Solution

Migration of Oracle RAC to Cloud

Issue 1.0.0

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Contents

1 Solution Overview

Scenarios

This solution enables you to easily deploy the basic environment for your core database. It helps speed up your digital transformation and provides a highly reliable and high-performance database. This solution can be used for migrating core database workloads to the cloud.

Architecture

This solution uses Elastic Cloud Server (ECS) and shared **Elastic Volume Service (EVS)** disks to provide secure and reliable compute, storage, and network resources for your core database. The following figure shows the deployment architecture.

Figure 1-1 Architecture
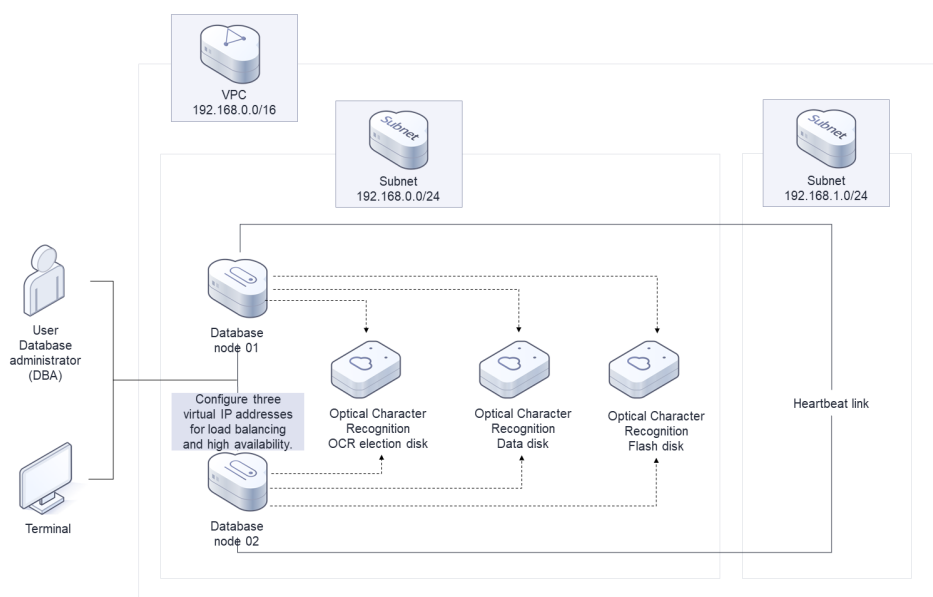
This solution will:

- Create two ECSs for deploying database nodes.
- Attach two NICs to each ECS. One NIC is for public network communication and the other for private network communication.
- Create six shared SCSI **EVS** disks, three for OCR election, one for MGMTDB database, one for data disks, and the last one for flash disks.
- Attach the six shared SCSI EVS disks to the two database nodes.
- Create three virtual IP addresses and bind them to the two core database nodes.

Advantages

- Easy deployment

  This solution helps you easily deploy a basic environment for your database and reduces the deployment period from two days to one hour.

- High availability

  Highly Available IP (HAIP) is enabled on the public and private networks to ensure stable running of your database on the cloud.

- High performance

  A shared EVS disk supports concurrent access from different ECSs. The random IOPS of a shared EVS disk can reach up to 160,000.

Constraints

- Before deploying this solution, ensure that you have an account with access to the target region.

2 Resource Planning and Costs

This solution deploys the resources listed in **Deployment on ECSs (Yearly/Monthly + Pay-per-use)**. The costs are estimates and may differ from the final prices. For details, see **Pricing details**.

Deployment on ECSs (Yearly/Monthly + Pay-per-use)

Table 2-1 Resource planning and prices — ECSs (yearly/monthly)

Huawei Cloud Service	Description	Monthly Cost
Elastic Cloud Server (ECS)	- Region: AP-Singapore - Billing Mode: Yearly/Monthly - Type: General computing-plus | c6.2xlarge.4 | 8 vCPUs | 32 GiB - System Disk: Ultra-high I/O | 150 GB - Required Duration: 1 month - Quantity: 2	$272.38 USD x 2 = $544.76 USD
Elastic IP (EIP)	- Pay-per-use: $0.12 USD/GB - Region: AP-Singapore - Billing Mode: Pay-per-use - Routing Type: Dynamic BGP - Billed By: Traffic - Bandwidth: 100 Mbit/s - EIP Quantity: 2	You are billed based on the total amount of traffic going out of the cloud. If an EIP is not released, it will still be billed even if it is not bound to an instance.

Elastic Volume Service (EVS)	• Region: AP-Singapore • Billing Mode: Yearly/Monthly • Disk Capacity: 200 GB | Ultra-high I/O • Quantity: 1	$40.80 USD
Elastic Volume Service (shared)	• Billing Mode: Yearly/Monthly • Disk Capacity: 10 GB | Extreme SSD | shared | SCSI • Quantity: 6	$4.48 USD x 6 = $26.88 USD
Total	-	$612.44 USD + Fees billed by actual traffic you use

Table 2-2 Resource planning and prices — ECSs (pay-per-use)

Huawei Cloud Service	Description	Monthly Cost
Elastic Cloud Server (ECS)	• Pay-per-use: $0.50 USD/hour • Region: AP-Singapore • Billing Mode: Pay-per-use • Type: General computing-plus | c6.2xlarge.4 | 8 vCPUs | 32 GiB • System Disk: Ultra-high I/O | 150 GB • Quantity: 2	$0.50 USD x 24 x 30 x 2 = $720 USD
Elastic IP (EIP)	• Pay-per-use: $0.12 USD/GB • Region: AP-Singapore • Billing Mode: Pay-per-use • Routing Type: Dynamic BGP • Billed By: Traffic • Bandwidth: 100 Mbit/s • EIP Quantity: 2	You are billed based on the total amount of traffic going out of the cloud. If an EIP is not released, it will still be billed even if it is not bound to an instance.
Elastic Volume Service (EVS)	• Region: AP-Singapore • Billing Mode: Pay-per-use • Disk Capacity: 200 GB | Ultra-high I/O • Quantity: 1	$0.06 USD x 24 x 30 = $43.2 USD

Elastic Volume Service (shared)	● Billing Mode: Pay-per-use ● Disk Capacity: 10 GB | Extreme SSD | shared | SCSI ● Quantity: 6	$0.01 USD x 24 x 30 x 6 = $43.2 USD
Total	-	$806.4 USD + Fees billed by actual traffic you use

3 Procedure

3.1 Preparations

Creating the rf_admin_trust Agency

Step 1 On the Huawei Cloud official website, log in to the **console**. Hover over the account name and choose **Identity and Access Management**.
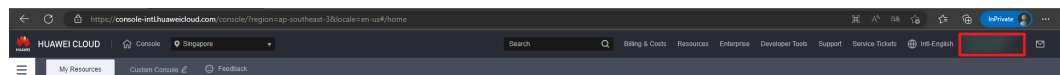
Figure 3-1 Console page

Figure 3-2 Identity and Access Management
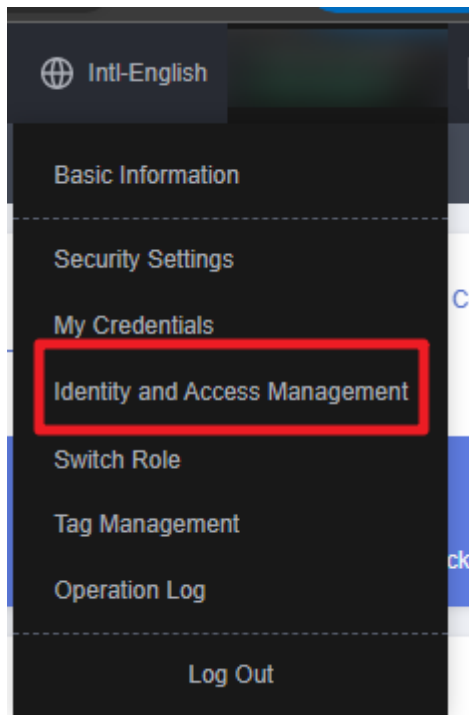
Step 2 Choose **Agencies** and then search for the **rf_admin_trust** agency in the right pane.

Figure 3-3 Agencies
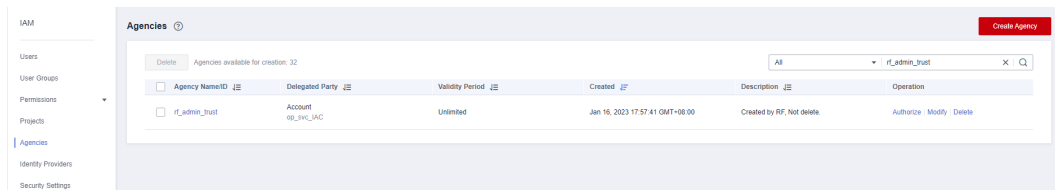
- If the agency is found, skip the following steps.
- If the agency is not found, perform the following steps.

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 Creating an agency

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

Figure 3-5 Selecting a policy

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

Figure 3-6 Selecting a scope

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

Figure 3-7 Agencies
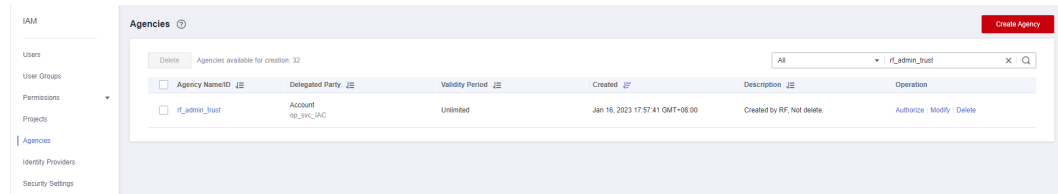
----End

Obtaining IDs of the Associated Subnets

Step 1 On the **Huawei Cloud console**, choose **Virtual Private Cloud**. In the navigation pane on the left, click **Subnets** and obtain IDs of the associated subnets.

Figure 3-8 Logging in to **Virtual Private Cloud**

Figure 3-9 Obtaining the IDs of the associated subnets

----End

3.2 Quick Deployment

This section describes how to deploy the **Migration of Oracle RAC to Cloud** solution.

Table 3-1 Parameters for a new VPC

Parameter	Type	Mandatory	Description	Default Value

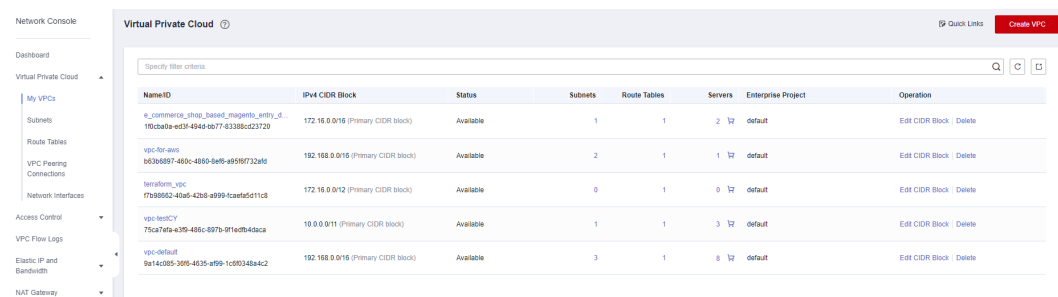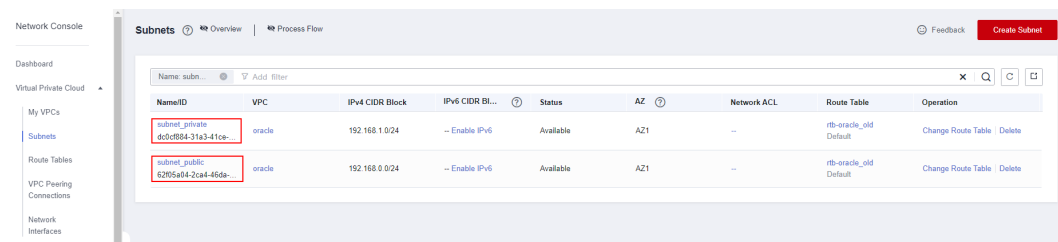| availability _zone	string	Yes	AZ where the solution is deployed. For details, see **Regions and Endpoints**.	ap-southeast-3a
oracle_vers ion	string	Yes	Oracle database version. Currently, 11g, 12c, and 19c are supported.	11g
vpc_name	string	Yes	VPC name. This template uses a newly created VPC and the VPC name must be unique. The name contains 1 to 56 characters, including letters, digits, underscores (_), hyphens (-), and periods (.).	oracle_rac_in_cloud _ecs_new_vpc_dem o
vpc_cidr	string	Yes	VPC CIDR block. Value range: 10.0.0.0/8–24, 172.16.0.0/12–24, 192.168.0.0/16–24.	192.168.0.0/16
subnet_pu blic_cidr	string	Yes	Public subnet CIDR block. Value range: 10.0.0.0/8–24, 172.16.0.0/12–24, 192.168.0.0/16–24.	192.168.0.0/24
subnet_pri vate_cidr	string	Yes	Private subnet CIDR block. Value range: 10.0.0.0/8–24, 172.16.0.0/12–24, 192.168.0.0/16–24.	192.168.1.0/24
public_ip_1	string	Yes	Private IP address of the public subnet NIC of the first ECS. Value range: the IP addresses within the CIDR block of the public subnet.	192.168.0.2
public_ip_2	string	Yes	Private IP address of the public subnet NIC of the second ECS. Value range: the IP addresses within the CIDR block of the public subnet.	192.168.0.3
private_ip_ 1	string	Yes	Private IP address of the private subnet NIC of the first ECS. Value range: the IP addresses within the CIDR block of the private subnet.	192.168.1.2
private_ip_ 2	string	Yes	Private IP address of the private subnet NIC of the second ECS. Value range: the IP addresses within the CIDR block of the private subnet.	192.168.1.3

scan_vip	string	Yes	Virtual IP address of the public subnet NIC of all ECSs. Value range: the IP addresses within the CIDR block of the public subnet.	192.168.0.4
vip_1	string	Yes	Virtual IP address of the public subnet NIC of all ECSs. Value range: the IP addresses within the CIDR block of the public subnet.	192.168.0.5
vip_2	string	Yes	Virtual IP address of the public subnet NIC of all ECSs. Value range: the IP addresses within the CIDR block of the public subnet.	192.168.0.6
security_group_name	string	Yes	Security group name. This template uses a newly created security group. For details about how to modify security group rules, see **(Optional) Modifying Security Group Rules**. The name contains 1 to 64 characters, including letters, digits, underscores (_), hyphens (-), and periods (.).	oracle_rac_in_cloud_ecs_new_vpc_demo
ecs_name	string	Yes	ECS name, which must be unique. The name consists of 1 to 52 characters, only including letters, digits, underscores (_), hyphens (-), and periods (.).	oracle_rac_in_cloud_ecs_new_vpc_demo
ecs_image	string	Yes	ECS OS image. For more OS images, see **OSs Supported by Different Types of ECSs**.	CentOS 7.6 64bit
image_visibility	string	Yes	Image type. The value can be public (public image), private (private image), or shared (shared image).	public
ecs_flavor	string	Yes	ECS flavor. For more flavors, see **A Summary List of x86 ECS Specifications**.	c6.2xlarge.4

password	string	Yes	Password for ECS login and Oracle user. After this solution is deployed, reset the password by following the operations provided in **Resetting the Password for Logging In to an ECS on the Management Console**. The password contains 8 to 26 characters, including 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.	Left blank
system_disk_size	number	Yes	System disk volume of the ECS. The value ranges from **40** to **1,024** in the unit of GB.	150
data_disk_size	number	Yes	Dedicated data disk attached to the first ECS. The value ranges from **10** to **32,768** in the unit of GB.	200
charging_mode	string	Yes	Billing mode of the ECS and EVS. The value can be **prePaid** (yearly/monthly) or **postPaid** (pay-per-use).	postPaid
period_unit	string	Yes	Subscription period unit of ECSs and EVS disks. This parameter is valid only when **charging_mode** is set to **prePaid** (yearly/monthly). The value can be **month** or **year**.	month
period	number	Yes	Subscription period unit of ECSs and EVS disks. This parameter is valid only when **charging_mode** is set to **prePaid** (yearly/monthly). If **period_unit** is set to **month**, the value ranges from **1** to **9**. If **period_unit** is set to **year**, the value ranges from **1** to **3**.	1
evs_volume_type	string	Yes	EVS data disk type. The value can be **ESSD** (Extreme SSD) or **SSD** (ultra-high I/O).	ESSD

evs_data_c ount	num ber	Yes	Number of data disks. They are used as database data disks. The value ranges from **1** to **10**.	1
evs_data_si ze	num ber	Yes	Data disk volume. The value ranges from **10** to **32,768** in the unit of GB.	10
evs_flash_c ount	num ber	Yes	Number of flash disks. They are used as database flash disks. The value ranges from **1** to **10**.	1
evs_flash_s ize	num ber	Yes	Flash disk volume. The value ranges from **10** to **32,768** in the unit of GB.	10
evs_ocr_co unt	num ber	Yes	Number of OCR data disks. The OCR data disks are used for disk election. The value ranges from **1** to **10**.	3
evs_ocr_siz e	num ber	Yes	OCR data disk volume. The OCR data disks are used for disk election. The value ranges from **10** to **32,768** in the unit of GB.	10
evs_mgmt_ count	num ber	Yes	Number of MGMTDB data disks. The data disks are used by the MGMTDB database. The value ranges from **0** to **23**.	1
evs_mgmt_ size	num ber	Yes	MGMTDB data disk volume. The value ranges from **10** to **32,768** in the unit of GB.	10

Table 3-2 Parameters of an existing VPC

| Parameter	Type	Man dato ry	Description	Default Value
availability _zone	strin g	Yes	AZ where the solution is deployed. For details, see **Regions and Endpoints**.	ap-southeast-3a
oracle_vers ion	strin g	Yes	Oracle database version. Currently, 11g, 12c, and 19c are supported.	11g

subnet_public_id	string	Yes	Existing subnet ID (public subnet), which is used for the public network of the Oracle RAC cluster. For details, see **Obtaining IDs of the Associated Subnets**.	Left blank
subnet_private_id	string	Yes	Existing subnet ID (private subnet), which is used for the private network of the Oracle RAC cluster. For details, see **Obtaining IDs of the Associated Subnets**.	Left blank
public_ip_1	string	Yes	Private IP address of the public subnet NIC of the first ECS. Value range: the IP addresses within the CIDR block of the public subnet.	192.168.0.2
public_ip_2	string	Yes	Private IP address of the public subnet NIC of the second ECS. Value range: the IP addresses within the CIDR block of the public subnet.	192.168.0.3
private_ip_1	string	Yes	Private IP address of the private subnet NIC of the first ECS. Value range: the IP addresses within the CIDR block of the private subnet.	192.168.1.2
private_ip_2	string	Yes	Private IP address of the private subnet NIC of the second ECS. Value range: the IP addresses within the CIDR block of the private subnet.	192.168.1.3
scan_vip	string	Yes	Virtual IP address of the public subnet NIC of all ECSs. Value range: the IP addresses within the CIDR block of the public subnet.	192.168.0.4
vip_1	string	Yes	Virtual IP address of the public subnet NIC of all ECSs. Value range: the IP addresses within the CIDR block of the public subnet.	192.168.0.5
vip_2	string	Yes	Virtual IP address of the public subnet NIC of all ECSs. Value range: the IP addresses within the CIDR block of the public subnet.	192.168.0.6

security_gr oup_name	strin g	Yes	Existing security group name.	default
ecs_name	strin g	Yes	ECS name, which must be unique. The name consists of 1 to 52 characters, only including letters, digits, underscores (_), hyphens (-), and periods (.).	oracle_rac_in_clo ud_ecs_demo
ecs_image	strin g	Yes	ECS OS image. For more OS images, see **OSs Supported by Different Types of ECSs**.	CentOS 7.6 64bit
image_visi bility	strin g	Yes	Image type. The value can be public (public image), private (private image), or shared (shared image).	public
ecs_flavor	strin g	Yes	ECS flavor. For more flavors, see **A Summary List of x86 ECS Specifications**.	c6.2xlarge.4
password	strin g	Yes	Password for ECS login and Oracle user. After this solution is deployed, reset the password by following the operations provided in **Resetting the Password for Logging In to an ECS on the Management Console**. The password contains 8 to 26 characters, including 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.	Left blank
system_dis k_size	num ber	Yes	System disk volume of the ECS. The value ranges from **40** to **1,024** in the unit of GB.	150
charging_ mode	strin g	Yes	Billing mode of the ECS and EVS. The value can be **prePaid** (yearly/monthly) or **postPaid** (pay-per-use).	postPaid
period_uni t	strin g	Yes	Subscription period unit of ECSs and EVS disks. This parameter is valid only when **charging_mode** is set to **prePaid** (yearly/ monthly). The value can be **month** or **year**.	month

| period	num ber	Yes	Subscription period unit of ECSs and EVS disks. This parameter is valid only when **charging_mode** is set to **prePaid** (yearly/monthly). If **period_unit** is set to **month**, the value ranges from **1** to **9**. If **period_unit** is set to **year**, the value ranges from **1** to **3**.	1
evs_volum e_type	strin g	Yes	EVS data disk type. The value can be **ESSD** (Extreme SSD) or **SSD** (ultra-high I/O). Default value: **ESSD** (Extreme SSD)	ESSD
evs_data_c ount	num ber	Yes	Number of data disks. They are used as database data disks. The value ranges from **1** to **10**.	1
evs_data_si ze	num ber	Yes	Data disk volume. The value ranges from **10** to **32,768** in the unit of GB.	10
evs_flash_c ount	num ber	Yes	Number of flash disks. They are used as database flash disks. The value ranges from **1** to **10**.	1
evs_flash_s ize	num ber	Yes	Flash disk volume. The value ranges from **10** to **32,768** in the unit of GB.	10
evs_ocr_co unt	num ber	Yes	Number of OCR data disks. The OCR data disks are used for disk election. The value can be **3**, **5**, **7**, or **9**.	3
evs_ocr_siz e	num ber	Yes	OCR data disk volume. The OCR data disks are used for disk election. The value ranges from **10** to **32,768** in the unit of GB.	10
evs_mgmt_ count	num ber	Yes	Number of MGMTDB data disks. The data disks are used by the MGMTDB database. The value ranges from **0** to **23**.	1
evs_mgmt_ size	num ber	Yes	MGMTDB data disk volume. The value ranges from **10** to **32,768** in the unit of GB.	10

Step 1 Log in to Huawei Cloud Solution Best Practices and choose **Migration of Oracle RAC to Cloud**. Click **Deploy (New VPC)** or **Deploy (Existing VPC)**.
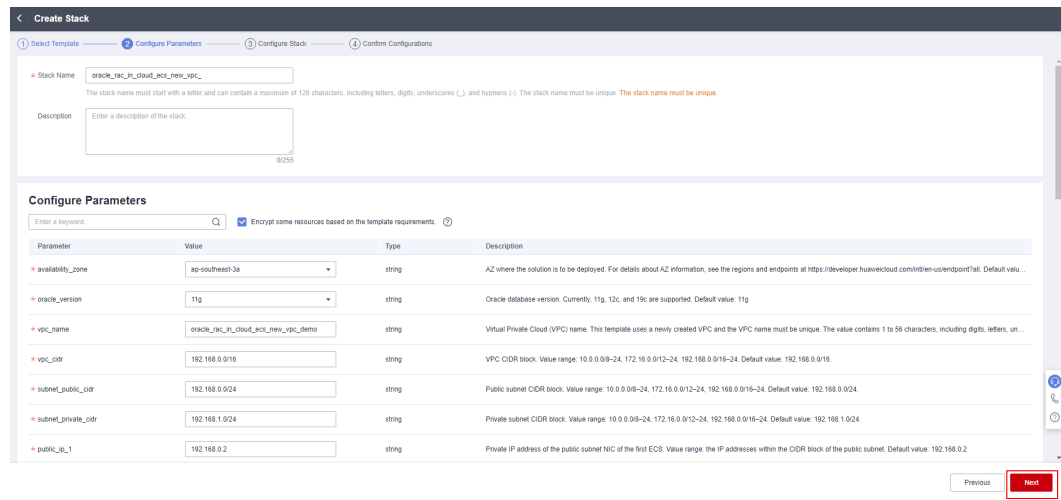
Figure 3-10 Deploying the solution
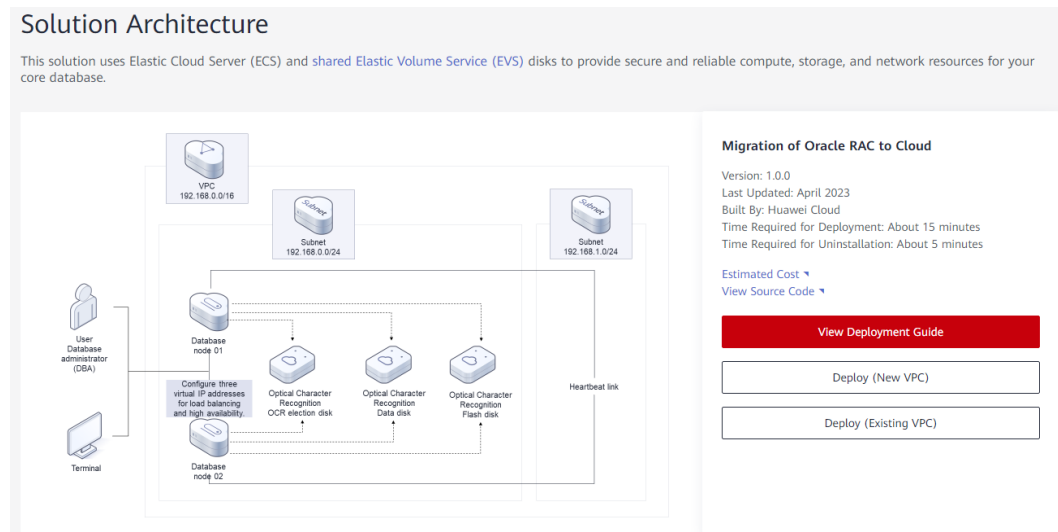
Step 2 On the **Select Template** page, click **Next**.
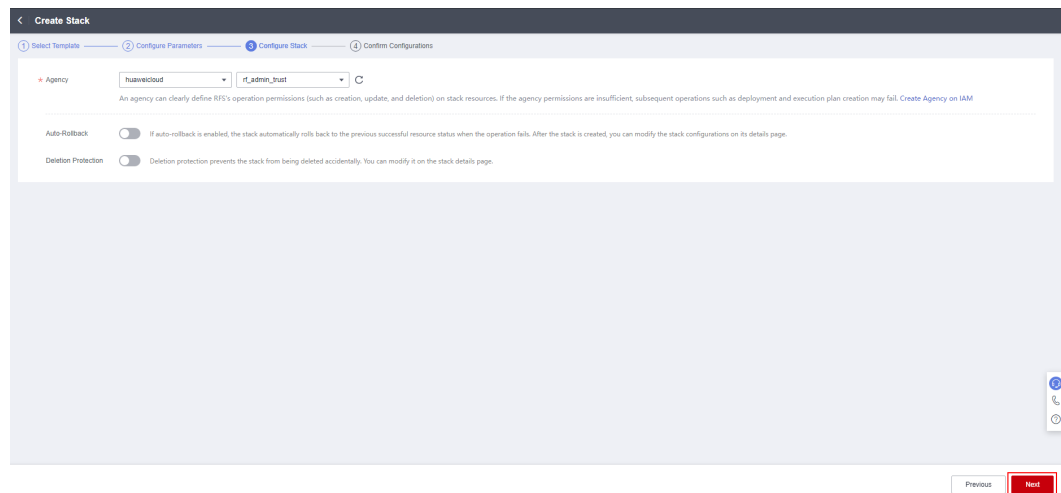
Figure 3-11 Selecting a template
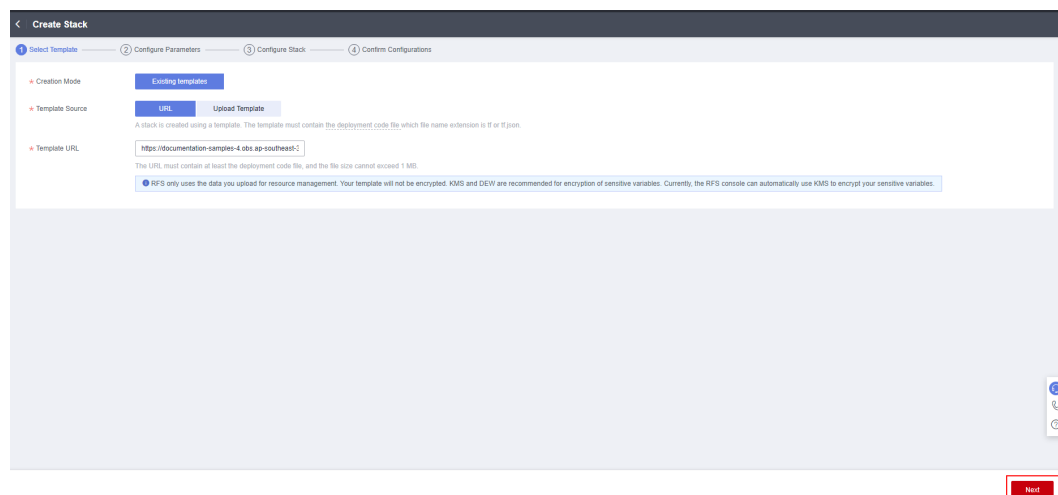
Step 3 On the **Configure Parameters** page, enter a stack name, configure parameters according to **Table 3-1**, and click **Next**.
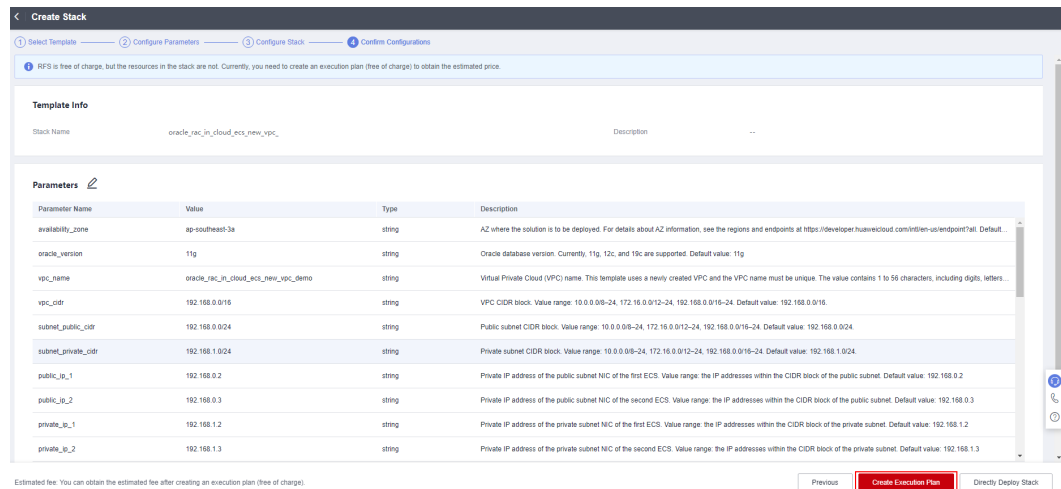
Figure 3-12 Configure parameters

Step 4 On the **Configure Stack** page, select the **rf_admin_trust** agency and click **Next**.
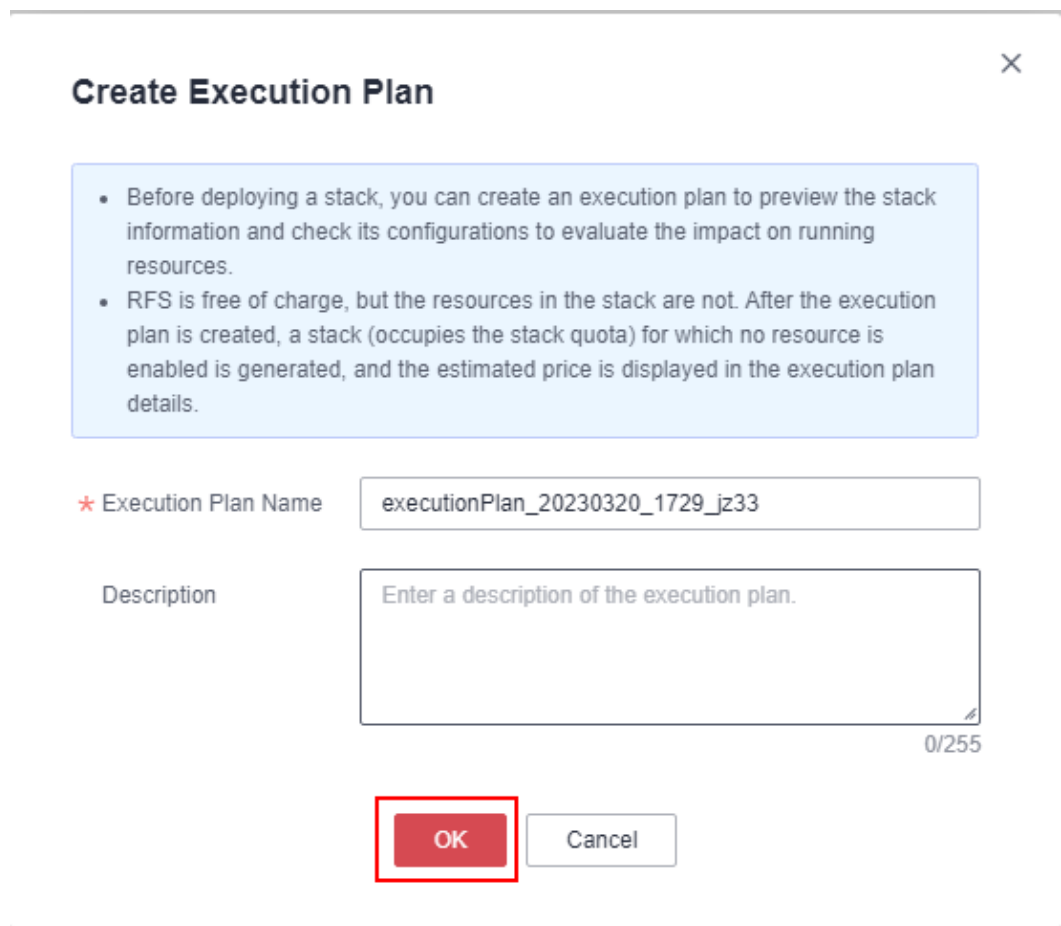
Figure 3-13 Configuring a stack

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

Figure 3-14 Confirming configurations

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

Figure 3-15 Creating an 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**.
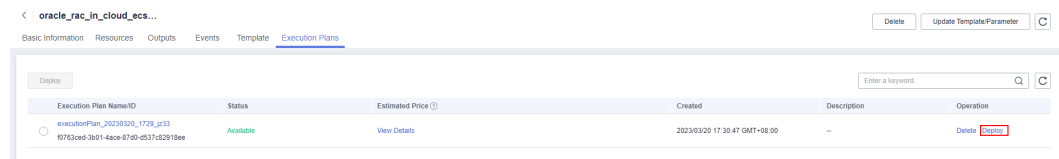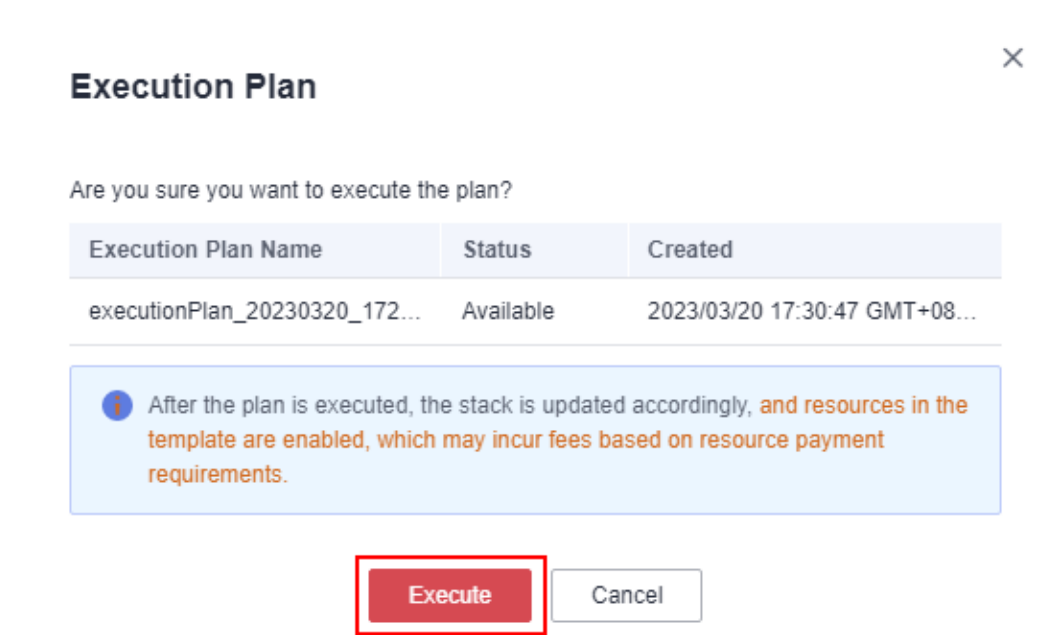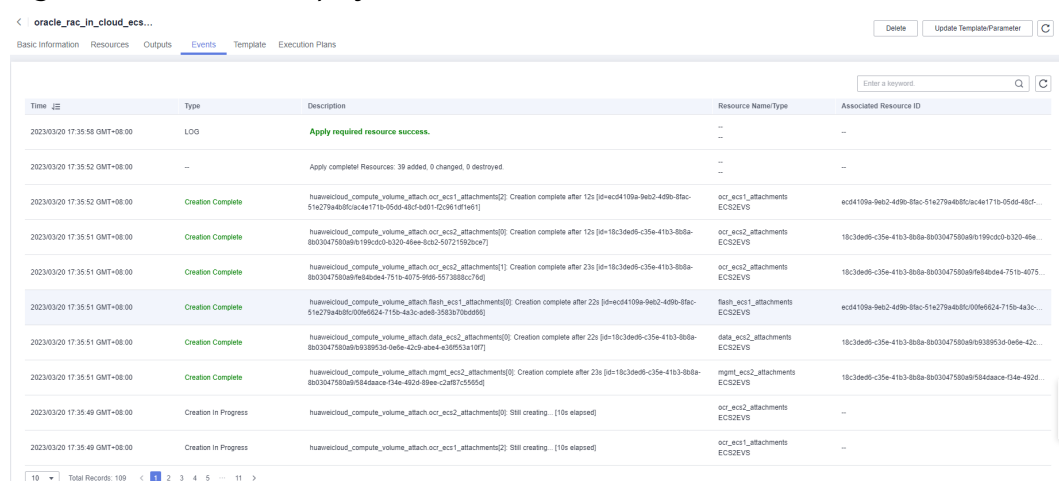
Figure 3-16 Execution plan

Figure 3-17 Confirming the execution plan

Step 8 Click the **Events** tab and check whether the message "Apply required resource success" is displayed. If so, the solution is successfully deployed.

Figure 3-18 Solution deployed

----End

3.3 Getting Started

(Optional) Modifying Security Group Rules

> **NOTICE**
>
> - In this solution, ICMP packets and traffic from port 22 and port 1521 are not allowed to pass through by default. You can add a security group rule to allow access from them.

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 ECSs.

- 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**.
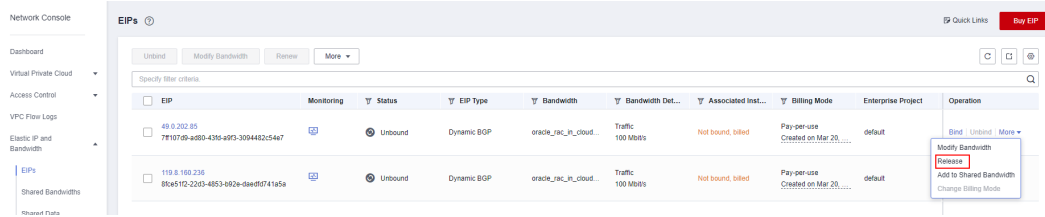
(Optional) Releasing Temporary EIPs

> **NOTE**
>
> The EIPs created in this solution are used for downloading software and can be released if they are no longer required.

Step 1 Log in to the **EIP console**, locate the target EIP, and click **Unbind** in the **Operation** column.
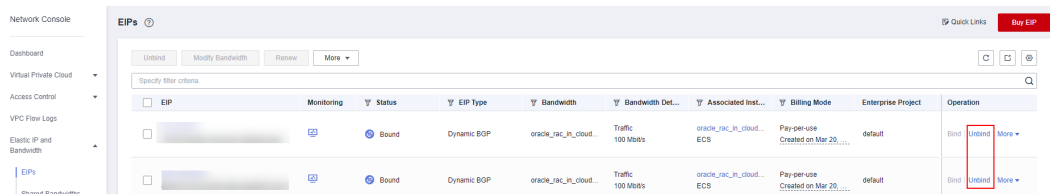
Step 2 After the status of the EIP changes to **Unbound**, choose **More** > **Release**.
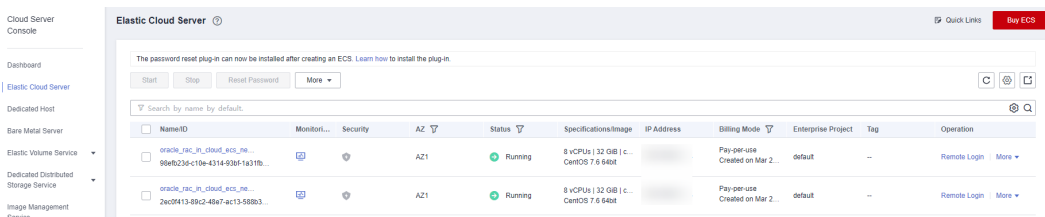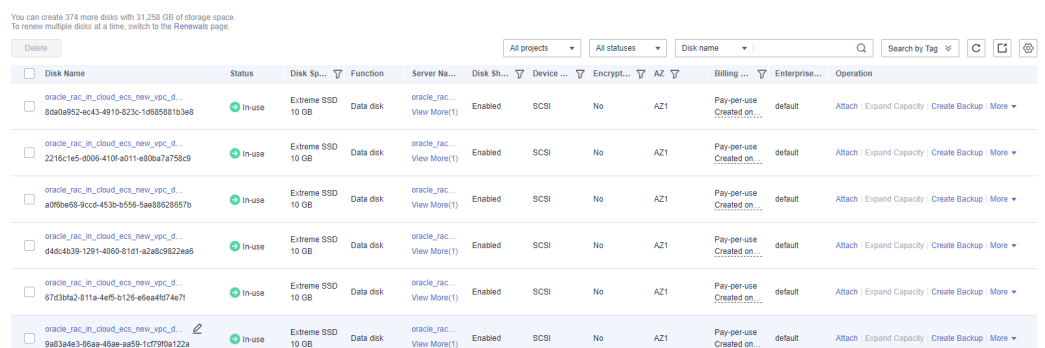
----End

Viewing Deployed Resources

Step 1   Log in to the **ECS console** and view the newly created ECSs.

Figure 3-19 ECS console

Step 2   Log in to the **EVS console** and view the six shared EVS disks that have been created.

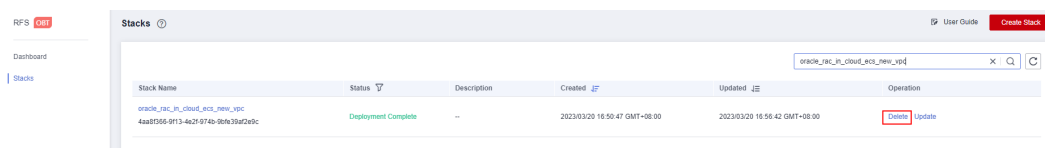**Figure 3-20** EVS console

----End
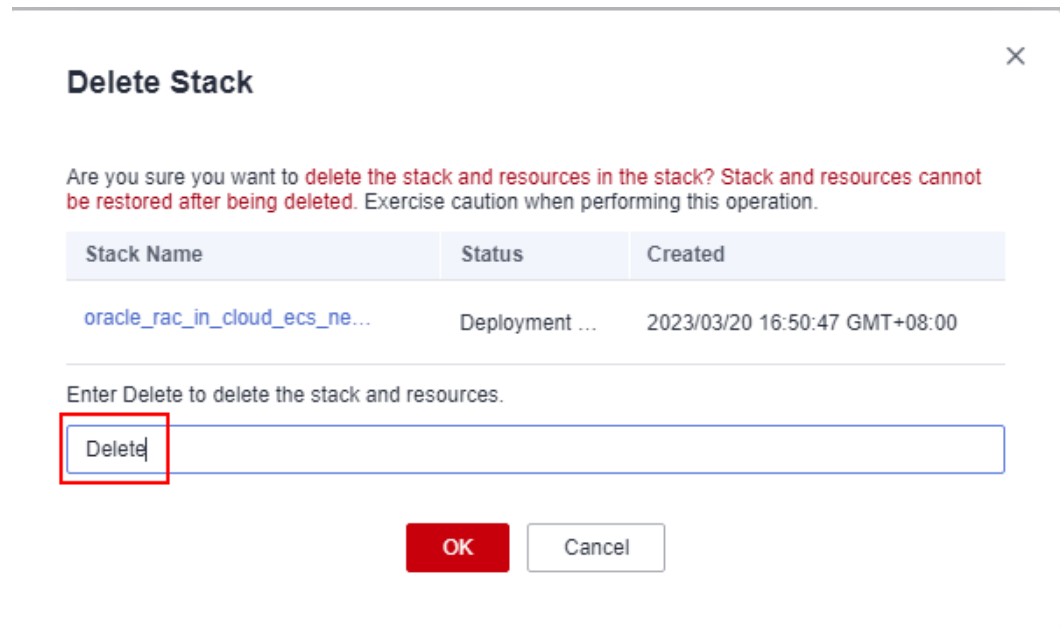
3.4 Quick Uninstallation

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

Figure 3-21 Deleting the solution

Step 2   Enter **Delete** and click **OK**.

Figure 3-22 Confirming the deletion

----End

4 Appendix

Terms

- **Elastic Cloud Server (ECS)**: ECS provides secure, scalable, on-demand compute resources, enabling you to flexibly deploy applications and workloads.

- **Elastic Volume Service (EVS)**: EVS provides highly durable block storage for Huawei Cloud servers such as Elastic Cloud Servers (ECSs) and Bare Metal Servers (BMSs). EVS offers 99.9999999% durability and as little as sub-millisecond read/write latency for a broad range of mission-critical applications.

- **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.

5 Change History

Table 5-1 Change history

Released On	Change History
2023-04-30	This issue is the first official release.