

Solution

Quick Deployment for a High-Availability MongoDB Database

Issue	1.0.0
Date	2025-11-06



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<https://securitybulletin.huawei.com/enterprise/en/security-advisory>

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1 Solution Overview

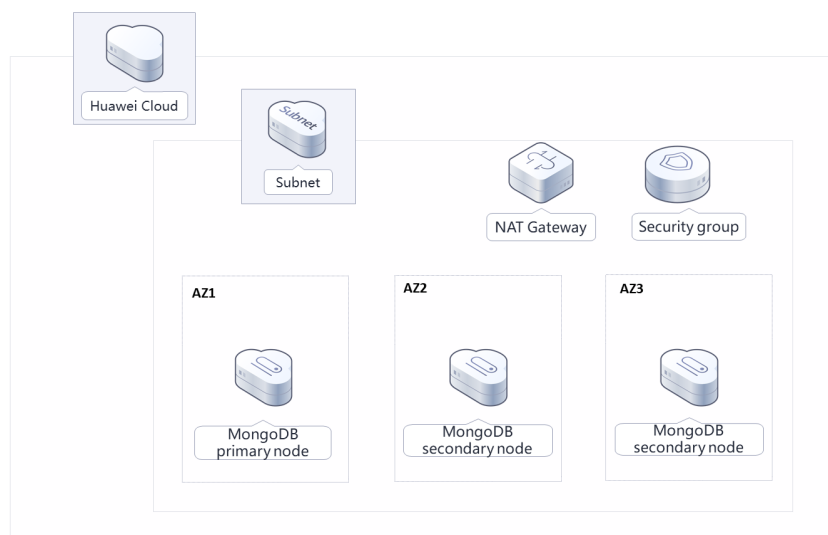
Application Scenarios

This solution helps you create a highly available MongoDB replica set on Huawei Cloud cloud servers. MongoDB is an open-source NoSQL database, where key-value pairs are stored as a document. Each MongoDB replica set contains primary and secondary nodes so that the replica set can recover automatically once a fault occurs.

Solution Architecture

This solution can help you quickly create a MongoDB replica set on Huawei Cloud cloud servers. The solution architecture is illustrated below.

Figure 1-1 Architecture



This solution will:

- Create three FlexusX instances, and these instances will be used for deploying one primary node and two secondary nodes for a MongoDB replica set at different AZs.
- Create a public NAT gateway and configure SNAT rules so that database nodes can access Internet unidirectionally, making O&M easy while ensuring database access security.

Advantages

- High availability
Cloud servers can be deployed across AZs, so a MongoDB replica set deployed on these cloud servers can work in primary/secondary mode to provide disaster recovery and automatic fault recovery.
- One-click deployment
You can create cloud servers and deploy a high-availability MongoDB database with just a few clicks.
- Open source and customization
This solution is open-source and free for commercial use. You can also make custom development based on source code.

Constraints

- Before deploying this solution, ensure that you have created a Huawei ID with access to the target region and enabled Huawei Cloud services.
- If you select the yearly/monthly billing mode, ensure that your account has sufficient balance. If you do not have sufficient balance, you can go to the [Billing Center](#) to manually pay for the order.
- It takes about 2 to 3 minutes to set up a MongoDB replica set. After the replica set is deployed, you can verify this solution by referring to [3.3 Getting Started](#).
- Currently, FlexusX instances can be deployed only in the **AP-Bangkok,CN-Hong Kong**,and **AP-Singapore** region.

2 Resource and Cost Planning

This solution will deploy the resources listed in the following table. The costs are only estimates and may differ from the final prices. For details, see [pricing details](#).

Table 2-1 Resource planning and costs (yearly/monthly)

Huawei Cloud Service	Example Configuration	Estimated Monthly Cost
Flexus X Instance	• Region: AP-Bangkok • Billing Mode: Yearly/Monthly • Specifications: FlexusX Performance mode (disabled) x1.1u.2g 1vCPUs 2GiB • Image: CentOS 7.6 64-bit • System Disk: High I/O 40 GiB • Data Disk: General Purpose SSD 100 GiB • Quantity: 3	\$90.84 USD
Elastic IP (EIP)	• Region: AP-Bangkok • Billing Mode: Yearly/Monthly • Routing Type: Dynamic BGP • Billed By: Bandwidth • Bandwidth: 5 Mbit/s • EIP Quantity: 1	\$24.30 USD
NAT Gateway	• Pay-per-use: \$2.44 USD • Region: AP-Bangkok • Billing Mode: Pay-per-use • Specifications: Small • Required Duration: 1 day	\$73.14 USD

Huawei Cloud Service	Example Configuration	Estimated Monthly Cost
Total		\$188.28 USD

Table 2-2 Resource planning and costs (pay-per-use)

Huawei Cloud Service	Example Configuration	Estimated Monthly Cost
Flexus X Instance	- Pay-per-use: \$0.05 USD/hour - Region: AP-Bangkok - Billing Mode: Pay-per-use - Specifications: x86 ECS s6.medium.2 1 vCPU 2 GiB - Image: CentOS 7.6 64-bit - System Disk: High I/O 40 GiB - Data Disk: General Purpose SSD 100 GiB - Quantity: 3	\$109.8 USD
Elastic IP (EIP)	- Pay-per-use: \$0.13 USD - Region: AP-Bangkok - Billing Mode: Pay-per-use - Routing Type: Dynamic BGP - Billed By: Bandwidth - Bandwidth: 5 Mbit/s - EIP Quantity: 1	\$50.40USD
NAT Gateway	- Pay-per-use: \$2.44 USD - Region: AP-Bangkok - Billing Mode: Pay-per-use - Specifications: Small - Required Duration: 1 day	73.14 USD
Total		\$233.34 USD

3 Procedure

- [3.1 Preparations](#)
- [3.2 Quick Deployment](#)
- [3.3 Getting Started](#)
- [3.4 Quick Uninstallation](#)

3.1 Preparations

(Optional) Creating the `rf_admin_trust` Agency

- Step 1** Access the Huawei Cloud official website, log in to the [console](#), move your mouse over the account name, and choose **Identity and Access Management**.

Figure 3-1 Console page

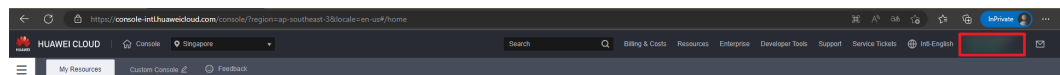
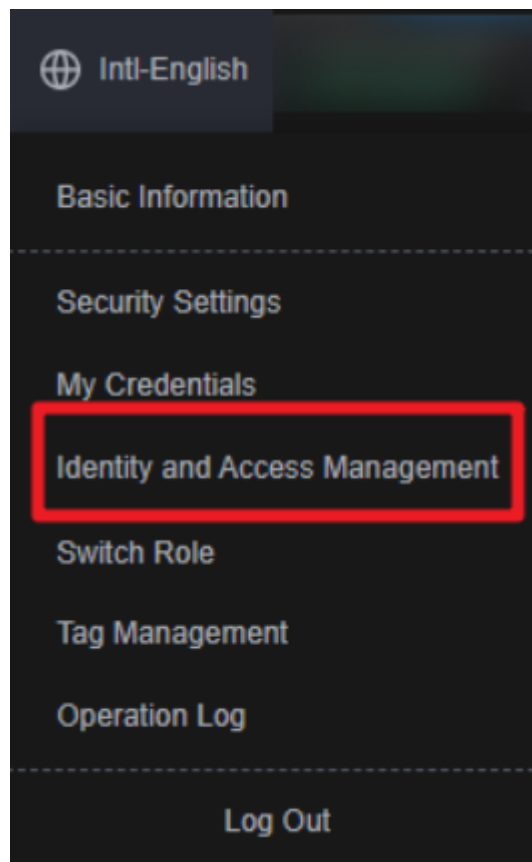
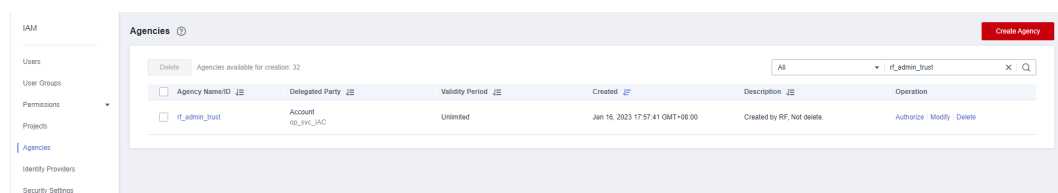


Figure 3-2 Identity and Access Management



Step 2 Choose **Agencies** in the left navigation pane and search for the **rf_admin_trust** agency.

Figure 3-3 Agency list



- If the agency is found, skip the following steps.
- If the agency is not found, perform the following steps.

Step 3 Click **Create Agency** in the upper right corner of the page. On the displayed page, enter **rf_admin_trust** for **Agency Name**, select **Cloud service** for **Agency Type**, select **RFS** for **Cloud Service**, and click **Next**.

Figure 3-4 Create Agency

Agencies / Create Agency

★ Agency Name

rf_admin_trust

★ Agency Type

☐ Account

Delegate another HUAWEI CLOUD account to perform operations on your resources.

☒ Cloud service

Delegate a cloud service to access your resources in other cloud services.

★ Cloud Service

RFS

★ Validity Period

Unlimited

Description

Enter a brief description.

0/255

Next

Cancel

Step 4 Search for **Tenant Administrator** and select it in the search results.

Figure 3-5 Select Policy

Authorize Agency

1 Select Policy/Role

2 Select Scope

3 Finish

Assign selected permissions to rf_admin_trust1.

View Selected (1)

Copy Permissions from Another Project

All policies/roles

All services

Tenant Administrator

X

Q

Policy/Role Name	Type
☐ DME AdministratorAccess Data Model Engine tenant administrator with full permissions.	System-defined policy
☒ Tenant Administrator Tenant Administrator (Exclude IAM)	System-defined role
☐ CS Tenant Admin Cloud Stream Service Tenant Administrator, can manage multiple CS users	System-defined role

Step 5 Select **All resources** and click **OK**.

Figure 3-6 Select Scope

Authorize Agency

1 Select Policy/Role

2 Select Scope

3 Finish

The following are recommended scopes for the permissions you selected. Select the desired scope requiring minimum authorization.

Scope

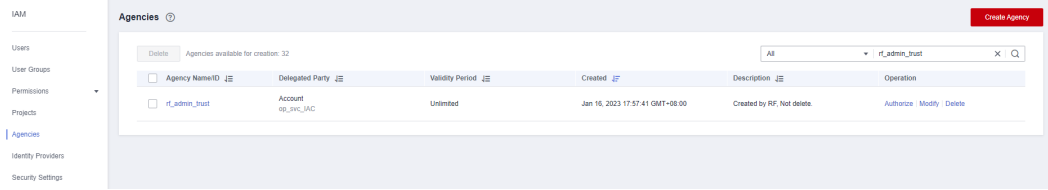
☒ All resources

IAM users will be able to use all resources, including those in enterprise projects, region-specific projects, and global services under your account based on assigned permissions.

Show More

Step 6 Check that the **rf_admin_trust** agency is displayed in the agency list.

Figure 3-7 Agency list



----End

3.2 Quick Deployment

This section describes how to quickly deploy this solution.

Table 3-1 Parameter description

Parameter	Type	Mandato ry	Description	Default Value
vpc_name	String	Yes	Virtual Private Cloud (VPC) name. You can select a template and create a VPC with the unique name. The name can include 1 to 57 characters and can contain letters, digits, underscores (_), hyphens (-), and periods (.).	deploy-a-highly-available-mongodb-demo
secgroup_name	String	Yes	Security group name. A new security group needs to be created. For details about how to configure a security group rule, see (Optional) Modifying Security Group Rules . The name can include 1 to 64 characters and can contain letters, digits, underscores (_), hyphens (-), and periods (.).	deploy-a-highly-available-mongodb-demo

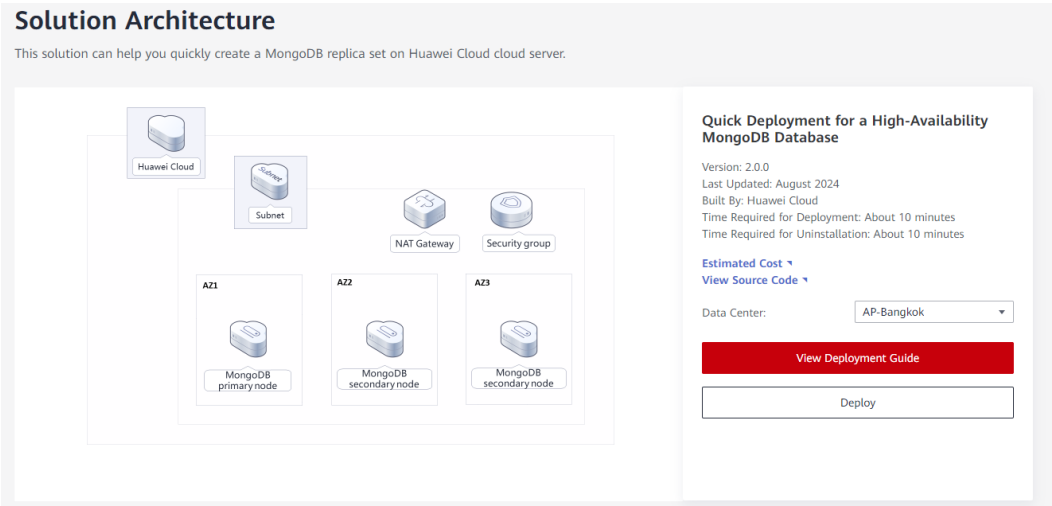
ecs_name	String	Yes	Cloud server name, which must be unique. It can include 1 to 52 characters and can contain letters, digits, underscores (_), hyphens (-), and periods (.).	deploy-a-highly-available-mongodb-demo
ecs_flavor	String	Yes	Instance flavor of ECS or FlexusX. The flavor ID format of a FlexusX instance is x1.?u.?g. For example, the flavor ID of a FlexusX instance with 2 vCPUs and 4 GiB memory is x1.2u.4g. For details about FlexusX instance flavors, see the console. For details about ECS flavors, see A Summary List of x86 ECS Specifications .	x1.1u.2g
ecs_password	String	Yes	Initial password of the cloud server. The password can include 8 to 26 characters and must contain at least three of the following character types: uppercase letters, lowercase letters, digits, and special characters (!@ \$%^&_+=+[{ }];,./?). The password cannot contain any username or the username spelled backwards. The administrator username is root .	Left blank
system_disk_size	String	Yes	System disk size of the cloud server. Value range (GiB): 40–1024. The system disk size cannot be reduced.	40

data_disk_size	String	Yes	Data disk size of the cloud server. Value range (GiB): 10–32768	100
charging_mode	String	Yes	Billing mode. By default, fees are automatically deducted. The value can be prePaid (yearly/monthly) or postPaid (pay-per-use).	postPaid
charging_unit	String	Yes	Subscription period unit. This parameter is mandatory when the billing mode is set to prePaid . The value can be month (monthly) or year (yearly).	month
charging_period	number	Yes	Required duration. When charging_unit is set to year , the value ranges from 1 to 3 . When charging_unit is set to month , the value ranges from 1 to 9 . This parameter is mandatory when charging_mode is set to prePaid .	1
eip_bandwidth_size	number	Yes	Elastic IP (EIP) bandwidth size, in Mbit/s. This template uses an EIP billed by bandwidth. The value ranges from 1 to 2000.	5

mongodb_pass word	String	Yes	Password of user root of the MongoDB database. After a MongoDB database is created, you can change its password by referring to (Optional) Changing the Password of the MongoDB Database . The password can include 4 to 12 characters and can contain at least three of the following character types: uppercase letters, lowercase letters, digits, and special characters @%^-=	Left blank
----------------------	--------	-----	--	------------

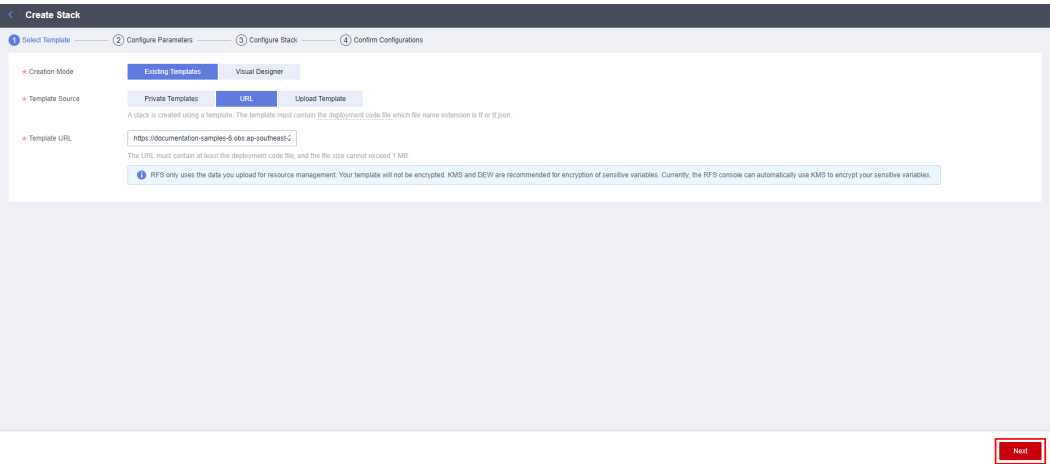
Step 1 Log in to Huawei Cloud Solution Best Practices, choose **Quick Deployment for a High-Availability MongoDB Database**, and click **Deploy**.

Figure 3-8 Selecting a solution



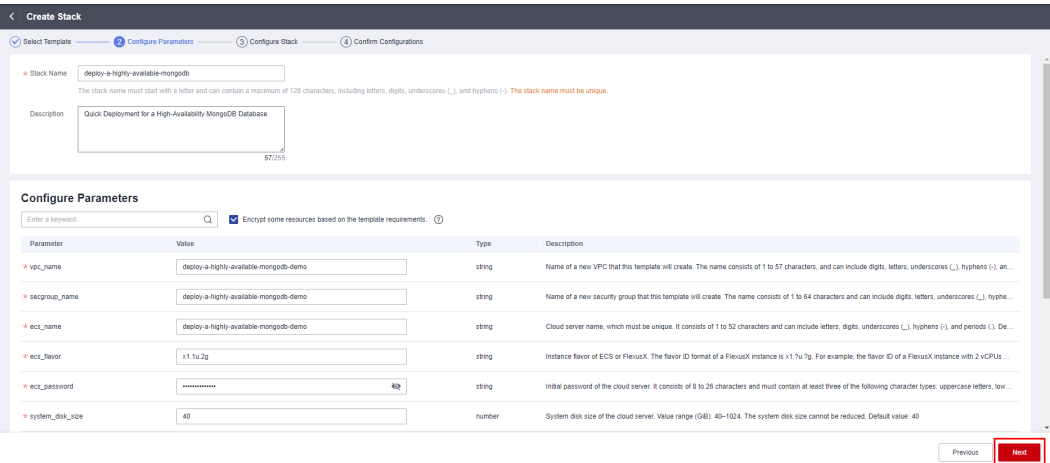
Step 2 On the **Select Template** page, click **Next**.

Figure 3-9 Select Template



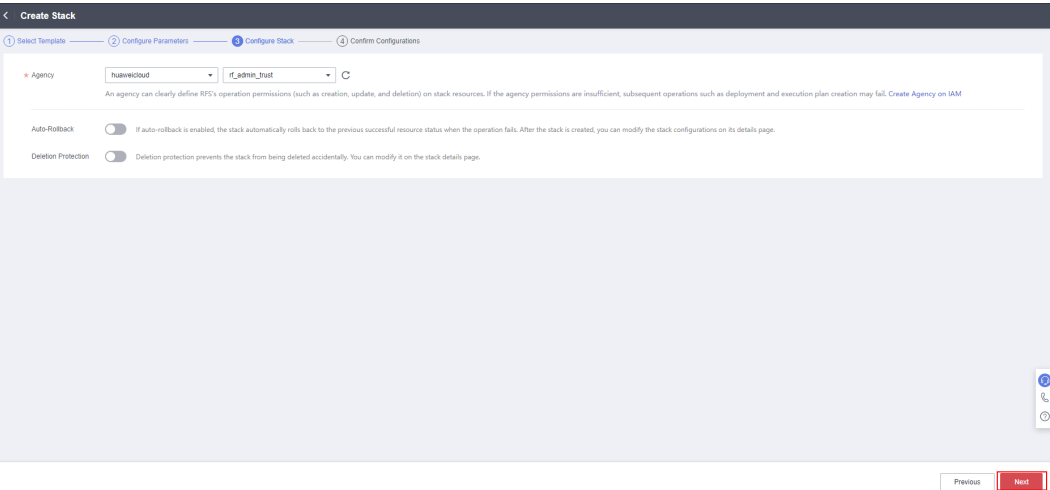
Step 3 On the **Configure Parameters** page, configure parameters by referring to [Table 3-1](#) and click **Next**.

Figure 3-10 Configure Parameters



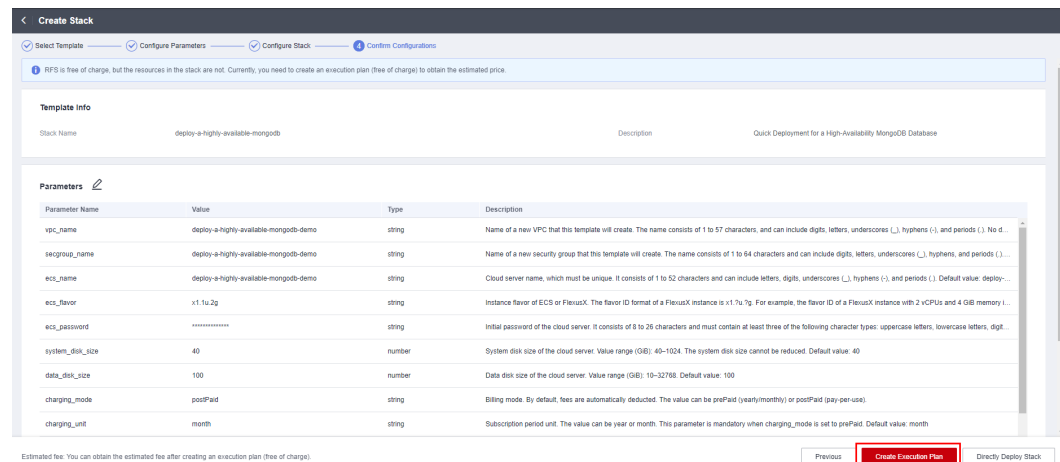
Step 4 On the **Configure Stack** page, select the **rf_admin_trust** agency and click **Next**.

Figure 3-11 Configure Stack



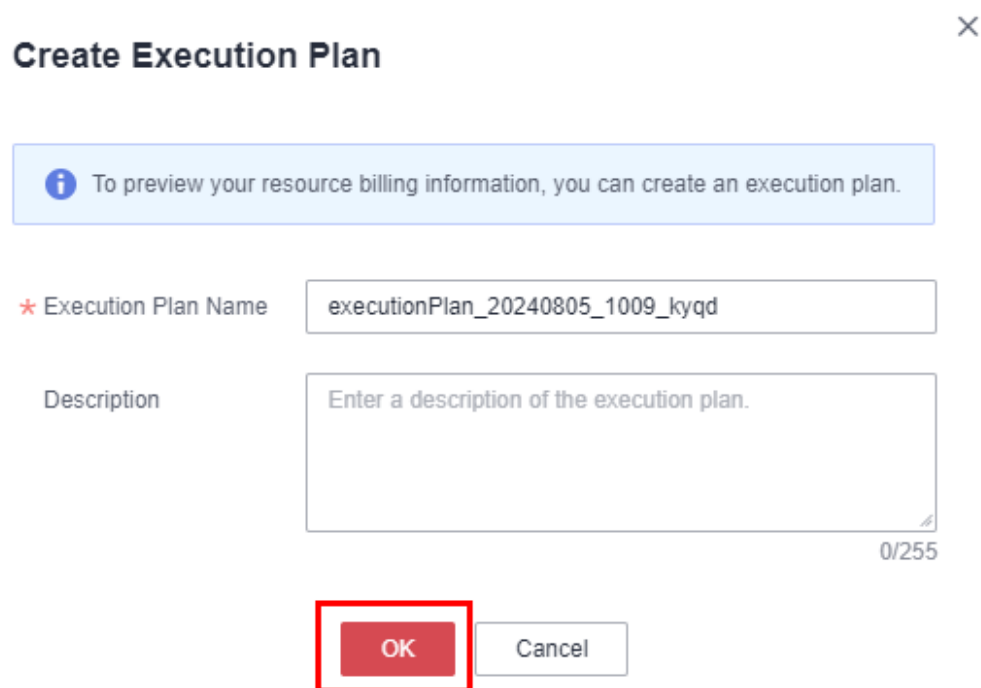
Step 5 On the **Confirm Configurations** page, click **Create Execution Plan**.

Figure 3-12 Confirm Configurations



Step 6 In the displayed **Create Execution Plan** dialog box, enter an execution plan name and click **OK**.

Figure 3-13 Create Execution Plan



Step 7 Wait until the status of the execution plan changes to **Available** and click **Deploy** in the **Operation** column. In the displayed dialog box, click **Execute**.

Figure 3-14 Execution plan created

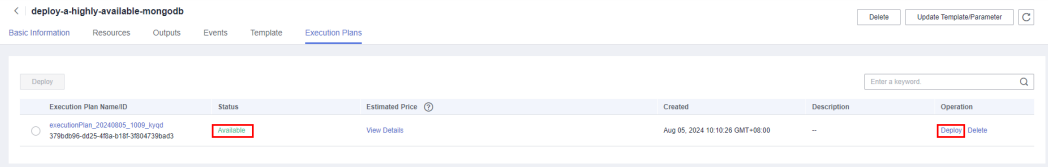
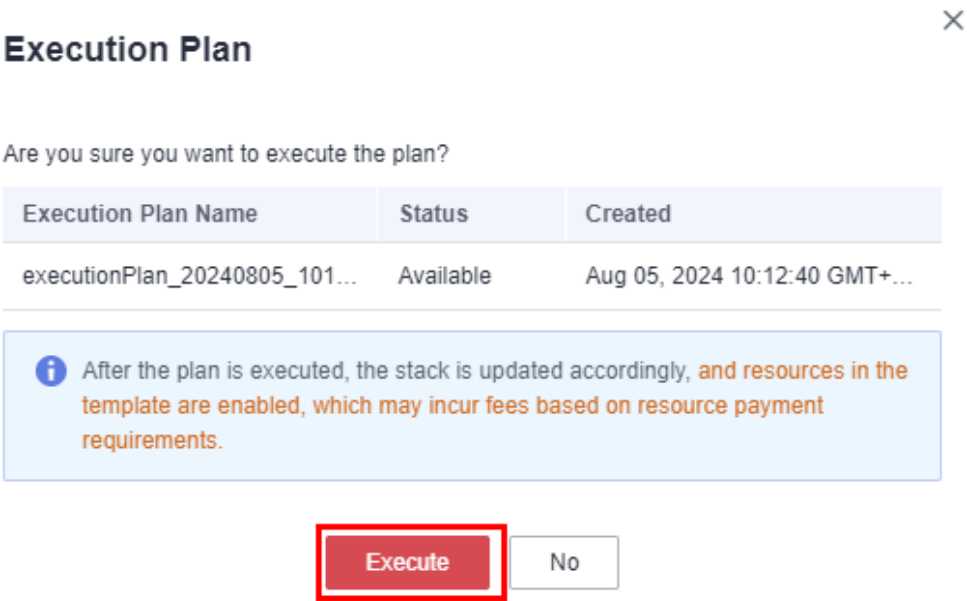
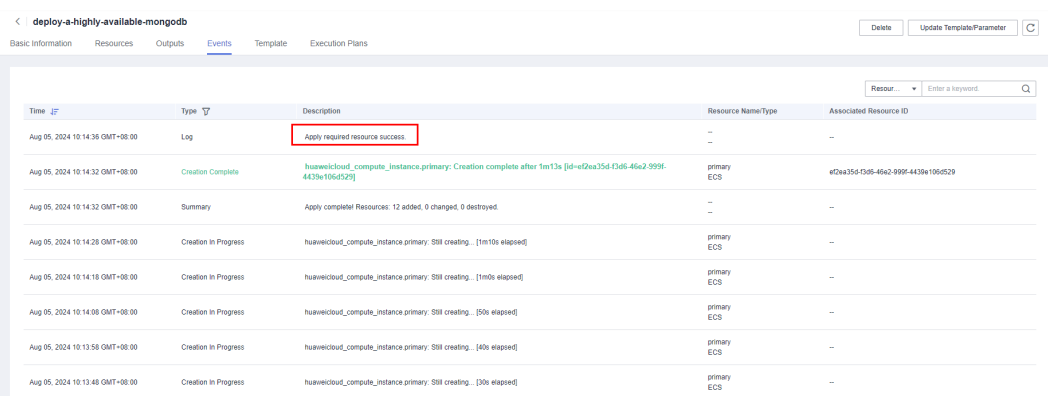


Figure 3-15 Confirming the execution plan



Step 8 Wait until the automatic deployment is complete and click the **Events** tab to view details.

Figure 3-16 Resources created



----End

3.3 Getting Started

(Optional) Modifying Security Group Rules

A security group is a collection of access control rules for cloud resources, such as cloud servers, containers, and databases, to control inbound and outbound traffic. Cloud resources associated with the same security group have the same security requirements and are mutually trusted within a VPC.

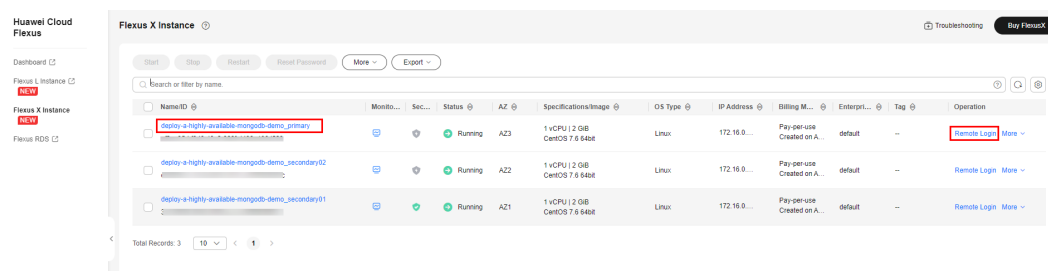
You can modify your security group policy based on service requirements, for example, by adding, modifying, or deleting a TCP port, as follows:

- Adding a security group rule: [Add an inbound rule](#) and enable a TCP port if needed.
- Modifying a security group rule: Inappropriate security group settings can be a serious security risk. You can [modify security group rules](#) to ensure the network security of your instances.
- Deleting a security group rule: If the source or destination IP address of an inbound or outbound security group rule changes, or a port does not need to be enabled, you can [delete the security group rule](#).

(Optional) Changing the Password of the MongoDB Database

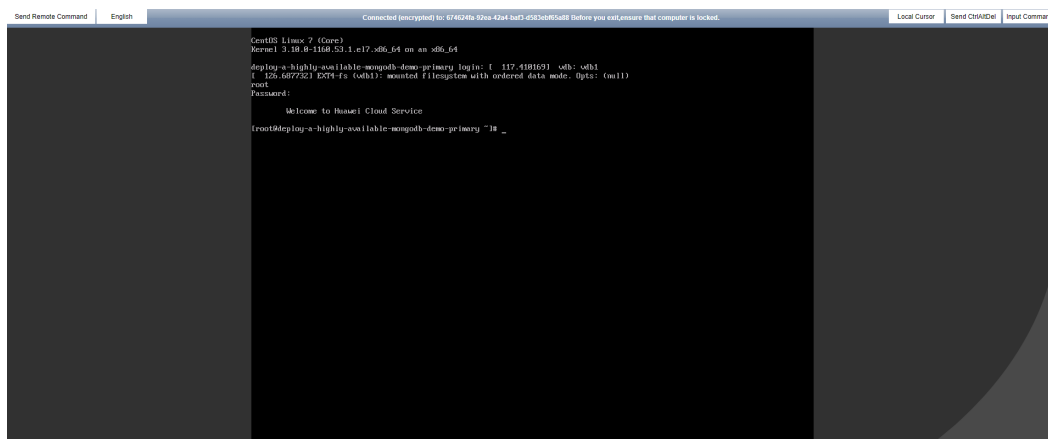
Step 1 Log in to the [ECS console](#), select the created instance whose suffix is **primary**, and click **Remote Login**.

Figure 3-17 Logging in to the ECS console



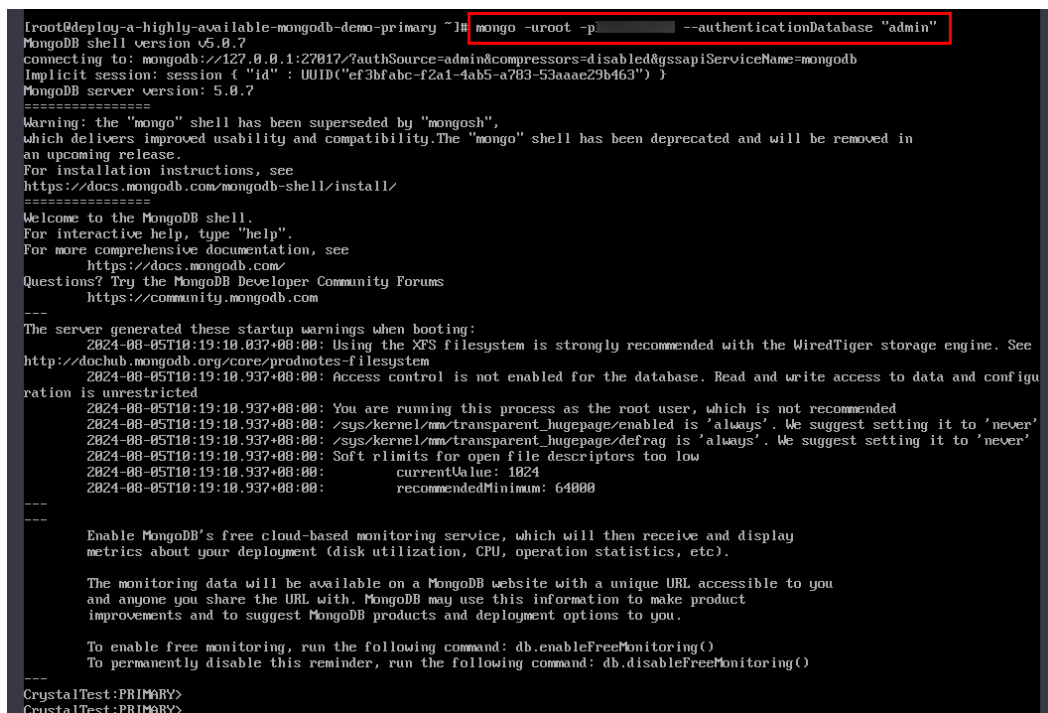
Step 2 Enter the username and password and press **Enter**.

Figure 3-18 Logging in to Linux cloud servers



Step 3 Run `mongo -uroot -pPassword --authenticationDatabase "admin"` to log in to the database.

Figure 3-19 Logging in to the MongoDB database



Step 4 Switch to the admin database, enter `db.changeUserPassword("root","new password")`, and press **Enter**. After the password is changed, enter `exit` to exit the MongoDB database.

Figure 3-20 Switching to the admin database and changing the password of user root

```
[root@deploy-a-highly-available-mongodb-demo-primary ~]# mongo -uroot -p --authenticationDatabase "admin"
MongoDB shell version v5.0.7
connecting to: mongodb://127.0.0.1:27017/?authSource=admin&compressors=disabled&gssapiServiceName=mongodb
Implicit session: session { "id" : UUID("39509385-3a7d-4beb-ab08-98f4fb9e3574") }
MongoDB server version: 5.0.7
=====
Warning: the "mongo" shell has been superseded by "mongosh",
which delivers improved usability and compatibility. The "mongo" shell has been deprecated and will be removed in
an upcoming release.
For installation instructions, see
https://docs.mongodb.com/mongodb-shell/install/
=====
The server generated these startup warnings when booting:
  2024-08-05T10:19:10.937+08:00: Using the XFS filesystem is strongly recommended with the WiredTiger storage engine. See
http://dochub.mongodb.org/core/prodnotes-filesystem
  2024-08-05T10:19:10.937+08:00: Access control is not enabled for the database. Read and write access to data and configu
ration is unrestricted
  2024-08-05T10:19:10.937+08:00: You are running this process as the root user, which is not recommended
  2024-08-05T10:19:10.937+08:00: /sys/kernel/mm/transparent_hugepage/enabled is 'always'. We suggest setting it to 'never'
  2024-08-05T10:19:10.937+08:00: /sys/kernel/mm/transparent_hugepage/defrag is 'always'. We suggest setting it to 'never'
  2024-08-05T10:19:10.937+08:00: Soft rlimits for open file descriptors too low
  2024-08-05T10:19:10.937+08:00:             currentValue: 1024
  2024-08-05T10:19:10.937+08:00:             recommendedMinimum: 64000
-----
Enable MongoDB's free cloud-based monitoring service, which will then receive and display
metrics about your deployment (disk utilization, CPU, operation statistics, etc).

The monitoring data will be available on a MongoDB website with a unique URL accessible to you
and anyone you share the URL with. MongoDB may use this information to make product
improvements and to suggest MongoDB products and deployment options to you.

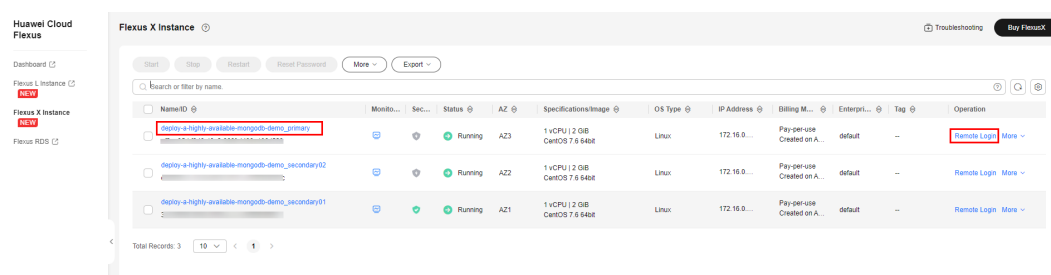
To enable free monitoring, run the following command: db.enableFreeMonitoring()
To permanently disable this reminder, run the following command: db.disableFreeMonitoring()
-----
CrystalTest:PRIMARY> use admin: 1
switched to db admin
CrystalTest:PRIMARY> db.changeUserPassword("root","root"): 2
CrystalTest:PRIMARY>
```

----End

Verifying the MongoDB Database

- Step 1** On the [ECS console](#), select the created instance whose suffix is **primary**, and click **Remote Login** to log in to the Linux instance.

Figure 3-21 Logging in to the ECS console



- Step 2** Run `mongo -uroot -pPassword --authenticationDatabase "admin"` to log in to the MongoDB database. If the output contains **PRIMARY**, the MongoDB database is deployed successfully.

Figure 3-22 Database connection

```
[root@deploy-a-highly-available-mongodb-demo-primary ~]# mongo -uroot -p[REDACTED] --authenticationDatabase "admin"
MongoDB shell version v5.0.7
connecting to: mongodb://127.0.0.1:27017/?authSource=admin&compressors=disabled&gssapiServiceName=mongodb
Implicit session: session { "id" : UUID("ef3bfabc-f2a1-4ab5-a783-53aaac29b463") }
MongoDB server version: 5.0.7

=====
Warning: the "mongo" shell has been superseded by "mongosh",
which delivers improved usability and compatibility. The "mongo" shell has been deprecated and will be removed in
an upcoming release.
For installation instructions, see
https://docs.mongodb.com/mongodb-shell/install/
=====
Welcome to the MongoDB shell.
For interactive help, type "help".
For more comprehensive documentation, see
https://docs.mongodb.com/
Questions? Try the MongoDB Developer Community Forums
https://community.mongodb.com

---
The server generated these startup warnings when booting:
2024-08-05T10:19:10.937+08:00: Using the XFS filesystem is strongly recommended with the WiredTiger storage engine. See
http://dochub.mongodb.org/core/prodnotes-filesystem
2024-08-05T10:19:10.937+08:00: Access control is not enabled for the database. Read and write access to data and configu
ration is unrestricted
2024-08-05T10:19:10.937+08:00: You are running this process as the root user, which is not recommended
2024-08-05T10:19:10.937+08:00: /sys/kernel/mm/transparent_hugepage/enabled is 'always'. We suggest setting it to 'never'
2024-08-05T10:19:10.937+08:00: /sys/kernel/mm/transparent_hugepage/defrag is 'always'. We suggest setting it to 'never'
2024-08-05T10:19:10.937+08:00: Soft rlimits for open file descriptors too low
2024-08-05T10:19:10.937+08:00:         currentValue: 1024
2024-08-05T10:19:10.937+08:00:         recommendedMinimum: 64000
---
---
Enable MongoDB's free cloud-based monitoring service, which will then receive and display
metrics about your deployment (disk utilization, CPU, operation statistics, etc).

The monitoring data will be available on a MongoDB website with a unique URL accessible to you
and anyone you share the URL with. MongoDB may use this information to make product
improvements and to suggest MongoDB products and deployment options to you.

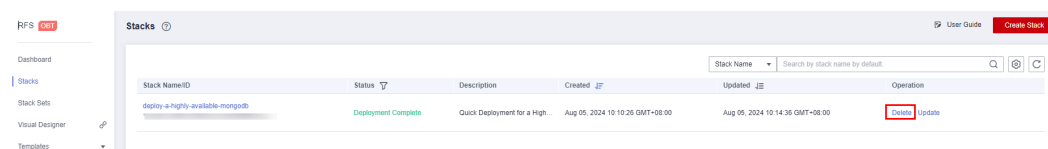
To enable free monitoring, run the following command: db.enableFreeMonitoring()
To permanently disable this reminder, run the following command: db.disableFreeMonitoring()
---
CrystalTest:PRIMARY>
CrystalTest:PRIMARY>
```

----End

3.4 Quick Uninstallation

Step 1 Click **Delete** in the row where the solution stack is.

Figure 3-23 Uninstalling the solution



Step 2 In the displayed dialog box, enter **Delete** and click **OK**.

Figure 3-24 Confirming the uninstallation

✕

Delete Stack

Are you sure you want to delete the stack and resources in the stack? **Cannot be restored after being deleted. Exercise caution when performing this operation.**

Stack Name	Status	Created
deploy-a-highly-available-mongodb	Deployment ...	Aug 05, 2024 10:10:26 GMT+08:00

Resources (12)

Cloud Product N...	Physical Resource Name/ID	Resource Status
Elastic Cloud Server	deploy-a-highly-available-mongodb-demo_...	Creation Complete
Elastic Cloud Server	deploy-a-highly-available-mongodb-demo_...	Creation Complete
Elastic Cloud Server	deploy-a-highly-available-mongodb-demo_...	Creation Complete
NAT Gateway	deploy-a-highly-available-mongodb-demo_...	Creation Complete
NAT Gateway		Creation Complete
Virtual Private Cloud	deploy-a-highly-available-mongodb-demo	Creation Complete

When Deleted ☒ Delete resource ☐ Retain resource (Delete only the stack)

Type Delete in the box below to continue.

Delete

OK

Cancel

----End

4 Appendix

Terms

- **Flexus X Instance (FlexusX):** FlexusX is a next-generation flexible cloud server service designed for small- and medium-sized enterprises (SMEs) and developers. FlexusX provides functions similar to what ECS provides. It supports flexible vCPU/memory ratios, performance mode, and live specification change.
- **Elastic Cloud Server (ECS):** ECS provides secure, scalable, on-demand compute resources, enabling you to flexibly deploy applications and workloads.
- **Elastic IP (EIP):** EIP provides static public IP addresses and scalable bandwidths that enable your cloud resources to communicate with the Internet. You can easily bind an EIP to an ECS, BMS, virtual IP address, NAT gateway, or load balancer, enabling immediate Internet access.
- **NAT Gateway:** Public NAT gateways translate private IP addresses into EIPs, and are used by cloud servers in a VPC for secure, cost-effective Internet access. Private NAT gateways translate between private IP addresses, and are used between VPCs or your VPC and on-premises data center to keep legacy networks running after cloud migration.

5 Change History

Table 5-1 Change history

Released On	Description
2023-04-30	This issue is the first official release.
2024-07-23	Supported Flexus X Instance.