# Alibaba Cloud Aliyun Container for Kubernetes

# solution

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# **Generic conventions**

#### Table -1: Style conventions

Style	Description	Example
	This warning information indicates a situation that will cause major system changes, faults, physical injuries, and other adverse results.	<b>Danger:</b> Resetting will result in the loss of user configuration data.
	This warning information indicates a situation that may cause major system changes, faults, physical injuries, and other adverse results.	Warning: Restarting will cause business interruption. About 10 minutes are required to restore business.
	This indicates warning informatio n, supplementary instructions, and other content that the user must understand.	• Notice: Take the necessary precautions to save exported data containing sensitive information.
	This indicates supplemental instructions, best practices, tips, and other content that is good to know for the user.	Note: You can use Ctrl + A to select all files.
>	Multi-level menu cascade.	Settings > Network > Set network type
Bold	It is used for buttons, menus , page names, and other UI elements.	Click OK.
Courier font	It is used for commands.	Run the cd / d C :/ windows command to enter the Windows system folder.
Italics	It is used for parameters and variables.	bae log list instanceid <i>Instance_ID</i>
[] or [a b]	It indicates that it is a optional value, and only one item can be selected.	ipconfig [-all -t]

Style	Description	Example
{} or {a b}	It indicates that it is a required value, and only one item can be selected.	<pre>swich {stand   slave}</pre>

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# **1** Blockchain solution

### 1.1 Overview

Alibaba Cloud Container Service blockchain solution is a simple and flexible generic solution used to develop and test the blockchain applications and solutions based on Hyperledger Fabric.

This solution provides developers with a graphical blockchain network configuration wizard to address the issues in blockchain configuration and deployment, such as high requirements for professional skills, complex and time-consuming procedures , and being prone to errors. By using this solution, developers are only required to enter key configuration parameters. Then, with the one-click automated configurat ion and deployment, the complex configuration files can be generated and the blockchain network based on Hyperledger Fabric can be created in the container cluster within several minutes. In addition, to facilitate developers to access the blockchain network by using blockchain applications and blockchain administration and monitoring tools, the solution provides pre-generated configuration files for applications and tools. Developers can download the configuration files with one click and then use the blockchain applications and tools.

Alibaba Cloud Container Service blockchain solution has the following characteri stics:

- Standard: Supports major functions of the open-source blockchain technology Hyperledger Fabric V1.4 in the Linux foundation, including standard blockchain node types such as Peer, CouchDB, Orderer, Kafka, ZooKeeper, and CA.
- Simple: A graphical wizard that simplifies blockchain configuration, masks complicated underlying procedures such as parameter settings, tool invocation , and configuration distribution, significantly reduces the error probability, and supports the built-in deployment of Hyperledger Blockchain Explorer.
- Mature: Multiple years of enterprise level large-scale production and application have proved the stability and reliability of underlying Alibaba Cloud Container Service clusters. In addition, Alibaba Cloud Container Service clusters integrate with best practices of cloud applications and expertise of Docker technology development.

 Versatile: Seamlessly integrates with powerful and rich enterprise level applicatio n service capabilities of Alibaba Cloud, such as storage, network, routing, security , image, log, and monitoring, and provides all-round support for blockchain upper -layer applications. In the future, the blockchain solution will support multiple deployment modes such as public could, private cloud, and hybrid cloud.

Alibaba Cloud Container Service blockchain solution is currently in public beta. Welcome to try the solution and provide your valuable comments and suggestions if you are interested in it. This solution is to be improved and enriched continuously according to your requirements and the market requirements, allowing developers and partners to create more and better service innovation applications and industry solutions.

## 1.2 Version history and upgrade instructions

This document lists the version history and the corresponding functional changes of the Alibaba Cloud Container Service blockchain solution, and the instructions during the upgrade process. The version number is the chart version number of the blockchain solution ack-hyperledger-fabric in the application directory.

#### Version history

Version 0.2.3

- Hyperledger Fabric is upgraded to V1.4.0.
- Explorer is upgraded to V0.3.8.

#### Version 0.2.2

· Improves availability of NAS file system mount.

## Note:

You must enter the NAS mount address each time you create a blockchain network. It is unnecessary to mount the NAS to ECS in the environment preparation.

- · Improves availability of blockchain node deployment.
- · Blockchain log level parameterized configuration.
- · Improves data cleanup, explorer startup, chaincode execution timeout.
- · Unified naming convention for partial pods.

#### Version 0.2.1

- · Chart is renamed as ack-hyperledger-fabric.
- Bug fixes.

#### Version 0.2.0

- Supports Hyperledger Fabric 1.1.0.
  - Supports the Node.js-type chaincode function and the related examples.
  - Supports the chaincode-level ledger data encryption function and the related examples.
  - Supports connection profile.
  - Code-level optimization to further improve the performance and horizontal scalability.
  - More new functions provided by Hyperledger Fabric 1.1.0.
- · Integrates with Alibaba Cloud Log Service.
- · Built-in deployment of Hyperledger Blockchain Explorer.
- · Supports Alibaba Cloud Elastic Compute Service (ECS) Bare Metal Instance.
- Optimizes the cleanup of the data directory in the process of deleting the blockchain network.

#### Version 0.1.0

• Supports deploying Hyperledger Fabric 1.0.0 on the Alibaba Cloud Container Service Kubernetes cluster.

#### Upgrade instructions

- The blockchain solution installed on the App Catalog page in the Container Service console is of the latest version.
- For the blockchain solution installed by using the helm install command, use the following command to view the current version because helm repo may

have the cache of an earlier version locally if the blockchain solution was installed before.

helm search hyperledge r

To update the local repo cache, run the following command to obtain the blockchain solution of the latest version:

helm repo update

## 1.3 Quick start

This document is a quick start guide for deploying the blockchain network from the beginning, in which most settings use the default or example values. For more information about the configurations, see the subsequent sections.

#### Limits

- You must register an account and activate Container Service.
- The container cluster and the NAS file system must be in the same region. Make sure the selected region supports both the Kubernetes cluster and the NAS file system (intersection of both). For the list of regions that support the NAS file system, see Products > Storage & CDN > NAS > > File System List.
- The usage of a file system only applies to the development and test phases of blockchain applications and solutions. For deployment in the production environment, contact us to further discuss specific business and technical needs and determine the most suitable method.

#### Step 1. Create a Kubernetes cluster

- 1. Log on to the Container Service console.
- 2. Under Kubernetes, click Clusters in the left-side navigation pane. Click Create Kubernetes Cluster in the upper-right corner.

Container Service - Kubernetes +	Cluster List	You can create up to 5 clus	ters and can add up I	to 40 nodes in each clu	ister. Refresł	Create Serve	rless Kubernetes Cluster	Create Kubernetes Cluste	er 👻
Overview	Help: 🖉 Create cluster	Scale cluster S Connect to Ku	bernetes cluster via k	ubecti 🔗 Manage ap	oplications with	commands		2	
Clusters	Name 🔻								
Clusters	Cluster Name/ID	Cluster Type	Region (All) =	Natwork Type	Cluster	Time Created	Kubernetes		Action
Nodes	Cruster Harley ID	cluster Type	Region (All) +	несноїк туре	Julius	Time Greated	V0131011		ACIUIT

- 3. Configure the basic information for the cluster. In this example, complete the configurations as follows:
  - · Enter the Cluster Name. For example, k8s-blockchain.
  - Select China East 1 (Hangzhou) as the Region.
  - Select China East 1 Zone B as the Zone.
  - Select Auto Create to create a Virtual Private Cloud (VPC) together with the Kubernetes cluster, or Use Existing to use an existing VPC.
  - · Configure the Logon Password and Confirm Password.
  - Configure instance specifications and quantity. The blockchain network deployment is resource-intensive. Therefore, we recommend that you use the default configurations.
  - Select the Enable SSH access for Internet check box.
  - · Click Create Cluster. Wait a few minutes until the cluster is successfully created.
- 4. On the Cluster List page, click Manage at the right of the created cluster (k8sblockchain).

Container Service - Kubernetes +	Cluster List	You can create up to 5 clus	ters and can add up to	40 nodes in each clus	ter. Refresh	Create Serverles	s Kubernetes Cluster	Create Kubernetes	Cluster 👻
Overview	Help: 🔗 Create cluster 🛛 🔗	Scale cluster 🔗 Connect to Kul	oernetes cluster via ku	bectl 🕜 Manage app	olications with o	commands			
Clusters	Name 🔻								
Clusters	Cluster Name/ID	Cluster Type	Region (All) 👻	Network Type	Cluster Status	Time Created	Kubernetes Version	2	Action
Volumes	k8s-blockchain	Kubernetes	China East 1 (Hangzhou)	VPC vpc- bp1kd7yn4qn	Running	06/27/2018,17:48:29	1.9.7	Manage   Scale Clus	View Logs   Dashboard ter   More <del>-</del>
Namespace									

5. On the Basic Information page of the cluster, record the Master node SSH IP address, which is an Internet address.



6. On the Node List page, record the IP addresses (intranet addresses) of the cluster nodes (both master nodes and worker nodes).

	Container Service - Kubernetes -	Node List						Refresh	Label Manageme	nt Scale Cluster Add Existing Instance
	Overview	Help: 🔗 Postp	ay instance t	o Prepay						
-[	Clusters 1	Cluster: k8s-	olockchain	Filter by labels 👻	3					
	Clusters	IP Address	Role	Instance ID/Name	Configuration	Pods(Allocated)	CPU(Request   Limit)	Memory(Request   Limit)	Update Time	Action
	Nodes 2		Master		Pay-As-You-Go ecs.n4.xlarge	8	21.25%   %	2.56%   %	06/27/2018,18:01:36	Details   Monitor   Remove   Scheduling Settings
	Volumes Namespace		Master	And Andrewson and Andrews	Pay-As-You-Go ecs.n4.xlarge	7	21.25%   %	2.56%   %	06/27/2018,18:01:36	Details   Monitor   Remove   Scheduling Settings
•	Application		Master	1000	Pay-As-You-Go ecs.n4.xlarge	9	27.75%   %	3.96%   %	06/27/2018,18:01:36	Details   Monitor   Remove   Scheduling Settings
	Deployment Pods		Worker	10000	Pay-As-You-Go ecs.n4.xlarge	10	2.75%   %	2.81%   %	06/27/2018,18:01:37	Details   Monitor   Remove   Scheduling Settings

Step 2. Bind an EIP to a worker node

- 1. Log on to the Elastic IP Address (EIP) console.
- 2. Click Elastic IP Addresses in the left-side navigation pane. Click Create EIP.
- 3. Select the Region in which the cluster k8s-blockchain resides. Complete the other configurations as per your needs. Click Buy Now.
- 4. After activating the EIP, wait until the purchased EIP is displayed in the list and then click Bind at the right of the EIP.

VPC	Elastic IP Addresses								
VPCs	Create EIP Refresh	Export Cust	om					Elastic IP Address V Er	nter a name or ID Q
Route Tables									
VSwitches	Instance ID/Name	IP Address	Мо	Bandwidth	Billing Method(All) 77	Status(All) 17	Bind Instance	Instance Type(All)	Actions
Elastic IP Add	oin, incluing and Challen				Pay-As-You-Go				
NAT Gateways	test	47.00.101.125	1	1 Mbps Pay By Traffic	05/25/2018, 17: 48:58 Created	<ul> <li>Available</li> </ul>	-	-	Bind Unbind More~

- 5. Select ECS Instance from the Instance Type drop-down list and select a worker node (the instance name begins with node). Then, click OK.
- 6. After binding the EIP to the worker node, record the IP address of the purchased EIP on the Elastic IP Addresses page.

Step 3. Create a file system and add a mount point

- 1. Log on to the NAS console.
- 2. Select China East 1 (Hangzhou) in the region list and click Create File System.

▼ NAS	File System List	China North 1 (Qingdao) EU Central 1 (Frankfurt)	China East 1 (Hangzi Australia (Sydney)	hou) China North Hong K Asia P	2 (Beijing) China Eastactific SE 1 (Singapore)	st 2 (Shanghai) China ) US East 1 (Virginia)	South 1 (Shenzhen) China Malaysia (Kuala Lumpur)	a North 3(zhangjiakou) China North 5 (Huhehaote)	2
File System List		India (Mumbal) Indone:	sid (JdKditd)				₿ R	Buy Storage Package	Create File System
Storage Package	Reminder: Afte	er creating a file system, yo	u need to add a moun	t point for the file s	ystem. The mount poir	nt is the entry to access	the file system. How to c	eate a mount point	
NAS File Sync	File System ID/N	lame Storage	e Type Protocol Ty	Storage rpe Capacity	Zone	Bo Pa	und Storage Number of ckage Mount Point	S	Action

3. Complete the configurations in the displayed Create File System dialog box.

Create	e File System		$\times$
The sys pet	e upper limit o item is 1 petab abytes.	f the storage capacity of an SSD performance-type file oyte, and that of a capacity-type file system is 10	
[	* Region :	China East 1 (Hangzhou)  File systems and computing nodes in different regions are not connected.	
	* Storage Type :	Capacity-type 🔻	
	* Protocol Type :	NFS (including NFSv3 an 🔻	
	* Zone :	China East 1 Zone B  File systems and computing nodes in different zones in the same region are connected.	
	Storage Package :	Default No Package   Bind an unused storage package	
		OK Cance	2

- Region: Select China East 1 (Hangzhou). Select the region in which the container cluster resides.
- Storage Type: In this example, select Capacity-type.
- Protocol Type: Select NFS.
- Zone: Select China East 1 Zone B. Different zones in the same region are interconnected.
- · Click OK.

4. Click Click to go in the displayed dialog box.



5. Configure the NAS storage package.

NA	S Storage Pa	ackage						Current Selecte	d
	Region	China East 1 (Hangzhou) EU Central 1 (Frankfurt) Asia Pacific SE 5 (Jakarta)	China North 2 (Beijing) Hong Kong Asia Pacific SE 3 (Kuala Lumpur)	China East 2 (Shanghai) US East 1 Asia Pacific SE 2 (Sydney)	China South 1 (Shenzhen) China North 5 (Huhehaote) UK(London)	China North 1 (Qingdao) China North 3 (Zhangjiakou)	Asia Pacific SE 1 (Singapore) Asia Pacific SOU 1 (Mumbai)	Region: File System ID: Storage Type: Protocol Type:	China East 1 (Hangzhou) Create new FS and bind package Capacity-Type NFS
	Storage Type	Storage package r You can select an Capacity-Type	nust bind p v nust bind with a file existed file system SSD Performance-	e system, and a file ID to bind or selec	e system can only l ct [Create new FS a	bind with one pac nd bind package]	kage at any time.	Available Zone: Capacity: Quantity: Order Duration:	China East 1 Zone B 500GB 1 1 month(s)
	Protocol Type Available Zon	NFS China East 1 Zone B	SMB China East 1 Zone G					\$23.00 Buy Now	I
	Capacity	500GB 100TB	1TB 200TB	5TB 300TB	10TB 500TB	30TB 1PB	50TB		
	Quantity Order Duration	1 1 month	6 months	1 year					

- · Storage Type: Select Capacity-Type.
- Order Duration: In this example, select one month. Select the duration as per your needs.
- · Click Buy Now.
- 6. If Use Existing is selected in the VPC field when you create the Kubernetes cluster, skip this step. If Auto Create is selected in the VPC field when you create the

Kubernetes cluster, go to the VPC console. Change the VPC instance name to one that is easy to identify, for example, blockchain\_huadong1.

VPCs						
Create VPC Refresh Ci	ustom				Instance Name $\vee$	Enter a name or ID
Instance ID/Name	Destination CIDR Block	Status	Default VPC	Route Table	VSwitch	Actions
vpc-bpl mest resident	192.168.0.0/16	Available	No	1	1	Manage Delete

7. Click Add Mount Point at the right of the created file system. Complete the configurations in the displayed Add Mount Point dialog box.

Add Mount Point	×
The mount point mount point type mount point must	is the entry for the ECS server to visit the file system. The s currently supported are classic network and VPC. Each t be bound to a permission group.
The Linux client in concurrent requeres refer to this docu	mplements a default limitation on the number of sts to the NFS. In the event of poor performance, you can ment to adjust the configuration.
File System ID :	07e9649902
* Mount Point Type :	VPC 💌
* VPC :	blockchain handones C Go to the VPC console to  create a VPC
* VSwitch :	vsw-bp1######c2nt ▼
* Permission Group :	VPC default permission q 🔻
	OK Cancel

- Mount Point Type: Select VPC.
- VPC: Select the VPC used when creating the container cluster.
- · VSwitch: Select the VSwitch used when creating the container cluster.
- Permission Group: Select VPC default permission group (allow all).
- · Click OK.

8. On the File System List page, click Manage at the right of the file system. Record the Mount Address on the File System Details page.

Mount Point						How to mount   Add Mount Point
Mount Point Type 🕈	VPC	VSwitch 🗢	Mount Address	Permission Group	Status 🕈	Action
VPC 🚓	vpc- koa antaittynnentaallyyng	vsw- lopt.chi.Powratipnc2aniwu6	07e9649902-nat8.cn-hangzhou.nas.aliyuncs.com	VPC default permission group (	Available	Modify Permission Group   Activate   Disable   Delete

- Step 4. Configure and deploy blockchain network
  - 1. Under Kubernetes, click Store > App Catalog in the left-side navigation pane. Click ack-hyperledger-fabric , and select the region.

Container Service - Kubernetes +	App Catalog			
▼ Clusters		0	0	0
Clusters	$\mathbf{Q}_{0}^{\circ}$	QÖ	Qõ	QÖ
Volumes	ack-hyperledger-fabric	ack-istio	ack-istio-remote	ack-openmpi
Namespace				
Authorization  Application	Ø	¢o	¢°	¢o
Deployment	ack englageland configeonier	adv cartegeland auraka	adv carlandoud by the	
Pods Service	1.5.13.RELEASE Incubator	1.5.13.RELEASE incubator	1.5.13.RELEASE Incubator	1.5.13.RELEASE Incubator
Ingress	, mO	0	0,	0
Volumes Claim	¥0	Ψo	w <sub>o</sub>	Ψo
Release	ack-springcloud-zipkin 1.5.13.RELEASE incubator	ack-springcloud-zuul 1.5.13.RELEASE incubator	ack-tensorflow-dev 1.5.0 incubator	ack-tensorflow-serving 1.4.0 incubator
Config Maps				
Secret	Øo	Ø	¢°	ØO
Docker Images Orchestration Templa	ack-tensorflow-training 1.4.0 incubator	ceph incubator	chartmuseum 0.7.1 stable	consul 0.8.3 stable

2. Select the cluster in which the blockchain network is to be deployed from the Clusters drop-down list and enter the Release Name.

App Catalog - ack-hyperledger-fabric	
ack-hyperledger-fabric incubator Hyperledger Fabric Helm chart for Kubernetes on Alibaba Cloud Container Service	
Readme Values	Deploy
Hyperledger Fabric on Kubernetes of Alibaba Cloud Container Service	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
Foundation.	Clusters
Introduction	k8s-blockchain *
	Namespace
This chart implements a solution of automatic configuration and deployment for Hyperledger Fabric. The solution is deployed on Kubernetes cluster of Alibaba Cloud Container Service. And the Hyperledger Fabric network can be accessed by CLI applications and	default *
explorers within or outside the Kubernetes cluster. Blockchain Explorer is now integrated into this solution as well.	Release Name
A NAS (NFS protocol) shared file storage is needed for: 1. distribution of crypto and configurations; 2. data persistence for most services.	blockchain
Currently v1.1.0 of Hyperledger Fabric is supported.	DEPLOY
You can also refer to the documentation for blockchain solution of Alibaba Cloud Container Service.	

- 3. Click the Values tab. View or modify the corresponding deployment parameters.
  - sharedStor age : Create a file system and add a NAS file system mount address recorded in the mount point (required, otherwise the deployment fails).
  - dockerImag eRegistry : Enter the container image repository address in the annotations as the value according to the region in which the blockchain network is to be deployed (inside or outside China).
  - externalAd dress : Enter the EIP bound to the worker node to generate the connection profile.



4. Click Deploy.

## Note:

If sharedStor age is not configured, the spec. NFS. error for server: required value error is reported during the deployment process. When the error occurs, you must delete the corresponding publication name and then enter the sharedStor age parameter values, and redeploy. 5. Enter the cluster dashboard. Check the status of the pods related to the blockchain network. Wait until the statuses of all the pods become Running.

<							+ CREAT
Cluster	Pods						Ŧ
Namespaces	Name 🗢	Node	Status 🗢	Restarts	Age 🗢 CPU (cores)	Memory (bytes)	
Nodes Persistent Volumes	network01-zookeep er3-depl oyment-7f44bf68	cn-hangzhou.i- bp12btbe9mtlbdd49c3g	Running	0	2018- 05-26 21:30:20	40.875 Mi	≡ :
Roles Storage Classes	network01-zookeep er2-depl oyment-6f575c8	cn-hangzhou.i- bp12btbe9mtlbdd49c3f	Running	0	2018- 05-26 21:30:20 0.002	40.457 Mi	≡ :
Namespace default —	network01-zookeep er1-deployment-75 c6fcf4	cn-hangzhou.i- bp12btbe9mtlbdd49c3h	Running	0	2018- 05-26 0.003 21:30:20	37.957 Mi	≡ :
Overview	network01-peer4-d eployment-76d6b4fcb9-tg	cn-hangzhou.i- bp12btbe9mtlbdd49c3g	Running	0	2018- 05-26 0.07 21:30:20	52.766 Mi	≡ :
Workloads Cron Jobs	network01-peer1-deployment-79777466fc-w	cn-hangzhou.i- bp12btbe9mtlbdd49c3f	Running	0	2018- 05-26 0.075 21:30:20	61.676 Mi	≡ :
Daemon Sets Deployments	network01-peer3-d eployment-8989f6688-hzt	cn-hangzhou.i- bp12btbe9mtlbdd49c3h	Running	0	2018- 05-26 0.068 21:30:19	<b>5</b> 9.438 Mi	≡ :
Jobs	network01-peer2-d eployment-5d7b86d544-5	cn-hangzhou.i- bp12btbe9mtlbdd49c3g	Running	0	2018- 05-26 0.065 21:30:19	57.352 Mi	≡ :
Replica Sets	network01-orderer2-deployment-59d978699	cn-hangzhou.i- bp12btbe9mtlbdd49c3h	Running	0	2018- 05-26 21:30:19	4.773 Mi	≡ :

The Kubernetes service of the container dashboard also supports deploying the blockchain network by using Helm. For more information, see Configure and deploy blockchain network.

#### Step 5. Test blockchain network by using CLI

1. On a master node of the Kubernetes cluster, run the following command to enter the CLI container.

```
kubectl exec - it < fabricNetw ork >- fabric - cli bash
```

2. Run the following command to start the CLI test.

./ cli - test . sh

- 3. During the test, press any key to continue.
- 4. If no errors occur during the test and the following words are displayed, it indicates that the test is successfully completed.

```
۱
Query
                     PEER4
                             channel
                   on
                          on
bankchanne l'
             successful
         is
                   Press any
             to continue ...
         key
                 GOOD ,
============ All
                      End – 2 – End
                                execution
```

Step 6. Access blockchain explorer

1. Log on to the Container Service console.

2. Under the Kubernetes, click Application > Services in the left-side navigation pane. Select the target cluster and namespace, find the <Network name>-explorer service and access external endpoint.

You can also run the kubectl get svc command on the master node of the Kubernetes cluster, or log on to the Container Service console. Then, go to the Kubernetes clusters, and click Services in the left-side navigation pane. Then view the EXTERNAL-IP (external endpoint) of the <Network name>-explorer service.

Container Service - Kubernetes 🕶	Service List						Refresh Create
Overview	Clusters k8s-blockchain v Namespace	default	- 3				
<ul> <li>Clusters</li> </ul>	Name	Туре	Time Created	ClustersIP	internalendpoint	externalendpoint	Action
Clusters	kubernetes	ClusterIP	07/03/2018,10:00:33		kubernetes:443 TCP		Details   Update   Delete
Nodes Storage	network01-ca1	NodePort	07/03/2018,10:27:21		network01-ca1:7054 TCP network01-ca1:31054 TCP	-	Details   Update   Delete
Namespace	network01-ca2	NodePort	07/03/2018,10:27:21		network01-ca2:7054 TCP network01-ca2:31064 TCP	- 4	Details   Update   Delete
Application     Deployment	network01-explorer	LoadBalancer	07/03/2018,10:27:21		network01-explorer:80 TCP network01-explorer:31410 TCP	:80	Details   Update   Delete
Pods	network01-explorer-mysql	ClusterIP	07/03/2018,10:27:21		network01-explorer-mysql:3306 TCP		Details   Update   Delete
Service 2	network01-fabric-network-generator-svc	ClusterIP	07/03/2018,10:27:21		network01-fabric-network-generator-svc:8080 TCP	-	Details   Update   Delete

3. Access the external endpoint in the browser.

← → C ① 118.13	8.109.160							Q ☆
HYPERLEDGER EX	KPLORER							Select Channel +
bankchanne	2							
<	PEER 4	&	BLOCK	₹		тх 5	<b>₽</b>	chaincode 1
BLOCK #3			2 v C ×	BLOCKLIST		v C ×	BLOCKVIEW	v ℃ ×
number	3			Block	TXNs	<u>^</u>	Identifier [number, hash, tag]	
previous_hash	bf93300ce9dc346cfd0ecd5c8e4a92449d200	023cbe63417773c431e9a36d091e		#4	1			
data_hash	57d43f3877dd9aa6b5da5295558a9ed51ff7	5eb5ee5452b55ecc9d3d53ecbe25		#3	1		<ul> <li>Block</li> <li>Transaction</li> </ul>	
Transactions	1f14e74670db03aaba40f11eb780acf13f49a	8182eee621d7bd0da53916af2f4		#2	1	_		Find
				#1	1			_
				#0	1	-		

#### Step 7. Delete blockchain network

 Under the Kubernetes, click Application > Helm in the left-side navigation pane. Select the cluster from the Clusters drop-down list. Click Delete at the right of the release name of the blockchain network.

Container Service - Kubernetes +	Release List								Refresh
✓ Clusters	Clusters k8s-cluster 🔻 3								
Clusters	Release Name	Status	Namespace	Chart Name	Chart Version	App Version	Update Time		Action
Nodes	ack-hyperledger-fabric-default	Deployed	default	ack-hyperledger-fabric	0.2.2	1.1.0	09/03/2018,10:23:06	Detail	Update Delete
Volumes									4
Namespace									
Authorization									
Application									
Deployment									
Pods									
Service									
Ingress									
Volumes Claim									
Helm 2									

2. Click OK in the displayed dialog box.

Delete			$\times$
	Are you sure to delete the release network01 ? Purge		
		ОК	Cancel

Then, the environment preparations, configuration and deployment, test, and deletion of the blockchain network are complete. For further development and testing, you can repeat the steps of blockchain configuration and deployment, blockchain testing, and blockchain deletion. You can also customize the network environment according to product instructions as needed.

## **1.4 Environment preparations**

Before using the Alibaba Cloud Container Service blockchain solution, complete the corresponding environment preparations, which mainly includes:

· Create a Kubernetes cluster

- Bind an Elastic IP (EIP) to a worker node
- · Create a file system and add a mount point

This document introduces how to prepare the environment.

Create a Kubernetes cluster

The blockchain solution deployment is based on a Kubernetes cluster built by ECS. For how to create a Kubernetes cluster, see Create a Kubernetes cluster. When creating a Kubernetes cluster, you must complete the following key configurations to make sure the blockchain solution can be deployed successfully.

- Region: The Kubernetes cluster and the NAS file system must be in the same region. Make sure the selected region supports both the Kubernetes cluster and the NAS file system (intersection of both). For the list of regions that support the NAS file system, see Products > Storage & CDN > NAS > File System List.
- Network type: Select Virtual Private Cloud (VPC).
- SSH login: For ease of management, select the Enable SSH access for Internet check box.
- Node configurations: We recommend that you use the default settings (such as three master nodes and three worker nodes). You can also configure the nodes as per your needs. The numbers of softwares, services, and containers deployed by the blockchain network are large. Therefore, make sure the cluster resources can meet the requirements.

Click Create Cluster. Wait several minutes (depends on the number of ECS instances), until the Kubernetes cluster and the ECS instances are created.

After the Kubernetes cluster is created, click Manage at the right of the created cluster on the Cluster List page. On the Basic Information page > Connection Information section, record the Master node SSH IP address, which is an Internet address and used as the external address.

Click Kubernetes > Clusters > > Nodes in the left-side navigation pane. Record the IP addresses (intranet addresses) of the cluster nodes (both master nodes and worker nodes) for later usage.

#### Bind an EIP to a worker node

This section introduces the prerequisite for the access to the blockchain network from outside the cluster, which creates and binds an EIP to a worker node of the Kubernetes cluster.

#### Procedure

- 1. Log on to the Elastic IP Address (EIP) console.
- 2. Click Elastic IP Addresses in the left-side navigation pane.
- 3. Click Create EIP.

VPC	Elastic IP Addresses							
VPCs Route Tables	Create EIP 2 resi	n Export Custo	om			Ela	stic IP Address 🗸 Ente	er a name or ID Q
VSwitches	Instance ID/Name	IP Address N	Io Bandwidth	Billing Method(All) \	Status(All) \	Bind Instance	Instance Type(AII)	Actions
Elastic IP Addr NAT Gateways Global Acceler	eip-bpl tempolitikati test	47.85/101/125	al 1 Mbps Pay By Traffic	Pay-As-You-Go 05/25/2018, 17: • 48:58 Created	Allocated	HQ712004940000000 10g NoCHCOT2485457-00- 0000279884-00128409 2197299900000072	ECS Instance	Bind Unbind More∨

- 4. Select the region in which the Kubernetes cluster resides. Complete the other configurations as per your needs. Click Buy Now.
- 5. After activating the EIP, wait until the purchased EIP is displayed in the list and then click Bind at the right of the EIP.
- 6. Select ECS Instance from the Instance Type drop-down list and select a worker node (the instance name begins with node, instead of master) from the ECS Instance drop-down list. Click OK.
- 7. After binding the EIP to the worker node, record the IP address of the purchased EIP on the Elastic IP Addresses page.

#### Create a file system and add a mount point

In the blockchain solution, a file system is mainly used to store and distribute the certificates, keys, and configurations of the blockchain and persistently store the data of the blockchain master nodes.



Note:

The usage of a file system only applies to the development and test phases of blockchain applications and solutions. For deployment in the production environment, contact us to further discuss specific business and technical needs and determine the most suitable method.

For how to create a file system, see Mount a file system on an ECS instance running Linux. When creating a file system, you must complete the following key configurations to make sure the blockchain solution can be deployed successfully.

- · Region: Select the region in which the container cluster resides.
- · Protocol Type: Select NFS.



For more information, see ../../SP\_111/DNnas1858274/EN-US\_TP\_18691.dita#concept\_60431\_zh.

After adding a mount point, click Manage at the right of the file system.

File System ID/Name	Storage Type	Protocol Type	Storage Capacity	Zone	Bound Storage Package	Number of Mount Points		Action
07e9649902 07e9649902	Capacity-type	NFS	336.12 MB	China East 1 Zone B	Yes	1	Add Mount Point   Manage	Delete

Record the Mount Address of the mount point.

Mount Point						How to mount   Add Mount Point ^
Mount Point Type♥	VPC	VSwitch 🕈	Mount Address	Permission Group	Status 🕈	Action
VPC 🌰	vpc- lapitantal reynoliticglogog	vsw- belafil70nestpec2p3eu6	December 21. cn-hangzhou.nas.aliyuncs.com	VPC default permission group (	Available	Modify Permission Group   Activate   Disable   Delete

## 1.5 Access blockchain solution homepage

Alibaba Cloud Container Service blockchain solution is released in the Container Service Kubernetes app catalog in the form of Helm chart. You can follow these steps to view the blockchain solution information, such as the introduction and configuration parameters.

#### Procedure

- 1. Log on to the Container Service console.
- 2. Under Kubernetes, click App Catalog in the left-side navigation pane.

Container Service - Kubernetes 🔻	App Catalog			
Overview				
▼ Clusters	Ø	0 <sup>0</sup>	¢	Ø
Clusters	<u> </u>	2	0	-
Nodes	ack-hyperledger-fabric	ack-istio	ack-openmpi 3.1.0 incubator	ack-springcloud-configserver
volumes				
Namespace				
<ul> <li>Application</li> </ul>	<b>Ö</b>	<b>Ö</b> <sup>O</sup>	<b>O</b> O	<b>O</b> O
Deployment		0	0	Q
Pods	ack-springcloud-eureka	ack-springcloud-hystrix	ack-springcloud-turbine	ack-springcloud-zipkin
Service 😐	1.5.13.RELEASE incubator	1.5.13.RELEASE incubator	1.5.13.RELEASE incubator	1.5.13.RELEASE incubator
Ingress				
Volumes Claim	0	<b>H</b> O	<b>HO</b>	<b>H</b> O
e l	¥0	¥0	W <sub>O</sub>	Ho
Kelease				
Config Maps	ack-springcloud-zuul	ack-tensorflow-dev	ack-tensorflow-serving	ack-tensorflow-training
Secret				
▼ Store 1				
Docker Images	<b>O</b> O	<b>Ö</b> <sup>O</sup>	<b>O</b> O	<b>O</b> O
App Catalog	~0	0	0	-+Q
Service Catalog	ceph	consul	elasticsearch	etcd
	incubator	0.8.3 stable	incubator	incubator

3. Click ack-hyperledger-fabric on the App Catalog page.

4. On the details page of ack-hyperledger-fabric, view the blockchain solution information, including the introduction, deployment conditions, deployment commands, test commands, debugging commands, and configuration parameters.

## 1.6 Configure and deploy blockchain network

After completing the environment preparations, you must configure and deploy the blockchain network. The blockchain network is a blockchain running environment , which is based on Hyperledger Fabric and consists of the following standard node types:

- Orderer: Used to combine blockchain transactions into blocks. From the perspectiv e of scalability, the blockchain solution uses the Orderer services of the Kafka type.
- Kafka and ZooKeeper: Used to provide underlying services for Orderer in the form of clusters.
- Peer: Used to store and maintain a ledger, create and run a chaincode container, and endorse transactions. From the perspective of high availability, the blockchain solution creates two peer nodes for each organization.
- CouchDB: Used to store the state database of peer. The blockchain solution creates a CouchDB for each peer.

• CA: Used to provide the PKI certificate service for applications. The blockchain solution creates a CA node for each organization.

For more information, see Hyperledger Fabric official documentation.

To satisfy requirements of enterprise level applications, the blockchain solution provides master nodes with persistent data storage by using the shared file system created in Environment preparations.

The blockchain network is deployed and run on an Alibaba Cloud Container Service Kubernetes cluster. You can deploy multiple blockchain networks (separated by namespaces) in the same Kubernetes cluster or deploy one blockchain network in each Kubernetes cluster.

The blockchain network can be configured and deployed on the graphical interface or by using the Helm commands. Both of these methods are introduced in the following sections.

## Note:

Currently, the new organizations or peers cannot be dynamically added to an existing blockchain network. Therefore, you must delete the existing blockchain network and recreate one if you want to modify the blockchain network configurations.

#### Configuration parameter description

The blockchain solution provides default values for most parameters to simplify your configuration process. To customize a blockchain, you can set parameters by referring to the following parameter description.

Parameter	Description
sharedStorage	The mount address of the NAS file system . Parameters that must be provided to create a blockchain network, otherwise the creation fails.
storageCapacity	The initial size of the Persistent Volume Claim (PVC) of the NAS in Kubernetes . NAS supports dynamic scaling. The default size is 1G.

Parameter	Description
dockerImageRegistry	<ul> <li>The Docker image repository URL: The image repository of the blockchain solution. Select an image repository based on the region in which the Kubernetes cluster resides.</li> <li>Inside China: registry.cn-hangzhou. aliyuncs.com/cos-solution</li> <li>Outside China: registry.ap-southeast-1 .aliyuncs.com/cos-solution</li> </ul>
fabricNetwork	Blockchain network name (required): The blockchain network is deployed as an application of Container Service. Therefore, the blockchain network name is an application name. Avoid using the name of a deployed application. The blockchain network name is also used as the name of the root directory for storing configurations and data in the shared file system.
fabricChannel	Blockchain network channel name: The channel name of Hyperledger Fabric. The blockchain solution automatically creates the channel with the specified name when the blockchain network is deployed.
externalAddress	External access address (mandatory). To use an application or a management and monitoring tool outside the container cluster to access the blockchain network, the public IP address of a node in the Kubernetes cluster or the public IP address of the Server Load Balancer instance of the Kubernetes cluster must be used as the external access address. For more information about the configuration method, see Bind an EIP to a worker node.
ordererDomain	Orderer domain: The Orderer domain in Hyperledger Fabric. Set this parameter based on actual requirements.

Parameter	Description
ordererNum	Number of Orderer nodes: This parameter applies to the Orderer services of the Kafka type, not the Solo type. Set this parameter to the number of Orderer nodes to be deployed. To modify the parameter value, you must modify the value of ordererExternalPortList at the same time to make sure the number of nodes and the number of external ports are the same. Otherwise, the blockchain network fails to be deployed.
peerDomain	Peer domain: The peer domain in Hyperledger Fabric. Set this parameter based on actual requirements.
orgNum	Number of organizations: The number of organizations in Hyperledger Fabric . The blockchain solution creates two peer nodes for each organization to guarantee the high availability and meet the requirements of business expansion . Specify the number of organizations according to your actual requirements. The number of actually deployed peer nodes is twice the number of organizati ons. To modify the parameter value, you must modify the values of peerExtern alGrpcPortList and caExternalPortList at the same time to make sure the number of nodes and the number of external ports are the same. Otherwise, the blockchain network fails to be deployed.
ordererExternalPortList	Orderer external port list: To access the Orderer services by using an application outside the cluster, you must specify the external ports used by Orderer nodes or use the default port. Different blockchain networks must use different ports and make sure the number of ports in the list must be the same as the value of ordererNum. Otherwise, the blockchain network fails to be deployed.

Parameter	Description
caExternalPortList	CA external port list: To access the CA services by using an application outside the cluster, you must specify the external ports used by CA nodes or use the default port. Different blockchain networks must use different ports and make sure the number of ports in the list must be the same as the value of orgNum . Otherwise, the blockchain network fails to be deployed.
peerExternalGrpcPortList	Peer gRPC external port list: To access the Peer services by using an applicatio n outside the cluster, which is based on the gRPC protocol by default, you must specify the external ports used by peer nodes or use the default port. Different blockchain networks must use different ports and make sure the number of ports in the list must be twice the value of orgNum. Otherwise, the blockchain network fails to be deployed.
imagePullPolicy	Image pull policy: This is a Kubernetes parameter and is generally used for development and test.
hyperledgerFabricVersion	Hyperledger Fabric version: Currently, 1. 4.0 is supported, and no configuration is required.
thirdPartyImageVersion	The image version of the third-party softwares (such as CouchDB, Kafka, and ZooKeeper) included in Hyperledger Fabric: Currently, 0.4.14 is supported, which corresponds to the Hyperledge r Fabric 1.4.0, and no configuration is required.
explorer.enabled	Whether to automatically deploy the Hyperledger Explorer. During the deployment, the Server Load Balancer instance is created, and the blockchain explorer function based on Web UI is provided by using port 80. The default value is true.

Parameter	Description
logService.enabled	Whether to enable the support for Alibaba Cloud Log Service. The default value is false. For more information about Alibaba Cloud Log Service, see Use Log Service to collect Kubernetes cluster logs.
logService.region	Specify the region in which the Log Service project resides if logService.enabled is set to true. Set the parameter value as per your needs. For more information about Alibaba Cloud Log Service, see Use Log Service to collect Kubernetes cluster logs.
logService.userID	Specify the user ID of the Alibaba Cloud primary account if logService.enabled is set to true. For more information about Alibaba Cloud Log Service, see Use Log Service to collect Kubernetes cluster logs.
logService.machineGroup	Specify the machine group of the Log Service project if logService.enabled is set to true. For more information about Alibaba Cloud Log Service, see Use Log Service to collect Kubernetes cluster logs.
logLevel	Hyperledger Fabric log levels for different types of nodes (peer, orderer, couchdb) Optional values are: CRITICAL   ERROR   WARNING   NOTICE   INFO   DEBUG, the default value is INFO.

#### Deploy blockchain network in Container Service console

1. Log on to the Container Service console. In the left-side navigation pane under Kubernetes, choose Store > App Catalog. Then, click ack-hyperledger-fabric



2. Select the cluster in which the blockchain network is to be deployed from the Clusters drop-down list and enter the Release Name.

App Catalog - ack-hyperledger-fabric ack-hyperledger-fabric incubator Hyperledger Fabric Helm chart for Kubernetes on Alibaba Cloud Container Service	
Readme Values Hyperledger Fabric on Kubernetes of Alibaba Cloud Container Service	Deploy Only Kubernetes versions 1.8.4 and above are supported. For clusters of version 1.8.1, you can perform "upgrade cluster" beration in the cluster list
Hyperledger Fabric is one of the most popular blockchain infrastructures in the world, which is open sourced and hosted by Linux Foundation. Introduction	Clusters k8s-test v
This chart implements a solution of automatic configuration and deployment for Hyperledger Fabric. The solution is deployed on Kubernetes cluster of Alibaba Cloud Container Service. And the Hyperledger Fabric network can be accessed by CLI, applications and explorers within or outside the Kubernetes cluster. Blockchain Explorer is now integrated into this solution as well. A NAS (NFS protocol) shared file storage is needed for: 1. distribution of crypto and configurations; 2. data persistence for most services. Currently v1.4.0 of Hyperledger Fabric is supported. You can also refer to the documentation for blockchain solution of Alibaba Cloud Container Service.	Release Name       ack-hyperledger-fabric-default
Prerequisites         • A Kubernetes cluster of Alibaba Cloud Container Service has been created. Refer to guidance document.         • NAS file system with mounting address of Alibaba Cloud has been created. Refer to guidance document (File system related section)         Installing the Chart	Version 0.2.3 Project Homepage https://hyperledger.org/projects/fabric
You can use either Helm client or Application Catalog Dashboard of Alibaba Cloud Container Service to install this chart. In either way, please ensure NAS is set during installation.	Links <ul> <li>https://github.com/hyperledger/fabric</li> </ul>

- 3. Click the Values tab. View or modify the corresponding deployment parameters.
  - sharedStor age : Enter the NAS file system mount address during the environment preparation (required, otherwise the deployment fails).
  - dockerImag eRegistry : Enter the container image repository address in the annotations as the value according to the region in which the blockchain network is to be deployed (inside or outside China).
  - externalAd dress : Enter the EIP bound to the worker node to generate the connection profile.



4. Click Deploy.

## Note:

If sharedStor age is not configured, the spec. NFS. error for server: required value error is reported during the deployment process. When the error occurs, you must delete the corresponding publication and then enter the sharedStor age parameter values, and redeploy.

5. Enter the cluster dashboard. Check the status of the pods related to the blockchain network. Wait until the status of all the pods becomes Running.

<	= Overview	+ CREAT
Cluster	Pods	Ŧ
Namespaces	Name Φ         Node         Status Φ         Restarts         Age Φ         CPU (cores)         Memory (bytes)	
Nodes Persistent Volumes	network01-zookeeper3-deployment-7f44bf68     cn-hangzhou.i-     Running     0     2018-     05-26     0.003     40.875 Mi     21:30:20	≡ :
Roles Storage Classes	Image: State	≡ :
Namespace default —	network01-zookeeper1-deployment-75c6fcf4       cn-hangzhou.i- in Linear Control Cont	≡ :
Overview	Instruction         2018-           Instruction         0           0         05-26           21:30:20         0.07	≡ :
Workloads Cron Jobs	network01-peer1-deployment-79777466fc-w cn-hangzhou.i- Running 0 05-26 0.075 61.676 Mi 21:30:20	≡ :
Daemon Sets Deployments	network01-peer3-deployment-8989f6688-hz cn-hangzhou.i- bit 1212444 Double 121244 Double 121244 Double 12124 Double 1212	≡ :
Jobs	network01-peer2-deployment-5d7b86d544-5 cn-hangzhou.i- bell 2014 cn-hangzhou.i- bell 2014 cn-hangzhou.i- bell 2014 cn-hangzhou.i- 21:30:15 double 2018 cn-hangzhou.i- 21:30	≡ :
Replica Sets	network01-orderer2-deployment-59d978699 cn-hangzhou.i- Running 0 2018- 05-26 0.002 4.773 Mi	≡ :

Deploy blockchain network by using Helm commands

For more information about how to use Helm to deploy applications in Container Service Kubernetes clusters, see Simplify Kubernetes application deployment by using Helm.

- 1. Use SSH to log on to the master node in a Kubernetes cluster with the root account. Enter the password configured when the Kubernetes cluster is created.
- 2. Run Helm commands to deploy the blockchain network.
  - To deploy the blockchain network by using the default parameter configurations, run the following command:

```
helm install -- name blockchain - network01 -- set "
sharedStor age = 987a6543bc - abc12 . cn - hangzhou . nas .
aliyuncs . com " incubator / ack - hyperledge r - fabric
```

Wherein, -- name indicates the Helm release name of the blockchain network. You can set the parameter value as per your needs.

To deploy a blockchain network to the specified namespace (for example, network01), run the following command:

helm install -- namespace network01 -- name blockchain network01 -- set " sharedStor age = 987a6543bc - abc12 . cn -

```
hangzhou . nas . aliyuncs . com " incubator / ack - hyperledge r - fabric
```

Wherein, -- namespace indicates the name of the namespace in which the

blockchain network is to be deployed. You can set the parameter value as per your needs.

• To deploy the blockchain network with simple or a small number of configuration parameters, use the set parameter to pass in the configuration parameter values. For example:

```
helm install -- name blockchain - network01 -- set "
fabricChan nel = mychannel , sharedStor age = 987a6543bc -
abc12 . cn - hangzhou . nas . aliyuncs . com " incubator / ack -
hyperledge r - fabric
```

• To deploy the blockchain network with complex or a large number of configuration parameters, use the YAML file to pass in the configuration parameter values. For example:

```
helm install -- values network01 . yaml -- name
blockchain - network01 incubator / ack - hyperledge r - fabric
```

Wherein, -- values indicates the YAML file for customizing configuration parameters. You can set the parameter values as per your needs. See the following example:

```
yaml
 sample
             values
                       987a6543bc - abc12 . cn - hangzhou . nas .
sharedStor
             age :
aliyuncs . com
fabricNetw ork :
                       network01
fabricChan nel :
                       tradechann el
orgNum : 3
ordererNum : 4
ordererDom ain : shop
peerDomain : shop
externalAd dress: 11 . 22 . 33 . 44
caExternal PortList: [" 31054 ", " 31064 ", " 31074 "]
ordererExt ernalPortL ist: [" 31050 ", " 31060 ", " 31070 ", "
31080 "]
peerExtern alGrpcPort List : [" 31051 ", " 31061 ", " 31071 ",
" 31081 ", " 31091 ", " 31101 "]
```

Check if the Helm release of the blockchain network is successfully deployed. Run the following command to make sure the release status of the blockchain network is Deployed. 3. Run the following command to check if all the node pods of the blockchain network are successfully running and make sure the status of all the pods in the blockchain network is Running.

kubectl get pod

• If a namespace is specified, for example, network01, run the following command:

kubectl get pod - n network01

• To listen to the pod status changes in watcher mode, run the following command:

kubectl get pod - w

4. Run the following command to check the blockchain network deployment status. If the status is If the status is DEPLOYED, the blockchain network is successfully deployed.

helm list

Then, the blockchain network configuration and deployment are complete.

Naming rules for node services of blockchain network

For standard node types of Hyperledger Fabric, the service naming rule is as follows:

< blockchain network name >-< node type >< serial number >

For example:

network01 - peer1 network01 - peer2 network01 - orderer1 network01 - ca1

Although blockchain networks can be differentiated by namespaces in a Kubernetes cluster, the preceding service naming rule still uses a blockchain network name as the prefix to keep consistent with the blockchain solution of swarm clusters.

A service name must be consistent with the node name in the blockchain certificat e and key. This type of service name (together with the service port) can be used to directly access blockchain applications or CLI deployed in the same Kubernetes cluster. The external address is not required.

#### **Problem diagnosis**

This section introduces some common approaches, methods, and tools for diagnosing problems and errors that may occur during blockchain configuration, deployment, and access.

First, check if all preparations described in Environment preparations have been completed correctly.

Then, use Kubernetes-related commands, such as kubectl describe pod , kubectl logs , and kubectl get pod – o yaml , to view the deployment events and output logs.

In addition, to assist in fault diagnosis and problem troubleshooting, the blockchain solution deploys a custom fabric-utils container in the blockchain network. This container integrates with common basic tools, such as telnet, ping, nslookup, and curl. You can run the following kubectl command on the master node to enter the fabric-utils container and use suitable tools to diagnose and analyze the problems. For example:

kubectl exec - it fabric - utils - pod bash

Finally, for problems or errors related to Hyperledger Fabric, use Hyperledger Fabric official documentation, StackOverFlow, or Google/Bing/Baidu for relevant informatio n or solutions.

## 1.7 View blockchain network logs

Logs generated when the blockchain network is running are output as container logs of Peer, Orderer, CA, Kafka, and ZooKeeper node types. The Container Service blockchain solution allows you to view these logs in the Container Service console, by using Kubernetes commands, or by means of Alibaba Cloud Log Service. This document introduces these three methods in details.

#### View logs in Container Service console

The Container Service console allows you to conveniently view logs on GUI. After deploying the blockchain network, you can follow these steps to view the container logs of the corresponding node.

#### Procedure

- 1. Log on to the Container Service console.
- 2. Under Kubernetess, click Clusters in the left-side navigation pane. Click Dashboard at the right of the cluster.

Container Service - Kubernetes -	Cluster List	You car	create up to 5 clusters and	can add up to 40 nodes	in each cluster.	Refresh Crea	te Serverless Kubernetes Clus	ter Create Kubernetes Cluster 👻
Overview	Help: & Create cluster & Scale cluste	er 🔗 Connect to Kuberr	etes cluster via kubectl 🔗	Manage applications wi	ith commands			
▼ Clusters	Name 🔻							
Clusters	Cluster Name/ID	Cluster Type	Region (All) 👻	Network Type	Cluster Status	Time Created	Kubernetes Version	Action
Nodes Volumes	k8s-blockchain	Kubernetes	China East 1 (Hangzhou)	VPC vpc-bp1kd7yn4qn	Running	06/27/2018,17:48:29	1.9.7	Manage   View Logs   Dashboard Scale Cluster   More -

3. Click Pods in the left-side navigation pane and then click the Logs icon.



4. View the log details.

≡ Logs						+	CREAT
Logs from network01-zookeeper3 👻	in network01-zookeeper3-deployment-7f44bf6865-nkctf 👻	A	Tr	Ō	Ø	0	Ŧ
2018-05-26 23:30:54,948 [my:d:3] - IN 2018-05-26 23:30:54,955 [my:d:3] - IN 2018-05-27 00:30:54,955 [my:d:3] - IN 2018-05-27 00:30:54,948 [my:d:3] - IN 2018-05-27 01:30:54,948 [my:d:3] - IN 2018-05-27 01:30:54,955 [my:d:3] - IN 2018-05-27 00:30:54,948 [my:d:3] - IN	70 [PurgeTask:DatadirCleanupManagerSPurgeTask0136] - Purge task started. 70 [PurgeTask:DatadirCleanupManagerSPurgeTask0136] - Purge task completed. 70 [PurgeTask:DatadirCleanupManagerSPurgeTask0136] - Purge task started. 70 [PurgeTask:DatadirCleanupManagerSPurgeTask0144] - Purge task started. 70 [PurgeTask:DatadirCleanupManagerSPurgeTask0136] - Purge task completed. 70 [PurgeTask:DatadirCleanupManagerSPurgeTask0146] - Purge task completed.						
2018-05-27 02:30:54,955 [myid:3] - IND 2018-05-27 03:30:54,959 [myid:3] - IND 2018-05-27 03:30:54,949 [myid:3] - IND 2018-05-27 04:30:54,949 [myid:3] - IND	<ul> <li>[FurgeTask:DatadirClearuyManagerSFurgeTask0144] - Furge task completed</li> <li>[FurgeTask:DatadirClearuyManagerSFurgeTask0130] - Furge task started</li> <li>[FurgeTask:DatadirClearuyManagerSFurgeTask0130] - Furge task started</li> <li>[FurgeTask:DatadirClearuyManagerSFurgeTask0130] - Furge task started</li> </ul>						
2018-05-27 04:30:54,956 [myid:3] - INH 2018-05-27 05:30:54,948 [myid:3] - INH 2018-05-27 05:30:54,956 [myid:3] - INH 2018-05-27 06:30:54,956 [myid:3] - INH 2018-06-77 06:30:54 056 [myid:3] - INH	10 [PurgeTask:DistairCleanuyManagerSPurgeTask0144] - Purge task completed. 10 [PurgeTask:DistairCleanuyManagerSPurgeTask0130] - Purge task started. 10 [PurgeTask:DistairCleanuyManagerSPurgeTask0144] - Purge task started. 10 [PurgeTask:DistairCleanuyManagerSPurgeTask0130] - Purge task started. 10 [PurgeTask:DistairCleanuyManagerSPurgeTask0130] - Purge task started.						

#### 5. You can also click the name of a pod and click LOGS. Then, view the log details.



#### View logs by using Kubernetes commands

You can also use the standard kubectl logs con Service logs of the blockchain network.

logs command to view the Container

#### Procedure

- 1. Log on to the Container Service console. Click Kubernetes > Clusters in the left-side navigation pane. Click Manage at the right of the cluster in which the blockchain network is deployed. Obtain the Master node SSH IP address.
- 2. Log on to the master node of the Kubernetes cluster by using SSH. Enter the username root and the password configured when creating the cluster.
- 3. Run the kubectl get pod command to obtain the pod list and select the name of the pod whose logs you want to view.
- 4. Run the kubectl logs pod name command to view the logs.
- 5. If a pod contains multiple containers, you can run the kubectl logs pod name container name command to view the logs of a container.

#### View logs by using Alibaba Cloud Log Service

The log function of the Container Service console and the Kubernetes commands can basically meet the common requirements of log viewing. However, enterprise level requirements may include advanced functions such as log storage, real-time query and analysis, alarm, and visualized report. Then, you can integrate with Alibaba Cloud Log Service for expansion. Container Service blockchain solution supports integrating with Alibaba Cloud Log Service. The basic procedures are as follows. For more information about integrating Container Service Kubernetes clusters with Alibaba Cloud Log Service, see Application log management.

You may be charged by using Alibaba Cloud Log Service. For more information, see Log Service billing method.

#### Procedure

- 1. Log on to the Log Service console and activate Log Service as instructed.
- 2. Click Project Management in the left-side navigation pane, and click Create Projectin the upper-right corner.
- 3. Enter the Project Name, and select the Region in which the blockchain network resides. Then, click Confirm.

Create Project	$\times$
<ul> <li>Project Name: blockchain-network</li> <li>Description:</li> </ul>	
<>"'\ are not supported, and the description cannot exceed 512 characters. * Region: China East 1 (Ha	
Confirm	Cancel

4. Click Create in the displayed dialog box to create the Logstore.

Create F	Project X	
0	You have created a project, however, you need to create a Logsto re in order to store logs.	
	Create Cancel	

5. The Create Logstore dialog box appears. Enter the Logstore name. Complete the other configurations as per your needs. Then, click Confirm.

Create Logstore		×
* Logstore Name:	blockchain-network-logstore	
Logstore- Attributes		
* WebTracking:	Web Tracking supports the collection of various types of access logs in web browsers or mobile phone apps (iOS/Android). By default, it is disabled. ( Help Link )	
* Data Retention Time:	30 Data can be retained for 1-3650 days.	
* Number of Shards:	2 • What is shard?	
* Billing:	Refer to pricing	
	<b>Confirm</b> Cance	el

6. Click Data Import Wizard in the displayed dialog box.

Create		×
0	You have created a logstore, use the data import wizard to learn a bout collecting logs, analysis and more.	
	Data Import Wizard Cancel	

7. Select Docker Stdout under Third-Party Software. Then, click Next.

blockchain-network-logs tBack to Logstore List			
1.Select Data Source	2.Configure Data Source	> 3.Search, Analysis, and Visualization $>$	4.Shipper & ETL
Cloud Services			
	API Gateway	Server Load Balancer	
Third-Party Software			
	NGINX ACCESSLOG	ocker File	

8. In the Plug-In Configuration field, enter the following example configuration. For more information about the configurations, see Container standard output. Then, click Next.



9. Click Create Machine Group.

The Create Machine Group dialog box appears.Enter the custom machine group name in the Group Name field. Select User-defined Identity from the Machine Group Identification drop-down list. In the User-defined Identity field, enter the

# same content as that in the Group Name field. Then, click Confirm. The example is as follows:



10.Select the created machine group and then click Apply to Machine Group.

blockchain-network-logs 🕏 Back to Logstore List			
1.Select Data Source	2.Configure Data Source	3.Search, Analysis, and Visualization	A.Shipper & ETL
Apply to Machine Group			
	+ Create	Machine Group	
⊘ blockchain-network01			
			2
			Apply to Machine Group

11.Add the key (for example, \_pod\_name\_) for creating the index as per your needs. After completing the configurations, click Next.

blockchain-network-logs tBack to Logstore List		
1.Select Data Source > 2.Configure Data Source		3.Search, Analysis, and Visualization 4.Shipper & ETL
custom		
* Full Text Index Attributes:		Preview
Core Constitue Taken		Time/IP Content
Case Jelsure     Tokan       false     , ";=()[]{?@&<>/:\n\t       * Key/Value Index Attributes:     Fold		No data 1. When using Logtail to collect logs . check whether the machine group heartbeat is normal (Help document). If the heartbeat is normal but there is no data, clickDiagnoseView Collection Errors 2. When using API/SDK , please check the output logs.
Key + Type alias Case Sensitive Token Analytics	Delete	
	×	
	No log data	lata is available. Click the preview button or follow the prompts to check the data source. Previous New

- 12.Click Confirm. Then, the creation and initial configuration of Alibaba Cloud Log Service are complete. Deploy a new blockchain network by using the blockchain solution
- 13 and configure the parameters integrated with Log Service on the Values page of the blockchain solution.



Set the parameter enabled to true, which indicates to enable Log Service. Set the parameter machineGro up to the user-defined identity configured in the machine group. In this example, it is blockchain-network01.

To set the parameter region, see Linux to search for the corresponding installation commands and the region ID. For example, cn\_hangzho u indicates to write

logs from the Alibaba Cloud intranet in the region Hangzhou to Log Service and no Internet bandwidth is consumed.

To set the parameter userID, see the following figure.

Account Manage	Security Settings	
Security Settings		Logia Account
Basic Information Real-name Regist	<b>O</b>	Account ID Registration Time : 05-02-2017 16:47:00
	Change Avatar	

14.Log on to the Log Service console. Click the project name and then click Search at the right of the Logstore.

lockchain-network	€ Back to Project List					Region : China	a East 1 (Hangzhou
Logstore List						Endpoint	List Create
Searching by logstore nan	Search						
Logshave Name	Data Import	Monitor	Log Collection Mode	Lo	g Consumption Mo	ode	Astion
Logstore name	Wizard	PIONILOF	Log collection mode	LogHub	LogShipper	LogSearch	ACUON
blockchain-network- logstore		Ł	Logtail Config (Manage)   Diagnose   More Data -	Preview	OSS	Search	Modify Delete

The blockchain network log example is as follows:

<	B blockchain-network-lo	ogstore (Belo	ong to blockchain-netw	ork )		Share	Index Attributes	Saved to Savedsearch	Saved as Alarm	
Tab List	Enter the keyword used for searching logs									
🗟 blockchain	0 22:50:29	22:52:15	22:54:1	5 22:56:15 22:58:15	_	23:00	:15	23:02:15 23	3:04:15	
New Tab 🥝	Raw Data Gra	iph		Total Count:12,193 Status:The results are	accurate					
	Quick Analysis	<	Time 🔺	Content 🗸					₩ @	
	pod_na	1 Q	05-27 23:02:14	source 172.16.4.35 logic 1002 logic 1002 logic 1002 limage name registry changchou allyuncs.cor 28 teo11046904005407760011 namespace.default pod _und2420111-61tee-1deployment-7977 pod _und2420111-61tee-1deployment-7977 pod _und2420111-61tee-1deployment-7977 pod _und2420111-61tee-1deployment-7977 pod _und2420111-61tee-1deployment-7977 content250407 time2012-05-27715-02-14.0025 UTC [endo stime_172.014.338.35442]	m/cos-sol 7466fc-hł Ic3f rser] Prod	lution/fabric zfz cessPropos	-peer@sha256:5741 :al -> DEBU 1543[0rr	7699ddf50c5ebd47a9a2cc ) Exit: request from%l(EXTR	.74c0324fbba0 M	
		2 🛛	05-27 23:02:14	_source_ 172.16.4.35 _taghostname logtal-pjt76 _topic _container_name registry.cn-hangchou.aliyuncs.cor 28 ieo1104/90d005a97776b011 namespace default	n/cos-sol	lution/fabric	-peer@sha256:5741	7699ddf50c5ebd47a9a2cc	.74c0324fbba0	

15.Log Service supports complex queries. For more information about the query syntax and other advanced functions of Log Service, see ../../SP\_7/DNSLS11850791/ EN-US\_TP\_13099.dita#concept\_tnd\_1jq\_zdb.

品 blockchain-network-l	logstore (Be	elong to blockchain-net	Share Index Attributes Saved to Savedsearch Saved as A	Alarm	
network01-ca1 or network	01-ca2		0	15min V 2018-05-27 22:54:56 ~ 2018-05-27 23: Search	
200 0 22:54:58	22:56:4	5 22:58	:45 23:00:45 23:02:45	23:04:45 23:06:45 23:08:45	
			Total Count:174 Status:The results are accu	rate.	
Raw Data Gra	aph				
Quick Analysis	<	Time 🛋	Content 🗸	U @	)
_pod_na	1 Q	05-27 22:58:58	source: 172.16.5.35 taghostname: logtail-cdj6n topic: _container_name_: reletiv cn-hangzhou.aliyuncs.com/cd 0c7613e7085438c244b03t4 namespace_: default pod_name: network01-ca1-deployment-587546694 _pod_uid_: 41d272ac-61be-11e8-9d0-00163e101c3 _source_: stderr _time_: 2018/05/2714.58:58 [INFO] Listening on https content: 2018/05/2714.56:58 [INFO] Listening on https	os-solution/fabric-ca@sha256:92f44d0811cddb0d335f7879f7e3b3c4b631f317 45-bskwm 3f s://0.0.0.0:7054	'4
	2 🔍	05-27 22:58:58	source_: 172 16.5.35 _taghostname: logtail-cdj6n _topic_: _container_name_: rejstry.cn-hangzhou.aliyuncs.com/cr 0c7613e7085438c244b03f4 _namespace_: default _pod_name_: network01-ca1-deployment-587546694	os-solution/fabric-ca@sha256;92f44d0811cddb0d335f7879f7e3b3c4b631f317 45-bskwm	'4

## 1.8 Overview about blockchain network access

After configuring and deploying the blockchain network on Alibaba Cloud, the blockchain developer or administrator can access the blockchain network and use different blockchain node services. Common access methods are as follows:

- The developer or administrator remotely connects to the blockchain node container, and tests or manages the blockchain network by using CLI.
- The blockchain applications connect to the blockchain network services such as CA, Orderer, and Peer for transactions and service calls based on the blockchain.
- The blockchain administration and monitoring tools connect to the blockchain network, managing and monitoring the blockchain network and each node in the graphical or automated way.

These blockchain access methods, applications, and codes can be developed and deployed according to your own business and technical requirements. They can be either deployed as container applications in the container cluster, together with the blockchain network, or deployed in your own environment that you can access the blockchain network from outside the container cluster. For the second method, create an Internet IP address or a Server Load Balancer instance for the blockchain network in advance and configure security group rules for NodePort to allow external access. The following documents provide simple examples and instructions for main blockchain access methods to help you better understand and develop related applications and tools. At the same time, the Blockchain Solution provides configurat ion files that can be downloaded in one click (including certificates, keys and blockchain network configuration files necessary for access to blockchain services) to accelerate the development and testing processes of blockchain applications and management and monitoring tools.

- Configure Internet IP address and external port
- Access blockchain network by using CLI
- #unique\_25
- Access blockchain network by using administration and monitoring tools

## 1.9 Configure Internet IP address and external port

#### Prerequisites

The following prerequisites must be met before making the blockchain network available to administration and monitoring tools and applications outside the container cluster.

- Possess the externally accessible Internet address. You can either bind an EIP to a worker node or create a Server Load Balancer instance (add a worker node on the backend server) and use its Internet address. Environment preparations introduces how to bind an EIP to a worker node, see Bind an EIP to a worker node.
- Allows the inbound access from the NodePort in the external port list by configurin g the ECS security group rules.

#### Procedure

- 1. Log on to the ECS console .
- 2. Click Networks & Security > Security Groupsin the left-side navigation pane.
- 3. Select the region in which your Kubernetes cluster resides.

4. The security group name of the Kubernetes cluster contains k8s\_sg. Click Configure Rules at the right of the security group.

Home Products -	🍋 China (Hangzhou) 🗸	3			c	수 💄 304) Billing Management English	
Elastic Compute	Security Group List					Create Security Gro	ир
Overview Instances	Security Group ID	Enter security group 1	D	Search 📎 Tag		<u>.</u>	?
Auto Scaling • Block Storage	Security Group ID/Name	Tags VPC	Related N Instances T	letwork Type Creation Time	Description	4 Act	ions
Cloud Disks Snapshots & Ima Snapshots	sg- ■ bp12btbe9mtlb7g51f0n k8s_sg	<ul> <li>Vpc- bezzetzitrzynewszytwyeg bieckchein_twedengt</li> </ul>	6 V	/PC 2018-05-25 16:59:07	-	Modify   Clone Security Group   Restore a Manage Instances   Configure Rule Manage Network Interfa	s ces
Snapshot Chain Automatic Snap Images	sg-bp1euaoi9pa7jtv52slo sg- bp1euaoi9pa7jtv52sl	<ul> <li>vpc- holtmanteiladivperhealh webmt</li> </ul>	0 V	/PC 2018-05-03 12:59:10	System created securit	Modify   Clone Security Group   Restore ru Manage Instances   Configure Rule Manage Network Interfa	les s   ces
<ul> <li>Networks &amp; Secu</li> <li>Network Interfa</li> <li>Security Groups</li> </ul>	bp12gcbuo8pmtnvd6o11 ecsdocTest_VPC	vpc- toLwSCnergeR0/mitoued8	0 V	/PC 2017-10-27 10:06:34	-	Modify   Clone Security Group   Restore ru Manage Instances   Configure Rule Manage Network Interfa	les s   ces
Key Pairs S Virtual Private C Elastic IP C Load Balancer	sg- bp19adyup5herkd2trto sg- bp19adyup5herkd2trt	vpc- bgdwiGu(igpt) 1 imópubelii	1 V	/PC 2017-10-24 13:08:53	System created securit	Modify   Clone Security Group   Restore ru Manage Instances   Configure Rule Manage Network Interfa	les s l ces
Diagnostics Tags Manage Tasks	sg- bp14n88h0hml953t9j29 sg- bp14n88h0hml953t9j2	•	0 0	Classic 2017-08-25 19:24:45	System created securit	Modify   Clone Security Group   Restore ru Manage Instances   Configure Rule Manage Network Interfa	les s l ces

5. If no security group rules under the Inbound tab meets the requirements, click Add Security Group Rules. The Add Security Group Rules dialog box appears. Complete the configurations. Complete the configurations.

Add Security Group R	Rules	? ×
NIC:	Intranet *	
Rule Direction:	Inbound *	
Authorization Policy:	Allow •	
Protocol Type:	Custom TCP •	
* Port Range:	30000/32767	
Priority:	1	
Authorization Type:	Address Field Acces *	
* Authorization Object:	0.0.0/0	<ul> <li>Tutorial</li> </ul>
Description:		
	It must contain 2-256 characters and it cannot begin with http:// or https://	
	ОК	Cancel

- Select Inbound from the Rule Direction drop-down list.
- Enter the suitable Port Range according to the external port NodePort range of the blockchain network.
- Enter the suitable address range in the Authorization Object field based on the actual access requirements.
- 6. Click OK. The security group rule is successfully added to the list and takes effect immediately.

## 1.10 Access blockchain network by using CLI

#### Context

The blockchain solution creates CLI containers during the blockchain network deployment. CLI containers connect to the Peer and Orderer nodes of the blockchain network in command line mode, run CLI commands supported by Hyperledge r Fabric, and satisfy the requirements for testing and managing the blockchain network.

To log on to a CLI container, run the kubectl exec - it < fabricNetw ork >- fabric - cli - n < namespace name > bash command in the environment that supports kubectl commands. The CLI container provides a standard end-to-end CLI test script based on Hyperledger Fabric. To modify the test script, find the file in the path / data / fabric /< blockchain network name >/ cli / cli - test . sh on any Elastic Compute Service (ECS) instance.

#### Procedure

- Use SSH to log on to a master node of the Kubernetes cluster as the root account. For how to obtain the address, see Environment preparations. You can also access an environment that supports managing Kubernetes clusters remotely by using kubectl.
- 2. Run the kubectl exec it n < namespace name > < fabricNetw ork >- fabric - cli bash command to enter the CLI container, for example, kubectl exec - it - n network01 < fabricNetw ork >fabric - cli bash.
- 3. Run the test script ./ cli test . sh to start the CLI test.
- 4. After each step is complete, the test pauses so that you can view the execution process and result. The test continues after you press any key. After the test script is executed successfully, information similar to the following one is displayed:

Result : 90 Query 2017 - 11 - 12 NFO 007 Exi 09 : 22 : 31 . 452 [ main ] UTC main -> INFO 007 Exiting ..... ====== Query on channel PEER4 on bankchanne l'is Press any key to continue ...

## Note:

For the same blockchain network, CLI sample and application sample cannot run at the same time. Choose to run only one type of sample for each blockchain network.

## 1.11 Access blockchain network by using applications

#### Prerequisites

- The blockchain network is configured and deployed in a Kubernetes cluster.
- The Internet IP address and external port are configured if the application is deployed outside container clusters.

#### Context

After creating the blockchain network by using the Alibaba Cloud Container Service blockchain solution, you can access services on the blockchain network by using blockchain applications based on Hyperledger Fabric SDKs. The blockchain solution supports the Connection Profile function from the 1.1 Hyperledger Fabric version.

- The blockchain application can be deployed on the Alibaba Cloud container cluster together with the blockchain network. In this mode, the application directly accesses services by using the name and port of each blockchain service.
- The blockchain application can also be deployed outside Alibaba Cloud container clusters. In this mode, the application accesses services by using the external address of the blockchain network and the external port of each service.

In this example, deploy the blockchain application outside Alibaba Cloud container clusters. The provided application is a balance transfer application developed and adapted based on Hyperledger Fabric.

You can use the application provided in this example, the official Hyperledger Fabric example application (for example, fabric-samples), or self-developed blockchain application. Adapt the application by referring to the source codes of the application provided in the example to access the Alibaba Cloud Container Service blockchain network.

Adapt the existing blockchain application as follows:

- Directly use the script download-from-fabric-network.sh that is provided in the sample code to automatically download blockchain network configurations from the newly deployed blockchain network with one click, including certificates, keys , and blockchain network configuration files (basically the config.json and network -config.yaml).
- Make sure that the blockchain application can be correctly loaded to the preceding blockchain network configurations.
- If the blockchain application directly uses the channel name, external address
  , node name, or domain name of the blockchain, replace them with parameters
  in the configuration files (config.json and network-config.yaml) to keep the
  configurations of the application consistent with those of the target blockchain
  network.

#### Procedure

1. Download the source codes of the blockchain application provided in the example to the local development environment. The command is as follows:

```
git clone https :// github . com / AliyunCont ainerServi ce /
solution - blockchain - demo . git
```

2. Perform subsequent operations based on the README document of the blockchain application provided in the example.

Chinese version: https://github.com/AliyunContainerService/solution-blockchaindemo/blob/master/balance-transfer-app/README.cn.md

English version: https://github.com/AliyunContainerService/solution-blockchaindemo/blob/master/balance-transfer-app/README.md

## Note:

For the same blockchain network, CLI sample and application sample cannot run at the same time. Select to run only one type of sample for each blockchain network.

# 1.12 Access blockchain network by using administration and monitoring tools

#### Prerequisites

- Create the Alibaba Cloud blockchain network by using the Container Service blockchain solution. For more information, see Configure and deploy blockchain network.
- Access the blockchain network by using applications or CLI and complete the endto-end test. For more information, see Access blockchain network by using CLI or #unique\_25.

#### Context

After creating the blockchain network by using the Alibaba Cloud Container Service blockchain solution, you can access services on the blockchain network by using blockchain administration and monitoring tools based on Hyperledger Fabric SDKs.

- The administration and monitoring tool can be deployed on an Alibaba Cloud container cluster together with the blockchain network. In this mode, the administration and monitoring tool directly accesses services by using the name and port of each blockchain service.
- The administration and monitoring tool can also be deployed outside Alibaba Cloud container clusters. In this mode, the administration and monitoring tool accesses services by using the external address of the blockchain network and the external port of each service.

In this example, deploy the administration and monitoring tool outside Alibaba Cloud container clusters. The provided administration and monitoring tool is developed and adapted based on Hyperledger Explorer . When the blockchain network is deployed, the Hyperledger Explorer is deployed to the Kubernetes cluster by default.

You can use the administration and monitoring tool provided in this example, the official version of Hyperledger Explorer, self-developed administration and monitoring tool, or third-party administration and monitoring tool, and adapt the tool by referring to the source codes of the administration and monitoring tool provided in this example to access the Alibaba Cloud Container Service blockchain network.

Adapt the existing blockchain administration and monitoring tool as follows:

• Directly use the script download-from-fabric-network.sh that is provided in the sample code to automatically download blockchain network configurations from the newly deployed blockchain network with one click, including certificates, keys

, and blockchain network configuration files (basically the config.json and network -config.yaml).

- Make sure that the blockchain administration and monitoring tool can be correctly loaded to the preceding blockchain network configurations.
- If the blockchain administration and monitoring tool directly uses the channel name, external address, node name, or domain name of the blockchain, replace them with parameters in the configuration files (config.json and network-config .yaml) to keep the configurations of the administration and monitoring tool consistent with those of the target blockchain network.

#### Procedure

1. Run the kubectl get svc command on a master node of the Kubernetes cluster. You can also log on to the Container Service console, click Services in the left-side navigation pane, and check the external endpoint of the service <network name>-explorer.

Storage Cases         Namespace         default *         Overview         Workloads         Cron Jobs         Daemon Sets         Deployments         Jobs         Replica Sets         Replica Sets         Replica Sets         Name         Name         Node         Statul Sets         Name         Name         Node         Status       Restarts         Age       CPU (cores)         Memory (bytes)         Status       Restarts         Age       CPU (cores)         Memory (bytes)         Status       Restarts         Age       CPU (cores)         Name       Node         Status       Restarts         Age       CPU (cores)         Memory (bytes)         Status       Restarts         Age       CPU (cores)         Memory (bytes)         Status       Restarts         Optioner	Roles	Discovery and load balancing Services net	work01-explorer							🖍 EDIT	DELETE	+ CF	REATE
Namespace       Mame: network01-explorer       Connection         default       •       Ouster IP: IFIERELIE         Overview       Creation Time: 2018-05-27 22:57:20       Internal endpoints: network01-explorer: 80 TCP         Workloads       Creation Time: 2018-05-27 22:57:20       Internal endpoints: network01-explorer: 80 TCP         Daemon Sets       Deployments       Session Affinity: None         Daemon Sets       Endpoints       •         Deployments       Jobs       Host       Ports (Name, Port, Protocol)       Node       Ready         Pods       •       •       •       •       •         Replication Controllers       Stateful Sets       Reglication Controllers       Name       Node       Status       Restarts       Age       CPU (cores)       Memory (bytes)         Decrement and Lad Balary       •       •       •       •       •       •       •         Pods       •	Storage Classes	Details											
Daemon Sets       Endpoints         Jobs       Host       Ports (Name, Port, Protocol)       Node       Ready         Pods       ITE MALE       cn-hangzhoul-bpl Interference/Block       true         Replication Controllers       Node       Status       Restarts       Age       CPU (cores)       Memory (bytes)         Stateful Sets       Name       Node       Status       Restarts       Age       CPU (cores)       Memory (bytes)         Discovery and Load Balary       Enterview Load Balary       O       005-27       0.041       94.305 Mil ■ :	Namespace default * Overview Workloads Cron Jobs	Name: network01-explorer Namespace: default Creation Time: 2018-05-27 22:57:20 Label selector: app: network01-explorer Type: LoadBaincer Session Affinity: None			Connection Cluster IP: III Internal endpo External endpo	oints: networks networks	3 ork01-explo ork01-explo	rer:80 TCP rer:31263 TCP					
Jobs         Host         Ports (Name, Port, Protocol)         Node         Ready           Pods         Replica Sets          ITE M 436          true           Replica Sets         Replication Controllers         Node         Restarts         Age         CPU (cores)         Memory (bytes)           Stateful Sets         Name         Node         Status         Restarts         Age         CPU (cores)         Memory (bytes)           Discovery and Load Balary         Implement-76b855696d-qurent-finanzational-         Running         0         00-527         0.041         94.305 Mil         Implement-76b855696d-qurent-76b855696	Daemon Sets Deployments	Endpoints											
Replica Sets Replication Controllers Stateful Sets         Pods           Stateful Sets         Name         Node         Status         Restarts         Age         CPU (cores)         Memory (bytas)           Discovery and Load Balary         Certemork01-explorer-deployment-76b855696d-qr         Certemork01-explorer-deployment-76b855696d-qr         Running         0         05-27         94.305 Mil         Image: 100 million of the plot o	Jobs Pods	Host 172.16(4.18)	Ports (Name, Port, Protocol) <unset>, 8080, TCP</unset>		Node cn-hangz	hou.i-bp[]	booknobe	848c3g	Ready true				
Stateful Sets         Name         Node         States         Restarts         Age         CPU (cores)         Memory (bytes)           Discovery and Load Balary <ul></ul>	Replica Sets Replication Controllers	Pods											
Stateliu Sets 2018- Disroverv and Load Balan O network01-explorer-deployment-76b855696d-qv cn-hangzhou.i- Running 0 05-27 2018- 0.041 94.305 Mi = 1	Charles ( Carla	Name	Node	Status		Restarts	Age	CPU (cores)		Memory (b)	ytes)		_
22:57:21	Discovery and Load Balance	network01-explorer-deployment-76b855696d-qv	cn-hangzhou.i- be Theby@mitbols40c5g	Running		0	2018- 05-27 22:57:21	0.041		<u> </u>	94.305 Mi	=	ontact Us
Ingresses	Ingresses												
Services Events	Services	Events											
Config and Storage There is nothing to display here	Config and Storage		Th	ere is noth	ing to disp	lay her	e						

2. Access the external endpoint in the browser.

$\leftrightarrow$ > C	ë 🚺 118.1	78.109.160							Q ☆
💮 Hypi	ERLEDGER E	EXPLORER							Select Channel +
ba	nkchann	el							
	4	PEER 4		BLOCK <b>4</b>	₹		тх 5		chaincode 1
BL	LOCK #3			2 v C ×	BLOCKLIST	~ (	2 ×	BLOCKVIEW	v ℃ ×
n	number	3			Block	TXNs	<b>^</b>	Identifier [number, hash, tag]	
p	previous_hash	bf93300ce9dc346cfd0ecd5c8e4a92449d200	023cbe63417773c431e9a36d091e		#4	1			
d	data_hash	57d43f3877dd9aa6b5da5295558a9ed51ff7	5eb5ee5452b55ecc9d3d53ecbe25		#3	1		Block     Transaction	
Т	Fransactions	1f14e74670db03aaba40f11eb780acf13f49a	8182eee621d7bd0da53916af2f4		#2	1			Find
					#1	1			_
					#0	1	-		



Hyperledger Explorer is still in the project incubation phase, and the functionality remains to be improved. You can follow its official project progress to get further functions and version updates.

## 1.13 Clean up blockchain environment

After you complete the development and testing activities, clean up the blockchain environment if the deployed blockchain network is no longer in use or you must redeploy the blockchain network.

Delete blockchain network in Container Service console

1. Log on to the Container Service console.

2. Under Kubernetes, click Application > Helm. Select the cluster from the Clusters drop-down list. Click Delete at the right of the release name of the blockchain network.

Container Service - Kubernetes ▼	Release List								R	lefresh
✓ Clusters	Clusters k8s-cluster 🔻 3									
Clusters	Release Name	Status	Namespace	Chart Name	Chart Version	App Version	Update Time			Action
Nodes	ack-hyperledger-fabric-default	Deployed	default	ack-hyperledger-fabric	0.2.2	1.1.0	09/03/2018,10:23:06	Detail	Update	Delete
Volumes										4
Namespace										-
Authorization										
- Application										
Deployment										
Pods										
Service										
Ingress										
Volumes Claim										
Helm 2										

3. Click OK in the displayed dialog box.

Delete		$\times$
0	Are you sure to delete the release blockchain ?  Purge	
	ОК Са	incel

Use Helm to delete blockchain network

- 1. Use SSH to log on to a master node of the Kubernetes cluster as the root account.
- 2. Run the helm list command to view the Helm release name of the blockchain network.
- 3. Execute the helm delete -- purge < Helm release name of the blockchain network > command to delete the blockchain network. For example, helm delete -- purge blockchain - network01.

Depending on the number of nodes on the blockchain network, wait for several minutes until the helm delete command is completed and the result is returned. So far, the services and containers corresponding to all nodes on the blockchain network have been deleted from the Kubernetes cluster. The chaincode containers related to the blockchain network are also automatically deleted from all worker nodes.

#### Data directory of blockchain network

When the blockchain network is deleted, the data directory of the blockchain network in the shared file storage is automatically cleaned up for recreating the blockchain network. For security reasons, the data directory is cleaned up by adding the suffix -deleted-timestamp to the original directory name. For example, -deleted -2018-03-17-160332. In this way, you can reuse the data by deleting the suffix. To completely delete the data directory, manually use the rm command or use the automated script to release storage space with regular cleanup.

To access or clean up the blockchain data catalog, you can use the following command example to mount a NAS file system to ECS.

```
mkdir / data
mount - t nfs - o vers = 4 . 0 987a6543bc - abc12 . cn -
hangzhou . nas . aliyuncs . com :/ / data # Replace with your
NAS mount address
```

### 1.14 Blockchain network restart and data recovery

Container Service blockchain solution supports restarting the blockchain network. At the same time, the original blockchain configuration and data can be reused.

Prerequisites

- You have created a Kubernetes cluster. For more information, see Create a Kubernetes cluster.
- Blockchain network is already running on the Kubernetes cluster. For more information, see Quick start.
- You have connected to the Kubernetes cluster by using SSH, see Access Kubernetes clusters by using SSH.

#### Procedure

- 1. Use SSH to log on to a master node of the Kubernetes cluster as the root account.
- 2. Run the helm delete -- no hooks -- purge < blockchain network Helm Release name > command to delete blockchain network.

```
Use the -- no - hooks parameter to avoid deleting the original data directory.
```

helm delete -- no - hooks -- purge network01 # In this example , the Helm Release name is network01

release " network01 " deleted

3. Use the same blockchain network name as the fabricNetwork variable value to create a new blockchain network by using the Container Service console or the Helm command line. Therefore, you can reuse the original data directory. For more information, see Configure and deploy blockchain network. An example of Helm command is as follows.

```
helm install -- name network01 -- set " sharedStor age
= 029bb489d2 - ikw80 . cn - hangzhou . nas . aliyuncs . com "
incubator / ack - hyperledge r - fabric # Replace with your
NAS mount address
```

To back up the blockchain data directory, use the following command example to mount the NAS file system to ECS. In this example, blockchain network name is network01.

```
mkdir / data
mount - t nfs - o vers = 4 . 0 987a6543bc - abc12 . cn -
hangzhou . nas . aliyuncs . com :/ / data # Replace with your
NAS mount address
```

```
Note:
```

Now, you must back up the /data/fabric/network01 data directory.

Using this method, you can perform blockchain network data backup, migration, and recovery.