Solution

Quick Deployment of an MHA MySQL Cluster

 Issue
 1.0.0

 Date
 2023-04-30





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Solution Overview

Scenarios

This solution is developed based on Master High Availability (MHA) and helps you deploy highly available MySQL clusters on Huawei Cloud cloud servers. MHA is a mature and open source MySQL HA program that provides heartbeat detection, primary/standby replication, failover, and alert email sending. It is suitable for enterprises that require high availability, data integrity, and almost uninterrupted maintenance of primary servers.

Architecture

This solution helps you quickly deploy an MHA MySQL cluster on Huawei Cloud. The following figure shows the deployment architecture.

Virtual Private Cloud (VPC) Subnet		
	MHA Manager listening	Security Group
	•	
AZ 1	AZ 2	AZ 3
Primary MySQL database	Standby MySQL database	Standby MySQL database (MHA Manager)

Figure 1-1 Architecture

This solution will:

- Create three FlexusX instances, add them to the same FlexusX group, configure an anti-affinity policy, deploy them across AZs, and install the MHA and MySQL software on each FlexusX instance.
- Create a virtual IP address (VIP) for primary/standby switchover of the MySQL databases.
- Assign three EIPs for Internet access and alarm notifications in case of any faults.
- Create a security group to secure the FlexusX instance environment by controlling access to FlexusX instances.

Advantages

• High reliability

The cloud servers configured with the anti-affinity policy and deployed across AZs provide cross-AZ disaster recovery. MHA is installed for automated failover and primary/standby replication, helping ensure data consistency in the event of a failure.

• Lower cost

MHA is composed of MHA Manager and MHA Node. MHA Manager is installed on one of the cloud servers where the standby databases are deployed. No additional cloud server is required.

• Easy deployment

Resources can be quickly provisioned and a highly available MySQL cluster can be easily created.

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.
- Ensure that you have an email account for sending emails over SMTP.
- Currently, FlexusX instances can be deployed only in the **AP-Bangkok** region.

2 Resource Planning and Costs

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 **Price Calculator**.

Huawei Cloud Service	Example Configuration	Estimated Monthly Cost
Flexus X Instance	 Pay-per-use: \$0.08 USD/hour Region: AP-Bangkok Specifications: FlexusX Performance mode (disabled) x1.2u.4g 2 vCPUs 4 GiB Image: CentOS 7.6 64bit System Disk: High I/O 40 GiB Data disk: General Purpose SSD 100 GiB Quantity: 3 	\$181.44 USD
Elastic IP (EIP)	 Pay-per-use: \$0.11 USD/hour Region: AP-Bangkok Routing Type: Dynamic BGP Billed By: Traffic EIP Quantity: 3 (After two of the created EIPs are released, they will not be billed.) 	\$0.11 USD/GB
Total	-	\$181.44 USD + Price of public network traffic

Huawei Cloud Service	Example Configuration	Estimated Monthly Cost
Flexus X Instance	 Region: AP-Bangkok Specifications: FlexusX Performance mode (disabled) x1.2u.4g 2 vCPUs 4 GiB Image: CentOS 7.6 64bit System Disk: High I/O 40 GiB Data Disk: General Purpose SSD 100 GiB Quantity: 3 	\$199.80 USD
Elastic IP (EIP)	 Region: AP-Bangkok Routing Type: Dynamic BGP Billed By: Traffic Bandwidth: 5 Mbit/s EIP Quantity: 3 (After two of the created EIPs are released, they will not be billed.) 	\$0.11 USD/GB
Total	-	\$47.73 USD + Price of public network traffic

 Table 2-2 Resource planning and costs (Yearly/Monthly)

3_{Procedure}

- 3.1 Preparations
- 3.2 Quick Deployment
- 3.3 Getting Started
- 3.4 Quick Uninstallation

3.1 Preparations

Creating the rf_admin_trust Agency

Step 1 Log in to **Huawei Cloud management 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

IAM	Agenci	es 🗇								Create Agency
Users		Delete Agencies available for creati	ion: 32				AI	▼ rf_a	idmin_trust	×Q
User Groups		Agency NameID ↓≣	Delegated Party ↓≣	Validity Period ↓≡	Created 4F	Descrip	tion J≣	0	peration	
Permissions • Projects		rf_admin_trust	Account op_svc_IAC	Unlimited	Jan 16, 2023 17:57:41 GMT+08:00	Created	by RF, Not delete.	A	uthorize Modify Delete	
Agencies										
Identity Providers										
Security Settings										

- If the agency is found, skip the following steps.
- If the agency is not found, perform the following steps to create it.
- 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, enter RFS for Cloud Service, and click Next.

Figure 3-4 Create Agency

Agencies / Create Agence	cy little and a second s
★ 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 Selecting a policy

Saled PalayRole (2) Saled Scope (3) Firsth	
Assign selected permissions to if jacimin_trust. Create P	Policy
Vers Selvide (1) Copy Permissions from Another Project All services + All services + All services + X (Q
PolicyRole Name Type	
DME AdministratorAccess Bootomicolds Data Mode Expine Insura doministrator with MI permissions. System-defined policy	
Tenant Administrator (Exclude MM) System-defined role	
Cis Tenard Admin System Service Tenard Administrator, can manage multiple CS users System Service Tenard Administrator, can manage multiple CS users	

Step 5 Select All resources and click OK.

Figure 3-6 Setting the authorization scope

<	Authorize Agency
	Select Policy/Role 2 Select Scope 3 Finish
	1 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 created in the agency list.

Figure	3-7	Agency	list
--------	-----	--------	------

IAM	Agencies ⑦			Create Agency			
Users	Delete Agencies available for	creation: 32			AI	 rf_admin_trust 	×Q
User Groups	Agency Name1D ↓⊟	Delegated Party ↓Ξ	Validity Period ↓Ξ	Created ↓ F	Description JΞ	Operation	
Permissions -	rt_admin_trust	Account op_svc_IAC	Unlimited	Jan 16, 2023 17:57:41 GMT+08:00	Created by RF, Not delete.	Authorize Modify Dele	te
Agencies							
Identity Providers							
Security Settings							

----End

Obtaining an Authorization Code

When MHA performs a failover or stops working due to an error, you can execute **send_report** to obtain the failover report by an email. In this way, users can learn about the current database status in time. In this solution, emails are sent through SMTP. You need to log in to the mailbox to enable SMTP. In addition, an independent password or authorization code is required for sending emails. Perform the following operations in this section to obtain the authorization code. The Outlook mailbox is used as an example.

Step 1 Log in to your mailbox. Click the **Settings** icon in the upper right corner and click **View all Outlook settings**.

□ ¤	Meet Nov	v S	ង្ខ	Þ	ŝ	Ŷ	VX
¢ P	in / Ur	Setting Search O	S utlook s	ettings			×
		Get started	d —				×
				fi <u>, lî</u> †			
		View all					
		Dark mode	e (i)				
		Focused In	nbox (i)				D
		Desktop n	otificati	ons 🛈			\square
		Display de	nsity ()			
		Roomy		Соzy		Compac	t
		Arrange m	essage l	ist			-
		View all Ou	utlook s	ettings	59		

Figure 3-8 Settings

Step 2 Choose **Sync email** on the left, select **Yes** and **Let apps and devices to delete messages from Outlook** (if required). View and record the value of **Server name**.

ettings	Layout	Sync email	
ettings Search settings General Calendar People View quick settings	Layout Compose and reply Attachments Rules Sweep Junk email Customize actions Sync email Message handling Forwarding Automatic replies	Sync email POP and IMAP POP options Let devices and apps use POP Image: Pop options Devices and apps that use POP can be set to delete messages from Outlook after download. Image: Pop ontil allow devices and apps to delete messages from Outlook. It will move the messages to a special POP folder instead. Image: Pop setting Server name: outlook office365.com Por: 995 Encryption method: TLS IMAP setting Server name: outlook office365.com Por: 993 Encryption method: TLS Image: Pop Setting Server name: outlook office365.com Por: 993 Encryption method: TLS Encryption method: TLS	
		SM1P setting Server name: smtp.office365.com Port: 587 Encryption method: STARTTLS	

Step 3 Click the avatar in the upper right corner and click **My profile**.



Figure 3-10 My profile



Figure 3-11 safe

Microsoft account			safe				
	safe		_				Change the password Last updated: 2023/3/8
	Security bas Manage passwords.	sics protect acco	unts, and	view other secure resources.			
	۶)		••	2	P	
	Sign-in activity Please check the logi let us know if you fin	in time and loo ad anything un	cation, and usual.	Password securit Use stronger passwords accounts.	y i to better secure your	Advanced security options Try using the latest security options to keep your account secure.	Stay safe with Windows 10 Windows 10 makes it eslier to keep your system secure with Microsoft Dafender Anthonus.
	View my activity			Change my passwor	rd	"Get started now"	Check out Windows Security

Step 5 After the system verification is successful, click **Manage** under **Two-step verification**, perform required operations to enable **Two-step verification**.

Figure 3-12 Two-step verification

 Microsoft account Your info	Privacy	Security	Rewards	Payment & billing \sim	Services & subscriptions	Devices		?	
Security					Change password Last update: 4/14/2023 Change >		िन्तु Two-step verification OFF Manage >		

Step 6 In the **Additional security options** area, verify that the status of **Two-step** verification is **Open**.

Figure 3-13 Two-step verification

III Microsoft account Your information privacy safe Rewards Payment and bill	ing $arminist \sim$ Services and Subscriptions equipment	
security	Charge the password Lot updated 322/09 Charge the s	ବୁଳ୍ମ Two step verification Open Manage >
A way to prove your identity Manage sign-in and verification methods for Microsoft accounts. Lea	im more about sign-in and verification.	
 Enter the password 		Latest
Last changed 2023/3/8 time Change the View activity password	For Account	login
> 💌 Emeil the code		Latest
> 🖾 Email the code		Latest
Add a new sign-in or verification method		
Additional security options To increase the security of your account, remove your password or n	equire two steps to sign in.	
No password account	Two-step verification Open Shut down	
Learn more about removing passwords		

Step 7 In the **App passwords** area, click **Create a new app password** to set a password for connecting to a third-party application.

Figure 3-14 App passwords

Additional	security options			
To increase t	he security of your account, remove your password or requir	e two steps i	to sign in.	
••••×	No password account Shut down Open	ଡୁ	Two-step verification Open Shut down	
Learn more . Learn more .	about removing passwords about two-step verification			
App passw Some apps a Learn more a Create a new	vords and devices (for example, the Mail app on Xbox 360, Window about app passwords. v app password	is Phone, or	ather devices) don't support security cades for two-step verifi	cation. In these cases, you'll need to create an app password to sign in.

Step 8 Obtain the authorization code and enter it in the text box of **email_authorization_code**.

Figure 3-15 Obtaining an authorization code

Microsoft account			safe Rewards			
	Sign in wi	th this	app passv	word		
	Enter the app passw	ord below in	the Password field fo	r an app or device that doesn	't accept a security code. If you	don't know how to update your app or device with an app password, follow these steps.
	App passwords n	rt				
	For apps or devices t Create additional ap	that don't aci p passwords	cept security codes, y	ou'll need to create a new ap	p password for them.	
	finish					

NOTE

By default, SMTP is disabled for Outlook. To send emails over SMTP, enable it in advance.

----End

3.2 Quick Deployment

This section describes how to quickly deploy this solution.

 Table 3-1
 Parameter description

Parameter	Туре	Mandator y	Description	Default value
vpc_name	string	Yes	VPC name. This template uses a newly created VPC and the VPC name must be unique. The name contains 1 to 54 characters, including digits, letters, underscores (_), hyphens (-), and periods (.).	highly- available- mha- mysql- cluster- demo

Parameter	Туре	Mandator y	Description	Default value
security_group_ name	string	Yes	Security group name. This template uses a newly created security group. The name contains 1 to 64 characters, including letters, digits, underscores (_), hyphens (-), and periods (.).	highly- available- mha- mysql- cluster- demo
ecs_name	string	Yes	Cloud server name, which must be unique. The name contains 1 to 57 characters, including lowercase letters, digits, underscores (_), and hyphens (-).	highly- available- mha- mysql- cluster- 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.	x1.2u.4g

Parameter	Туре	Mandator y	Description	Default value
ecs_password	string	Yes	Initial password of the cloud server, MySQL replication account, and MHA administrator account. The value consists of 8 to 26 characters. It includes at least three of the following character types: uppercase letters, lowercase letters, digits, and special characters ($\$!$ @%=+[]:./^,{}?), and cannot contain the username or the username or the username spelled backwards. The default ECS administrator account is root , the MySQL replication account is repl , and the MHA administrator account is mha .	Left blank
system_disk_siz e	number	Yes	System disk size of the cloud server. The default disk type is high I/O and the ECS disk space cannot be scaled down. The value ranges from 40 to 1,024, in GiB.	40
data_disk_size	number	Yes	Data disk size of the cloud server. The default disk type is general- purpose SSD. Value range: 10 GiB to 32,768 GiB.	100
sender_email_a ddress	string	Yes	Sender's email address, which sends alarm emails to inform users of a MySQL database failover through MHA. Example: mha@huawei.com	Left blank
recipient_email _address	string	Yes	Recipient's email address, which receives alarm emails. Example: recipent@huawei.com	Left blank

Parameter	Туре	Mandator y	Description	Default value
email_authoriz ation_code	string	Yes	Email account authorization code, which is used to authenticate operations for sending emails using the sender's email account through MHA. For details about how to obtain the authorization code, see 3.1 Preparations.	Left blank
smtp_server_ad dress	string	Yes	SMTP server address of the sender's mailbox. For example, the SMTP address of Outlook is smtp.office365.com . SMTP may be disabled for some mailboxes by default and needs to be enabled before you send emails over SMTP.	Left blank
charging_mode	string	Yes	Billing mode. The value can be postPaid (pay- per-use) or prePaid (yearly/monthly). The default value is postPaid . By default, an order is automatically paid from the account balance.	postPaid
charge_period_ unit	string	Yes	Subscription period unit. This parameter is valid only when charge_mode is set to prePaid . The value can be month or year .	month
charge_period	number	Yes	Subscription period unit. This parameter is valid only when charge_mode is set to prePaid. If charge_period_unit is set to month, the value ranges from 1 to 9. If charge_period_unit is set to year, the value ranges from 1 to 3.	1

Step 1 Log in to Huawei Cloud Solution Practice and choose Quick Deployment of an MHA MySQL Cluster.

Solution Architecture This solution helps you quickly deploy an MHA MySQL cluster on Huawei Cloud. Quick Deployment of an MHA MySQL Cluster Version: 1.1.0 Last Updated: July 2024 Built By: Huawei Cloud Time Required for Deployment: About 20 minutes Virtual Private Cloud (VPC) Subnet Time Required for Uninstallation: About 10 minutes 0 Estimated Cost View Source Code < MHA Manager listening Security Group AP-Bangkok Data Center: AZ 3 AZ 1 AZ 2 nt Guide Standby MySQL database (MHA Manager) Primary MySQL database Standby MySQL database Deploy

Figure 3-16 Selecting a solution

Step 2 Click **Deploy Now** to switch to the **Create Stack** page.

Figure 3-17 Create Stack

< Create Stack		
1 Select Template	(2) Contigue Parameters (3) Contigue Black (4) Continn Contigurations	
* Creation Mode	Existing templates	
* Template Source	USA Uppost Template A stack is created using a template. The template must certain the deployment code life which life name entension is if or if point.	
* Template URL	https://documentation-samples-4.dot.ap.out/heads1	
		0
		(
		Next

Step 3 Click **Next**, and set parameters by referring to **Table 3-1**.

Figure 3-18 Configuring parameters

Stack Name deploy-a-high	ly-available-mha-mysql-cluster		
The stack name	must start with a letter and can contain a maximum of 128 characters, inclu	uding letters, digits, underscores	s (_), and hyphens (-). The stack name must be unique.
Description Quick Deployn	ment of an MHA MySQL Cluster		
antinuna Danamatu			
onligure Paramete	ans de la companya de		
		ha kamalata maninamanta 🔊	
Enter a keyword.	Q Encrypt some resources based on th	he template requirements.	
Enter a keyword. Parameter	Q Encrypt some resources based on the Value	he template requirements. (?) Type	Description
Enter a keyword. Parameter vpc_name	Q Encrypt some resources based on the Value highly-available-mhs-mysql-cluster-demo	he template requirements. ⑦ Type String	Description Virtual Private Cloud (VPC) name. This temptate uses a newly created VPC and the VPC name must be unique. Value name: 1 L
Enter a keyword. Parameter vpc_name security_group_name	Q Encrypt some resources based on t Value htghy-available-mha-mysql-duster-demo htghy-available-mha-mysql-duster-demo	he template requirements. ⑦ Type string string	Description Virtual Private Cloud (VPC) name. This template uses a nextly created VPC and the VPC name must be unique. Value range: 11 Security group name. This template uses a newly created security group. For details about how to set security group nules, see 1
Enter a keyword. Parameter vpc_name security_group_name ecs_name	Q Encrypt some resources based on th Value Ingrly-available-mha-mysql-duster-demo highly-available-mha-mysql-duster-demo thghly-available-mha-mysql-duster-demo	he template requirements. ⑦ Type String String string string	Description Virtual Private Cloud (VPC) name. This temptate uses a newly created VPC and the VPC name must be unique. Value range: 1 L. Security group name. This temptate uses a newly created security group. For details about how to set security group nules, see L. Cloud server name, which must be unique. Value range: 1 to 57 characters, including lowercase letters, digits, underscores (), a

Step 4 On the **Configure Stack** page, select **rf_admin_trust** from the **Agency** drop-down list and click **Next**.

Figure 3-19 Configuring a stack

< Create Stack	
Select Template	O Configure Parameters Outgrave Stack Outgrave Stack
* Agency	[hasereduct •] [f_sdem_hast •] C
Auto-Rollback	If auto-rollback is enabled, the thack automatically rolls back to the previous successful resource status when the operation fails. After the stack is created, you can modify the stack configurations on its details page.
Deletion Protection	Deletion protection prevents the stack from being deleted accidentally. You can modify it on the stack details page.

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

Select Template 🧭	Configure Parameters Configure Stack	🙆 Confirm	1 Configurations
RFS is free of charge, but the	resources in the stack are not. Currently, you need to create	an execution plan (free o	if charge) to obtain the estimated price.
Template Info			
Stack Name	highly-available-mha-mysql-cluster		Description Quick Deployment of an MHA MySQL Cluster
Parameters 🖉			
Parameter Name	Value	Туре	Description
vpc_name	highly-available-mha-mysql-cluster-demo	string	Virtual Private Cloud (VPC) name. This template uses a newly created VPC and the VPC name must be unique. Value range: 1 to 54 characters
security_group_name	highly-available-mha-mysql-cluster-demo	string	Security group name. This template uses a newly created security group. For details about how to set security group rules, see the deployment
ecs_name	highly-available-mha-mysql-cluster-demo	string	Cloud server name, which must be unique. Value range: 1 to 57 characters, including lowercase letters, digits, underscores (_), and hyphens (-)
ecs_flavor	x1.2u.4g	string	Instance flavor of ECS or FlexusX. The flavor ID format of a FlexusX instance is x1.2u.2g. For example, the flavor ID of a FlexusX instance with
ecs_password		string	Initial password of the cloud server, MySQL replication account, and MHA administrator account. It consists of 8 to 26 characters, and must cont
system_disk_size	40	number	System disk size of the cloud server. The default disk type is high I/O and the ECS disk space cannot be scaled down. Value range (GIB): 40-10
data diek eize	400	number	Data diele eine af the elevel earner. The default diele turn is annural numere CCD. Value menne /CiD> 40.00700. Datault waken 400
imated fee: You can obtain the esti	imated fee after creating an execution plan (free of charge).		Previous Create Execution Plan Directly Deploy

Figure 3-20 Confirming the configurations

Х

Step 6 In the displayed **Create Execution Plan** dialog box, specify **Execution Plan Name** and click **OK**.

	ΓΙάΙΙ
 Before deploying a sta information and check resources. 	ack, you can create an execution plan to preview the stack its configurations to evaluate the impact on running
 RFS is free of charge, plan is created, a stac 	but the resources in the stack are not. After the execution k (occupies the stack quota) for which no resource is
enabled is generated, details.	and the estimated price is displayed in the execution plan
+ Execution Plan Name	executionPlan 20230317 1648 s9mt
★ Execution Plan Name	executionPlan_20230317_1648_s9mt
★ Execution Plan Name Description	executionPlan_20230317_1648_s9mt Enter a description of the execution plan.
★ Execution Plan Name Description	executionPlan_20230317_1648_s9mt Enter a description of the execution plan.

Step 7 Locate the target execution plan and click **Deploy** in the **Operation** column. In the displayed dialog box, click **Execute** for resource deployment.

Figure 3-22 Deploying an execution plan

Figure 3-21 Creating an execution plan

< deploy-a-highly-available Basic Information Resources Outputs Events Templ	ate Execution Plans		Delete	Update Template/Parameter
Deploy			Enter a keyword.	QC
Execution Plan Name/ID Status	Estimated Price (2)	Created	Description	Operation
executionPlan_20230317_1655_0090 Available d0c545de-9305-4da5-8780-904ef8181753	View Details	2023/03/17 16:55:15 GMT+08:0		Delete Deploy

Step 8 Click the **Events** tab and check whether the solution has been deployed. If message "Apply required resource success" is displayed in the **Description** column, the solution has been deployed.

Figure 3-23 Resources created

< deploy-a-highly-available	Translate Translate Plane			Delete Update Template/Parameter C
Basic Information Resources Outputs	events remplate Execution Plans			
				Enter a keyword. Q
Time j≞ Typ	Description		Resource Name/Type	Associated Resource ID
2023/03/17 18:07:39 GMT+08:00 LOG	G Apply required resource success	i.		-
2023/03/17 18:07:30 GMT+08:00	Apply completel Resources: 14 added	0 changed, 0 destroyed.	-	-

Step 9 Click the **Outputs** tab to view information about the VIP and ECSs.

deploy-a-highly-available			It takes about 15 minutes to complete the environment initialization. The private IP		Delete Update T	femplate/Parameter
sic Information Resources Outputs Events Terr	plate Execution Plans		addresses on the primary database, standoy database stave1, and standby database			
			survez (where were warming as a tecanica) are 192 (56 100 111) (32 168 100 112, and 192 (56 100 113, respectively, By default, pert 3306 is enabled for accessing MySOL. The site (10 orderess in 150 168 100 152)		Enter a keyword.	٩
Name Typ	e	Value	The writida in- doulless is 192, 108, 100, 202.	Description		
Note strin	g	It takes abor	It 15 minutes to complete the environment initialization. The priva	-		

----End

3.3 Getting Started

(Optional) Modifying Security Group Rules

NOTICE

- By default, IP addresses from the VPC subnet CIDR block created in this solution are allowed to access the MySQL database through port 3306. Configure an IP address whitelist by referring to Modifying a Security Group Rule.
- This solution uses port 22 to remotely log in to the cloud server. By default, the VPC subnet created in this solution allows access from port 22. Configure an IP address whitelist by referring to Modifying a Security Group Rule.

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.

If the rules of the security group associated with your instance cannot meet your requirements, for example, you need to add, modify, or delete a TCP port, do 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**.
- **Step 1** Log in to the **ECS console** and view the instances created through one-click deployment and the EIPs bound to the instances.

Figure 3-25 Instances

ic C	loud Server ③											Troubleshooting	Quick Links	
) The	e password reset plug-in can nov	v be installed at	ter creating	an ECS.										
Lo	oking for Flexus instances? Yo	u can view and	manage F	lexusL and Flexus	X instances o	n the Flexus console. Access the Fle	xus console							
iy EC	CSs: AP-Bangkok (4) CN-F	long Kong (3)												
Star	t Stop Restart	Reset	Password	More ~	Export	$\overline{}$							X	5
0	Name/ID 🕀	Monito	Sec	Status 🖯	AZ 🖯	Specifications/Image 🕀	OS Type \varTheta	IP Address \ominus	Billing Mode	Enterpri 🖨	Tag ⊖		Operation	00
	highly-available-mh FlexusX d6383859-a3d5-45f9-b2	•	٥	Running	AZ3	2 vCPUs 4 GiB x1.2u.4g CentOS 7.6 64bit	Linux	11 127 (EIP) 3 192.168.100.113 (Privat	Pay-per-use Created on Jul 22, 2024 10:0	default	-		Remote Login M	ore ~
	highly-available-mh FlexusX 9588713b-6441-4438-98		0	Running	AZ2	2 vCPUs 4 GiB x1.2u.4g CentOS 7.6 64bit	Linux	49. 152 (EIP) 300 192.168.100.112 (Privat	Pay-per-use Created on Jul 22, 2024 10:0	default	-		Remote Login M	ore ~
	highly-available-mh	R	0	Running	AZ1	2 vCPUs 4 GiB x1.2u.4g	Linux	12 141 (EIP) 30	Pay-per-use Created on Jul 22, 2024 10.0	default	-		Remote Login M	ore ~

Step 2 Open the **Subnets** where the cloud server is located and click the **IP Addresses** tab to view the virtual IP address.

Figure 3-26 Virtual IP address

< highly-available-mha-mysql	cluster-demo-subnet			С
Summary IP Addresses	Tags			
Assign Virtual IP Address	Unbind EIP Learn more about virtual IP address configuration.			C
				Q
Virtual IP Address	Bound EIP	Bound Server (NIC)	Operation	
192.168.100.116	**	-	Bind to EIP Bind to Server More 👻	

Step 3 Check the security group rules. On the Security Groups page, locate the security group prefixed with the VPC name, and click the security group to view the security group rules. By default, ports 22 and 3306 are enabled in the inbound rules. Perform operations to modify the security group rules by referring to (Optional) Modifying Security Group Rules.

Figure 3-27 Security group rules

<	highly-available-mh	a-mysql-cluster-demo				
Sun	nmary Inbound R	tules Outbound Rules Associat	ed Instances			
	 Some security gro 	up rules will not take effect for ECSs with certain	specifications. Learn more			
	Add Rule Fas	t-Add Rule Delete Allow Comm	on Ports Inbound Rules: 5 Learn more abo	ut security group configuration.		
	Specify filter criteria.					
	Priority ⑦	T Action ⑦	Protocol & Port 💿	🗑 Туре	Source ⑦	Description
	1	Allow	TCP : 22	IPv4	192.168.100.0/24	Allows remote access to Linux ECSs usin
	1	Allow	ICMP : All	IPv4	0.0.0.0/0 ⑦	Allows to test the ECS connectivity with th
	1	Allow	TCP : 3306	IPv4	192.168.100.0/24	Allows IP addresses to access the databa
	100	Allow	All	IPv6	highly-available-mha-mysql-cluster-demo	
	100	Allow	All	IPv4	highly-available-mha-mysql-cluster-demo	**







Step 5 Unbind the EIPs bound to the primary database and standby database suffixed with master and slave1. Log in to the ECS console, locate the target database server, choose More > Manage Network > Unbind EIP in the Operation column, and click Yes in the displayed dialog box. Do not release the EIP bound to the standby database (suffixed with slave2) with MHA Manager installed. Otherwise, an alarm email will fail to be sent during a failover.

Figure	3-29	Unbinding	an	EIP
--------	------	-----------	----	-----

El	astic C	loud Server ⑦							🔘 Feedback 🕜 Tro	ubleshooting 🗹	ECS News	🕼 Quick Links	Buy ECS
	My EC	CSs: CN North-Beijing4 (78) CN South-G	luangzhou (19) AF	P-Singapore (8) C	CN North-Ulangab1 (2)	CN-Hong Kong (2)	CN East-Shanghai2 (1)						С
	Starl	t Stop Reset Password	More 👻									C 🛞 🖪	88 =
	Name	highly-available-mha-mysql-cluster-demo (Add filter									×	0 🕲 Q
		Name/ID	Monitoring	Security	AZ 🏹	Status 🖓	Specifications/Image	IP Address	Billing Mode 🍞	Enterprise Project	Tag	Operation	
		highly-available-mha-mysql-clust a4c2f7e0-6079-42c9-9ea2-acb99220	Ø	٥	AZ3	Running	2 vCPUs 4 GIB c6 CentOS 7.6 64bit	119.8.171.84 192.168.100	Pay-per-use Created on Mar	default	-	Remote Login	More 🔺
		highly-available-mha-mysql-clust 6657dcec-82b6-4300-8a35-1612de9	Ø	¢	AZ2	Running	2 vCPUs 4 GIB c6 CentOS 7.6 64bit	119.13.104.1 192.168.100	Pay-per-use Created on Mar	default	-	Start Stop	
		highly-available-mha-mysql-clust b3018cea-815a-4b69-adcf-3a09df03	Ø	٥	AZ1	Running	2 vCPUs 4 GiB c6 CentOS 7.6 64bit	190.92.221.2 192.168.100	Pay-per-use Created on Mar	default	-	Restart Reset Password	
e	4									Change Security Grou Security Group Rule (Modily Private IP Unbind EIP Modily Bandwidth	up Configuration	Modify Specification Change Biling Mode Delete Manage Image/Disk Manage Network Migrate ECS	s F
										Change VPC			

Figure 3-30 Confirming unbinding

4	Are you sure y highly-availabl	ou want to unbind the e-mha-mysql-cluster-c	following EIP from lemo-master?
EIP		Bandwidth Size	Bound NIC
highly-a	: vailable-mha-mysql	5 Mbit/s	192.168.100.111
Unrele	ased EIPs will continue	to be billed. To stop the EIPs fron	n being billed, release them.

Step 6 Release the EIPs. Locate the two EIPs whose Status is Unbound, choose More > Release, and click Yes in the displayed dialog box.

Figure 3-31 Releasing the EIPs

3 ⑦									G Feedback	Quick Links Buy Ell
Unbind Modify Bandwidth	Renew	More 💌								CC
EIP(IPv4): 119.13.104.10 🔘 🖓	Add filter									× Q
EIP	Monitoring	Status	Security	EIP Type	Bandwidth	Bandwidth Details	Associated Instance	Billing Mode	Enterprise Project	Operation
119.13.104.10 highly-available-mha	Ø	O Unbound	0	Dynamic BGP	highly-available-mha	Bandwidth	Nethered billed	Pay-per-use	4.4	
35244609-e9fb-46cd-9237						5 Mbit/s	Not bound, blied	Created on Mar 09, 2	derault	Modify Bandwidth



Figure 3-32 Confirming the release of the EIPs

----End

Initializing the Environment

Restarting ECSs may cause the MHA MySQL cluster to stop. You need to manually start MHA monitoring. Refer to the following operations.

Step 1 Reconfigure the VIP. Log in to the ECS where the primary database is deployed and run the ifconfig eth0:1 VIP/24 command. VIP is the virtual IP address obtained in Step 2 or Step 9.

Figure	3-33	Reconfig	urina	the	VIP
i iyui c	2-22	Reconing	uning	uic	V I I



Step 2 Enable the MHA service. Log in to the ECS (suffixed with slave2) with MHA Manager installed and run the mha_app1_start command to start MHA monitoring. If the MHA status is running, the cluster service is started.

Figure 3-34 Enabling MHA



----End

Working with MySQL Databases

In this solution, three cloud servers are created by default, each of which has a MySQL 5.7.34 database installed. The databases include one primary database (suffixed with **master**) and two standby databases (suffixed with **slave1** and **slave2**). By default, a user group **mysql** is created, the **mysql** user is added to the user group, and the service port 3306 is enabled. You need to create account **repl** on the primary database for primary/standby replication. Set the account password to be the same as the initial password. Allow only the IP addresses from 192.168.100.0/24 to access the primary database. Install MHA Manager on the standby database (suffixed with **slave2**). The default administrator account is **mha** and the password is the same as the initial password.

Check the primary/standby replication status. SHOW SLAVE STATUS\G;



Figure 3-35 Replication statuses of the standby databases

Create a replication account on the primary database. (By default, the **repl** user has been created, and the password is set to the initial password.)

mysql -uroot -S /tmp/mysql.sock -e "grant replication slave on *.* to *Account*@' %' identified by'*Password*"; Example:

mysql -uroot -S /tmp/mysql.sock -e "grant replication slave on *.* to repl@'192.168.100.%' identified by '123'";

Create an MHA administrator account on the primary database. (By default, the **mha** user has been created, and the password is set to the initial password.)

mysql -uroot -e "GRANT ALL PRIVILEGES ON *.* TO *Account*@'*Allowed login address*'IDENTIFIED BY'*Password*"; Example:

mysql -uroot -e "GRANT ALL PRIVILEGES ON *.* TO mha@'192.168.100.%' IDENTIFIED BY '123'";

Change the password of a MySQL database account.

update mysql.user set authentication_string=password('*Password*') where user='*Account*' and Host = 'localhost'; Example:

update mysql.user set authentication_string=password('123456') where user='repl' and Host = '192.168.100.%';

- If the password of the primary/standby replication account is changed, reconfigure the primary database information for the standby databases.
- > CHANGE MASTER TO

MASTER_HOST='192.168.100.111',

```
MASTER_USER='repl',
```

MASTER_PASSWORD='Password',

MASTER_PORT=3306,

MASTER_CONNECT_RETRY=10,

MASTER_AUTO_POSITION=1;

> START SLAVE;

• After changing the passwords of the primary/standby replication account and MHA administrator account, change the passwords in the **app1.cnf** configuration file on the ECS (suffixed with **slave2**) with MHA Manager installed.

Run the **vim /datadisk/mha/conf/app1.cnf** command to change the value of **password**.

Working with MHA

Install MHA Manager on the standby database (suffixed with **slave2**). An MHA program can manage multiple sets of primary and standby databases. You need to create a different configuration file for each set. In the initial solution, a configuration file for only one set of primary and standby databases is available, the default MHA administrator account is **mha**, the password is the initial password, and the configuration file is stored in **/datadisk/mha/conf/app1.cnf**.

MHA commands:

Checking the SSH connection statuses of the primary and standby databases masterha_check_ssh --conf=/datadisk/mha/conf/app1.cnf

If "All SSH connection tests passed successfully" is displayed, the three cloud servers can access each other without entering a password.

Figure 3-36 Checking SSH connection status

PERCENTED FOR THE STORE OF THE STORE OF THE STORE OF THE STORE AND A STORE AND A STORE AND A
Lroot@mina-mysql-slave2 ~j# masterna_cneck_ssncont=/mna/cont/app1.cnt
Thu Sep 110:50:48 2022 - [warning] Global configuration file /etc/masterha_default.cnf not found. Skipping.
Thu Sep 1 10:50:48 2022 - [info] Reading application default configuration from /mha/conf/app1.cnf
Thu Sep 1 10:50:48 2022 - [info] Reading server configuration from /mha/conf/app1.cnf.
Thu Sep 1 10:50:48 2022 - [info] Starting SSH connection tests
Thu Sep 1 10:50:49 2022 - [debug]
Thu Sep 1 10:50:48 2022 - [debug] Connecting via SSH from root@192.168.100.111(192.168.100.111:22) to root@192.168.100.112(192.168.100.112:22)
Thu Sep 1 10:50:49 2022 - [debug] ok.
Thu Sep 1 10:50:49 2022 - [debug] Connecting via SSH from root@192.168.100.111(192.168.100.111:22) to root@192.168.100.113(192.168.100.113:22)
Thu Sep 1 10:50:49 2022 - [debug] ok.
Thu Sep 1 10:50:50 2022 - [debug]
Thu Sep 1 10:50:49 2022 - [debug] Connecting via SSH from root@192.168.100.112(192.168.100.112:22) to root@192.168.100.111(192.168.100.111:22)
Thu Sep 1 10:50:49 2022 - [debug] ok.
Thu Sep 1 10:50:49 2022 - [debug] Connecting via SSH from root@192.168.100.112(192.168.100.112:22) to root@192.168.100.113(192.168.100.113:22)
Thu Sep 1 10:50:50 2022 - [debug] ok.
Thu Sep 1 10:50:51 2022 - [debug]
Thu Sep 1 10:50:49 2022 - [debug] Connecting via SSH from root@192.168.100.113(192.168.100.113:22) to root@192.168.100.111(192.168.100.111:22)
Thu Sep 1 10:50:50 2022 - [debug] ok.
Thu Sep 1 10:50:50 2022 - [debug] Connecting via SSH from root@192.168.100.113(192.168.100.113:22) to root@192.168.100.112(192.168.100.112:22)
Thu Sep 1 10:50:50 2022 - [debug]
Thu Sep 1 10:50:51 2022 - [info] All SSH connection tests passed successfully.
[root@mba_mycol_c]_clave?l#

Checking the replication statuses of the primary and standby databases masterha_check_repl --conf=/datadisk/mha/conf/app1.cnf If "MySQL Replication Health is OK" is displayed, the primary/standby replication status is normal.

Figure 3-37 Checking the primary/standby replication status

Thu S	ep 1	10:52:10	2022 -	[info]	Alive Servers:
Thu S	iep 1	10:52:10	2022 -	[info]	192.168.100.111(192.168.100.111:3306)
Thu S	iep 1	10:52:10	2022 -	[info]	192.168.100.112(192.168.100.112:3306)
Thu S	iep 1	10:52:10	2022 -	[info]	192.168.100.113(192.168.100.113:3306)
Thu S	iep 1	10:52:10	2022 -	[info]	Alive Slaves:
Thu S	iep 1	10:52:10	2022 -	[info]	192.168.100.112(192.168.100.112:3306) Version=5.7.34-log (oldest major version be
Thu S	iep 1	10:52:10	2022 -	[info]	GTID ON
Thu S	iep 1	10:52:10	2022 -	[info]	Replicating from 192.168.100.111(192.168.100.111:3306)
Thu S	iep 1	10:52:10	2022 -	[info]	Primary candidate for the new Master (candidate_master is set)
Thu S	iep 1	10:52:10	2022 -	[info]	192.168.100.113(192.168.100.113:3306) Version=5.7.34-log (oldest major version be
Thu S	iep 1	10:52:10	2022 -	[info]	GTID ON
Thu S	iep 1	10:52:10	2022 -	[info]	Replicating from 192.168.100.111(192.168.100.111:3306)
Thu S	iep 1	10:52:10	2022 -	[info]	Current Alive Master: 192.168.100.111(192.168.100.111:3306)
Thu S	iep 1	10:52:10	2022 -	[info]	Checking slave configurations
Thu S	iep 1	10:52:10	2022 -	[info]	read_only=1 is not set on slave 192.168.100.112(192.168.100.112:3306).
Thu S	iep 1	10:52:10	2022 -	[info]	read_only=1 is not set on slave 192.168.100.113(192.168.100.113:3306).
Thu S	iep 1	10:52:10	2022 -	[info]	Checking replication filtering settings
Thu S	iep 1	10:52:10	2022 -	[info]	binlog_do_db= , binlog_ignore_db=
Thu S	iep 1	10:52:10	2022 -	[info]	Replication filtering check ok.
Thu S	iep 1	10:52:10	2022 -	[info]	GTID (with auto-pos) is supported. Skipping all SSH and Node package checking.
Thu S	iep 1	10:52:10	2022 -	[info]	Checking SSH publickey authentication settings on the current master
Thu S	iep 1	10:52:10	2022 -	[info]	HealthCheck: SSH to 192.168.100.111 is reachable.
Thu S	iep 1	10:52:10	2022 -	[info]	
192.1	68.10	0.111(192	.168.100	0.111:3	306) (current master)
+1	92.10	8.100.112	(192.168	3.100.1	12:3306)
+1	92.10	8.100.113	(192.168	3.100.1	13:3306)
Thu S	ep 1	10:52:10	2022 -	[info]	Checking replication health on 192.168.100.112
Thu S	iep 1	10:52:10	2022 -	[into]	ok .
Thu S	iep 1	10:52:10	2022 -	[info]	Checking replication health on 192.168.100.113
Thu S	iep 1	10:52:10	2022 -	[info]	ok.
Thu S	iep 1	10:52:10	2022 -	[into]	Checking master_up_tailover_scrupt status:
Thu S	iep 1	10:52:10	2022 -	[unto]	/mha/scripts/master_ip_failovercommand=statusssh_user=rootorig_master_hos
lg_ma	ster_	port=3306			
THE	DTOT	TECT	aboo ya fa		
IN SC	RIPI	IES1====/	spin/ire	contig	etnu:1 down==/soth/trconfig etnu:1 192.168.100.99/24===
Charle	ana a	he Status	of the		
Thu c	ung	to Eachs	2022	ser upe	
Thu S	ep 4	10:52:10	2022 -	Lunol	un.
Thu S	an d	10:52:10	2022 -	Linfol	Got avit code 8 (Not most or deal)
inu s	eh 1	10.52.10	2022 -	Fairol	Sou extr code o (Nor master dead).
MySOL	Repl	ication H	ealth is	OK	
in adr	hepi	1 1		- OIL	
No.				-	

Starting MHA monitoring mha_app1_start

Checking the MHA status mha_app1_status

Stopping MHA monitoring mha_app1_stop

Viewing MHA logs tail -f /datadisk/mha/logs/manager

Simulating a Fault

Step 1 View log changes on the MHA Manager.

tail -f /datadisk/mha/logs/manager

Figure 3-38 Log changes

(root@mha-mysql-slave2 ~)# mha_ppp_status papi[pid:2426] is running(PiPM6 QK), master:192.168.100.111 [root@mha-mysql-slave2 ~]# tail -f /mha/logs/manager
IN SCRIPT TEST====/sbin/ifconfig eth0:1 down==/sbin/ifconfig eth0:1 192.168.100.99/24===
checking the Status of the script. or
hu sep 1 11:30:37 2022 - [units] on studiown_script is not defined.
Imu sep 1 11:30:37 2022 - [unto] set master ping interval 3 seconds. Thu sep 1 11:30:37 2022 - [warning] secondary_check_script is not defined. It is highly recommended setting it to check master reachability from two or more routes.
Thu Sep 1 11:30:37 2022 - [unto] Starting ping health check on 192.108.100.111(192.108.100.111:3306) Thu Sep 1 11:30:37 2022 - [unto] Ping(SELECT) succeeded, waiting until MySQL desn't respond.

- **Step 2** Stop the primary database service. systemctl stop mysqld
- **Step 3** Return to the ECS with MHA Manager installed, view the logs, and check whether the information "Master failover to xxxx completed successfully." is displayed.

Figure 3-39 Failover

Enabling the VIP - 192.168.100.99/24 on the new master - 192.168.100.112
Thu Sep 1 11:34:07 2022 - [info] OK.
Thu Sep 1 11:34:07 2022 - [info] ** Finished master recovery successfully.
Thu Sep 1 11:34:07 2022 - [info] * Phase 3: Master Recovery Phase completed.
Thu Sep 1 11:34:07 2022 - [info]
Thu Sep 1 11:34:07 2022 - [info] * Phase 4: Slaves Recovery Phase
Thu Sep 1 11:34:07 2022 - [info]
Thu Sep 1 11:34:07 2022 - [info]
Thu Sep 1 11:34:07 2022 - [info] * Phase 4.1: Starting Slaves in parallel
Thu Sep 1 11:34:07 2022 - [info]
Thu Sep 1 11:34:07 2022 - [info] Slave recovery on host 192.168.100.113(192.168.100.113:3306) started, pid: 14227. Check tmp log /mha/logs
Thu Sep 1 11:34:09 2022 - [info]
Thu Sep 1 11:34:09 2022 - [info] Log messages from 192.168.100.113
Thu Sep 1 11:34:09 2022 - [info]
Thu Sep 1 11:34:07 2022 - [info] Resetting slave 192.168.100.113(192.168.100.113:3306) and starting replication from the new master 192.168.
Thu Sep 1 11:34:07 2022 - [info] Executed CHANGE MASTER.
Thu Sep 1 11:34:08 2022 - [info] Slave started.
Thu Sep 1 11:34:08 2022 - [info] gtid_wait(2ed2aeb1-299c-11ed-8501-fa163e4d0914:1-2) completed on 192.168.100.113(192.168.100.113:3306). Exe
Thu Sep 1 11:34:09 2022 - [info] End of log messages from 192.168.100.113.
Thu Sep 1 11:34:09 2022 - [info] Slave on host 192.168.100.113(192.168.100.113:3306) started.
Thu Sep 1 11:34:09 2022 - [info] All new slave servers recovered successfully.
Thu Sep 1 11:34:09 2022 - [info]
Thu Sep 1 11:34:09 2022 - [into] * Phase 5: New master cleanup phase
Thu Sep 1 11:34:09 2022 - [unto]
Thu Sep 1 11:34:09 2022 - [into] Resetting slave into on the new master
Thu Sep 1 11:34:09 2022 - [into] 192.168.100.112: Resetting slave into succeeded.
Thu Sep 1 11:34:09 2022 - [unto] Master failover to 192.168.100.112(192.168.100.112:3306) completed successfully.
Thu Sep 1 11:34:09 2022 - [into] Deleted server1 entry from /mha/conf/app1.cnt .
Thu Sep 1 11:34:09 2022 - [into]
Failover Renort
app1: MySQL Master failover 192.168.100.111(192.168.100.111:3306) to 192.168.100.112(192.168.100.112:3306) succeeded
Master 192.108.100.111(192.108.100.111:3300) ts down:
Check MHA Manager logs at mha-mysql-slave2:/mha/logs/manager for details.
Started automated(non-interactive) failover.
Invalidated master IP address on 192.168.100.111(192.168.100.111:3306)
Selected 192.168.100.112(192.168.100.112:3306) as a new master.
192.168.100.112(192.168.100.112:3306): OK: Applying all logs succeeded.
192.168.100.112(192.168.100.112:3306): OK: Activated master IP address.
192.168.100.113(192.168.100.113:3306): OK: Slave started, replicating from 192.168.100.112(192.168.100.112:3306)
Master Factorer to 192.168.100.112(192.168.100.112:3306) completed successfully.
The sep 1 11.54, 65 2022 [Child J School of g mater.

Step 4 Log in to the standby database suffixed with **slave1** and check whether the VIP is successfully bound.

Figure 3-40 VIP bound successfully



Step 5 Check the status of the MHA Manager. Its status is **stopped**. mha_app1_status

Figure 3-41 Completing a failover

[root@mha-mysql-slave2 ~]# mha_app1_status app1 is stopped(2:NOT_RUNNING). [root@mha-mysql-slave2 ~]#

Step 6 Log in to the recipient's mailbox to view the alarm email.

Figure 3-42 Alarm email

 app1: MySQL Master failover 192.168.100.111(192.168.100.111:3306) to 192.168.100.112(192.168.100.112:3306) succeeded

 Recipient

 Master 192.168.100.111(192.168.100.111:3306) is down!

 Check MHA Manager logs at mha-mysql-xyh-slave2:/mha/logs/manager for details.

 Started automated(non-interactive) failover.

 Invalidated master IP address on 192.168.100.111(192.168.100.111:3306)

 Selected 192.168.100.112(192.168.100.112:3306) as a new master.

 192.168.100.112(192.168.100.112:3306): OK: Adplying all logs succeeded.

 192.168.100.112(192.168.100.112:3306): OK: Slave started, replicating from 192.168.100.112(192.168.100.112:3306)

```
192.168.100.112(192.168.100.112:3306): Resetting slave info succeeded.
Master failover to 192.168.100.112(192.168.100.112:3306) completed successfully.
```

----End

Rectifying a Fault

Step 1 Restart the MySQL service for the original primary database and add it to the cluster as a standby database. (The IP address of the primary database has been updated.)

```
systemctl start mysqld.service
mysql -uroot
> CHANGE MASTER TO
MASTER_HOST='192.168.100.112',
MASTER_USER='repl',
MASTER_PASSWORD=' Password',
MASTER_PORT=3306,
MASTER_CONNECT_RETRY=10,
MASTER_AUTO_POSITION=1;
> START SLAVE;
> SHOW SLAVE STATUS\G;
```

Step 2 Modify the MHA Manager configuration file to add the original primary database to the cluster.

vim /datadisk/mha/conf/app1.cnf [server1] candidate_master=1 check_repl_delay=0 hostname=192.168.100.111 port=3306

Step 3 Restart the MHA service.

mha_app1_start mha_app1_status

----End

Performing a Manual Switchover

Before performing a switchover, stop the MHA service.

mha_app1_stop

Run the following command on the MHA Manager to switch the primary and standby databases online:

masterha_master_switch --conf=/datadisk/mha/conf/app1.cnf --master_state=alive -new_master_host=192.168.100.111 --orig_master_is_new_slave --running_updates_limit=10000 --

interactive=0

If the information "Switching master to 192.168.0.111(192.168.0.111:3306) completed successfully." is displayed, the switchover is successful.

Figure	3-43	Performing	а	switchover	online
--------	------	------------	---	------------	--------

Enabling the VIP - 192.168.100.99/24 on new master: 192.168.100.111						
Stabled the VIP successfully						
Thu Son 1 11-52-11 2022 - [info] ok						
Thu Sep 1 11:52:11 2022 - [info] * Switching slaves in parallel.						
Thu Sep 1 11:52:11 2022 - [info]						
Thu Sep 1 11:52:11 2022 - [info] Slave switch on host 192.168.100.113(192.168.100.113:3306) started, pid: 15196						
Thu Sep 1 11:52:11 2022 - [info]						
Thu Sep 1 11:52:13 2022 - [info] Log messages from 192.168.100.113						
Thu Sep 1 11:52:13 2022 - [into]						
Thu Sep 1 11:52:11 2022 - [unfo] Walting to execute all relay logs on 192.168.100.113(192.168.100.113(3306).						
Inu Sep 1 11:52:11 2022 - [unfo] master_pos_watt(mysqt_bin.000003:194) completed on 192.168.100.113(192.168.100.113:3306). Executed 0 events.						
Thu Sep 1 11:52:11 2022 - [Unit] dome.						
This sen i 11:52:12 2022 [Jinfa] Executed (HANGE MASTER.						
Thu Sep 1 11:52:12 2022 - [info] Slave started.						
Thu Sep 1 11:52:13 2022 - [info] End of log messages from 192.168.100.113						
Thu Sep 1 11:52:13 2022 - [info]						
Thu Sep 1 11:52:13 2022 - [info] Slave switch on host 192.168.100.113(192.168.100.113:3306) succeeded.						
Thu Sep 1 11:52:13 2022 - [info] Unlocking all tables on the orig master:						
Thu Sep 1 11:52:13 2022 - [info] Executing UNLOCK TABLES						
Thu Sep 1 11:52:13 2022 - [info] ok.						
Inu Sep 1 11:52:13 2022 - Lunio Starting originaster as a new stave.						
Into Sep 1 11:52:13 2022 - Linfol Resetting Stave 192.108.100.112(192.108.100.112(192.108.100.112(192.108.100.111(192.100.111(192.108.100.111(192.100.1110(100.111(100.1100.1110(100.1100.111(100.						
Thu San 1 11:52:13 2022 - [UTO] EXECUTED CHARGE WASTER.						
Thu Sen 1 11:52:14 2022 - [uno] state stated.						
Thu Sep 1 11:52:14 2022 - [info]						
Thu Sep 1 11:52:14 2022 - [info] * Phase 5: New master cleanup phase						
Thu Sep 1 11:52:14 2022 - [info]						
Thu Sep 1 11:52:14 2022 - [info] 400-460-400-444 Benetting alave info succeeded						
Thu Sep 1 11:52:14 2022 - [info] Switching master to 192.168.100.111(192.168.100.111:3306) completed successfully.						
[root@mha-mysql-slave2 ~]#						

Check whether the VIP is bound to the new primary database (192.168.100.111).

ifconfig

Restart MHA on the ECS where MHA Manager is installed.

mha_app1_start mha_app1_status

3.4 Quick Uninstallation

Deleting the Solution

Step 1 Log in to Resource Formation Service (RFS) console, locate the resource stack created for the solution, and click Delete in the Operation column. In the displayed Delete Stack dialog box, enter Delete and click OK to uninstall the solution.

Figure 3-44 Delete Stack dialog box



----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.
- **Cloud server group**: A cloud server group allows you to create cloud servers on different hosts to improve service reliability. With the anti-affinity policy supported, cloud servers in the same cloud server group are deployed on different hosts for higher service reliability.
- **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.
- MHA: MHA performs automated failover and standby-to-primary promotion with minimal downtime, usually within 10-30 seconds. MHA prevents replication consistency problems and saves on expenses of having to acquire additional servers. All this with zero performance degradation, no complexity (easy-to-install) and requiring no change to existing deployments.

5 Change History

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