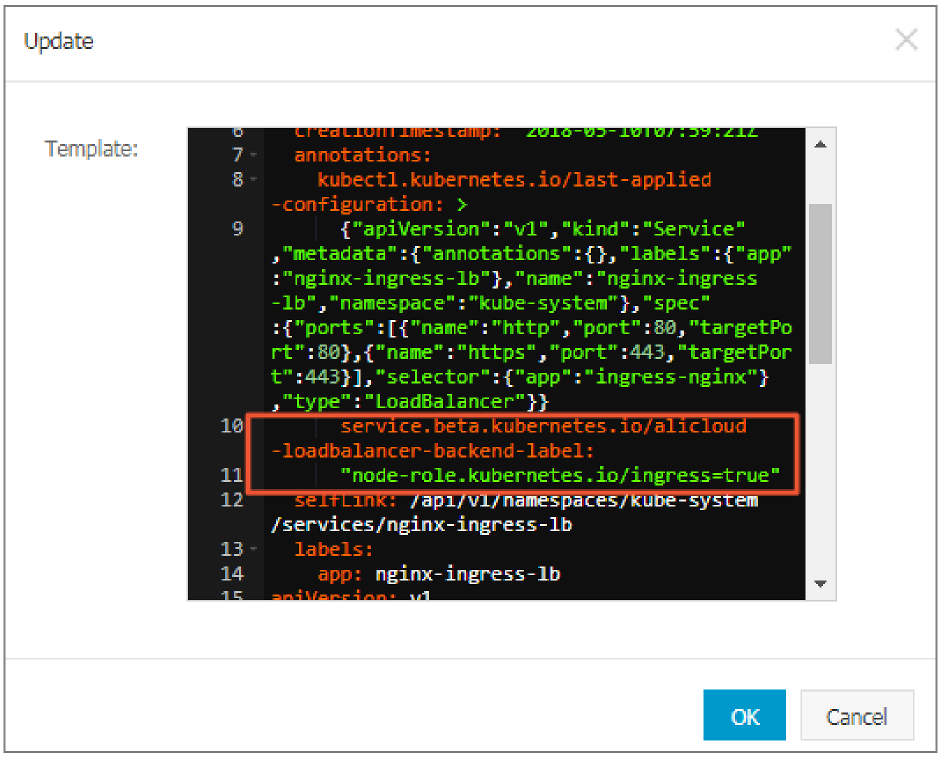


Clusters: test   Namespace: kube-system

Name	Type	Time Created	ClustersIP	internalendpoint	externalendpoint	Action
default-http-backend	ClusterIP	05/10/2018,15:59:21	[redacted]	default-http-backend:80 TCP	-	Details | Update | Delete
heapster	ClusterIP	05/10/2018,15:59:21	[redacted]	heapster:80 TCP	-	Details | Update | Delete
kube-dns	ClusterIP	05/10/2018,15:59:14	[redacted]	kube-dns:53 UDP kube-dns:53 TCP	-	Details | Update | Delete
monitoring-influxdb	ClusterIP	05/10/2018,15:59:21	[redacted]	monitoring-influxdb:8086 TCP	-	Details | Update | Delete
nginx-ingress-lb	LoadBalancer	05/10/2018,15:59:21	[redacted]	nginx-ingress-lb:80 TCP nginx-ingress-lb:31092 TCP nginx-ingress-lb:443 TCP nginx-ingress-lb:32052 TCP	[redacted]:80 [redacted]:443	Details | Update | Delete
tiller-deploy	ClusterIP	05/10/2018,15:59:24	[redacted]	tiller-deploy:44134 TCP	-	Details | Update | Delete

In the displayed dialog box, add the annotation service.beta.kubernetes.io/alicloud-loadbalancer-backend-label: "node-role.kubernetes.io/ingress=true", and then click **OK**.

You can also log on to the master node of the cluster and run the command kubectl apply -f https://acs-k8s-ingress.oss-cn-hangzhou.aliyuncs.com/nginx-ingress-slb-service.yml to update the nginx-ingress-lb service.



```
  creationTimestamp: 2018-05-10T07:59:21Z
  annotations:
    kubectl.kubernetes.io/last-applied
-configuration: >
      {"apiVersion":"v1","kind":"Service"
,"metadata":{"annotations":{},"labels":{"app"
:"nginx-ingress-lb"},"name":"nginx-ingress
-lb","namespace":"kube-system"},"spec"
:{"ports":[{"name":"http","port":80,"targetPo
rt":80},{"name":"https","port":443,"targetPor
t":443}],"selector":{"app":"ingress-nginx"}
,"type":"LoadBalancer"}}
      service.beta.kubernetes.io/alicloud
-loadbalancer-backend-label:
      "node-role.kubernetes.io/ingress=true"
  selfLink: /api/v1/namespaces/kube-system
/services/nginx-ingress-lb
  labels:
    app: nginx-ingress-lb
apiVersion: v1
```

Then, you have deployed the high-reliability access layer of Ingress, which allows you to effectively deal with the challenges of single point of failure and business traffic, and quickly expand the Ingress access layer by adding tags.

Implement Istio distributed tracking in Kubernetes

Background

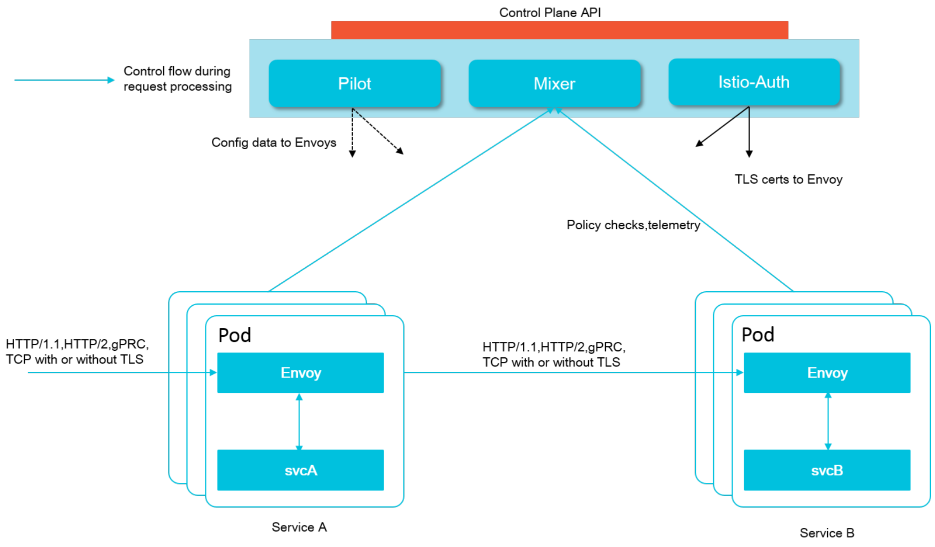
Microservice is a focus in the current era. More and more IT enterprises begin to embrace the microservices. The microservice architecture splits a complex system into several small services and each service can be developed, deployed, and scaled independently. As a heaven-made match, the microservice architecture and containers (Docker and Kubernetes) further simplify the microservice delivery and strengthen the flexibility and robustness of the entire system.

When monolithic applications are transformed to microservices, the distributed application architecture composed of a large number of microservices also increases the complexity of operation & maintenance, debugging, and security management. As microservices grow in scale and complexity, developers must be faced with complex challenges such as service discovery, Server Load Balancer, failure recovery, indicator collection, monitoring, A/B testing, throttling, access control, and end-to-end authentication, which are difficult to resolve.

In May 2017, Google, IBM, and Lyft published the open-source service network architecture Istio, which provides the connection, management, monitoring, and security protection of microservices. Istio provides an infrastructure layer for services to communicate with each other, decouples the issues such as version management, security protection, failover, monitoring, and telemetry in application logics and service access. Being unrelated to codes, Istio attracts enterprises to transform to microservices, which will make the microservice ecology develop fast.

Architecture principle of Istio

In Kubernetes, a pod is a collection of close-coupled containers, and these containers share the same network namespace. With the extension mechanism of Initializer in Kubernetes, an Envoy container is automatically created and started for each business pod, without modifying the deployment description of the business pod. The Envoy takes over the inbound and outbound traffic of business containers in the same pod. Therefore, the microservice governance functions, including the traffic management, microservice tracking, security authentication, access control, and strategy implementation, are realized by operating on the Envoy.



An Istio service mesh is logically split into a data plane and a control plane.

The data plane is composed of a collection of intelligent proxies (Envoys) deployed as sidecars that mediate and control all network communication between microservices.

The control plane is used to manage and configure the proxies to route traffic, and enforce polices at the runtime.

An Istio is mainly composed of the following components:

Envoy: The Envoy is used to mediate all the inbound and outbound traffic for all the services in the service mesh. Functions such as dynamic service discovery, Server Load Balancer, fault injection, and traffic management are supported. The Envoy is deployed as a sidecar to the pods of related services.

Pilot: The Pilot is used to collect and verify the configurations and distribute the configurations to all kinds of Istio components.

Mixer: The Mixer is used to enforce the access control and usage policies in the service mesh, and collect telemetry data from Envoy proxies and other services.

Istio-Auth: Istio-Auth provides strong service-to-service and end user authentication.

For more information about Istio, see the Istio official document.

Install Istio

Use an Alibaba Cloud Container Service Kubernetes cluster as an example.

Alibaba Cloud Container Service has enabled the Initializers plug-in by default for Kubernetes clusters if the cluster version is later than 1.8. No other configurations are needed.

Note: After you deploy the Istio, a sidecar is injected to each pod to take over the service communication. Therefore, we recommend that you verify this in the independent test environment.

Create Kubernetes clusters

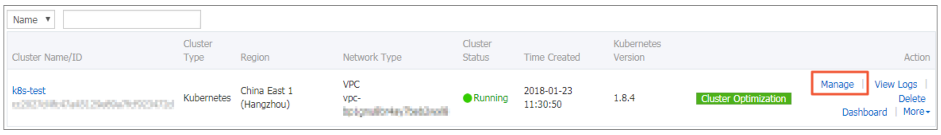
Log on to the Container Service console.

Click **Kubernetes** in the left-side navigation pane.

Click **Create Kubernetes Cluster** in the upper-right corner.

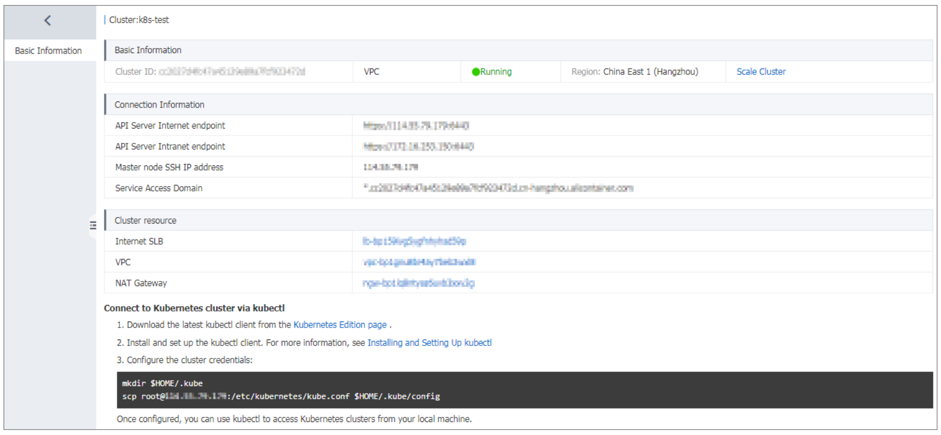
Configure the parameters to create a cluster. For how to create a Kubernetes cluster, see Create a cluster.

After the cluster is created, click **Manage** at the right of the cluster when the cluster status is changed to **Running**.



Cluster Name/ID	Cluster Type	Region	Network Type	Cluster Status	Time Created	Kubernetes Version		Action
k8s-test [redacted]	Kubernetes	China East 1 (Hangzhou)	VPC vpc-[redacted]	● Running	2018-01-23 11:30:50	1.8.4	Cluster Optimization	Manage | View Logs | Delete Dashboard | More

On the cluster **Basic Information** page, you can configure the corresponding connection information based on the page information. You can connect to the cluster either by using kubectl or SSH.



Cluster:k8s-test

Basic Information

Cluster ID: [redacted]	VPC	● Running	Region: China East 1 (Hangzhou)	Scale Cluster

Connection Information

API Server Internet endpoint	[redacted]
API Server Intranet endpoint	[redacted]
Master node SSH IP address	[redacted]
Service Access Domain	[redacted]

Cluster resource

Internet SLB	[redacted]
VPC	[redacted]
NAT Gateway	[redacted]

Connect to Kubernetes cluster via kubectl

1. Download the latest kubectl client from the Kubernetes Edition page .
2. Install and set up the kubectl client. For more information, see Installing and Setting Up kubectl
3. Configure the cluster credentials:

```
mkdir $HOME/.kube
scp root@[redacted]:/etc/kubernetes/kube.conf $HOME/.kube/config
```

Once configured, you can use kubectl to access Kubernetes clusters from your local machine.

Deploy Istio release version

Log on to the master node and run the following command to get the latest Istio installation package.

```
curl -L https://git.io/getLatestIstio | sh -
```

Run the following command:

```
cd istio-0.4.0                  ##Change the working directory to Istio.
export PATH=$PWD/bin:$PATH ##Add the istioctl client to PATH environment variable.
```

Run the following command to deploy Istio.

```
kubectl apply -f install/kubernetes/istio.yaml               ## Deploy Istio system components.
kubectl apply -f install/kubernetes/istio-initializer.yaml # Deploy Istio initializer plug-in.
```

After the deployment, run the following command to verify if the Istio components are successfully deployed.

```
$  kubectl get svc,pod  -n istio-system
NAME TYPE CLUSTER-IP EXTERNAL-IP PORT(S) AGE
svc/istio-ingress LoadBalancer 172.21.10.18 101.37.113.231 80:30511/TCP,443:31945/TCP 1m
svc/istio-mixer ClusterIP 172.21.14.221 <none>
9091/TCP,15004/TCP,9093/TCP,9094/TCP,9102/TCP,9125/UDP,42422/TCP 1m
svc/istio-pilot ClusterIP 172.21.4.20 <none> 15003/TCP,443/TCP 1m

NAME READY STATUS RESTARTS AGE
po/istio-ca-55b954ff7-crsjq 1/1 Running 0 1m
po/istio-ingress-948b746cb-4t24c 1/1 Running 0 1m
po/istio-initializer-6c84859cd-8mvfj 1/1 Running 0 1m
po/istio-mixer-59cc756b48-tkx6c 3/3 Running 0 1m
po/istio-pilot-55bb7f5d9d-wc5xh 2/2 Running 0 1m
```

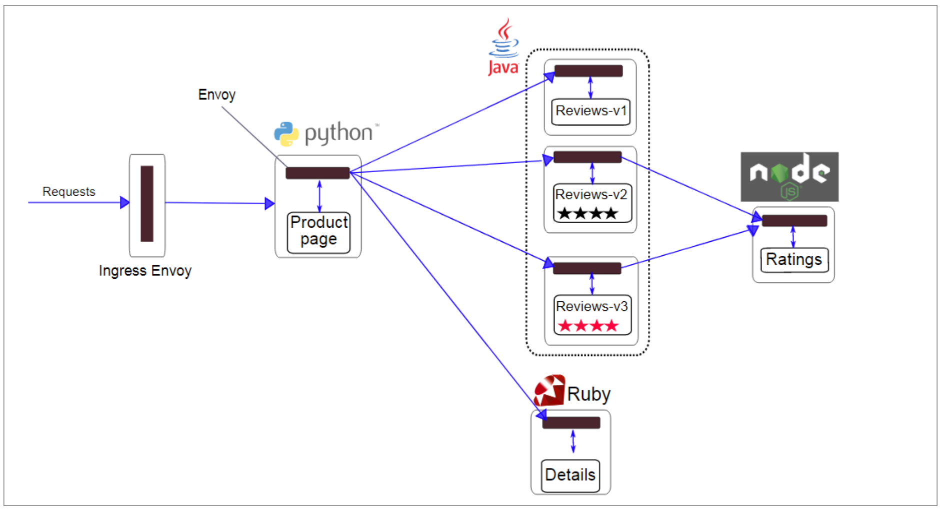
After all the pods are in the running status, the Istio deployment is finished.

Istio distributed service tracking case

Deploy and test the application BookInfo

BookInfo is an application similar to an online bookstore, which is composed of several independent microservices compiled by different languages. The application BookInfo is deployed in the container mode and does not have any dependencies on Istio. All the microservices are packaged together with an Envoy sidecar. The Envoy sidecar intercepts the inbound and outbound call requests of services to demonstrate the distributed tracking function of Istio service mesh.

For more information about BookInfo, see Bookinfo guide.



Run the following command to deploy and test the application Bookinfo.

```
kubectl apply -f samples/bookinfo/kube/bookinfo.yaml
```

In the Alibaba Cloud Kubernetes cluster environment, every cluster has been configured with the Server Load Balancer and Ingress. Run the following command to obtain the IP address of Ingress.

```
$ kubectl get ingress -o wide
NAME HOSTS ADDRESS PORTS AGE
gateway * 101.37.xxx.xxx 80 2m
```

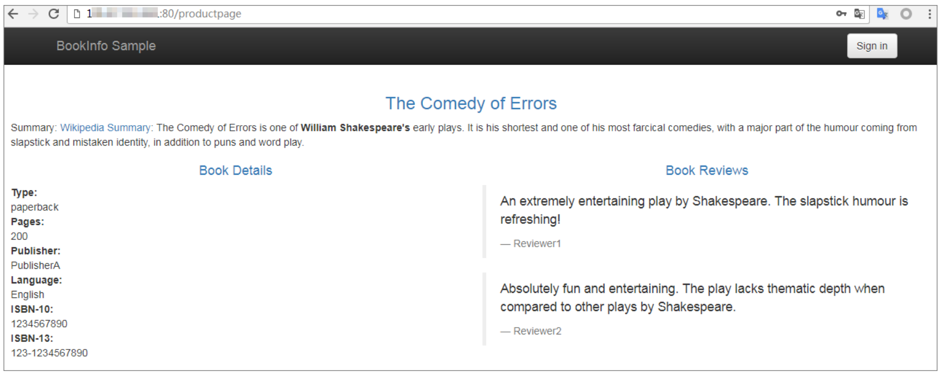
If the preceding command cannot obtain the external IP address, run the following command to obtain the corresponding address.

```
export GATEWAY_URL=$(kubectl get ingress -o wide -o jsonpath={.items[0].status.loadBalancer.ingress[0].ip})
```

The application is successfully deployed if the following command returns 200.

```
curl -o /dev/null -s -w "%{http_code}\n" http://${GATEWAY_URL}/productpage
```

You can open http://${GATEWAY_URL}/productpage in the browser to access the application. GATEWAY_URL is the IP address of Ingress.



1[redacted]:80/productpage

The Comedy of Errors

Summary: Wikipedia Summary: The Comedy of Errors is one of **William Shakespeare's** early plays. It is his shortest and one of his most farcical comedies, with a major part of the humour coming from slapstick and mistaken identity, in addition to puns and word play.

Book Details

Type:
paperback
Pages:
200
Publisher:
PublisherA
Language:
English
ISBN-10:
1234567890
ISBN-13:
123-1234567890

Book Reviews

An extremely entertaining play by Shakespeare. The slapstick humour is refreshing!

— Reviewer1

Absolutely fun and entertaining. The play lacks thematic depth when compared to other plays by Shakespeare.

— Reviewer2

Deploy Jaeger tracking system

Distributed tracking system helps you observe the call chains between services and is useful when diagnosing performance issues and analyzing system failures.

Istio ecology supports different distributed tracking systems, including Zipkin and Jaeger. Use the Jaeger as an example.

Istio version 0.4 supports Jaeger. The test method is as follows.

```
kubectl apply -n istio-system -f https://raw.githubusercontent.com/jaegertracing/jaeger-kubernetes/master/all-in-one/jaeger-all-in-one-template.yml
```

After the deployment is finished, if you connect to the Kubernetes cluster by using kubectl, run the following command to access the Jaeger control panel by using port mapping and open http://localhost:16686 in the browser.

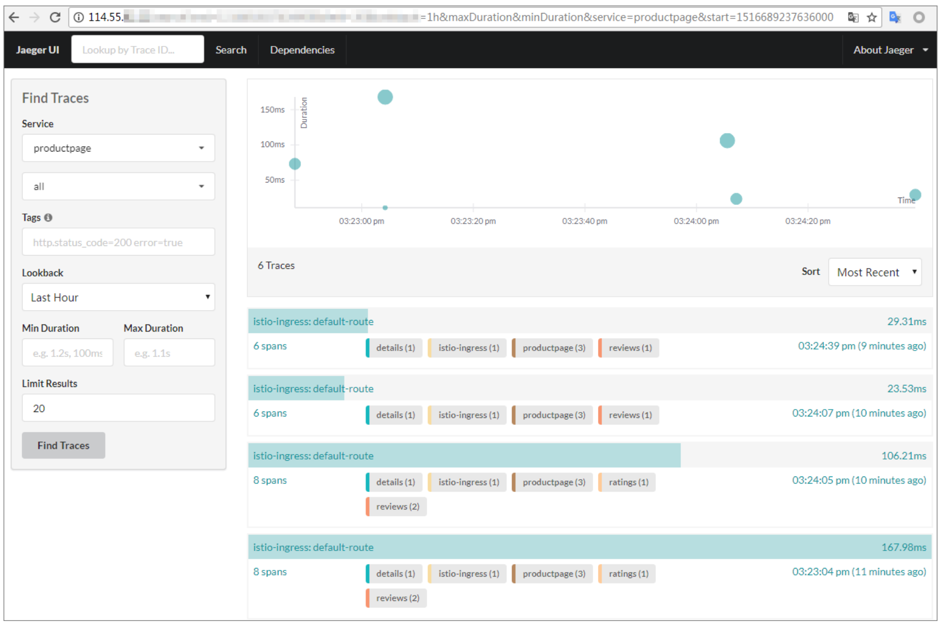
```
kubectl port-forward -n istio-system $(kubectl get pod -n istio-system -l app=jaeger -o jsonpath='{.items[0].metadata.name}') 16686:16686 &
```

If you connect to the Alibaba Cloud Kubernetes cluster by using SSH, run the following command to check the external access address of jaeger-query service.

```
$ kubectl get svc -n istio-system
NAME TYPE CLUSTER-IP EXTERNAL-IP PORT(S) AGE
jaeger-agent ClusterIP None <none> 5775/UDP,6831/UDP,6832/UDP 1h
jaeger-collector ClusterIP 172.21.10.187 <none> 14267/TCP,14268/TCP,9411/TCP 1h
jaeger-query LoadBalancer 172.21.10.197 114.55.82.11 80:31960/TCP ##The external access address is 114.55.82.11:80. 1h
zipkin ClusterIP None <none> 9411/TCP

...
```

Record the external access IP address and port of jaeger-query and then open the application in the browser.

By accessing the application BookInfo for multiple times and generating the call chain information, we can view the call chain information of services clearly.



Service: productpage
all
Tags: http.status_code=200 error=true
Lookback: Last Hour
Min Duration: e.g. 1.2s, 100ms
Max Duration: e.g. 1.1s
Limit Results: 20

6 Traces — Sort: Most Recent

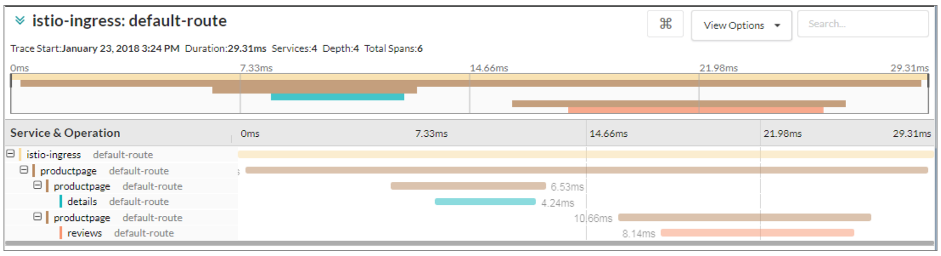
istio-ingress: default-route 29.31ms
6 spans — details (1), istio-ingress (1), productpage (3), reviews (1) — 03:24:39 pm (9 minutes ago)

istio-ingress: default-route 23.53ms
6 spans — details (1), istio-ingress (1), productpage (3), reviews (1) — 03:24:07 pm (10 minutes ago)

istio-ingress: default-route 106.21ms
8 spans — details (1), istio-ingress (1), productpage (3), ratings (1), reviews (2) — 03:24:05 pm (10 minutes ago)

istio-ingress: default-route 167.98ms
8 spans — details (1), istio-ingress (1), productpage (3), ratings (1), reviews (2) — 03:23:04 pm (11 minutes ago)

Click a specific Trace to view the details.

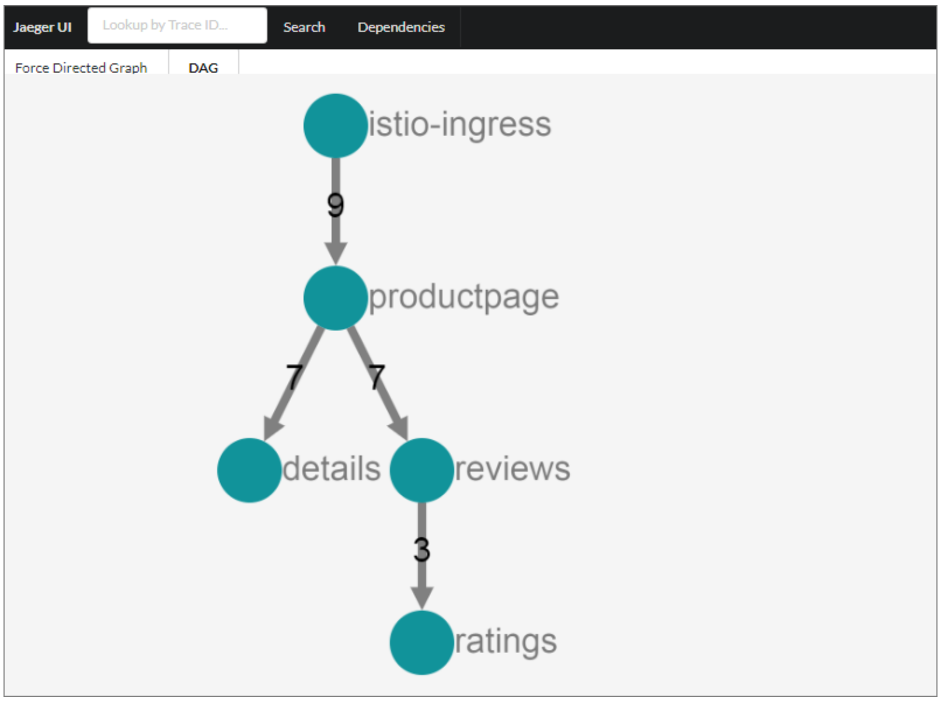


istio-ingress: default-route

Trace Start: January 23, 2018 3:24 PM Duration: 29.31ms Services: 4 Depth: 4 Total Spans: 6

istio-ingress default-route
productpage default-route
productpage default-route 6.53ms
details default-route 4.24ms
productpage default-route 10.66ms
reviews default-route 8.14ms

You can also view DAG.



Implementation principle of Istio distributed tracking

The kernel of Istio service mesh is the Envoy, which is a high-performance and open-source Layer-7 proxy and communication bus. In Istio, each microservice is injected with an Envoy sidecar and this instance is responsible for processing all the inbound and outbound network traffic. Therefore, each Envoy sidecar can monitor all the API calls between services, record the time required by each service call, and record whether each service call is successful or not.

Whenever a microservice initiates an external call, the client Envoy will create a new span. A span represents the complete interaction process between a collection of microservices, starting from a caller (client) sending a request to receiving the response from the server.

In the service interaction process, clients record the request start time and response receipt time, and the Envoy on the server records the request receipt time and response return time.

Each Envoy distributes their own span view information to the distributed tracking system. When a microservice processes requests, other microservices might need to be called, which causes the creation of a causally related span and then forms the complete trace. Then, an application must be used to collect and forward the following Headers from the request message:

- x-request-id
- x-b3-traceid
- x-b3-spanid
- x-b3-parentspanid
- x-b3-sampled
- x-b3-flags
- x-ot-span-context

Envoys in the communication links can intercept, process, and forward the corresponding Headers.

```
 Client Tracer                                   Server Tracer
┌───────────────────────┐  ┌───────────────────────┐
| | | |
| TraceContext | Http Request Headers | TraceContext |
| ┌───────────────────┐ | ┌────────────────────────┐ | ┌──────────────────┐ |
| | TraceId | | | X─B3─TraceId | | | TraceId | |
| | | | | | | | | | |
| | ParentSpanId | | Extract | X─B3─ParentSpanId | Inject | | ParentSpanId | |
| | ├─┼──────────> | ├─────────┼> | | |
| | SpanId | | | X─B3─SpanId | | | SpanId | |
| | | | | | | | | | |
| | Sampled | | | X─B3─Sampled | | | Sampled | |
| └───────────────────┘ | └────────────────────────┘ | └──────────────────┘ |
| | | |
└───────────────────────┘  └───────────────────────┘
```

For specific codes, see the Istio document.

Conclusion

Istio is accelerating the application and popularization of service mesh by using the good expansion mechanism and strong ecology. In addition to those mentioned in the preceding sections, Weave Scope, Istio Dashboard, and Istio-Analytics projects provide abundant call link visualization and analysis capabilities.

Swarm

Run TensorFlow-based AlexNet in Alibaba Cloud Container Service

AlexNet is a CNN network developed in 2012 by Alex Krizhevsky using five-layer convolution and three-layer ReLU layer, and won the ImageNet competition (ILSVRC). AlexNet proves the effectiveness in classification (15.3% error rate) of CNN, against the 25% error rate by previous image recognition tools. The emergence of this network marks a milestone for deep learning applications in the computer vision field.

AlexNet is also a common performance indicator tool for deep learning framework. TensorFlow provides the alexnet_benchmark.py tool to test GPU and CPU performance. This document uses AlexNet as an example to illustrate how to run a GPU application in Alibaba Cloud Container Service easily and quickly.

Prerequisite

Create a GN5 GPU cluster in Container Service console.

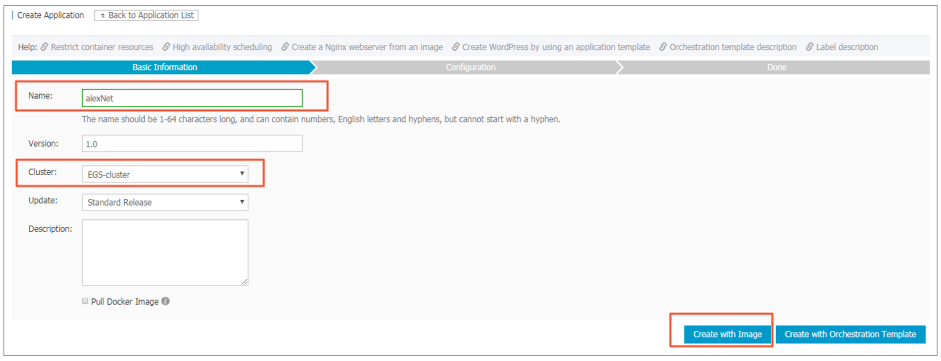
Procedure

Log on to the Container Service console.

Click **Applications** in the left-side navigation pane.

Click **Create Application** in the upper-right corner.

Complete the configurations. Enter the application name (**alexNet** in this example) in the **Name** field and then select the created GN5 GPU cluster from the **Cluster** list.



Create Application | Back to Application List

Help: Restrict container resources · High availability scheduling · Create a Nginx webserver from an image · Create WordPress by using an application template · Orchestration template description · Label description

Basic Information > Configuration > Done

Name: alexNet
The name should be 1-64 characters long, and can contain numbers, English letters and hyphens, but cannot start with a hyphen.

Version: 1.0

Cluster: EGS-cluster

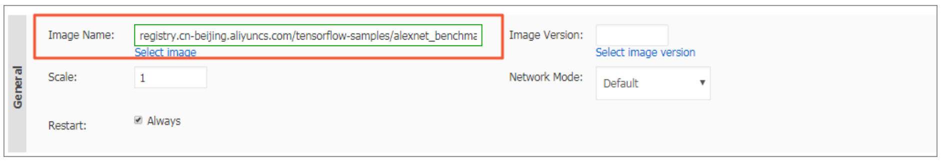
Update: Standard Release

Description:

☐ Pull Docker Image

Click **Create with Image**.

Enter **registry.cn-beijing.aliyuncs.com/tensorflow-samples/alexnet_benchmark:1.0.0-devel-gpu** in the **Image Name** field.



General

Image Name: registry.cn-beijing.aliyuncs.com/tensorflow-samples/alexnet_benchma

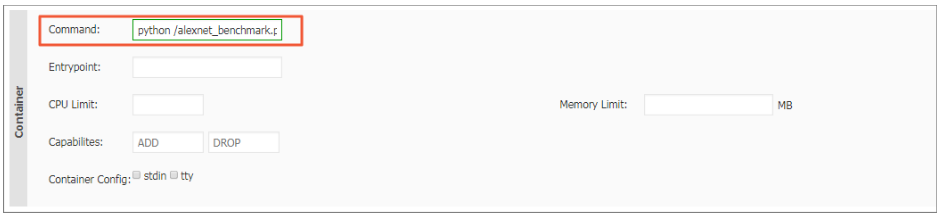
Image Version:

Scale: 1

Network Mode: Default

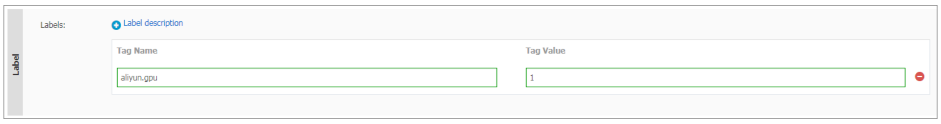
Restart: ☑ Always

In the **Container** section, enter the command in the **Command** field. For example, enter python /alexnet_benchmark.py --batch_size 128 --num_batches 100.



Command:	python /alexnet_benchmark.p		
Entrypoint:			
CPU Limit:		Memory Limit:	MB
Capabilites:	ADD DROP		
Container Config:	☐ stdin ☐ tty		

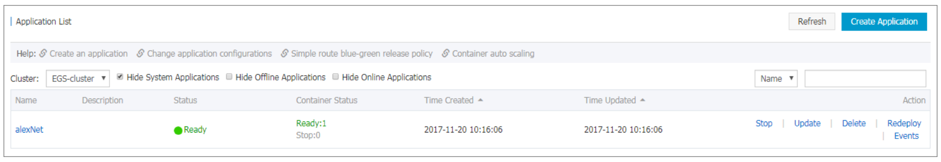
Click the button in the **Label** section. Enter the Alibaba Cloud gpu extension label. Enter **aliyun.gpu** in the **Tag Name** field, and the number of scheduling GPUs (**1** in this example) in the **Tag Value** field.



Tag Name	Tag Value
aliyun.gpu	1

Click **Create** after configuring the application.

You can view the created **alexNet** application on the **Application List** page.

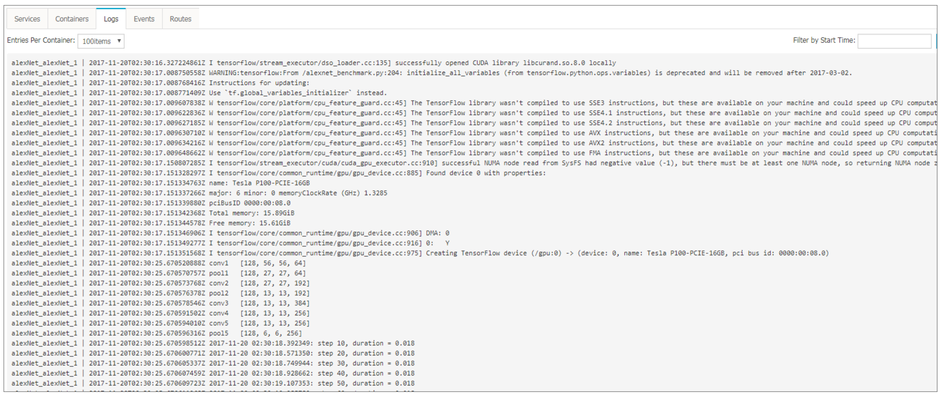

Application List
Refresh
Create Application
Help: Create an application
Change application configurations
Simple route blue-green release policy
Container auto scaling

Cluster: EGS-cluster ☑ Hide System Applications ☐ Hide Offline Applications ☐ Hide Online Applications Name

Name	Description	Status	Container Status	Time Created	Time Updated	Action
alexNet		● Ready	Ready:1 Stop:0	2017-11-20 10:16:06	2017-11-20 10:16:06	Stop | Update | Delete | Redeploy | Events

Click the application name **alexNet**.

Click the **Logs** tab.



Entries Per Container: 100items Filter by Start Time:

```
alexNet_alexNet_1 | 2017-11-20T02:30:16.327224861Z I tensorflow/stream_executor/dso_loader.cc:135] successfully opened CUDA library libcurand.so.8.0 locally
alexNet_alexNet_1 | 2017-11-20T02:30:17.008750558Z WARNING:tensorflow:From /alexnet_benchmark.py:204: initialize_all_variables (from tensorflow.python.ops.variables) is deprecated and will be removed after 2017-03-02.
alexNet_alexNet_1 | 2017-11-20T02:30:17.008768416Z Instructions for updating:
alexNet_alexNet_1 | 2017-11-20T02:30:17.008771409Z Use `tf.global_variables_initializer` instead.
alexNet_alexNet_1 | 2017-11-20T02:30:17.009607838Z W tensorflow/core/platform/cpu_feature_guard.cc:45] The TensorFlow library wasn't compiled to use SSE3 instructions, but these are available on your machine and could speed up CPU computat
alexNet_alexNet_1 | 2017-11-20T02:30:17.009622836Z W tensorflow/core/platform/cpu_feature_guard.cc:45] The TensorFlow library wasn't compiled to use SSE4.1 instructions, but these are available on your machine and could speed up CPU comput
alexNet_alexNet_1 | 2017-11-20T02:30:17.009627185Z W tensorflow/core/platform/cpu_feature_guard.cc:45] The TensorFlow library wasn't compiled to use SSE4.2 instructions, but these are available on your machine and could speed up CPU comput
alexNet_alexNet_1 | 2017-11-20T02:30:17.009630710Z W tensorflow/core/platform/cpu_feature_guard.cc:45] The TensorFlow library wasn't compiled to use AVX instructions, but these are available on your machine and could speed up CPU computati
alexNet_alexNet_1 | 2017-11-20T02:30:17.009634216Z W tensorflow/core/platform/cpu_feature_guard.cc:45] The TensorFlow library wasn't compiled to use AVX2 instructions, but these are available on your machine and could speed up CPU computat
alexNet_alexNet_1 | 2017-11-20T02:30:17.009648662Z W tensorflow/core/platform/cpu_feature_guard.cc:45] The TensorFlow library wasn't compiled to use FMA instructions, but these are available on your machine and could speed up CPU computati
alexNet_alexNet_1 | 2017-11-20T02:30:17.150807285Z I tensorflow/stream_executor/cuda/cuda_gpu_executor.cc:910] successful NUMA node read from SysFS had negative value (-1), but there must be at least one NUMA node, so returning NUMA node z
alexNet_alexNet_1 | 2017-11-20T02:30:17.151328297Z I tensorflow/core/common_runtime/gpu/gpu_device.cc:885] Found device 0 with properties:
alexNet_alexNet_1 | 2017-11-20T02:30:17.151334763Z name: Tesla P100-PCIE-16GB
alexNet_alexNet_1 | 2017-11-20T02:30:17.151337266Z major: 6 minor: 0 memoryClockRate (GHz) 1.3285
alexNet_alexNet_1 | 2017-11-20T02:30:17.151339880Z pciBusID 0000:00:08.0
alexNet_alexNet_1 | 2017-11-20T02:30:17.151342368Z Total memory: 15.89GiB
alexNet_alexNet_1 | 2017-11-20T02:30:17.151344578Z Free memory: 15.61GiB
alexNet_alexNet_1 | 2017-11-20T02:30:17.151346906Z I tensorflow/core/common_runtime/gpu/gpu_device.cc:906] DMA: 0
alexNet_alexNet_1 | 2017-11-20T02:30:17.151349277Z I tensorflow/core/common_runtime/gpu/gpu_device.cc:916] 0:   Y
alexNet_alexNet_1 | 2017-11-20T02:30:17.151351568Z I tensorflow/core/common_runtime/gpu/gpu_device.cc:975] Creating TensorFlow device (/gpu:0) -> (device: 0, name: Tesla P100-PCIE-16GB, pci bus id: 0000:00:08.0)
alexNet_alexNet_1 | 2017-11-20T02:30:25.670520888Z conv1   [128, 56, 56, 64]
alexNet_alexNet_1 | 2017-11-20T02:30:25.670570757Z pool1   [128, 27, 27, 64]
alexNet_alexNet_1 | 2017-11-20T02:30:25.670573768Z conv2   [128, 27, 27, 192]
alexNet_alexNet_1 | 2017-11-20T02:30:25.670576378Z pool2   [128, 13, 13, 192]
alexNet_alexNet_1 | 2017-11-20T02:30:25.670578546Z conv3   [128, 13, 13, 384]
alexNet_alexNet_1 | 2017-11-20T02:30:25.670591502Z conv4   [128, 13, 13, 256]
alexNet_alexNet_1 | 2017-11-20T02:30:25.670594010Z conv5   [128, 13, 13, 256]
alexNet_alexNet_1 | 2017-11-20T02:30:25.670596316Z pool5   [128, 6, 6, 256]
alexNet_alexNet_1 | 2017-11-20T02:30:25.670598512Z 2017-11-20 02:30:18.392349: step 10, duration = 0.018
alexNet_alexNet_1 | 2017-11-20T02:30:25.670600771Z 2017-11-20 02:30:18.571350: step 20, duration = 0.018
alexNet_alexNet_1 | 2017-11-20T02:30:25.670605337Z 2017-11-20 02:30:18.749944: step 30, duration = 0.018
alexNet_alexNet_1 | 2017-11-20T02:30:25.670607459Z 2017-11-20 02:30:18.928662: step 40, duration = 0.018
alexNet_alexNet_1 | 2017-11-20T02:30:25.670609723Z 2017-11-20 02:30:19.107353: step 50, duration = 0.018
```

In this way, you can check the performance of AlexNet on EGS by means of the container Log Service in Container Service console.

Best practices for restarting nodes

Restarting nodes directly may cause an exception in clusters. In the context of Alibaba Cloud use cases, this document introduces the best practices for restarting nodes in the situations such as performing active Operation & Maintenance (O&M) on Container Service.

Check the high availability configurations of business

Before restarting Container Service nodes, we recommend that you check or modify the following business configurations. In this way, restarting nodes cannot cause the exception of a single node and the business availability cannot be impaired.

Data persistence policy of configurations

We recommend the data persistence for external volumes of important data configurations such as configurations of logs and business. In this way, after the container is restructured, deleting the former container cannot cause the data loss.

For how to use the Container Service data volumes, see Manage data volumes.

Restart policy of configurations

We recommend that you configure the restart: always restart policy for the corresponding business services so that containers can be automatically pulled up after the nodes are restarted.

High availability policy of configurations

We recommend that you integrate with the product architecture to configure the affinity and mutual exclusion policies, such as high availability scheduling (availability:az propery), specified node scheduling (affinity and constraint properties) , and specified nodes scheduling (constraint property), for the corresponding business. In this way, restarting nodes cannot cause the exception of a single node. For example, for the database business, we recommend the active-standby or multi-instance deployment, and integrating with the preceding characteristics to make sure that different instances are on different nodes and related nodes are not restarted at the same time.

Best practices

We recommend that you check the high availability configurations of business by reading the preceding instructions. Then, follow these steps in sequence on each node.

Note: Do not perform operations on multiple nodes at the same time.

Back up snapshots

We recommend that you create the latest snapshots for all the related disks of the nodes and then back up the snapshots. When starting the shut-down nodes, an exception occurs because the server is not restarted for a long time and the business availability is impaired. However, by backing up the snapshots, this can be avoided.

Verify the container configuration availability of business

For a swarm cluster, restarting the corresponding business containers on nodes makes sure that the containers can be pulled up again normally.

Verify the running availability of Docker Engine

Try to restart Docker daemon and make sure that the Docker Engine can be restarted normally.

Perform related O&M

Perform the related O&M in the plan, such as updating business codes, installing system patches, and adjusting system configurations.

Restart nodes

Restart nodes normally in the console or system.

Check the status after the restart

Check the health status of the nodes and the running status of the business containers in the Container Service console after restarting the nodes.

Use OSSFS data volumes to share WordPress attachments

This document introduces how to share WordPress attachments across different containers by creating OSSFS data volumes in Alibaba Cloud Container Service.

Scenarios

Docker containers simplify WordPress deployment. With Alibaba Cloud Container Service, you can use an orchestration template to deploy WordPress with one click.

Note: For more information, see Create WordPress with an orchestration template.

In this example, the following orchestration template is used to create an application named **wordpress**.

```
web:
image: registry.aliyuncs.com/acs-sample/wordpress:4.3
ports:
- '80'
environment:
WORDPRESS_AUTH_KEY: changeme
WORDPRESS_SECURE_AUTH_KEY: changeme
WORDPRESS_LOGGED_IN_KEY: changeme
WORDPRESS_NONCE_KEY: changeme
WORDPRESS_AUTH_SALT: changeme
WORDPRESS_SECURE_AUTH_SALT: changeme
WORDPRESS_LOGGED_IN_SALT: changeme
WORDPRESS_NONCE_SALT: changeme
WORDPRESS_NONCE_AA: changeme
restart: always
links:
- 'db:mysql'
labels:
aliyun.logs: /var/log
aliyun.probe.url: http://container/license.txt
aliyun.probe.initial_delay_seconds: '10'
aliyun.routing.port_80: http://wordpress
aliyun.scale: '3'
db:
image: registry.aliyuncs.com/acs-sample/mysql:5.7
environment:
MYSQL_ROOT_PASSWORD: password
restart: always
labels:
aliyun.logs: /var/log/mysql
```

This application contains a MySQL container and three WordPress containers (aliyun.scale: '3' is the extension label of Alibaba Cloud Container Service, and specifies the number of containers. For more information about the labels supported by Alibaba Cloud Container Service, see Label description). The WordPress containers access MySQL by using a link. The aliyun.routing.port_80: http://wordpress label defines the load balancing among the three WordPress containers (for more information, see Simple routing - supports HTTP and HTTPS).

In this example, the application deployment is simple and the deployed application is of complete features. However, the attachments uploaded by WordPress are stored in the local disk, which means they cannot be shared across different containers or opened when requests are routed to other containers.

Solutions

This document introduces how to use OSSFS data volumes of Alibaba Cloud Container Service to share WordPress attachments across different containers, without any code modifications.

OSSFS data volume, a third-party data volume provided by Alibaba Cloud Container Service, packages various cloud storages (such as Object Storage Service (OSS)) as data volumes and then directly mounts them to the containers. This means the data volumes can be shared across different containers and automatically re-mounted to the containers when the containers are restarted or migrated.

Procedure

Create OSSFS data volumes.

Log on to the Container Service console.

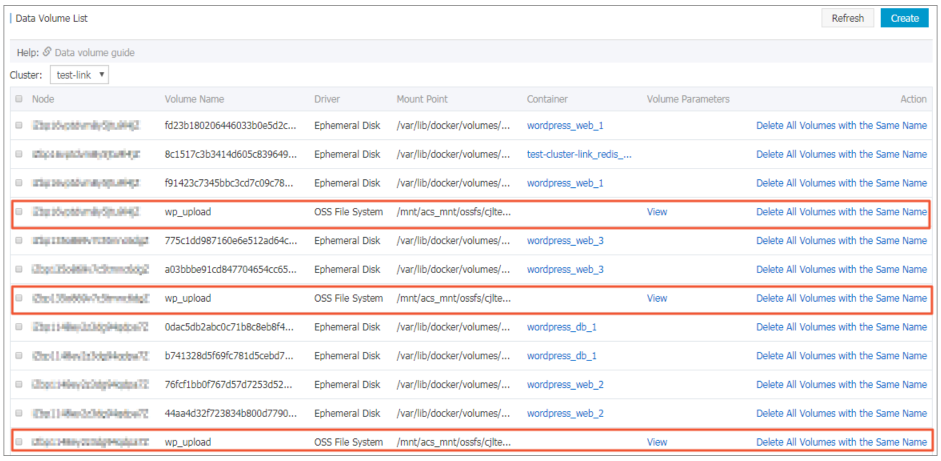
Click **Data Volumes** in the left-side navigation pane.

Select the cluster in which you want to create data volumes from the **Cluster** list.

Click **Create** in the upper-right corner to create the OSSFS data volumes.

For how to create OSSFS data volumes, see Create an OSSFS data volume.

In this example, the created OSSFS data volumes are named **wp_upload**. Container Service uses the same name to create data volumes on each node of a cluster.


Data Volume List

Help: Data volume guide

Cluster: test-link

Node	Volume Name	Driver	Mount Point	Container	Volume Parameters	Action
[redacted]	fd23b180206446033b0e5d2c...	Ephemeral Disk	/var/lib/docker/volumes/...	wordpress_web_1		Delete All Volumes with the Same Name
[redacted]	8c1517c3b3414d605c839649...	Ephemeral Disk	/var/lib/docker/volumes/...	test-cluster-link_redis_...		Delete All Volumes with the Same Name
[redacted]	f91423c7345bbc3cd7c09c78...	Ephemeral Disk	/var/lib/docker/volumes/...	wordpress_web_1		Delete All Volumes with the Same Name
[redacted]	wp_upload	OSS File System	/mnt/acs_mnt/ossfs/cjlte...		View	Delete All Volumes with the Same Name
[redacted]	775c1dd987160e6e512ad64c...	Ephemeral Disk	/var/lib/docker/volumes/...	wordpress_web_3		Delete All Volumes with the Same Name
[redacted]	a03bbbe91cd847704654cc65...	Ephemeral Disk	/var/lib/docker/volumes/...	wordpress_web_3		Delete All Volumes with the Same Name
[redacted]	wp_upload	OSS File System	/mnt/acs_mnt/ossfs/cjlte...		View	Delete All Volumes with the Same Name
[redacted]	0dac5db2abc0c71b8c8eb8f4...	Ephemeral Disk	/var/lib/docker/volumes/...	wordpress_db_1		Delete All Volumes with the Same Name
[redacted]	b741328d5f69fc781d5cebd7...	Ephemeral Disk	/var/lib/docker/volumes/...	wordpress_db_1		Delete All Volumes with the Same Name
[redacted]	76fcf1bb0f767d57d7253d52...	Ephemeral Disk	/var/lib/docker/volumes/...	wordpress_web_2		Delete All Volumes with the Same Name
[redacted]	44aa4d32f723834b800d7790...	Ephemeral Disk	/var/lib/docker/volumes/...	wordpress_web_2		Delete All Volumes with the Same Name
[redacted]	wp_upload	OSS File System	/mnt/acs_mnt/ossfs/cjlte...		View	Delete All Volumes with the Same Name

Use the OSSFS data volumes.

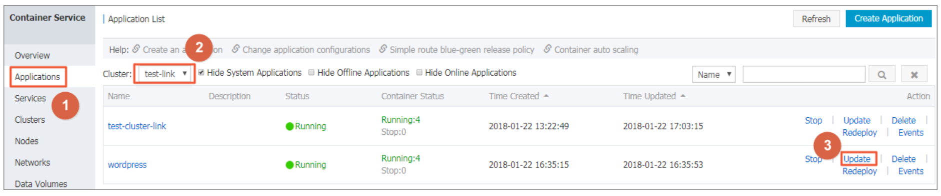
The WordPress attachments are stored in the /var/www/html/wp-content/uploads directory by default. In this example, map OSSFS data volumes to this directory and then an OSS bucket can be shared across different WordPress containers.

Log on to the Container Service console.

Click **Applications** in the left-side navigation pane.

Select the cluster used in this example from the **Cluster** list.

Click **Update** at the right of the application **wordpress** created in this example.


Container Service | Application List

Overview, Applications, Services, Clusters, Nodes, Networks, Data Volumes

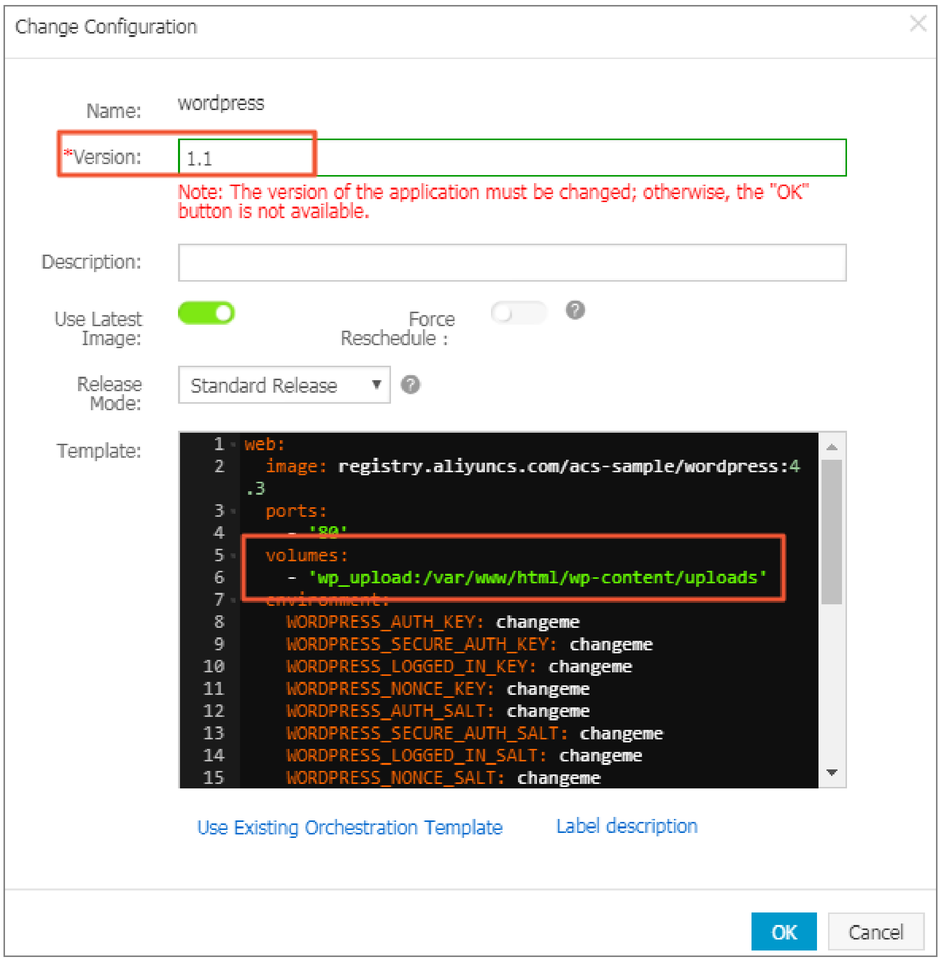
Help: Create an application · Change application configurations · Simple route blue-green release policy · Container auto scaling

Cluster: test-link ☑ Hide System Applications ☐ Hide Offline Applications ☐ Hide Online Applications

Name	Description	Status	Container Status	Time Created	Time Updated	Action
test-cluster-link		● Running	Running:4 Stop:0	2018-01-22 13:22:49	2018-01-22 17:03:15	Stop | Update | Delete | Redeploy | Events
wordpress		● Running	Running:4 Stop:0	2018-01-22 16:35:15	2018-01-22 16:35:53	Stop | Update | Delete | Redeploy | Events

In the **Template** field, add the mapping from OSSFS data volumes to the WordPress directory.

Note: You must modify the **Version**. Otherwise, the application cannot be redeployed.


Change Configuration

Name: wordpress

*Version: 1.1

Note: The version of the application must be changed; otherwise, the "OK" button is not available.

Description:

Use Latest Image: on

Force Reschedule : off

Release Mode: Standard Release

Template:

```
web:
  image: registry.aliyuncs.com/acs-sample/wordpress:4
.3
  ports:
    - '80'
  volumes:
    - 'wp_upload:/var/www/html/wp-content/uploads'
  environment:
    WORDPRESS_AUTH_KEY: changeme
    WORDPRESS_SECURE_AUTH_KEY: changeme
    WORDPRESS_LOGGED_IN_KEY: changeme
    WORDPRESS_NONCE_KEY: changeme
    WORDPRESS_AUTH_SALT: changeme
    WORDPRESS_SECURE_AUTH_SALT: changeme
    WORDPRESS_LOGGED_IN_SALT: changeme
    WORDPRESS_NONCE_SALT: changeme
```

Click **OK** to redeploy the application.

Open WordPress and upload attachments. Then, you can see the uploaded attachments in the OSS bucket.

Use Docker Compose to test cluster network connectivity

This document provides a simple Compose file used to realize one-click deployment and you can test the container network connectivity by visiting the service access endpoint.

Scenarios

When deploying interdependent applications in a Docker cluster, you must make sure that the applications can access each other to realize cross-host container network connectivity. However, sometimes containers on different hosts cannot access each other due to network problems. If this happens, it is difficult to troubleshoot the problem. Therefore, an easy-to-use Compose file can be used to test the connectivity among cross-host containers within a cluster.

Solutions

Use the provided image and orchestration template to test the connectivity among containers.

```
 web:
image: registry.aliyuncs.com/xianlu/test-link
command: python test-link.py
restart: always
ports:
- 5000
links:
- redis
labels:
aliyun.scale: '3'
aliyun.routing.port_5000: test-link;
redis:
image: redis
restart: always
```

This example uses Flask to test the container connectivity.

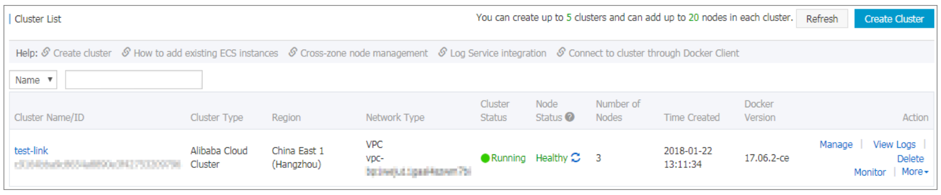
The preceding orchestration template deploys a Web service and a Redis service. The Web service contains three Flask containers and these three containers will be evenly distributed to three nodes when started. The three containers are on different hosts and the current network can realize cross-host container connectivity if the containers can ping each other. The Redis service runs on one of the three nodes. When started, each Flask container registers to the Redis service and reports the container IP address. The Redis service has the IP addresses of all the containers in the cluster after the three Flask containers are all started. When you access any of the three Flask containers, the container will send ping command to the other two containers and you can check the network connectivity of the cluster according to the ping command response.

Procedure

Create a cluster which contains three nodes.

In this example, the cluster name is **test-link**. For how to create a cluster, see Create a cluster.

> **Note:** Select to create a Server Load Balancer instance when creating the cluster.



Cluster List

You can create up to 5 clusters and can add up to 20 nodes in each cluster.

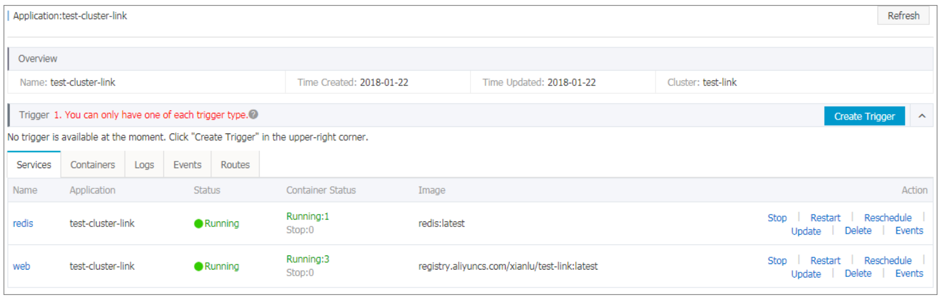
Help: Create cluster | How to add existing ECS instances | Cross-zone node management | Log Service integration | Connect to cluster through Docker Client

Cluster Name/ID	Cluster Type	Region	Network Type	Cluster Status	Node Status	Number of Nodes	Time Created	Docker Version	Action
test-link [redacted]	Alibaba Cloud Cluster	China East 1 (Hangzhou)	VPC vpc-[redacted]	● Running	Healthy	3	2018-01-22 13:11:34	17.06.2-ce	Manage | View Logs | Delete Monitor | More

Use the preceding template to create an application (in this example, the application name is **test-cluster-link**) to deploy the **web** service and **redis** service.

For how to create an application, see Create an application.

On the **Application List** page, click the application name to view the created services.



Application:test-cluster-link

Overview

Name: test-cluster-link | Time Created: 2018-01-22 | Time Updated: 2018-01-22 | Cluster: test-link

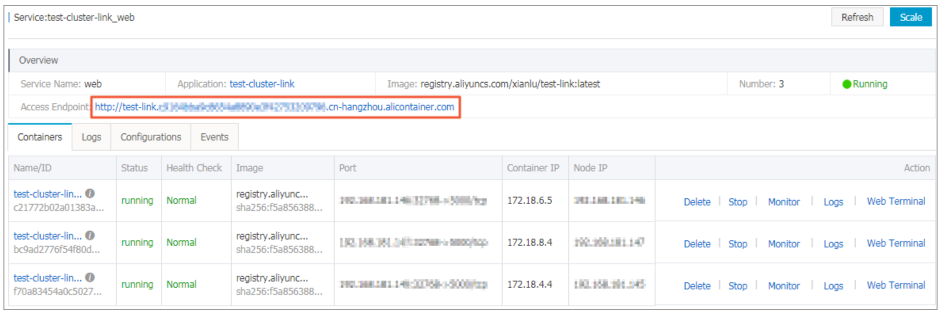
Trigger 1. You can only have one of each trigger type.

No trigger is available at the moment. Click "Create Trigger" in the upper-right corner.

Name	Application	Status	Container Status	Image	Action
redis	test-cluster-link	● Running	Running:1 Stop:0	redis:latest	Stop | Restart | Reschedule | Update | Delete | Events
web	test-cluster-link	● Running	Running:3 Stop:0	registry.aliyuncs.com/xianlu/test-link:latest	Stop | Restart | Reschedule | Update | Delete | Events

Click the name of the **web** service to enter the service details page.

You can see that the three containers (**test-cluster-link_web_1**, **test-cluster-link_web_2**, **test-cluster-link_web_3**) are all started and distributed on different nodes.



Service:test-cluster-link_web

Refresh | Scale

Overview

Service Name: web | Application: test-cluster-link | Image: registry.aliyuncs.com/xianlu/test-link:latest | Number: 3 | ● Running

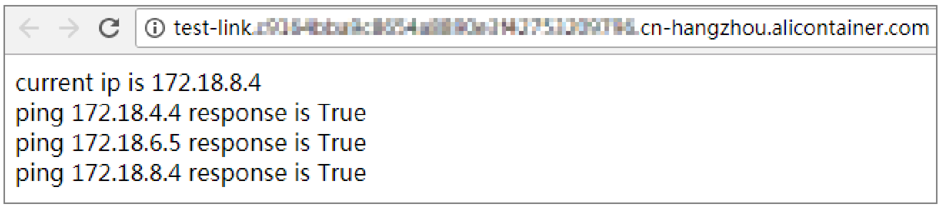
Access Endpoint: http://test-link.[redacted].cn-hangzhou.alicontainer.com

Containers | Logs | Configurations | Events

Name/ID	Status	Health Check	Image	Port	Container IP	Node IP	Action
test-cluster-lin... c21772b02a01383a...	running	Normal	registry.aliyunc... sha256:f5a856388...	[redacted]	172.18.6.5	[redacted]	Delete | Stop | Monitor | Logs | Web Terminal
test-cluster-lin... bc9ad2776f54f80d...	running	Normal	registry.aliyunc... sha256:f5a856388...	[redacted]	172.18.8.4	[redacted]	Delete | Stop | Monitor | Logs | Web Terminal
test-cluster-lin... f70a83454a0c5027...	running	Normal	registry.aliyunc... sha256:f5a856388...	[redacted]	172.18.4.4	[redacted]	Delete | Stop | Monitor | Logs | Web Terminal

Visit the access endpoint of the **web** service.

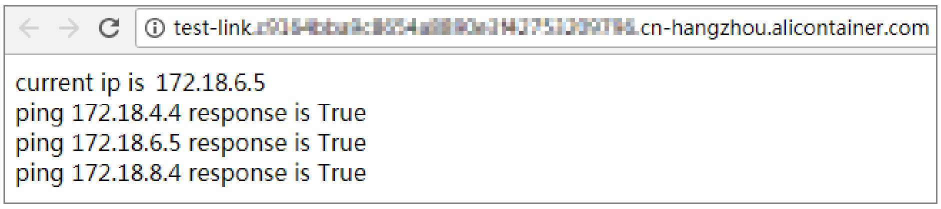
As shown in the following figure, the container **test-cluster-link_web_1** can access the container **test-cluster-link_web_2** and container **test-cluster-link_web_3**.



test-link.[redacted].cn-hangzhou.alicontainer.com

```
current ip is 172.18.8.4
ping 172.18.4.4 response is True
ping 172.18.6.5 response is True
ping 172.18.8.4 response is True
```

Refresh the page. As shown in the following figure, the **container test-cluster-link_web_2** can access the container **test-cluster-link_web_1** and container **test-cluster-link_web_3**.



test-link.[redacted].cn-hangzhou.alicontainer.com

```
current ip is  172.18.6.5
ping 172.18.4.4 response is True
ping 172.18.6.5 response is True
ping 172.18.8.4 response is True
```

As the preceding results show, the containers in the cluster can access each other.

Log

Use ELK in Container Service

Background

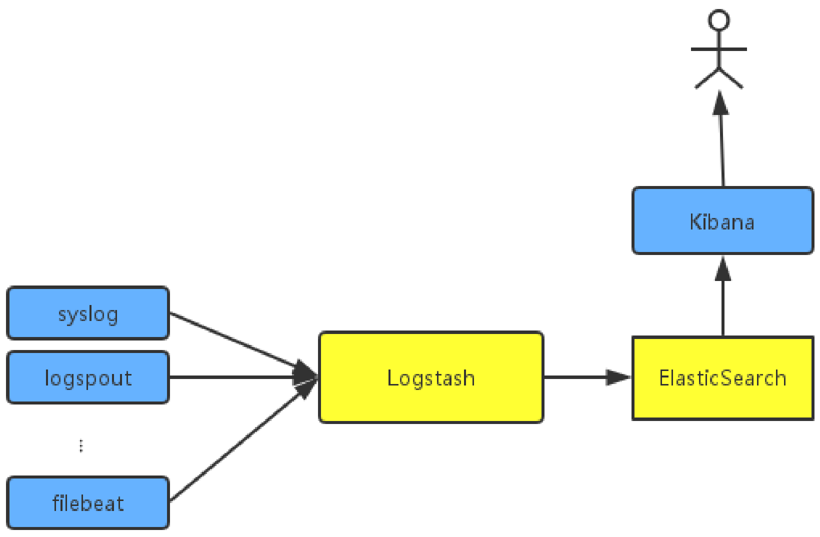
Logs are an important component of the IT system. They record system events and the time when the events occur. We can troubleshoot system faults according to the logs and make statistical analysis.

Logs are usually stored in the local log files. To view logs, log on to the machine and filter keywords by using grep or other tools. However, when the application is deployed on multiple machines, viewing logs in this way is inconvenient. To locate the logs for a specific error, you have to log on to all the machines and filter files one after another. That is why concentrated log storage has emerged. All the logs are collected in Log Service and you can view and search for logs in Log Service.

In the Docker environment, concentrated log storage is even more important. Compared with the traditional operation and maintenance mode, Docker usually uses the orchestration system to manage containers. The mapping between container and host is not fixed and containers might be constantly migrated between hosts. You cannot view the logs by logging on to the machine and the concentrated log becomes the only choice.

Container Service integrates with Alibaba Cloud Log Service and automatically collects container logs to Log Service by using declarations. However, some users might prefer the ELK (Elasticsearch+ Logstash+ Kibana) combination. This document introduces how to use ELK in Container Service.

Overall structure



An independent Logstash cluster needs to be deployed. Logstash is large and resource-consuming, so we do not run it on each machine, not to mention in every Docker container. To collect the container logs, syslog, Logspout, and filebeat are used. You might also use other collection methods.

To try to fit the actual scenario, two clusters are created here: one is the **testelk** cluster for deploying ELK, and the other is the **app** cluster for deploying applications.

Procedure

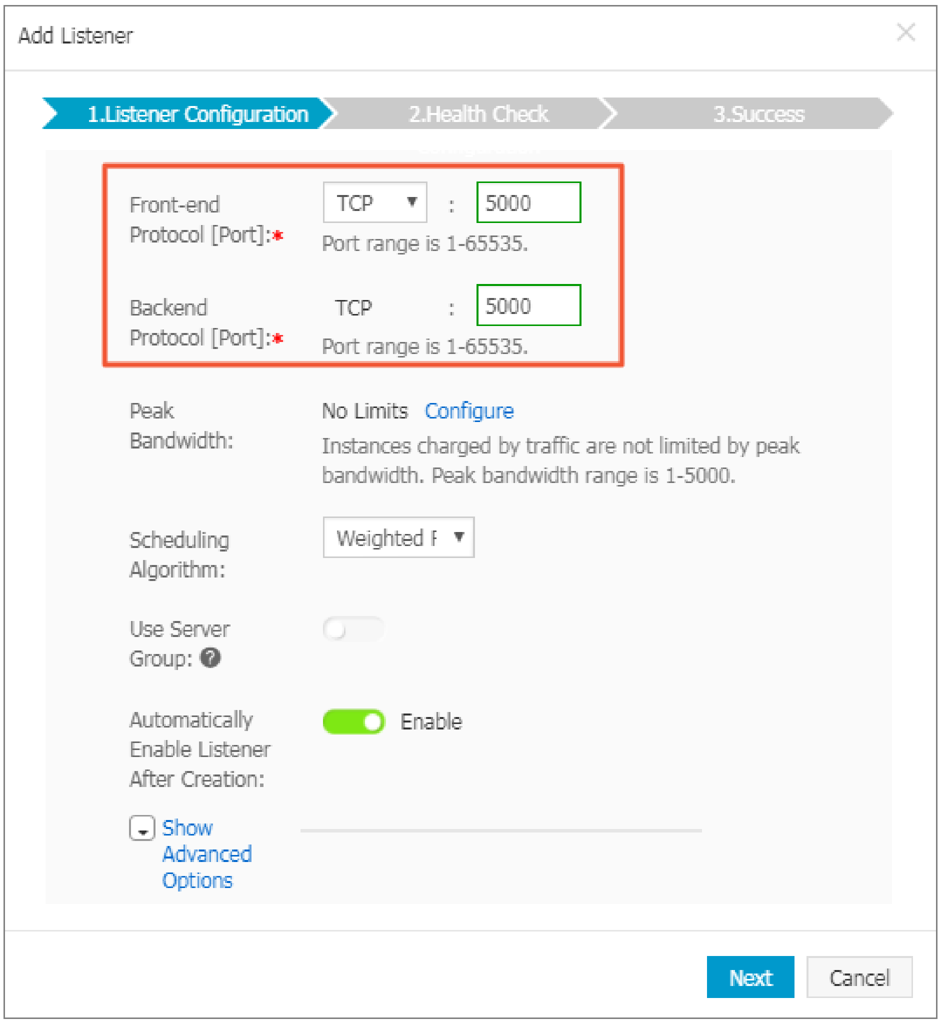
Note: The clusters and Server Load Balancer instance created in this document must be in the same region.

Step 1. Create a Server Load Balancer instance

To enable other services to send logs to Logstash, create and configure a Server Load Balancer instance before configuring Logstash.

1. Log on to the Server Load Balancer console before creating an application.
2. Create a Server Load Balancer instance whose **Instance type** is **Internet**.

   Add 2 listeners for the created Server Load Balancer instance. The frontend and backend port mappings of the 2 listeners are 5000: 5000 and 5044: 5044 respectively, with no backend server added.



Front-end Protocol [Port]:* TCP : 5000
Port range is 1-65535.
Backend Protocol [Port]:* TCP : 5000
Port range is 1-65535.
Peak Bandwidth: No Limits Configure
Instances charged by traffic are not limited by peak bandwidth. Peak bandwidth range is 1-5000.
Scheduling Algorithm: Weighted F
Use Server Group:
Automatically Enable Listener After Creation: Enable

Step 2. Deploy ELK

Log on to the Container Service console.

Create a cluster named **testelk**. For how to create a cluster, see Create a cluster.

Note: The cluster and the Server Load Balancer instance created in step 1 must be in the same region.

Bind the Server Load Balancer instance created in step 1 to this cluster.

On the **Cluster List** page, click **Manage** at the right of **testelk**. Click **Load Balancer Settings** in the left-side navigation pane. Click **Bind Server Load Balancer**. Select the created Server Load Balancer instance from the **Server Load Balancer ID** list and then click **OK**.

Deploy ELK by using the following orchestration template. In this example, an application named **elk** is created.

For how to create an application by using an orchestration template, see Create an application.

Note: Replace ${SLB_ID} in the orchestration file with the ID of the Server Load Balancer instance created in step 1.

```
 version: '2'
services:
elasticsearch:
image: elasticsearch

kibana:
image: kibana
environment:
ELASTICSEARCH_URL: http://elasticsearch:9200/
labels:
aliyun.routing.port_5601: kibana
links:
- elasticsearch

logstash:
image: registry.cn-hangzhou.aliyuncs.com/acs-sample/logstash
hostname: logstash
ports:
- 5044:5044
- 5000:5000
labels:
```

```
aliyun.lb.port_5044: 'tcp://${SLB_ID}:5044' #Create a Server Load Balancer instance first.
aliyun.lb.port_5000: 'tcp://${SLB_ID}:5000'
links:
- elasticsearch
```

In this orchestration file, the official images are used for Elasticsearch and Kibana, with no changes made. Logstash needs a configuration file, so make an image on your own to include the configuration file. The image source codes can be found in demo-logstash.

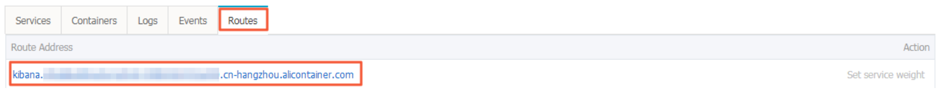
The Logstash configuration file is as follows. This is a simple Logstash configuration. Two input formats, syslog and filebeats, are provided and their external ports are 5044 and 5000 respectively.

```
 input {
beats {
port => 5044
type => beats
}

tcp {
port => 5000
type => syslog
}

}

filter {
}

output {
elasticsearch {
hosts => ["elasticsearch:9200"]
}

stdout { codec => rubydebug }
}
```

Configure the Kibana index.

Access Kibana.

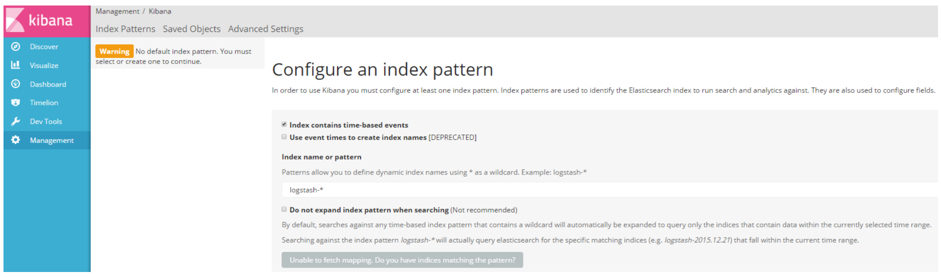
The URL can be found under the **Routes** tab of the application.
On the **Application List** page, click the application name **elk**. Click the **Routes** tab and then click the route address to access Kibana.



Route Address	Action
kibana.[redacted].cn-hangzhou.alicontainer.com	Set service weight

Create an index.

Configure the settings as per your needs and then click **Create**.



No default index pattern. You must select or create one to continue.

Configure an index pattern

In order to use Kibana you must configure at least one index pattern. Index patterns are used to identify the Elasticsearch index to run search and analytics against. They are also used to configure fields.

☑ **Index contains time-based events**
☐ **Use event times to create index names** [DEPRECATED]

Index name or pattern

Patterns allow you to define dynamic index names using * as a wildcard. Example: logstash-*

logstash-*

☐ **Do not expand index pattern when searching** (Not recommended)

By default, searches against any time-based index pattern that contains a wildcard will automatically be expanded to query only the indices that contain data within the currently selected time range.

Searching against the index pattern *logstash-** will actually query elasticsearch for the specific matching indices (e.g. *logstash-2015.12.21*) that fall within the current time range.

Unable to fetch mapping. Do you have indices matching the pattern?

Step 3. Collect logs

In Docker, the standard logs adopt Stdout file pointer. The following example first demonstrates how to collect Stdout to ELK. If you are using file logs, you can use filebeat directly. WordPress is used for the demonstration. The following is the orchestration template of WordPress. An application **wordpress** is created in another cluster.

Log on to the Container Service console.

Create a cluster named **app**. For how to create a cluster, see Create a cluster.

Note: The cluster and the Server Load Balancer instance created in step 1 must be in the same region.

Create the application **wordpress** by using the following orchestration template:

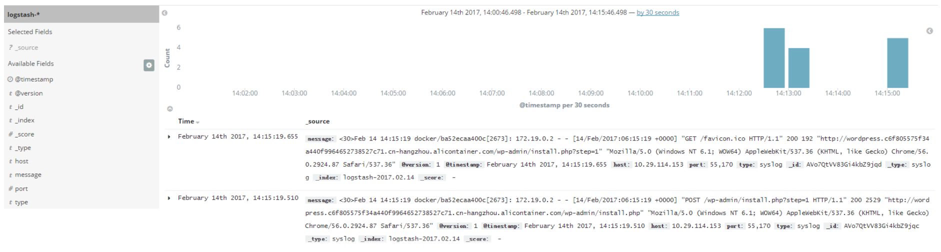
Note: Replace ${SLB_IP} in the orchestration file with the IP address of the Server Load Balancer instance created in step 1.

```
 version: '2'
services:
mysql:
image: mysql
environment:
- MYSQL_ROOT_PASSWORD=password

wordpress:
image: wordpress
labels:
aliyun.routing.port_80: wordpress
links:
- mysql:mysql
environment:
```

```
- WORDPRESS_DB_PASSWORD=password
logging:
driver: syslog
options:
syslog-address: 'tcp://${SLB_IP}:5000'
```

After the application is deployed successfully, click the application name **wordpress** on the **Application List** page. Click the **Routes** tab and then click the route address to access the WordPress application.

On the **Application List** page, click the application name **elk**. Click the **Routes** tab and then click the route address to access Kibana and view the collected logs.



```
February 14th 2017, 14:15:19.655  message: <30>Feb 14 14:15:19 docker/ba52ecaa400c[2673]: 172.19.0.2 - - [14/Feb/2017:06:15:19 +0000] "GET /favicon.ico HTTP/1.1" 200 192 "http://wordpress.c6f805575f34a440f9964652738527c71.cn-hangzhou.alicontainer.com/wp-admin/install.php?step=1" "Mozilla/5.0 (Windows NT 6.1; WOW64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/56.0.2924.87 Safari/537.36" @version: 1 @timestamp: February 14th 2017, 14:15:19.655 host: 10.29.114.153 port: 55,170 type: syslog _id: AVo7QtVV83Gi4kbZ9jqd _type: syslog _index: logstash-2017.02.14 _score: -
February 14th 2017, 14:15:19.510  message: <30>Feb 14 14:15:19 docker/ba52ecaa400c[2673]: 172.19.0.2 - - [14/Feb/2017:06:15:19 +0000] "POST /wp-admin/install.php?step=1 HTTP/1.1" 200 2529 "http://wordpress.c6f805575f34a440f9964652738527c71.cn-hangzhou.alicontainer.com/wp-admin/install.php" "Mozilla/5.0 (Windows NT 6.1; WOW64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/56.0.2924.87 Safari/537.36" @version: 1 @timestamp: February 14th 2017, 14:15:19.510 host: 10.29.114.153 port: 55,170 type: syslog _id: AVo7QtVV83Gi4kbZ9jqc _type: syslog _index: logstash-2017.02.14 _score: -
```

A new Docker log collection scheme: log-pilot

This document introduces a new log collection tool for Docker: log-pilot. Log-pilot is a log collection image we provide for you. You can deploy a log-pilot instance on each machine to collect all the Docker application logs.

> **Note:** Docker of Linux version is supported, while Docker of Windows or Mac version is not supported.

Log-pilot has the following features:

- A separate log process collects the logs of all the containers on the machine. No need to start a log process for each container.
- Log-pilot supports file logs and stdout logs. Docker log driver or Logspout can only process stdout, while log-pilot supports collecting the stdout logs and the file logs.
- Declarative configuration. When your container has logs to collect, log-pilot will automatically collect logs of the new container if the path of the log file to be collected is declared by using the label. No other configurations need to be changed.
- Log-pilot supports multiple log storage methods and can deliver the logs to the correct

location for powerful Alibaba Cloud Log Service, popular ElasticSearch combination, or even Graylog.
- Open-source. Log-pilot is fully open-sourced. You can download the codes from log-pilot GitHub project. If the current features cannot meet your requirements, welcome to raise an issue.

Quick start

See a simple scenario as follows: start a log-pilot and then start a Tomcat container, letting log-pilot collect Tomcat logs. For simplicity, here Alibaba Cloud Log Service or ELK is not involved. To run locally, you only need a machine that runs Docker.

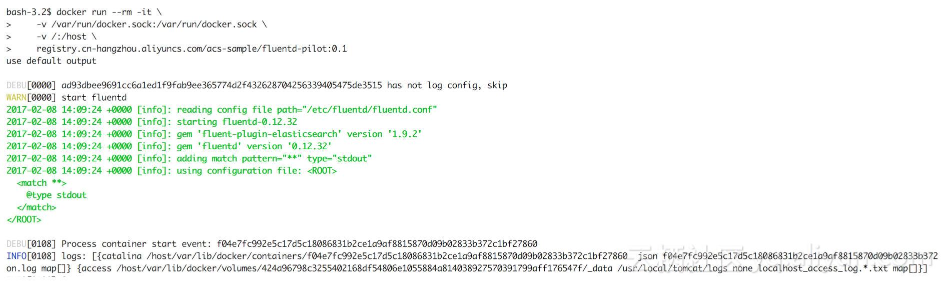
First, start log-pilot.

> **Note:** When log-pilot is started in this way, all the collected logs will be directly output to the console because no log storage is configured for backend use. Therefore, this method is mainly for debugging.

Open the terminal and enter the following commands:

```
docker run --rm -it \
-v /var/run/docker.sock:/var/run/docker.sock \
-v /:/host \
--privileged \
registry.cn-hangzhou.aliyuncs.com/acs-sample/log-pilot:0.1
```

You will see the startup logs of log-pilot.



```
bash-3.2$ docker run --rm -it \
>     -v /var/run/docker.sock:/var/run/docker.sock \
>     -v /:/host \
>     registry.cn-hangzhou.aliyuncs.com/acs-sample/fluentd-pilot:0.1
use default output

DEBU[0000] ad93dbee9691cc6a1ed1f9fab9ee365774d2f4326287042563394054 75de3515 has not log config, skip
WARN[0000] start fluentd
2017-02-08 14:09:24 +0000 [info]: reading config file path="/etc/fluentd/fluentd.conf"
2017-02-08 14:09:24 +0000 [info]: starting fluentd-0.12.32
2017-02-08 14:09:24 +0000 [info]: gem 'fluent-plugin-elasticsearch' version '1.9.2'
2017-02-08 14:09:24 +0000 [info]: gem 'fluentd' version '0.12.32'
2017-02-08 14:09:24 +0000 [info]: adding match pattern="**" type="stdout"
2017-02-08 14:09:24 +0000 [info]: using configuration file: <ROOT>
  <match **>
    @type stdout
  </match>
</ROOT>

DEBU[0108] Process container start event: f04e7fc992e5c17d5c18086831b2ce1a9af8815870d09b02833b372c1bf27860
INFO[0108] logs: [{catalina /host/var/lib/docker/containers/f04e7fc992e5c17d5c18086831b2ce1a9af8815870d09b02833b372c1bf27860  json f04e7fc992e5c17d5c18086831b2ce1a9af8815870d09b02833b372
on.log map[]} {access /host/var/lib/docker/volumes/424a96798c3255402168df54806e1055884a81403892757039179 9aff176547f/_data /usr/local/tomcat/logs none localhost_access_log.*.txt map[]}]
```

Do not close the terminal. Open a new terminal to start Tomcat. The Tomcat image is among the few Docker images that use stdout and file logs at the same time, and is suitable for the demonstration here.

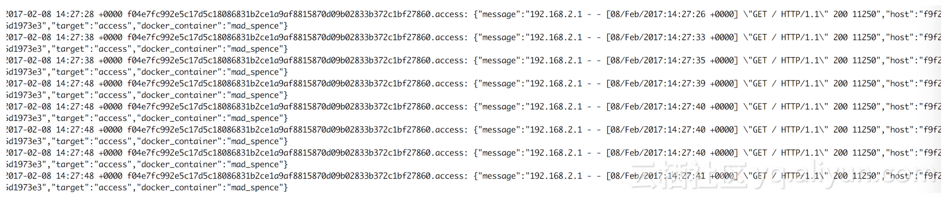
```
docker run -it --rm  -p 10080:8080 \
-v /usr/local/tomcat/logs \
--label aliyun.logs.catalina=stdout \
--label aliyun.logs.access=/usr/local/tomcat/logs/localhost_access_log.*.txt \
tomcat
```

Note:

- aliyun.logs.catalina=stdout tells log-pilot that this container wants to collect stdout logs.
- aliyun.logs.access=/usr/local/tomcat/logs/localhost_access_log.*.txt indicates to collect all log files whose names comply with the localhost_access_log.*.txt format under the /usr/local/tomcat/logs/ directory in the container. The label usage will be introduced in details later.

> **Note:** If you deploy Tomcat locally, instead of in the Alibaba Cloud Container Service, specify -v /usr/local/tomcat/logs. Otherwise, log-pilot cannot read log files. Container Service has implemented the optimization and you do not need to specify -v on your own.

Log-pilot will monitor the events in the Docker container. When it finds any container with aliyun.logs.xxx, it will automatically parse the container configuration and start to collect the corresponding logs. After you start Tomcat, you will find many contents are output immediately by the log-pilot terminal, including the stdout logs output at the Tomcat startup, and some debugging information output by log-pilot itself.



```
2017-02-08 14:27:28 +0000 f04e7fc992e5c17d5c18086831b2ce1a9af8815870d09b02833b372c1bf27860.access: {"message":"192.168.2.1 - - [08/Feb/2017:14:27:26 +0000] \"GET / HTTP/1.1\" 200 11250","host":"f9f2
5d1973e3","target":"access","docker_container":"mad_spence"}
2017-02-08 14:27:38 +0000 f04e7fc992e5c17d5c18086831b2ce1a9af8815870d09b02833b372c1bf27860.access: {"message":"192.168.2.1 - - [08/Feb/2017:14:27:33 +0000] \"GET / HTTP/1.1\" 200 11250","host":"f9f2
5d1973e3","target":"access","docker_container":"mad_spence"}
2017-02-08 14:27:38 +0000 f04e7fc992e5c17d5c18086831b2ce1a9af8815870d09b02833b372c1bf27860.access: {"message":"192.168.2.1 - - [08/Feb/2017:14:27:35 +0000] \"GET / HTTP/1.1\" 200 11250","host":"f9f2
5d1973e3","target":"access","docker_container":"mad_spence"}
2017-02-08 14:27:48 +0000 f04e7fc992e5c17d5c18086831b2ce1a9af8815870d09b02833b372c1bf27860.access: {"message":"192.168.2.1 - - [08/Feb/2017:14:27:39 +0000] \"GET / HTTP/1.1\" 200 11250","host":"f9f2
5d1973e3","target":"access","docker_container":"mad_spence"}
2017-02-08 14:27:48 +0000 f04e7fc992e5c17d5c18086831b2ce1a9af8815870d09b02833b372c1bf27860.access: {"message":"192.168.2.1 - - [08/Feb/2017:14:27:40 +0000] \"GET / HTTP/1.1\" 200 11250","host":"f9f2
5d1973e3","target":"access","docker_container":"mad_spence"}
2017-02-08 14:27:48 +0000 f04e7fc992e5c17d5c18086831b2ce1a9af8815870d09b02833b372c1bf27860.access: {"message":"192.168.2.1 - - [08/Feb/2017:14:27:40 +0000] \"GET / HTTP/1.1\" 200 11250","host":"f9f2
5d1973e3","target":"access","docker_container":"mad_spence"}
2017-02-08 14:27:48 +0000 f04e7fc992e5c17d5c18086831b2ce1a9af8815870d09b02833b372c1bf27860.access: {"message":"192.168.2.1 - - [08/Feb/2017:14:27:40 +0000] \"GET / HTTP/1.1\" 200 11250","host":"f9f2
5d1973e3","target":"access","docker_container":"mad_spence"}
2017-02-08 14:27:48 +0000 f04e7fc992e5c17d5c18086831b2ce1a9af8815870d09b02833b372c1bf27860.access: {"message":"192.168.2.1 - - [08/Feb/2017:14:27:41 +0000] \"GET / HTTP/1.1\" 200 11250","host":"f9f2
5d1973e3","target":"access","docker_container":"mad_spence"}
```

You can access the deployed Tomcat in the browser, and find that similar records are displayed on the log-pilot terminal every time you refresh the browser. The contents after message are the logs collected from /usr/local/tomcat/logs/localhost_access_log.XXX.txt.

Use ElasticSearch + Kibana

Deploy ElastichSearch + Kibana. See Use ELK in Container Service to deploy ELK in Alibaba Cloud Container Service, or deploy them directly on your machine by following the ElasticSearch/Kibana documents. This document assumes that you have deployed the two components.

If you are still running the log-pilot, close it first, and then start it again by using the following commands:

> **Note:** Before running the following commands, replace the two variables ELASTICSEARCH_HOST and ELASTICSEARCH_PORT with the actual values you are using. ELASTICSEARCH_PORT is generally 9200.

```
docker run --rm -it \
-v /var/run/docker.sock:/var/run/docker.sock \
-v /:/host \
--privileged \
-e FLUENTD_OUTPUT=elasticsearch \
-e ELASTICSEARCH_HOST=${ELASTICSEARCH_HOST} \
-e ELASTICSEARCH_PORT=${ELASTICSEARCH_PORT}
registry.cn-hangzhou.aliyuncs.com/acs-sample/log-pilot:0.1
```

Compared with the previous log-pilot startup method, here three environment variables are added:

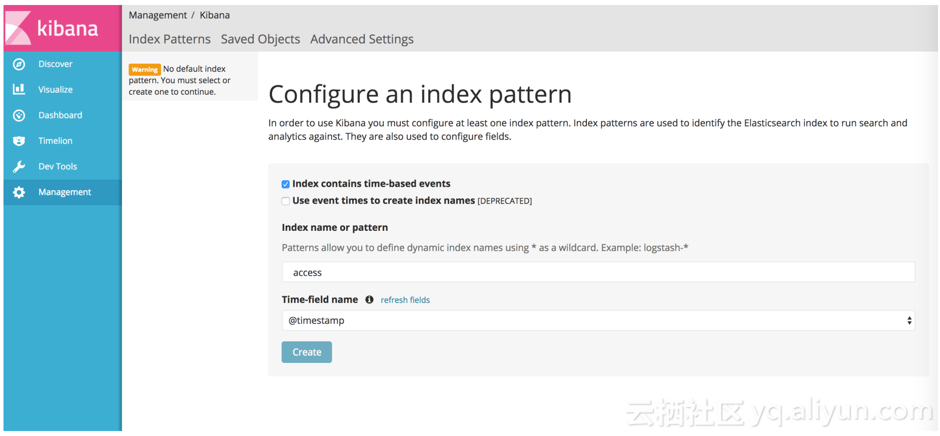
- FLUENTD_OUTPUT=elasticsearch: Send the logs to ElasticSearch.
- ELASTICSEARCH_HOST=${ELASTICSEARCH_HOST}: The domain name of ElasticSearch.
- ELASTICSEARCH_PORT=${ELASTICSEARCH_PORT}: The port number of ElasticSearch.

Continue to run the Tomcat started previously, and access it again to make Tomcat generate some logs. All these newly generated logs will be sent to ElasticSearch.

Open Kibana, and no new logs are visible yet. Create an index first. Log-pilot will write logs to the specific index of ElasticSearch. The rules are as follows:

If label aliyun.logs.tags is used in the application, and tags contains target, use target as the index of ElasticSearch. Otherwise, use XXX in the label aliyun.logs.XXX as the index.

In the previous example about Tomcat, the label aliyun.logs.tags is not used, so access and catalina are used by default as the index. First create the index access.



Warning No default index pattern. You must select or create one to continue.

Configure an index pattern

In order to use Kibana you must configure at least one index pattern. Index patterns are used to identify the Elasticsearch index to run search and analytics against. They are also used to configure fields.

☑ Index contains time-based events
☐ Use event times to create index names [DEPRECATED]

Index name or pattern

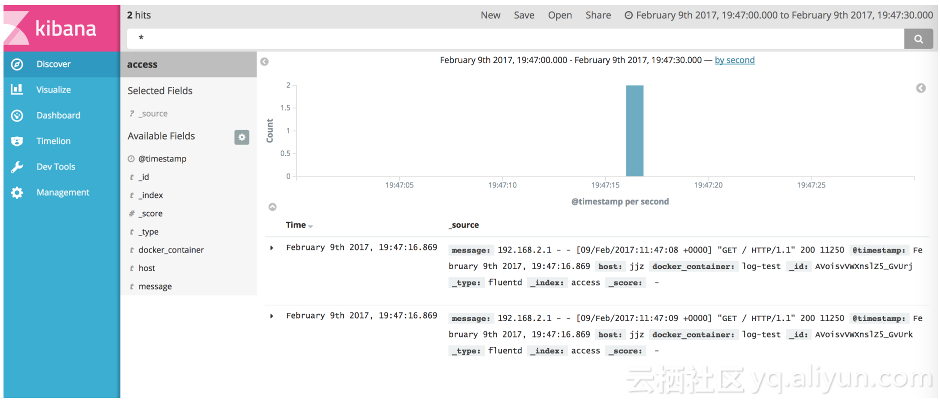
Patterns allow you to define dynamic index names using * as a wildcard. Example: logstash-*

access

Time-field name

@timestamp

After the index is created, you can view the logs.



2 hits

February 9th 2017, 19:47:00.000 to February 9th 2017, 19:47:30.000

February 9th 2017, 19:47:00.000 - February 9th 2017, 19:47:30.000 — by second

```
Time          _source
February 9th 2017, 19:47:16.869   message: 192.168.2.1 - - [09/Feb/2017:11:47:08 +0000] "GET / HTTP/1.1" 200 11250 @timestamp: February 9th 2017, 19:47:16.869 host: jjz docker_container: log-test _id: AVoisvVWXnslZ5_GvUrj _type: fluentd _index: access _score: -
February 9th 2017, 19:47:16.869   message: 192.168.2.1 - - [09/Feb/2017:11:47:09 +0000] "GET / HTTP/1.1" 200 11250 @timestamp: February 9th 2017, 19:47:16.869 host: jjz docker_container: log-test _id: AVoisvVWXnslZ5_GvUrk _type: fluentd _index: access _score: -
```

Use log-pilot in Alibaba Cloud Container Service

Container Service makes some special optimization for log-pilot, which adapts to running log-pilot best.

To run log-pilot in Container Service, create an application by using the following orchestration file. For how to create an application, see Create an application.

```
pilot:
image: registry.cn-hangzhou.aliyuncs.com/acs-sample/log-pilot:0.1
volumes:
- /var/run/docker.sock:/var/run/docker.sock
- /:/host
privileged: true
environment:
FLUENTD_OUTPUT: elasticsearch #Replace based on your requirements
ELASTICSEARCH_HOST: ${elasticsearch} #Replace based on your requirements
ELASTICSEARCH_PORT: 9200
labels:
aliyun.global: true
```

Then, you can use the aliyun.logs.xxx label on the application that you want to collect logs.

Label description

When Tomcat is started, the following two labels are declared to tell log-pilot the location of the container logs.

```
--label aliyun.logs.catalina=stdout
--label aliyun.logs.access=/usr/local/tomcat/logs/localhost_access_log.*.txt
```

You can also add more labels on the application container.

aliyun.logs.$name = $path

- The variable name is the log name and can only contain 0–9, a–z, A–Z, and hyphens (-).
- The variable path is the path of the logs to be collected. The path must specify the file, and cannot only be a directory. Wildcards are supported as part of the file name, for example, /var/log/he.log and /var/log/*.log are both correct. However, /var/log is not valid because the path cannot be only a directory. stdout is a special value, indicating standard output.

aliyun.logs.$name.format: The log format. Currently, the following formats are supported.

- none: Unformatted plain text.

- json: JSON format. One complete JSON string in each line.
- csv: CSV format.

aliyun.logs.$name.tags: The additional field added when the logs are reported. The format is k1=v1,k2=v2. The key-value pairs are separated by commas, for example, aliyun.logs.access.tags="name=hello,stage=test". Then, the logs reported to the storage will contain the name field and the stage field.

If ElasticSearch is used for log storage, the target tag will have a special meaning, indicating the corresponding index in ElasticSearch.

Log-pilot extension

For most users, the existing features of log-pilot can meet their requirements. If log-pilot cannot meet your requirements, you can:

- Submit an issue at https://github.com/AliyunContainerService/log-pilot.
- Directly change the codes and then raise the PR.

Health check of Docker containers

In a distributed system, the service availability is frequently checked by using the health check to avoid exceptions when being called by other services. Docker introduced native health check implementation after version 1.12. This document introduces the health check of Docker containers.

Process-level health check checks whether or not the process is alive and is the simplest health check for containers. Docker daemon automatically monitors the PID1 process in the container. If the docker run command specifies the restart policy, closed containers can be restarted automatically according to the restart policy. In many real scenarios, process-level health check alone is far from enough. For example, a container process is still alive, but cannot respond to user requests because of application deadlock, such problems cannot be discovered by monitoring the process.

Kubernetes provides Liveness and Readness probes to check the health status of the container and its service respectively. Alibaba Cloud Container Service also provides a similar Service health check.

Docker native health check capability

Docker introduced the native health check implementation after version 1.12. The health check configurations of an application can be declared in the Dockerfile. The HEALTHCHECK instruction declares the health check command that can be used to determine whether or not the service status of the container master process is normal. This can reflect the real status of the container.

HEALTHCHECK instruction format:

- HEALTHCHECK [option] CMD <command>: The command that sets the container health check.
- HEALTHCHECK NONE: If the basic image has a health check instruction, this line can be used to block it.

Note: The HEALTHCHECK can only appear once in the Dockerfile. If multiple HEALTHCHECK instructions exist, only the last one takes effect.

Images built by using Dockerfiles that contain HEALTHCHECK instructions can check the health status when instantiating Docker containers. Health check is started automatically after the container is started.

HEALTHCHECK supports the following options:

- --interval=<interval>: The time interval between two health checks. The default value is 30 seconds.
- --timeout=<interval>: The timeout for running the health check command. The health check fails if the timeout is exceeded. The default value is 30 seconds.
- --retries=<number of times>: The container status is regarded as unhealthy if the health check fails continuously for a specified number of times. The default value is 3.
- --start-period=<interval>: The initialization time of application startup. Failed health check during the startup is not counted. The default value is 0 second (introduced since version 17.05).

The command after HEALTHCHECK [option] CMD follows the same format as ENTRYPOINT, in either the shell or the exec format. The returned value of the command determines the success or failure of the health check:

- 0: Success.
- 1: Failure.
- 2: Reserved value. Do not use.

After a container is started, the initial status is **Starting**. Docker Engine waits for a period of interval to regularly run the health check command. If the returned value of a single check is not **0** or the running lasts longer than the specified timeout time, the health check is considered as failed. If the health check fails continuously for retries times, the health status changes to **Unhealthy**.

- If the health check succeeds once, Docker changes the container status back to **Healthy**.
- Docker Engine issues a health_status event if the container health status changes.

Assume that an image is a simple Web service. To enable health check to determine whether or not its Web service is working normally, curl can be used to help with the determination and the

HEALTHCHECK instruction in its Dockerfile can be written as follows:

```
FROM elasticsearch:5.5
HEALTHCHECK --interval=5s --timeout=2s --retries=12 \
CMD curl --silent --fail localhost:9200/_cluster/health || exit 1



docker build -t test/elasticsearch:5.5 .
docker run --rm -d \
--name=elasticsearch \
test/elasticsearch:5.5
```

You can use docker ps. After several seconds, the Elasticsearch container changes from the **Starting** status to **Healthy** status.

```
$ docker ps
CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS NAMES
c9a6e68d4a7f test/elasticsearch:5.5 "/docker-entrypoin..." 2 seconds ago Up 2 seconds (health: starting) 9200/tcp,
9300/tcp elasticsearch
$ docker ps
CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS NAMES
c9a6e68d4a7f test/elasticsearch:5.5 "/docker-entrypoin..." 14 seconds ago Up 13 seconds (healthy) 9200/tcp,
9300/tcp elasticsearch
```

Another method is to directly specify the health check policy in the docker run command.

```
$ docker run --rm -d \
--name=elasticsearch \
--health-cmd="curl --silent --fail localhost:9200/_cluster/health || exit 1" \
--health-interval=5s \
--health-retries=12 \
--health-timeout=2s \
elasticsearch:5.5
```

To help troubleshoot the issue, all output results of health check commands (including stdout and stderr) are stored in health status and you can view them with the docker inspect command. Use the following commands to retrieve the health check results of the past five containers.

```
docker inspect --format='{{json .State.Health}}' elasticsearch
```

Or

```
docker inspect elasticsearch | jq ".[].State.Health"
```

The sample result is as follows:

```
{
```

```
"Status": "healthy",
"FailingStreak": 0,
"Log": [
{
"Start": "2017-08-19T09:12:53.393598805Z",
"End": "2017-08-19T09:12:53.452931792Z",
"ExitCode": 0,
"Output": "..."
},
...
}
```

Generally, we recommend that you declare the corresponding health check policy in the Dockerfile to facilitate the use of images because application developers know better about the application SLA. The application deployment and Operation & Maintenance personnel can adjust the health check policies as needed for deployment scenarios by using the command line parameters and REST API.

The Docker community provides some instance images that contain health check. Obtain them in the following project: https://github.com/docker-library/healthcheck.

Note:

- Alibaba Cloud Container Service supports Docker native health check and Alibaba Cloud extension health check.
- Currently, Kubernetes does not support Docker native health check.

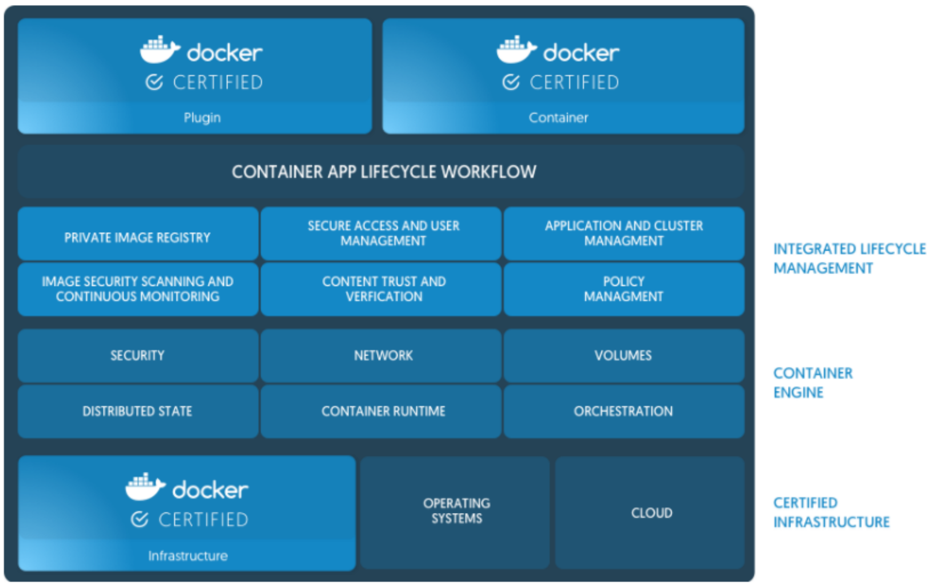
One-click deployment of Docker Datacenter

About DDC

Docker Datacenter (DDC) is an enterprise-level container management and service deployment package solution platform released by Docker. DDC is composed of the following three components:

- Docker Universal Control Plane (Docker UCP): A set of graphical management interfaces.
- Docker Trusted Registry (DTR): A trusted Docker image repository.
- Docker Engine enterprise edition: The Docker Engine providing technical support.

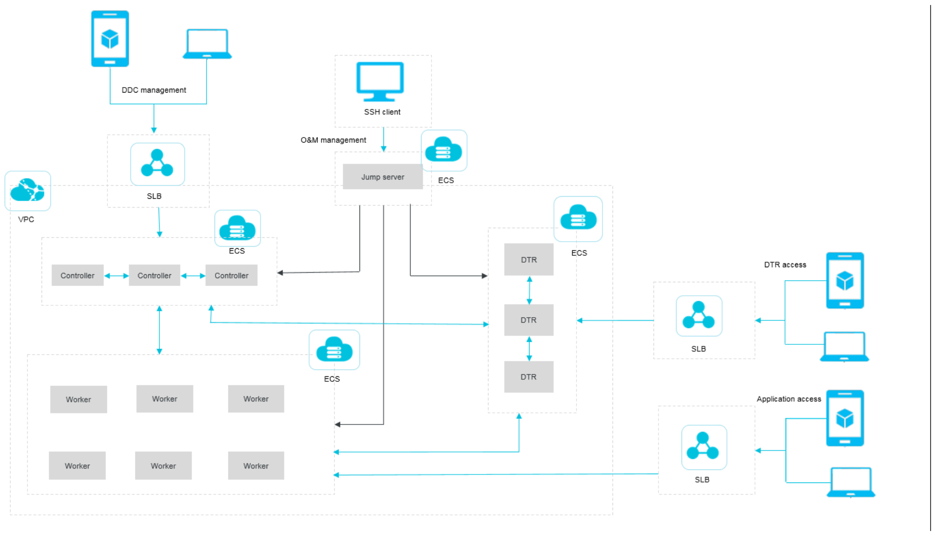
DDC is available on the Docker official website.


docker CERTIFIED Plugin
docker CERTIFIED Container
CONTAINER APP LIFECYCLE WORKFLOW
PRIVATE IMAGE REGISTRY
SECURE ACCESS AND USER MANAGEMENT
APPLICATION AND CLUSTER MANAGMENT
IMAGE SECURITY SCANNING AND CONTINUOUS MONITORING
CONTENT TRUST AND VERFICATION
POLICY MANAGMENT
INTEGRATED LIFECYCLE MANAGEMENT
SECURITY
NETWORK
VOLUMES
DISTRIBUTED STATE
CONTAINER RUNTIME
ORCHESTRATION
CONTAINER ENGINE
docker CERTIFIED Infrastructure
OPERATING SYSTEMS
CLOUD
CERTIFIED INFRASTRUCTURE

DDC is a counterpart of Docker Cloud, another online product of the Docker company. However, DDC primarily targets enterprise users for internal deployment. You can register your own Docker image to DTR and use UCP to manage the entire Docker cluster. Both components provide web interfaces.

You must purchase a license to use DDC, but the Docker company provides a free license for a one-month trial. You can download the trial license from the Docker official website after signing up.

DDC deployment architecture



In the preceding basic architecture figure, Controller primarily runs the UCP component, DTR runs the DTR component, and Worker primarily runs your own Docker service. The entire DDC environment is deployed on the Virtual Private Cloud (VPC) and all Elastic Compute Service (ECS) instances are in the same security group. Every component provides a Server Load Balancer instance for extranet access. Operations and maintenance are implemented by using the jump server. To enhance the availability, the entire DDC environment is deployed for high availability, meaning at least two Controllers and two DTRs exist.

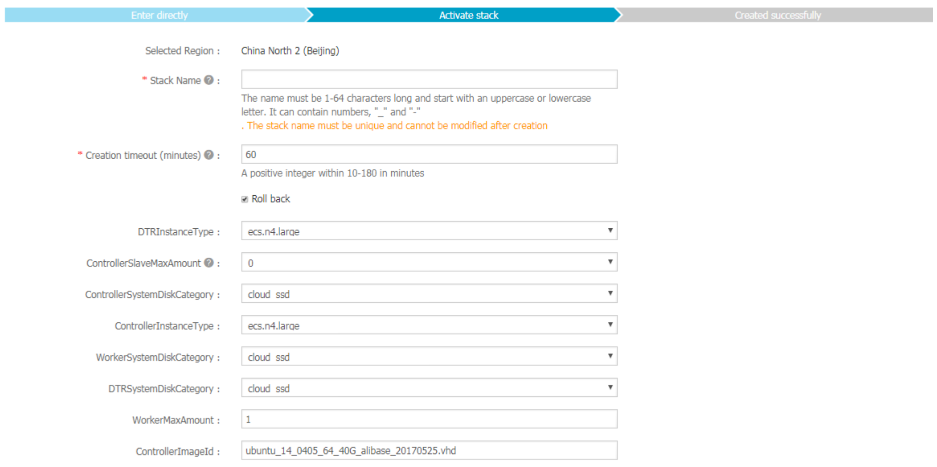
One-click deployment of DDC

You can use Alibaba Cloud Resource Orchestration Service (ROS) to deploy DDC in one click at the following link.

One-click deployment of DDC

In the preceding orchestration template, DDC is deployed in the region China North 2 (Beijing) by default. To change the region for deployment, click **Back** in the lower-right corner of the page. Select your region and then click **Next**.

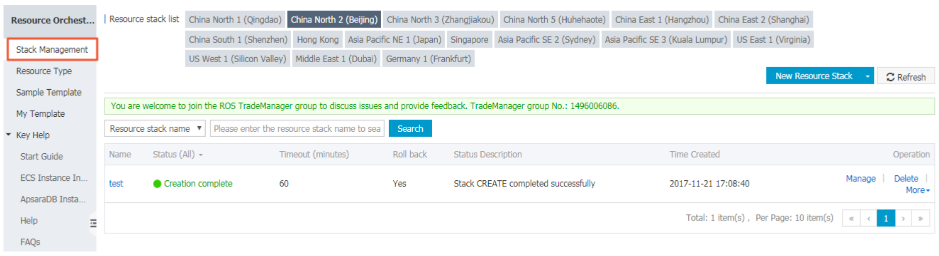
Complete the configurations. Click **Create** to deploy a set of DDC.



Selected Region :	China North 2 (Beijing)
* Stack Name :	The name must be 1-64 characters long and start with an uppercase or lowercase letter. It can contain numbers, "_" and "-" . The stack name must be unique and cannot be modified after creation
* Creation timeout (minutes) :	60 A positive integer within 10-180 in minutes ☑ Roll back
DTRInstanceType :	ecs.n4.large
ControllerSlaveMaxAmount :	0
ControllerSystemDiskCategory :	cloud_ssd
ControllerInstanceType :	ecs.n4.large
WorkerSystemDiskCategory :	cloud_ssd
DTRSystemDiskCategory :	cloud_ssd
WorkerMaxAmount :	1
ControllerImageId :	ubuntu_14_0405_64_40G_alibase_20170525.vhd

DDC access

After creating DDC successfully by using ROS, you can enter the ROS stack management page by clicking **Stack Management** in the left-side navigation pane. Find the created stack, and then click the stack name or **Manage** at the right of the stack. The **Stack Overview** page appears.



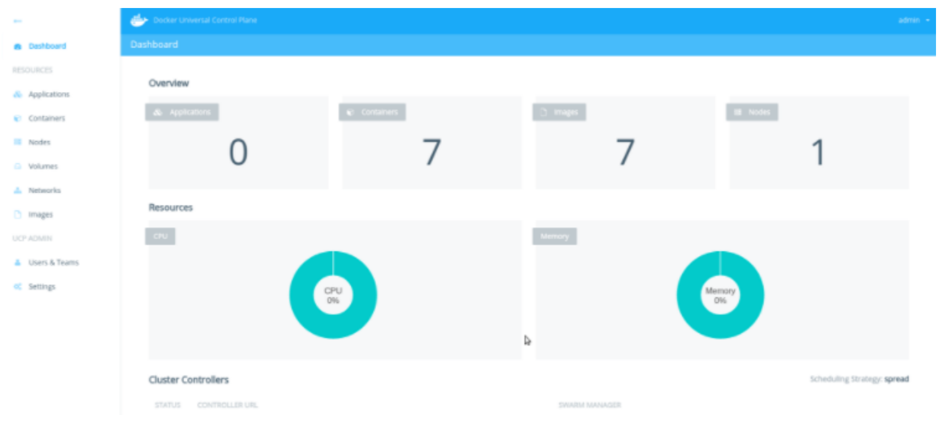
You are welcome to join the ROS TradeManager group to discuss issues and provide feedback. TradeManager group No.: 1496006086.

Name	Status (All)	Timeout (minutes)	Roll back	Status Description	Time Created	Operation
test	● Creation complete	60	Yes	Stack CREATE completed successfully	2017-11-21 17:08:40	Manage | Delete | More

Total: 1 item(s) , Per Page: 10 item(s)

You can view the addresses used to log on to UCP and DTR in the **Output** section.

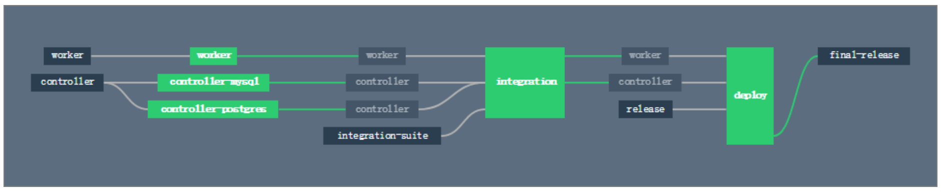
Enter the UCP address in the browser and the UCP access page appears. Enter the administrator account and password created when installing UCP and the system prompts you to import the license file. Import the license file and then enter the UCP control interface.



Build Concourse CI in Container Service in an easy way

Concourse CI, a CI/CD tool whose charm lies in the minimalist design, is widely applied to the CI/CD of each Cloud Foundry module. Concourse CI officially provides the standard Docker images and you can use Alibaba Cloud Container Service to deploy a set of Concourse CI applications rapidly.

Get to know the principle of Concourse if you are not familiar with the Concourse CI tool. For more information, see Concourse official website.

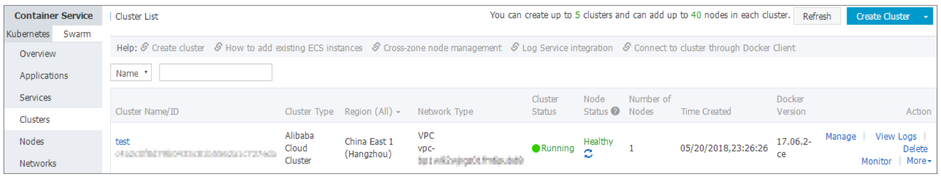


Create a swarm cluster

Log on to the Container Service console to create a cluster. In this example, create a swarm cluster with one node.

For how to create a cluster, see Create a cluster.

> **Note:** You must configure the external URL for Concourse, which allows you to access the Web service of Concourse from the current machine. Therefore, retain the Elastic IP (EIP) when creating a cluster.



Container Service | Cluster List — You can create up to 5 clusters and can add up to 40 nodes in each cluster. Refresh | Create Cluster

Kubernetes | Swarm: Overview, Applications, Services, Clusters, Nodes, Networks

Help: Create cluster | How to add existing ECS instances | Cross-zone node management | Log Service integration | Connect to cluster through Docker Client

Name

Cluster Name/ID	Cluster Type	Region (All)	Network Type	Cluster Status	Node Status	Number of Nodes	Time Created	Docker Version	Action
test [redacted]	Alibaba Cloud Cluster	China East 1 (Hangzhou)	VPC vpc-[redacted]	● Running	Healthy	1	05/20/2018,23:26:26	17.06.2-ce	Manage | View Logs | Delete Monitor | More

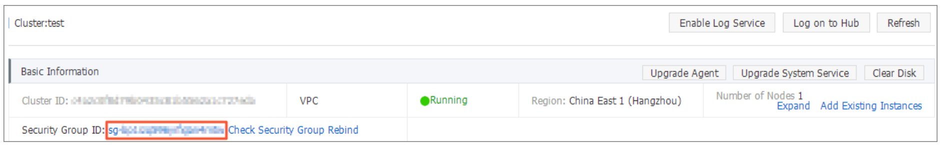
Configure security group rules

The Concourse component ATC listens to the port 8080 by default. Therefore, you must configure the inbound permissions of port 8080 for the cluster security group.

In the **Container Service console**, click **Swarm** > **Clusters** in the left-side navigation pane.

Click **Manage** at the right of the created cluster.

On the **Basic Information** page, click the security group ID.



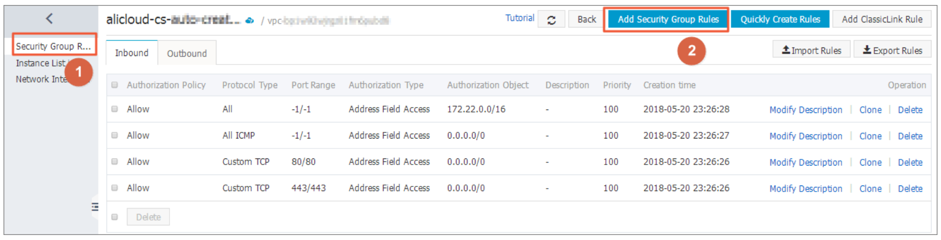
Cluster:test — Enable Log Service | Log on to Hub | Refresh

Basic Information — Upgrade Agent | Upgrade System Service | Clear Disk

Cluster ID: [redacted]	VPC	● Running	Region: China East 1 (Hangzhou)	Number of Nodes 1 Expand Add Existing Instances
Security Group ID: sg-[redacted] Check Security Group Rebind				

Click **Security Group Rules** in the left-side navigation pane.

Click **Add Security Group Rules** in the upper-right corner.



alicloud-cs-[redacted] / vpc-[redacted] — Tutorial | Back | Add Security Group Rules | Quickly Create Rules | Add ClassicLink Rule

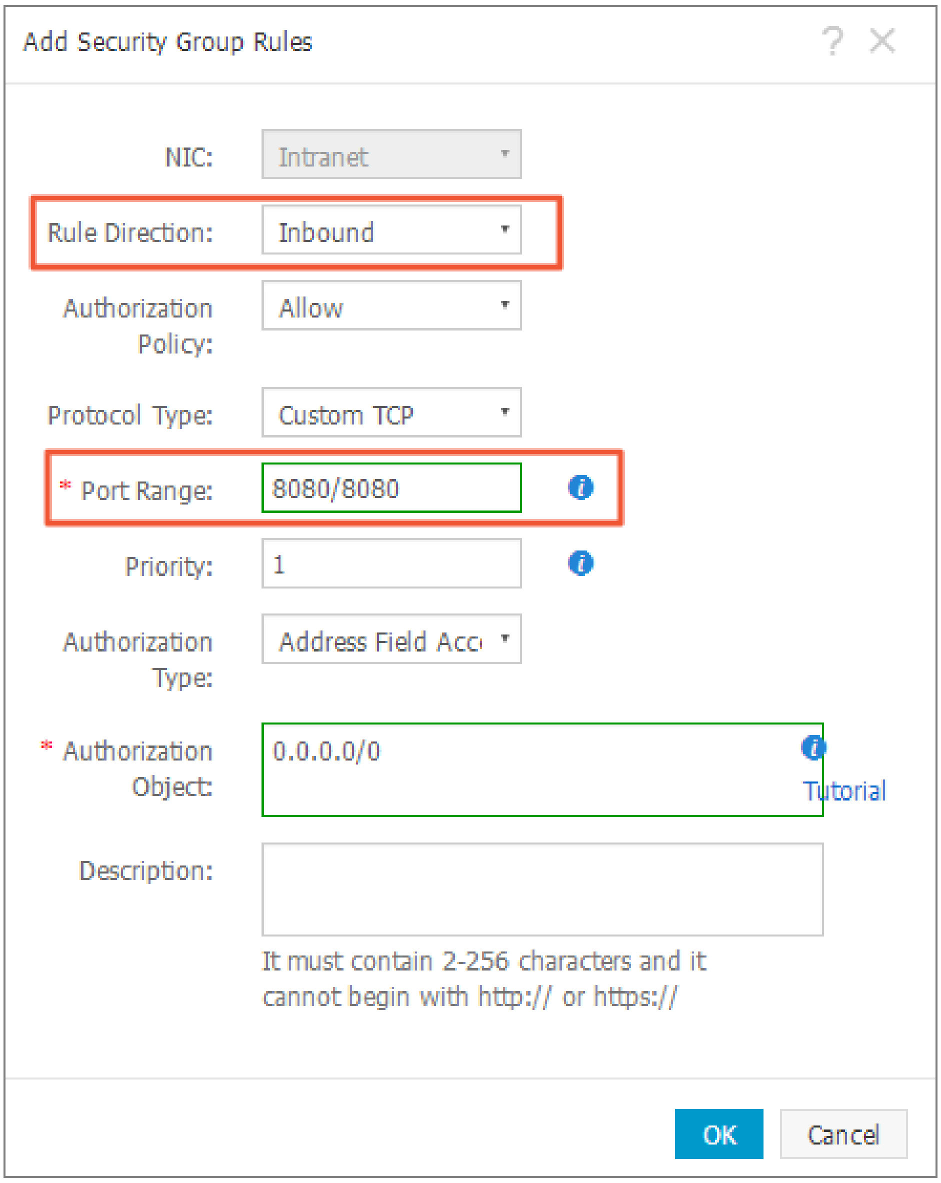
Security Group R... / Instance List / Network Inte

Inbound | Outbound — Import Rules | Export Rules

Authorization Policy	Protocol Type	Port Range	Authorization Type	Authorization Object	Description	Priority	Creation time	Operation
Allow	All	-1/-1	Address Field Access	172.22.0.0/16	-	100	2018-05-20 23:26:28	Modify Description | Clone | Delete
Allow	All ICMP	-1/-1	Address Field Access	0.0.0.0/0	-	100	2018-05-20 23:26:27	Modify Description | Clone | Delete
Allow	Custom TCP	80/80	Address Field Access	0.0.0.0/0	-	100	2018-05-20 23:26:26	Modify Description | Clone | Delete
Allow	Custom TCP	443/443	Address Field Access	0.0.0.0/0	-	100	2018-05-20 23:26:26	Modify Description | Clone | Delete

Delete

Configure the inbound permissions of port 8080 for the security group and then click **OK**.



NIC: Intranet
Rule Direction: Inbound
Authorization Policy: Allow
Protocol Type: Custom TCP
* Port Range: 8080/8080
Priority: 1
Authorization Type: Address Field Acc
* Authorization Object: 0.0.0.0/0
Description:
It must contain 2-256 characters and it cannot begin with http:// or https://

Create keys in the ECS instance

You must generate three private keys for running Concourse safely.

Log on to the Elastic Compute Service (ECS) instance. In the root directory, create the directories keys/web and keys/worker. You can run the following command to create these two directories rapidly.

```
mkdir -p keys/web keys/worker
```

Run the following command to generate three private keys.

```
 ssh-keygen -t rsa -f tsa_host_key -N ''
ssh-keygen -t rsa -f worker_key -N ''
ssh-keygen -t rsa -f session_signing_key -N ''
```

Copy the certificate to the corresponding directory.

```
 cp ./keys/worker/worker_key.pub ./keys/web/authorized_worker_keys
cp ./keys/web/tsa_host_key.pub ./keys/worker
```

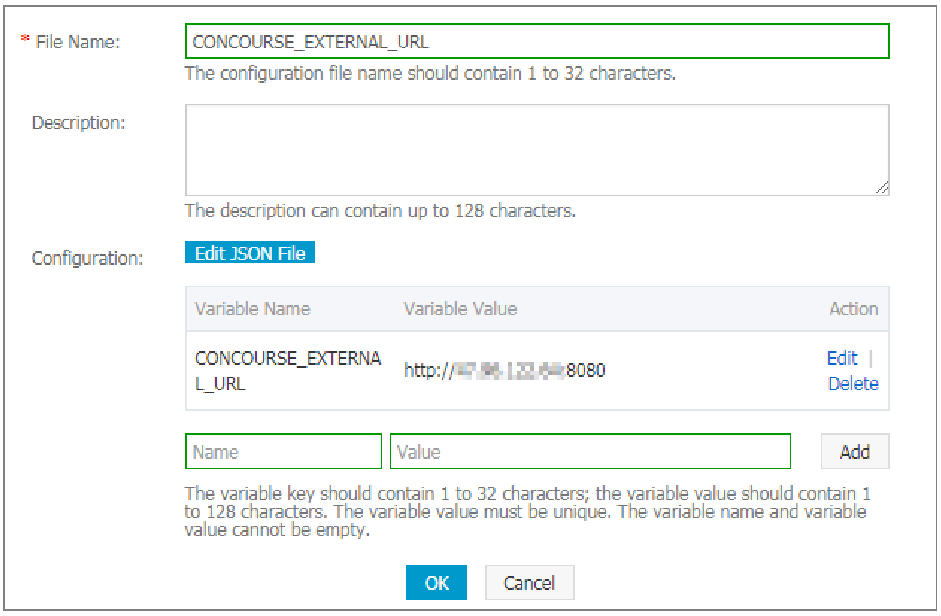
Deploy Concourse CI

Log on to the Container Service console.

Click **Swarm** > **Configurations** in the left-side navigation pane.

Click **Create** in the upper-right corner.

Enter **CONCOURSE_EXTERNAL_URL** as the **Variable Name** and http://your-ecs-public-ip:8080 as the **Variable Value**.



* File Name: CONCOURSE_EXTERNAL_URL
The configuration file name should contain 1 to 32 characters.

Description:
The description can contain up to 128 characters.

Configuration: Edit JSON File

Variable Name	Variable Value	Action
CONCOURSE_EXTERNAL_URL	http://[redacted]:8080	Edit | Delete

Name | Value | Add

The variable key should contain 1 to 32 characters; the variable value should contain 1 to 128 characters. The variable value must be unique. The variable name and variable value cannot be empty.

OK Cancel

Click **Applications** in the left-side navigation pane.

Select the cluster used in this example from the **Cluster** list.

Click **Create Application** in the upper-right corner.

Enter the basic information for the application you are about to create.

Select **Create with Orchestration Template**.

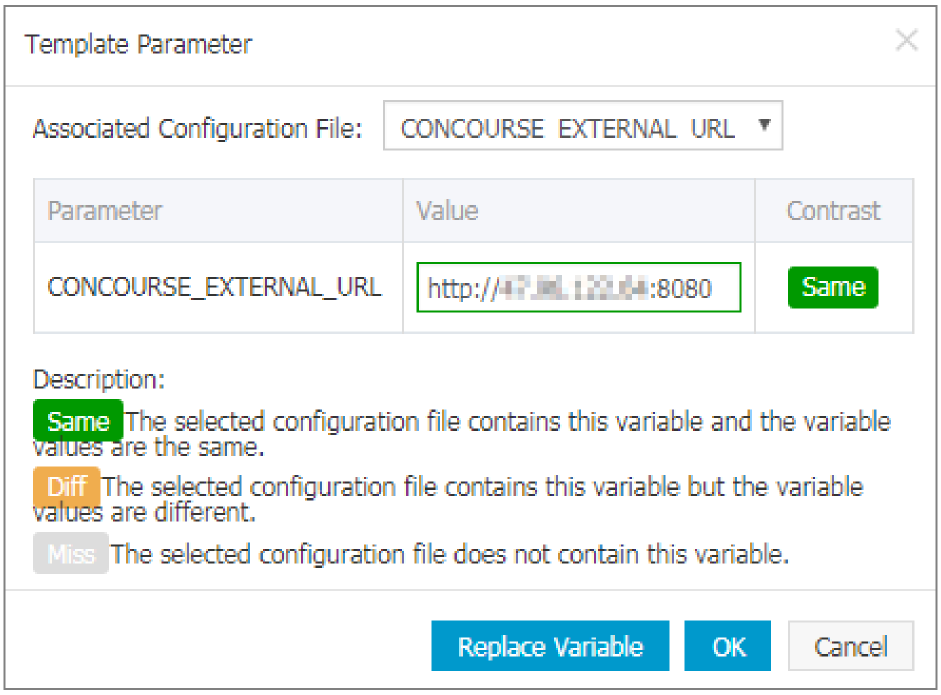
Use the following template:

```
 version: '2'
services:
concourse-db:
image: postgres:9.5
privileged: true
environment:
POSTGRES_DB: concourse
POSTGRES_USER: concourse
POSTGRES_PASSWORD: changeme
PGDATA: /database
concourse-web:
image: concourse/concourse
links: [concourse-db]
command: web
privileged: true
depends_on: [concourse-db]
ports: ["8080:8080"]
volumes: ["/root/keys/web:/concourse-keys"]
restart: unless-stopped # required so that it retries until conocurse-db comes up
environment:
CONCOURSE_BASIC_AUTH_USERNAME: concourse
CONCOURSE_BASIC_AUTH_PASSWORD: changeme
CONCOURSE_EXTERNAL_URL: "${CONCOURSE_EXTERNAL_URL}"
CONCOURSE_POSTGRES_HOST: concourse-db
CONCOURSE_POSTGRES_USER: concourse
CONCOURSE_POSTGRES_PASSWORD: changeme
CONCOURSE_POSTGRES_DATABASE: concourse
concourse-worker:
image: concourse/concourse
privileged: true
links: [concourse-web]
depends_on: [concourse-web]
command: worker
volumes: ["/keys/worker:/concourse-keys"]
environment:
CONCOURSE_TSA_HOST: concourse-web
dns: 8.8.8.8
```

Click **Create and Deploy**. The **Template Parameter** dialog box appears.

Select the configuration file to be associated with from the **Associated Configuration File** list.

Click **Replace Variable** and then click **OK**.



Template Parameter

Associated Configuration File: CONCOURSE_EXTERNAL_URL

Parameter	Value	Contrast
CONCOURSE_EXTERNAL_URL	http://[redacted]:8080	Same

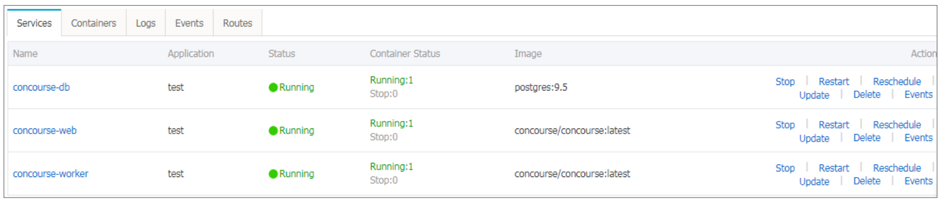
Description:

Same The selected configuration file contains this variable and the variable values are the same.

Diff The selected configuration file contains this variable but the variable values are different.

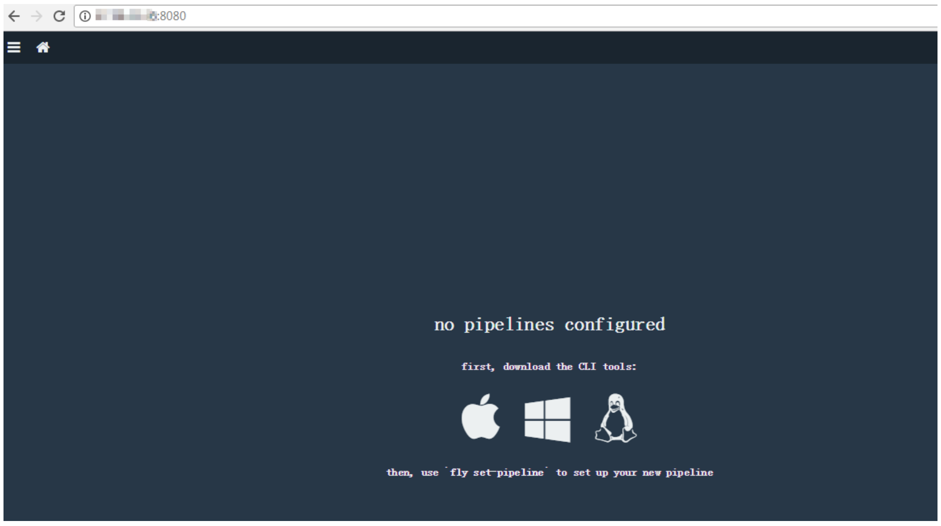
Miss The selected configuration file does not contain this variable.

After the application is created, the following three services are started.



Name	Application	Status	Container Status	Image	Action
concourse-db	test	● Running	Running:1 Stop:0	postgres:9.5	Stop | Restart | Reschedule | Update | Delete | Events
concourse-web	test	● Running	Running:1 Stop:0	concourse/concourse:latest	Stop | Restart | Reschedule | Update | Delete | Events
concourse-worker	test	● Running	Running:1 Stop:0	concourse/concourse:latest	Stop | Restart | Reschedule | Update | Delete | Events

Then, the Concourse CI deployment is finished. Enter http://your-ecs-public-ip:8080 in the browser to access the Concourse CI.



[redacted]:8080

no pipelines configured

first, download the CLI tools:

then, use `fly set-pipeline` to set up your new pipeline

Run a CI task (Hello world)

In the browser opened in the last section, download the CLI corresponding to your operating system and install the CLI client. Use ECS (Ubuntu 16.04) as an example.

For Linux and Mac OS X systems, you must add the execution permissions to the downloaded FLY CLI file first. Then, install the CLI to the system and add it to $PATH.

```
 chmod +x fly
install fly /usr/local/bin/fly
```

After the installation, you can check the version.

```
 $fly -v
3.4.0
```

Connect to the target. The username and password are concourse and changeme by default.

```
 $ fly -t lite login -c http://your-ecs-public-ip:8080
in to team 'main'
username: concourse
password:
saved
```

Save the following configuration template as hello.yml.

```
 jobs:
- name: hello-world
plan:
- task: say-hello
config:
platform: linux
image_resource:
type: docker-image
source: {repository: ubuntu}
run:
path: echo
args: ["Hello, world!"]
```

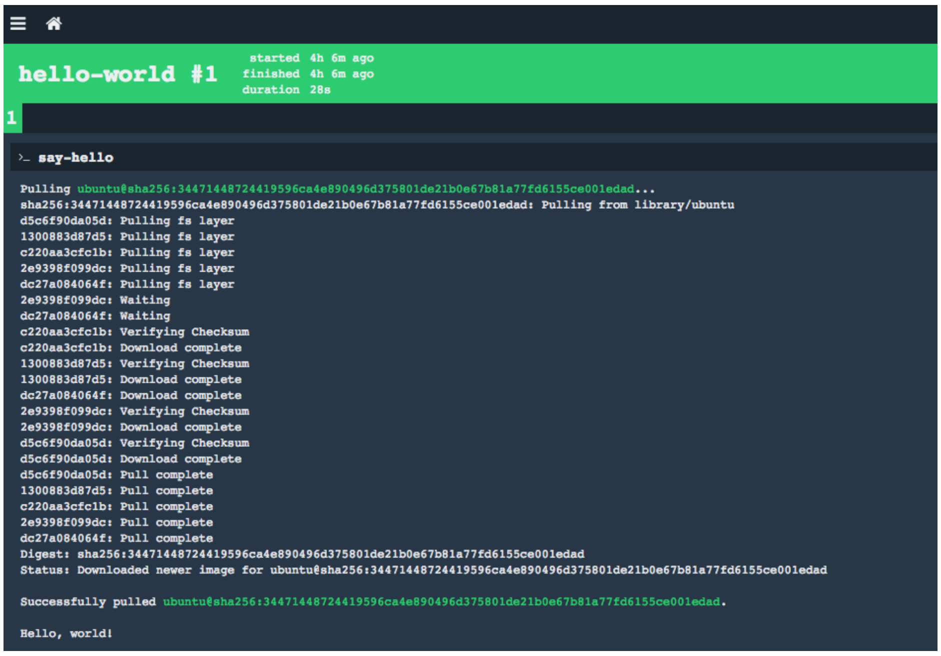
Register the task.

```
 fly -t lite set-pipeline -p hello-world -c hello.yml
```

Start the task.

```
fly -t lite unpause-pipeline -p hello-world
```

The page indicating the successful execution is as follows.



```
Pulling ubuntu@sha256:34471448724419596ca4e890496d375801de21b0e67b81a77fd6155ce001edad...
sha256:34471448724419596ca4e890496d375801de21b0e67b81a77fd6155ce001edad: Pulling from library/ubuntu
d5c6f90da05d: Pulling fs layer
1300883d87d5: Pulling fs layer
c220aa3cfc1b: Pulling fs layer
2e9398f099dc: Pulling fs layer
dc27a084064f: Pulling fs layer
2e9398f099dc: Waiting
dc27a084064f: Waiting
c220aa3cfc1b: Verifying Checksum
c220aa3cfc1b: Download complete
1300883d87d5: Verifying Checksum
1300883d87d5: Download complete
dc27a084064f: Download complete
2e9398f099dc: Verifying Checksum
2e9398f099dc: Download complete
d5c6f90da05d: Verifying Checksum
d5c6f90da05d: Download complete
d5c6f90da05d: Pull complete
1300883d87d5: Pull complete
c220aa3cfc1b: Pull complete
2e9398f099dc: Pull complete
dc27a084064f: Pull complete
Digest: sha256:34471448724419596ca4e890496d375801de21b0e67b81a77fd6155ce001edad
Status: Downloaded newer image for ubuntu@sha256:34471448724419596ca4e890496d375801de21b0e67b81a77fd6155ce001edad

Successfully pulled ubuntu@sha256:34471448724419596ca4e890496d375801de21b0e67b81a77fd6155ce001edad.

Hello, world!
```

For more information about the characteristics of Concourse CI, see Concourse CI project.

Deploy Container Service clusters by using Terraform

This document introduces how to use Terraform to deploy an Alibaba Cloud Container Service cluster in the Virtual Private Cloud (VPC) environment and deploy a sample WordPress application in the deployed cluster. In this document, a solution used to build Alibaba Cloud infrastructures is provided for you to use codes to automatically create, orchestrate, and manage services in Container Service.

Prerequisites

You must activate Alibaba Cloud Container Service and create an AccessKey for your account. Keep your AccessKey ID and AccessKey Secret properly.

Step 1 Install Terraform

Download Terraform

Download Terraform from the official website. Select the corresponding version and platform. In this document, install the Terraform on Linux (the procedure is similar to that of installing the Terraform on Mac OS X).

Under Linux, click to download the terraform_0.11.3_linux_amd64.zip file.

Copy the .zip file to an appropriate path (/usr/local/terraform in this example).

Extract the .zip file and then get a binary file terraform.

Create the following entries in the /etc/profile directory and add the path where the binary file resides (/usr/local/terraform in this example) to the PATH environment variable.

```
 export TERRAFORM_HOME=/usr/local/terraform
export PATH=$PATH:$TERRAFORM_HOME
```

Install Alibaba Cloud Terraform package

In this example, Alibaba Cloud provides its own Terraform package. You can download the package here.

Download the latest version for your system. In this example, download the package for Linux.

Copy the downloaded file terraform-provider-alicloud_linux-amd64.tgz to the /usr/local/terraform folder.

Extract the downloaded file and then get a bin folder in which the terraform-provider-alicloud file resides.

Create a .terraformrc file in the /usr/local/terraform directory.

```
$ vim .terraformrc
```

Add the following contents in the file:

```
 providers {
alicloud = "/usr/local/terraform/bin/terraform-provider-alicloud"
}
```

Run the following command to test the working of Terraform. If Terraform is successfully installed, the following contents are displayed:

```
 $ terraform
Usage: terraform [--version] [--help] <command> [args]

The available commands for execution are listed below.
The most common, useful commands are shown first, followed by
less common or more advanced commands. If you're just getting
started with Terraform, stick with the common commands. For the
other commands, please read the help and docs before usage.

Common commands:
....

All other commands:
debug Debug output management (experimental)
force-unlock Manually unlock the terraform state
state Advanced state management
```

Step 2 Download Container Service Terraform scripts

You can download the script file acs_terraform.zip here. The .zip file defines the resource files related to creating swarm clusters so that you can create a sample cluster quickly.

The .zip file contains the following files after being extracted:

main.tf

The main file of Terraform, which defines the resources to be deployed.

Region

Defines the region where resources will be created.

```
  provider "alicloud" {
region = "cn-hongkong"
}
```

VPC

```
  resource "alicloud_vpc" "vpc" {
```

```
name = "${var.vpc_name}"
cidr_block = "${var.vpc_cidr}"
}
```

VSwitch

```
  resource "alicloud_vswitch" "vswitch" {
availability_zone = "${data.alicloud_zones.default.zones.0.id}"
name = "${var.vswitch_name}"
cidr_block = "${var.vswitch_cidr}"
vpc_id = "${alicloud_vpc.vpc.id}"
}
```

Security group

```
  resource "alicloud_security_group" "group" {
name = "${var.sg_name}"
vpc_id = "${alicloud_vpc.vpc.id}"
}
```

Container Service cluster

```
  resource "alicloud_container_cluster" "wp_cs" {
password = "${var.ecs_password}"
instance_type = "${data.alicloud_instance_types.default.instance_types.0.id}"
name = "${var.cluster_name}"
size = "${var.node_number}"
disk_category = "${var.disk_category}"
disk_size = "${var.disk_size}"
cidr_block = "${var.contaner_cidr}"
image_id = "${data.alicloud_images.main.images.0.id}"
vswitch_id = "${alicloud_vswitch.vswitch.id}"
}
```

RDS instance

```
  resource "alicloud_db_instance" "instance" {
engine = "${var.engine}"
engine_version = "${var.engine_version}"
instance_type = "${var.instance_class}"
instance_storage = "${var.storage}"
vswitch_id = "${alicloud_vswitch.vswitch.id}"
security_ips = ["${var.contaner_cidr}","${var.vswitch_cidr}"]
}
```

Database account

```
  resource "alicloud_db_account" "account" {
instance_id = "${alicloud_db_instance.instance.id}"
name = "wp_admin"
password = "${var.password}"
}
```

Database backup policy

```
  resource "alicloud_db_backup_policy" "backup" {
instance_id = "${alicloud_db_instance.instance.id}"
backup_period = ["Tuesday", "Wednesday"]
backup_time = "10:00Z-11:00Z"
}
```

Database

```
  resource "alicloud_db_database" "db" {
instance_id = "${alicloud_db_instance.instance.id}"
name = "${var.database_name}"
}
```

Database privilege (read/write)

```
  resource "alicloud_db_account_privilege" "privilege" {
instance_id = "${alicloud_db_instance.instance.id}"
account_name = "${alicloud_db_account.account.name}"
privilege = "${var.db_privilege}"
db_names = ["${alicloud_db_database.db.name}"]
}
```

Database connection string

```
  resource "alicloud_db_connection" "connection" {
instance_id = "${alicloud_db_instance.instance.id}"
}
```

outputs.tf

This file defines the output parameters. Resources created as part of the execution will generate these output parameters. This is similar to the output parameters specified in a Resource Orchestration Service (ROS) template. For example, the template will deploy an RDS instance. The following output parameter provides the value of the connection string that will be required to connect to the database.

```
output "rds_conn" {
value = "${alicloud_db_instance.instance.connection_string}"
}
```

variables.tf

This file contains the variables that can be passed to main.tf and helps you customize the environment.

```
variable "vpc_name" {
description = "The vpc name used to launch a new vpc."
default = "WP-VPC"
}


variable "vpc_cidr" {
description = "The cidr block used to launch a new vpc."
default = "172.16.0.0/12"
}


variable "database_name" {
default = "wp_db"
}
```

Step 3 Run Terraform scripts

To run scripts, you must first go to the directory where the acs_terraform.zip file is extracted, that is, /usr/local/terraform. You can use the following Terraform commands to run scripts and create Container Service clusters. For more information on the command usage, see Terraform Commands (CLI).

Run terraform init to initialize the environment.

```
  $ terraform init
Initializing provider plugins...
...
- Checking for available provider plugins on https://releases.hashicorp.com...
- Downloading plugin for provider "alicloud" (1.7.2)...
* provider.alicloud: version = "~> 1.7"
Terraform has been successfully initialized!
...
```

Run terraform providers to list the installed providers.

```
 $ terraform providers
.
```

```
└── provider.alicloud
```

Before running terraform plan, you must first pass the AccessKey ID and AccessKey Secret for authorization.

```
$ export ALICLOUD_ACCESS_KEY="AccessKey ID"
$ export ALICLOUD_SECRET_KEY="AccessKey Secret"
```

Run terraform plan to create an execution plan and help you understand the resources that will be created or changed.

```
$ terraform plan
Refreshing Terraform state in-memory prior to plan...
The refreshed state will be used to calculate this plan, but will not be
persisted to local or remote state storage.

data.alicloud_images.main: Refreshing state...
data.alicloud_instance_types.default: Refreshing state...
data.alicloud_zones.default: Refreshing state...

------------------------------------------------------------------------

An execution plan has been generated and is shown below.
Resource actions are indicated with the following symbols:
+ create

Terraform will perform the following actions:
...
Plan: 9 to add, 0 to change, 0 to destroy.

------------------------------------------------------------------------

Note: You didn't specify an "-out" parameter to save this plan, so Terraform
can't guarantee that exactly these actions will be performed if
"terraform apply" is subsequently run.
```

After confirming the resources are created or updated as expected, run the terraform apply command to start the execution of the Terraform module.

```
$ terraform apply

data.alicloud_instance_types.default: Refreshing state...
data.alicloud_images.main: Refreshing state...
data.alicloud_zones.default: Refreshing state...

An execution plan has been generated and is shown below.
Resource actions are indicated with the following symbols:
+ create

Terraform will perform the following actions:
...
```

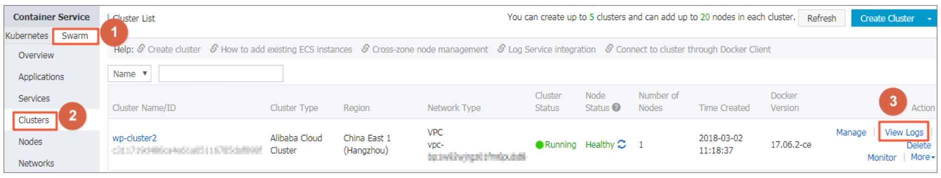
```
Plan: 9 to add, 0 to change, 0 to destroy.

Do you want to perform these actions?
Terraform will perform the actions described above.
Only 'yes' will be accepted to approve.

Enter a value: yes

alicloud_vpc.vpc: Creating...
...

Apply complete! Resources: 9 added, 0 changed, 0 destroyed.

Outputs: ##Note

cs_cluster = cf6e1c0cfba4248808dfcd80ab09ddb6a
rds_conn = rm-bp1grduxk9z36bq58.mysql.rds.aliyuncs.com
rds_conn_port = 3306
rds_db = wp_db
rds_db_account_name = wp_admin
```

After running the terraform apply command, the output parameters requested in the outputs.tf are displayed. In the following example, the output parameters are cs_cluster cluster name, connection string, rds_conn_port, rds_db name, and rds_db_account_name.

The output values can be listed at any time by running the terraform output command to help you configure the WordPress application.

```
$ terraform output
cs_cluster = cf6e1c0cfba4248808dfcd80ab09ddb6a
rds_conn = rm-bp1grduxk9z36bq58.mysql.rds.aliyuncs.com
rds_conn_port = 3306
rds_db = wp_db
rds_db_account_name = wp_admin
```

You can view the cluster created by using Terraform in the Container Service console. View the cluster information, node information, logs, and container information.



You can create up to 5 clusters and can add up to 20 nodes in each cluster.

Help: Create cluster How to add existing ECS instances Cross-zone node management Log Service integration Connect to cluster through Docker Client

Cluster Name/ID	Cluster Type	Region	Network Type	Cluster Status	Node Status	Number of Nodes	Time Created	Docker Version	Action
wp-cluster2 [redacted]	Alibaba Cloud Cluster	China East 1 (Hangzhou)	VPC vpc-[redacted]	● Running	Healthy	1	2018-03-02 11:18:37	17.06.2-ce	Manage | View Logs | Delete Monitor | More

Step 4 Deploy a WordPress application in Container Service

Log on to the Container Service console.

Click **Applications** in the left-side navigation pane under **Swarm**. Select the cluster (**wp-cluster** in this example) created in the preceding step from the **Cluster** list. Then, click **Create Application** in the upper-right corner.

Select **wordpress**, the Docker official image, as the **Image Name**. Then, configure the **Web Routing** for this application and click **Create**. For more information, see **Simple routing - supports HTTP and HTTPS**.

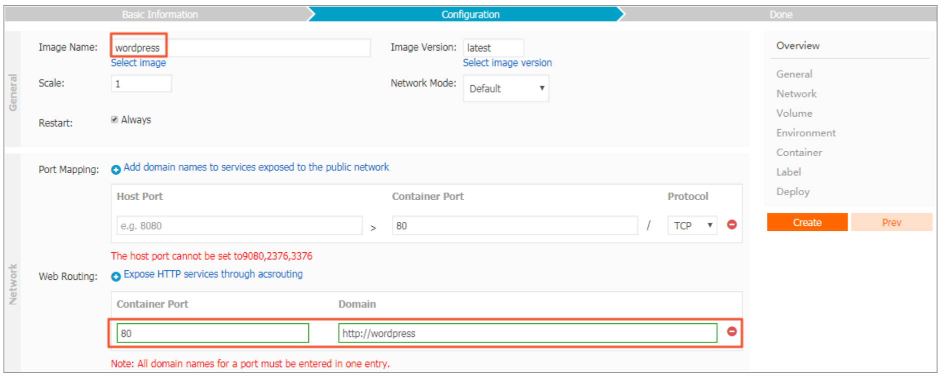


Image Name: wordpress
Select image
Image Version: latest
Select image version
Scale: 1
Network Mode: Default
Restart: ✓ Always
Port Mapping: Add domain names to services exposed to the public network

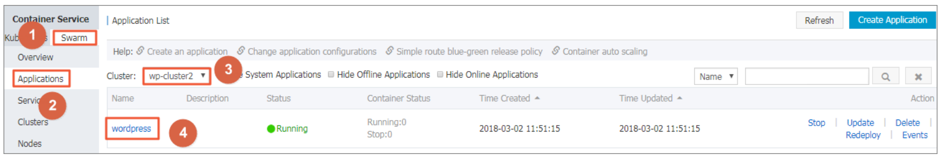
Host Port	Container Port	Protocol
e.g. 8080	80	TCP

The host port cannot be set to9080,2376,3376
Web Routing: Expose HTTP services through acsrouting

Container Port	Domain
80	http://wordpress

Note: All domain names for a port must be entered in one entry.

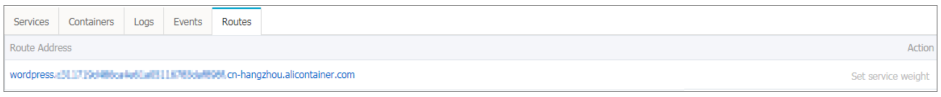
The WordPress application is displayed on the **Application List** page after being successfully created.



Help: Create an application Change application configurations Simple route blue-green release policy Container auto scaling
Cluster: wp-cluster2 System Applications Hide Offline Applications Hide Online Applications

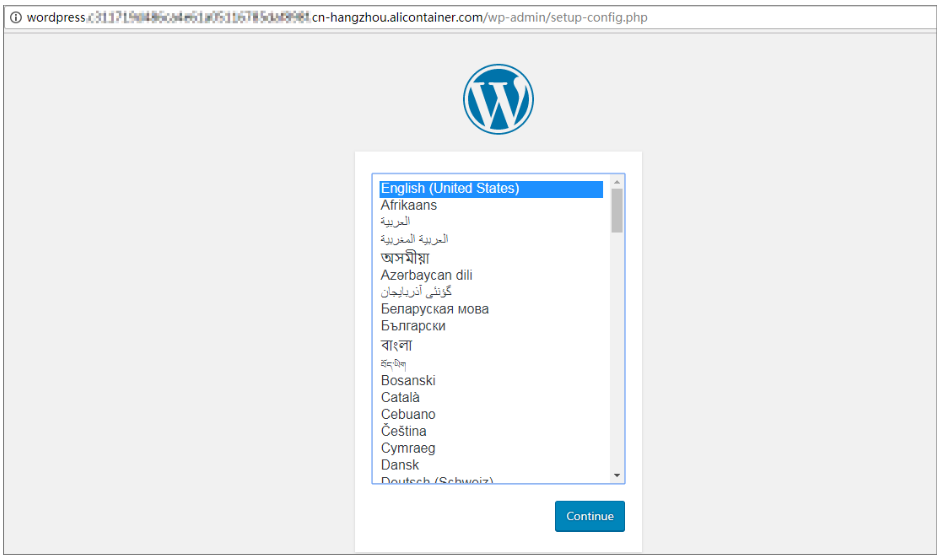
Name	Description	Status	Container Status	Time Created	Time Updated	Action
wordpress		● Running	Running:0 Stop:0	2018-03-02 11:51:15	2018-03-02 11:51:15	Stop | Update | Delete | Redeploy | Events

Click the application name, and then click the **Routes** tab to obtain the route address.



Route Address	Action
wordpress.[redacted].cn-hangzhou.alicontainer.com	Set service weight

Access the WordPress welcome page. Select the language and then click **Continue**.

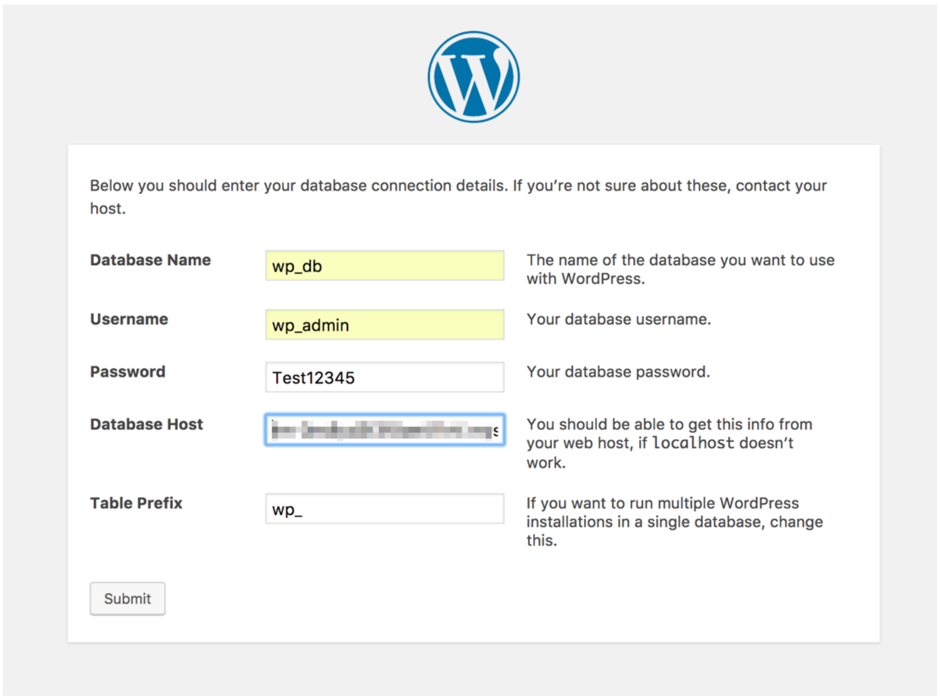


wordpress.[redacted].cn-hangzhou.alicontainer.com/wp-admin/setup-config.php

English (United States)
Afrikaans
العربية
العربية المغربية
অসমীয়া
Azərbaycan dili
گؤنئی آذربایجان
Беларуская мова
Български
বাংলা
བོད་ཡིག
Bosanski
Català
Cebuano
Čeština
Cymraeg
Dansk
Deutsch (Schweiz)

Continue

Enter the following detailed information according to the Terraform output parameters and then click **Submit**.

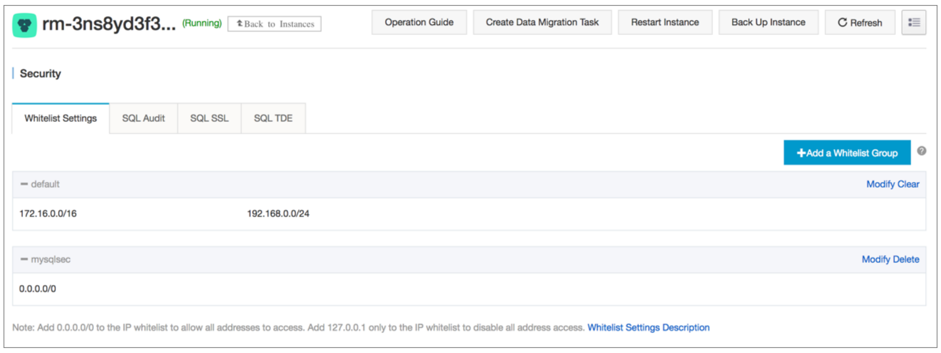


Below you should enter your database connection details. If you're not sure about these, contact your host.

Database Name	wp_db	The name of the database you want to use with WordPress.
Username	wp_admin	Your database username.
Password	Test12345	Your database password.
Database Host	[redacted]	You should be able to get this info from your web host, if `localhost` doesn't work.
Table Prefix	wp_	If you want to run multiple WordPress installations in a single database, change this.

Submit

After the submission, if the entered values are correct, you can go to the next configuration step to run the installation. When encountering an error, you must access the RDS database by setting the whitelist.



Security

default

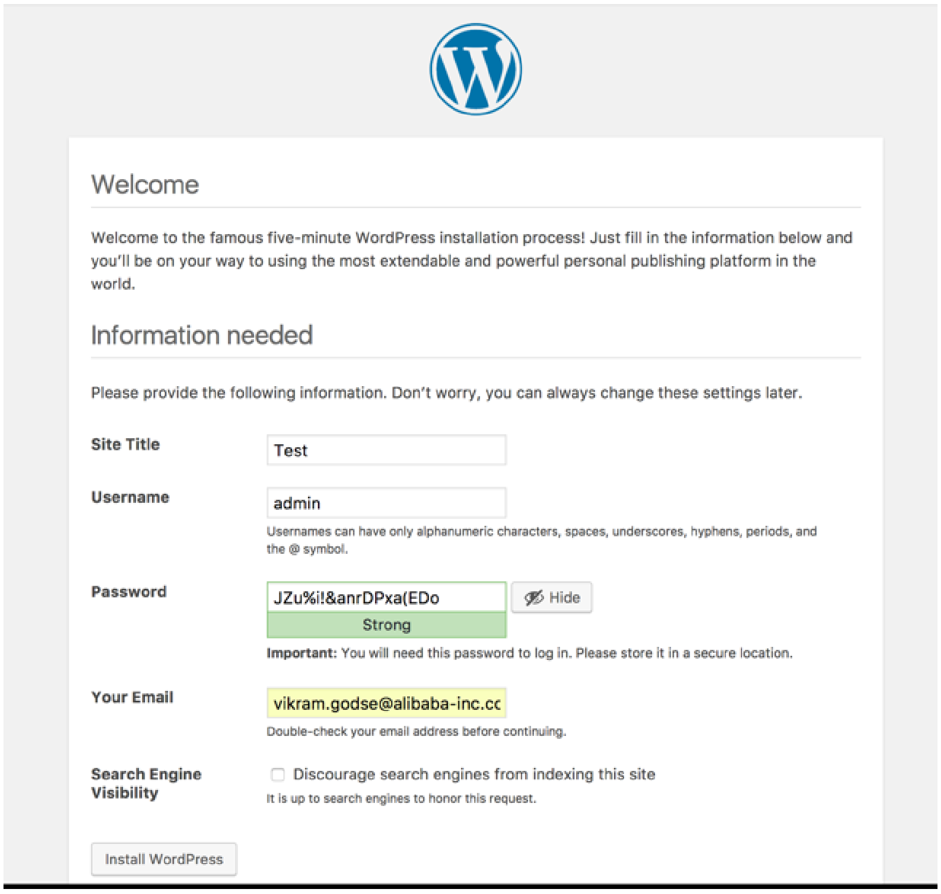
172.16.0.0/16 192.168.0.0/24

mysqlsec

0.0.0.0/0

Note: Add 0.0.0.0/0 to the IP whitelist to allow all addresses to access. Add 127.0.0.1 only to the IP whitelist to disable all address access.

Enter the **Site Title**, and the username and password of the administrator. Click **Install WordPress**.



Welcome

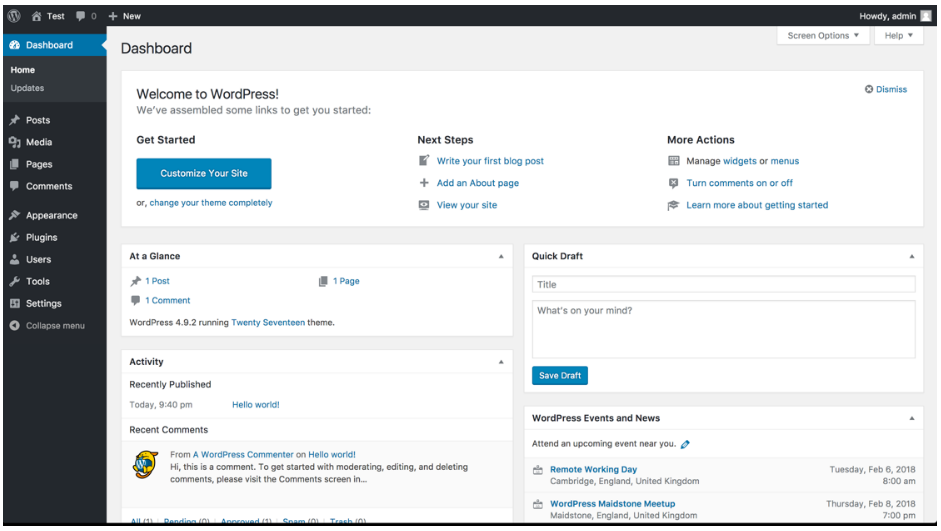
Welcome to the famous five-minute WordPress installation process! Just fill in the information below and you'll be on your way to using the most extendable and powerful personal publishing platform in the world.

Information needed

Please provide the following information. Don't worry, you can always change these settings later.

Site Title	Test
Username	admin Usernames can have only alphanumeric characters, spaces, underscores, hyphens, periods, and the @ symbol.
Password	JZu%i!&anrDPxa(EDo Strong **Important:** You will need this password to log in. Please store it in a secure location.
Your Email	vikram.godse@alibaba-inc.cc Double-check your email address before continuing.
Search Engine Visibility	☐ Discourage search engines from indexing this site It is up to search engines to honor this request.

After the installation, click **Log In**. Enter the username and password of the administrator, and then click **Log In** on the WordPress logon page to log on to the WordPress application.



Welcome to WordPress!
We've assembled some links to get you started:

WordPress 4.9.2 running Twenty Seventeen theme.

From A WordPress Commenter on Hello world!
Hi, this is a comment. To get started with moderating, editing, and deleting comments, please visit the Comments screen in...

Attend an upcoming event near you.

Further reading

Currently, Alibaba Cloud is the official major cloud provider of Terraform. To use Terraform to flexibly build Alibaba Cloud infrastructures, see Alibaba Cloud Provider for more information and customize the resource description files to quickly build your cloud infrastructures.