

**Solution**

# **CSS-based SQL Acceleration**

<b>Issue</b>	1.0.0
<b>Date</b>	2025-07-30



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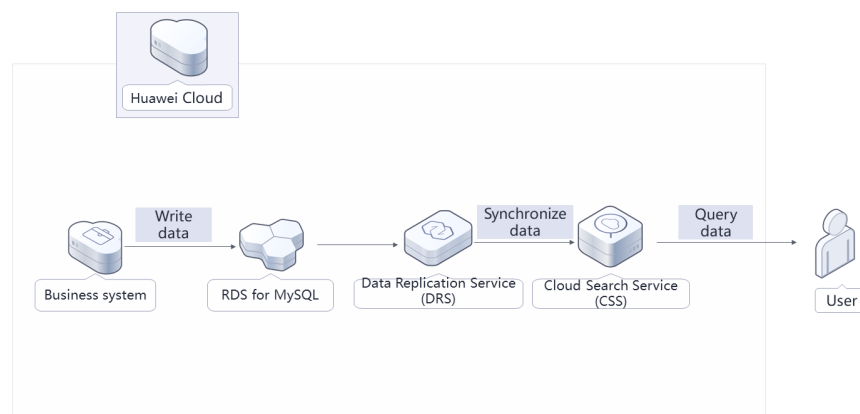
# 1 Solution Overview

## Application Scenarios

Based on Cloud Search Service (CSS), this solution synchronizes MySQL data to CSS in real time. CSS provides stable, low-latency, high-concurrency, and scalable query performance, as well as excellent multi-dimensional query analysis and full-text search capabilities. This solution is applicable to operation departments of e-commerce and logistics to query and analyze offering orders and logistics information from multiple dimensions.

## Solution Architecture

This solution helps you deploy the CSS-based SQL acceleration solution with just a few clicks and quickly complete basic configurations for Relational Database Service (RDS), Data Replication Service (DRS), and CSS.



To use this solution, you need to:

- Create an RDS for MySQL or **GaussDB(for MySQL)** database to store your service data.

- Synchronize RDS data to CSS in real time.
- Create a CSS cluster. CSS is a fully hosted, distributed search service powered by open-source Elasticsearch. It provides high-concurrency and low-latency query and analysis capabilities.

## Advantages

- Ease of use  
This solution is out-of-the-box. You can use DRS to synchronize data in real time without coding or data synchronization tasks.
- High performance  
With the industry-leading vector retrieval engine and composite index capability of CSS, this solution can support full-text retrieval and random multi-dimensional analysis in ad-hoc scenarios.
- Capability expansion  
CSS improves database concurrency, scale-out capability, and complex query (full-text search, fuzzy search, and random multi-dimensional analysis) satisfaction.

## Constraints

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

# 2 Resource Planning and Costs

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

Table 2-1 Resource planning and costs

Product	Configuration Example	Estimated Fee/Month
RDS for MySQL	Pay-per-use: \$0.27 USD/hour <ul style="list-style-type: none"><li>Region: AP-Singapore</li><li>Billing Mode: Pay-per-use</li><li>DB Engine: MySQL</li><li>DB Engine Version: 5.7</li><li>DB Instance Type: Primary/Standby</li><li>Storage: Cloud SSD 100 GB</li><li>DB Instance Class: General-purpose 2 vCPUs   8 GB</li><li>Quantity: 1</li></ul>	\$0.27 USD*24*30=\$194.4 USD
Data Replication Service (DRS)	Pay-per-use: \$0.38 USD/hour <ul style="list-style-type: none"><li>Region: AP-Singapore</li><li>Billing Mode: Pay-per-use</li><li>Task Type: Data Synchronization</li><li>Data Flow: Out of the cloud</li><li>Source DB Engine: MySQL</li><li>Destination DB Engine: CSS/ES</li><li>Network Type: VPC</li><li>Specifications: Medium</li></ul>	\$0.38 USD/hour (The specific cost is estimated based on the actual data transmission volume.)

Product	Configuration Example	Estimated Fee/Month
Cloud Search Service (CSS)	Pay-per-use: \$0.86 USD <ul style="list-style-type: none"><li>Region: AP-Singapore</li><li>Billing Mode: Pay-per-use</li><li>Type: Elasticsearch</li><li>Version: 7.9.3</li><li>Quantity: 3</li><li>Node Specifications: ess.spec-4u8g 4 vCPUs   8 GB</li><li>Storage Type: Ultra-high I/O</li><li>Storage Capacity: 100 GB</li></ul>	\$0.86 USD*24*30=\$619.2 USD
Total	—	\$813.6 USD + Data transfer configuration fee (0.38 USD/GB)



# 3 Procedures

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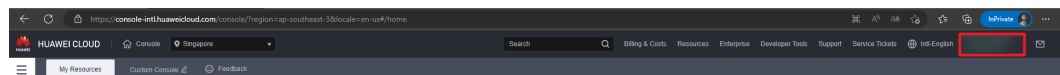
- [3.1 Preparations](#)
- [3.2 Quick Deployment](#)
- [3.3 Getting Started](#)
- [3.4 Quick Uninstallation](#)

## 3.1 Preparations

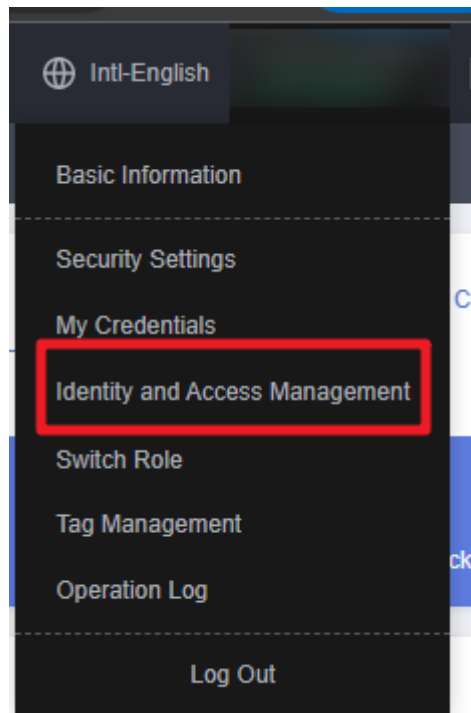
### Creating the rf\_admin\_trust Agency

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

**Figure 3-1** Console

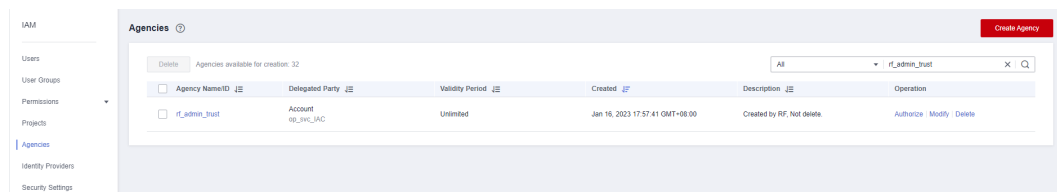


**Figure 3-2** Identity and Access Management



**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**, enter **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**, select it in the search results, and click **Next**.

Figure 3-5 Select Policy/Role

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
<input type="checkbox"/> DME AdministratorAccess Data Model Engine tenant administrator with full permissions.	System-defined policy
<input checked="" type="checkbox"/> Tenant Administrator Tenant Administrator (Exclude IAM)	System-defined role
<input type="checkbox"/> 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

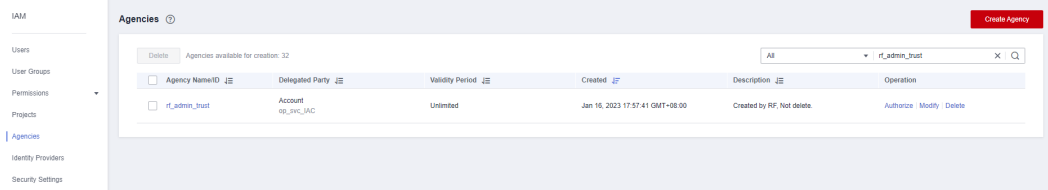
☒ All resources

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 Agencies



----End

### 3.2 Quick Deployment

This section describes how to automatically deploy the CSS-based SQL acceleration solution.

Table 3-1 Parameter description

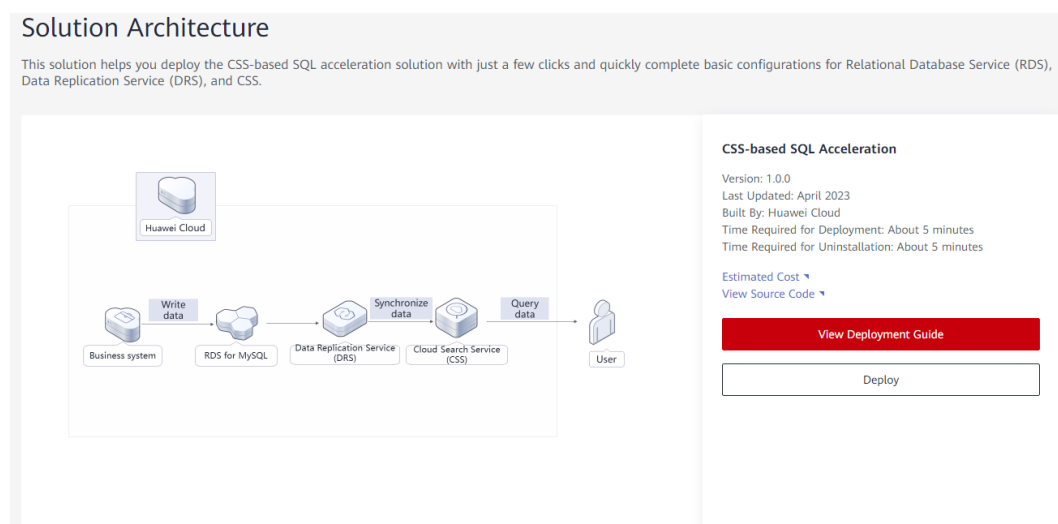
Parameter	Type	Man dator y	Description	Default Value
vpc_name	string	Yes	VPC name. This template uses a newly created VPC and the VPC name must be unique. The name contains 1 to 64 characters, including letters, digits, underscores (_), hyphens (-), and periods (.).	search_acceleration_ based_css_new_vpc_ demo
security_gro up_name	string	Yes	Security group name. This template uses a newly created security group. For details about how to modify a security group rule, see <a href="#">(Optional) Modifying Security Group Rules</a> . The name contains 1 to 64 characters, including letters, digits, underscores (_), hyphens (-), and periods (.).	search_acceleration_ based_css_new_vpc_ demo

css_name	string	Yes	CSS cluster name. The value contains 4 to 32 characters, including digits, letters, hyphens (-), and underscores (_), and must start with a letter.	search_css_new_vpc_demo
css_flavor	string	Yes	CSS cluster specifications. For details about how to configure specifications, see <a href="#">CSS Node Specifications</a> .	ess.spec-4u8g
css_password	string	Yes	CSS password. Value range: 8 to 32 characters, including at least three types of the following characters: uppercase letters, lowercase letters, digits, and special characters. The following special characters are allowed: ~ ! @ # \$ % ^ * - _ = + ? , ( ) &	Left blank
rds_name	string	Yes	RDS database name. The value contains 4 to 64 characters and must start with a letter. It is case sensitive and can contain letters, digits, hyphens (-), and underscores (_). Other special characters are not allowed.	search_acceleration_based_css_new_vpc_demo
rds_flavor	string	Yes	RDS specifications. For details about how to configure specifications, see <a href="#">RDS for MySQL Instance Classes</a> .	rds.mysql.n1.large.4. ha

rds_password	string	Yes	RDS password. Value range: 8 to 32 characters, including at least three types of the following characters: uppercase letters, lowercase letters, digits, and special characters. The following special characters are allowed: ~ ! @ # \$ % ^ * - _ = + ? , ( ) &	Left blank
--------------	--------	-----	---	------------

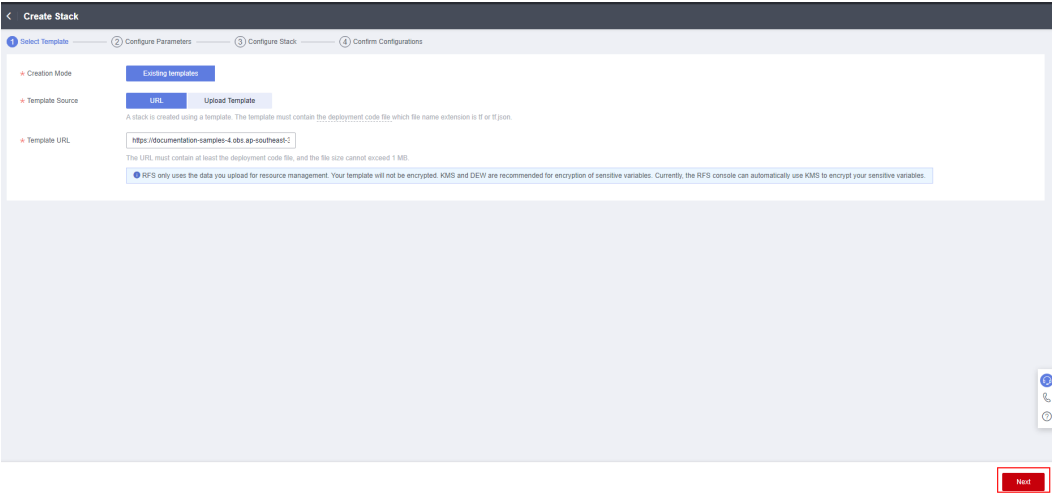
**Step 1** Log in to Huawei Cloud Solution Best Practices and choose **CSS-based SQL Acceleration**. Click **Deploy Now** to switch to the **Create Stack** page.

**Figure 3-8** Deploying the solution



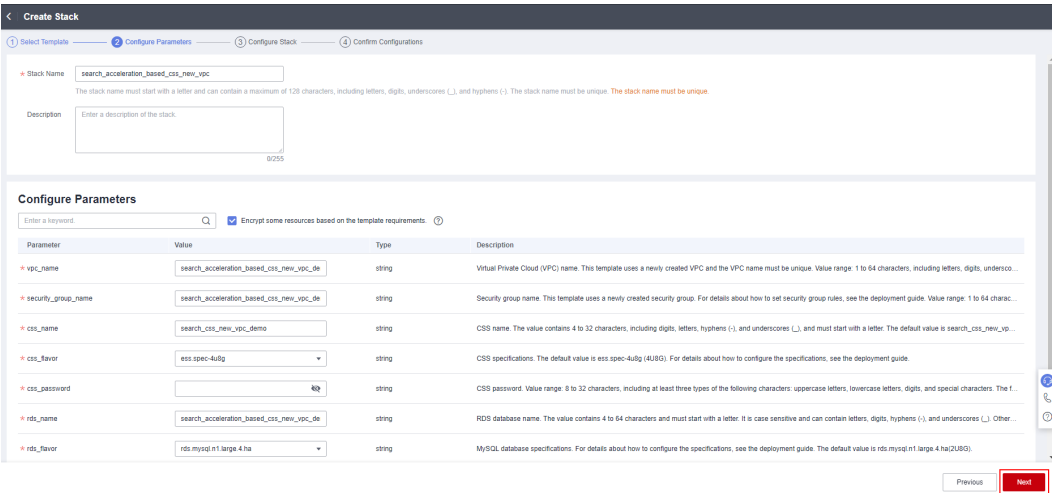
**Step 2** On the **Select Template** page, click **Next**.

Figure 3-9 Selecting a template



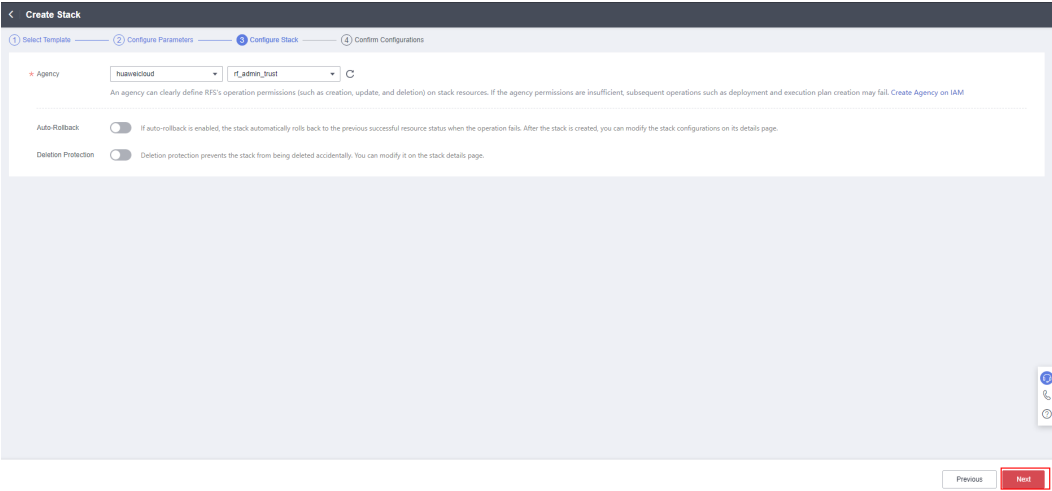
**Step 3** On the **Configure Parameters** page, enter a stack name, configure parameters according to [Table 3-1](#), and click **Next**.

Figure 3-10 Configure parameters



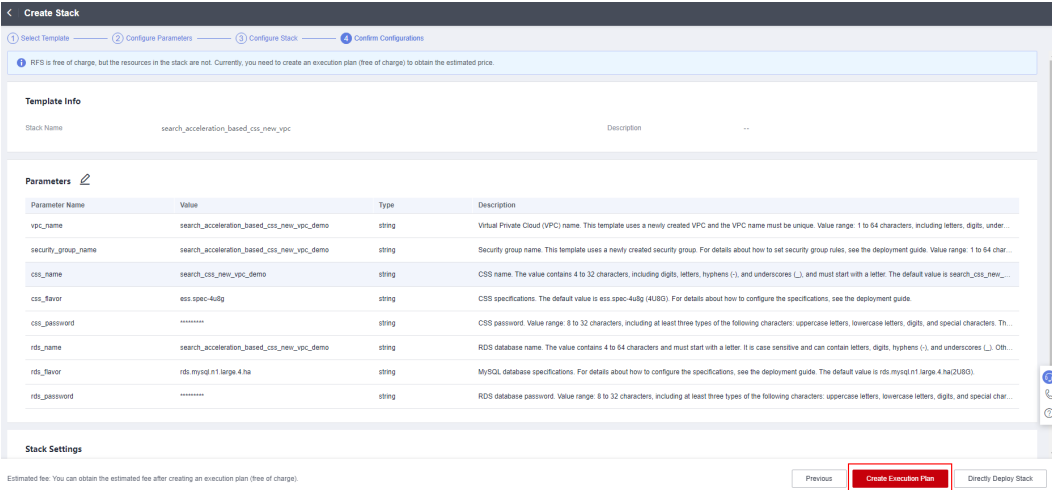
**Step 4** On the **Configure Stack** page, select the **rf\_admin\_trust** agency and click **Next**.

Figure 3-11 Configure Stack



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

Figure 3-12 Confirming the configurations



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



Figure 3-13 Creating an execution plan

Create Execution Plan

- Before deploying a stack, you can create an execution plan to preview the stack information and check its configurations to evaluate the impact on running resources.
- RFS is free of charge, but the resources in the stack are not. After the execution plan is created, a stack (occupies the stack quota) for which no resource is enabled is generated, and the estimated price is displayed in the execution plan details.

★ Execution Plan Name

executionPlan\_20230320\_1120\_sftx

Description

Enter a description of the execution plan.

0/255

OK

Cancel

**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

search\_acceleration\_bas...

Delete

Update Template/Parameter

C

Basic Information

Resources

Outputs

Events

Template

Execution Plans

Deploy

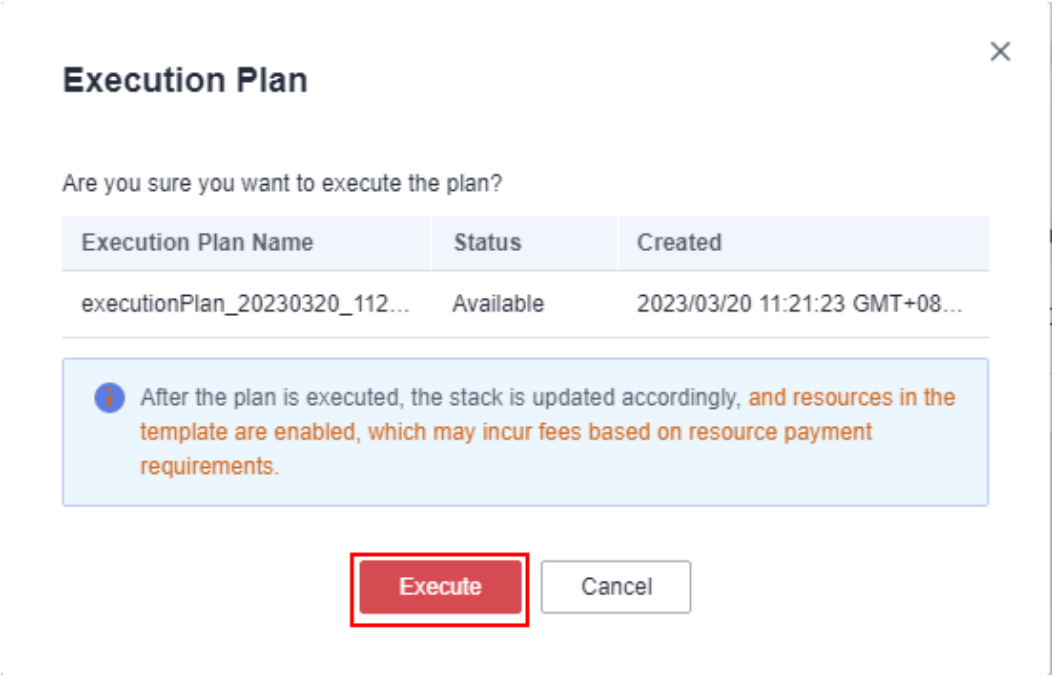
Enter a keyword

Q

C

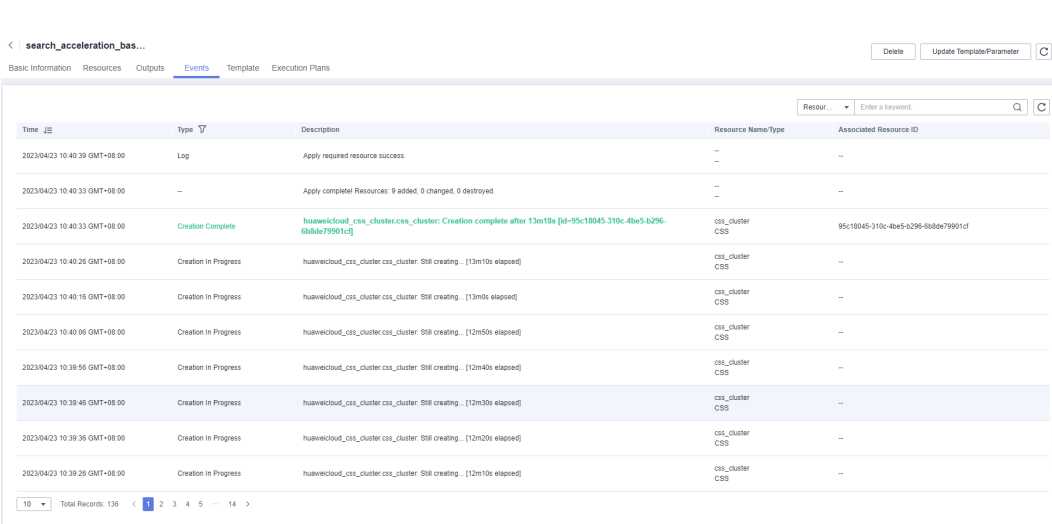
Execution Plan Name/ID	Status	Estimated Price ①	Created	Description	Operation
<div><div></div>executionPlan_20230320_1120_sftx 7af7494e-7207-4d89-b004-54b877674322</div>	Available	<a href="#">View Details</a>	2023/03/20 11:21:23 GMT+08:00	--	<a href="#">Delete</a> <a href="#">Deploy</a>

Figure 3-15 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 3-16 Solution deployed



----End

## 3.3 Getting Started

### (Optional) Modifying Security Group Rules

#### NOTICE

- This solution uses port 3306 to access the database. By default, the VPC subnet created in this solution allows access from port 3306. 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.

You can modify the security group policy, for example, by adding, modifying, or deleting a TCP port, as follows:

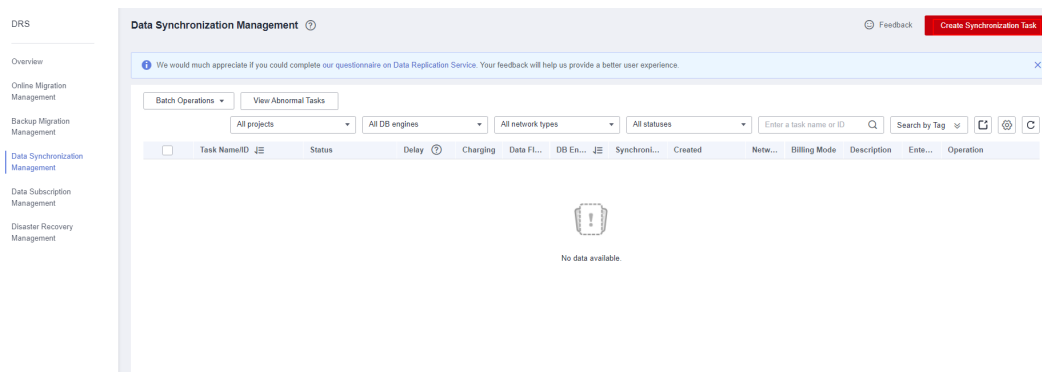
- Adding a security group rule: [Add an inbound rule](#) and enable a TCP port if needed.
- Modifying a security group rule: Inappropriate security group settings can be a serious security risk. You can [modify security group rules](#) to ensure the network security of your ECSs.
- Deleting a security 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](#).

## Synchronizing Data

After the deployment is complete, the MySQL database and CSS cluster are automatically created. This section describes how to configure DRS to synchronize data.

- Step 1** Log in to the [DRS console](#), choose **Data Synchronization Management** from the navigation pane, and click **Create Synchronization Task**.

Figure 3-17 DRS console



- Step 2** Configure the synchronization instance. Select **Out of the cloud** for **Data Flow**, **MySQL** for **Source DB Engine**, **CSS/ES** for **Destination DB Engine**, **VPC** for **Network Type**, select the corresponding MySQL instance name, and select the subnet where the instance to be synchronized resides. Click **Create Now**.

**Figure 3-18** Synchronization Instance Details

**Synchronization Instance Details**

The following information cannot be modified after you go to the next page.

**Data Flow**

To the cloud Out of the cloud Self-built to self-built

Out of the cloud: The source database must be a database in the current cloud.

**Source DB Engine**

MySQL DDM GaussDB Distributed GaussDB Primary/Standby DDS PostgreSQL GaussDB for MySQL

**Destination DB Engine**

MySQL Oracle CSS/ES Kafka

**Network Type**

VPC

**Source DB Instance**

rds-4.mysql.rds.amazonaws.com View DB Instance View Unselectable DB Instance

**Synchronization Instance Subnet**

search\_acceleration\_based\_css\_new\_vpc\_d... View Subnets

**Synchronization Mode**

Full-Incremental

This synchronization type synchronizes data in real time. After a full synchronization initializes the destination database, an incremental synchronization parses logs to ensure data consistency between the source and destination databases.

**Specifications**

Micro Small Medium Large

Micro: up to 300 statements per second Small: up to 3,000 statements per second Medium: up to 7,500 statements per second Large: unlimited

**Enterprise Project**

default View Project Management

Price \$0.38 USD/hour

Create Now

- Step 3** After the synchronization instance is created, configure the source and destination databases, enter the MySQL database username (**root**) and password (set during solution deployment), and click **Test Connection**. Enter the connection IP address of the CSS cluster automatically deployed in the solution (as shown in [Figure 3-20](#)), username (**admin**), and password (set during solution deployment), and click **Test Connection**. Click **Next**.



If the connection fails, check the security group and whitelist as prompted.

**Figure 3-19** Configuring the source and destination databases

**Edit Synchronization Task**

**Source Database**

DB Instance Name: rds-4.mysql.rds.amazonaws.com

Database Username: root

Database Password: [password]

SSL Connection: [toggle]

Test Connection: Test successful

**Destination Database**

VPC: search\_acceleration\_based\_css\_new\_vpc\_d... View VPC

Subnet: search\_acceleration\_based\_css\_new\_vpc\_d... View Subnets

IP Address or Domain Name: 172.16.10.144 9200, 172.16.10.172 9200, 172.16.10.172 1610. Ensure that the entered addresses belong to the same DB instance.

Database Username: admin

Database Password: [password]

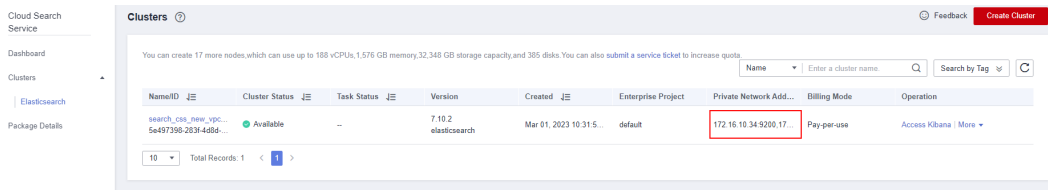
SSL Connection: [toggle]

Test Connection: Test successful

Price \$0.38 USD/hour

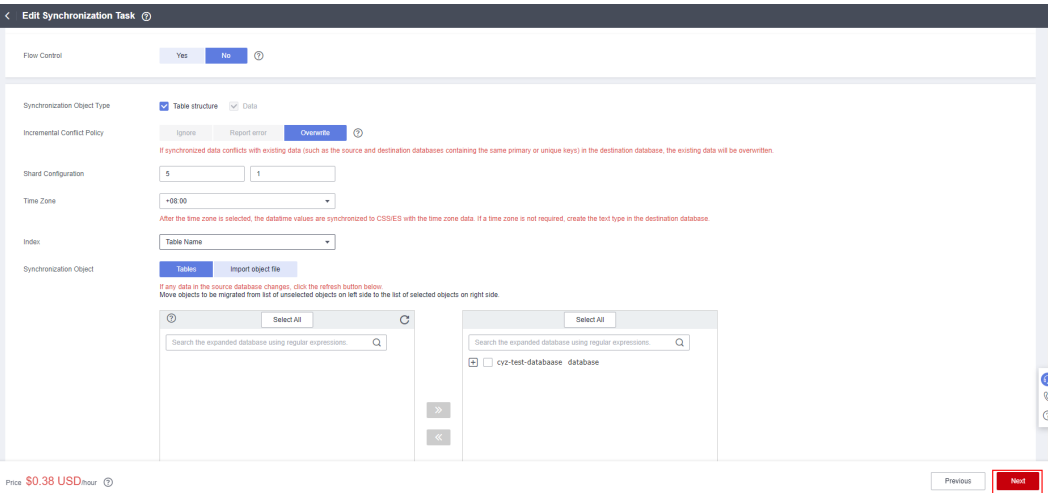
Previous Next

Figure 3-20 Obtaining the connection IP address of the destination database



Step 4 Select synchronization objects, click the right arrow, and click **Next**.

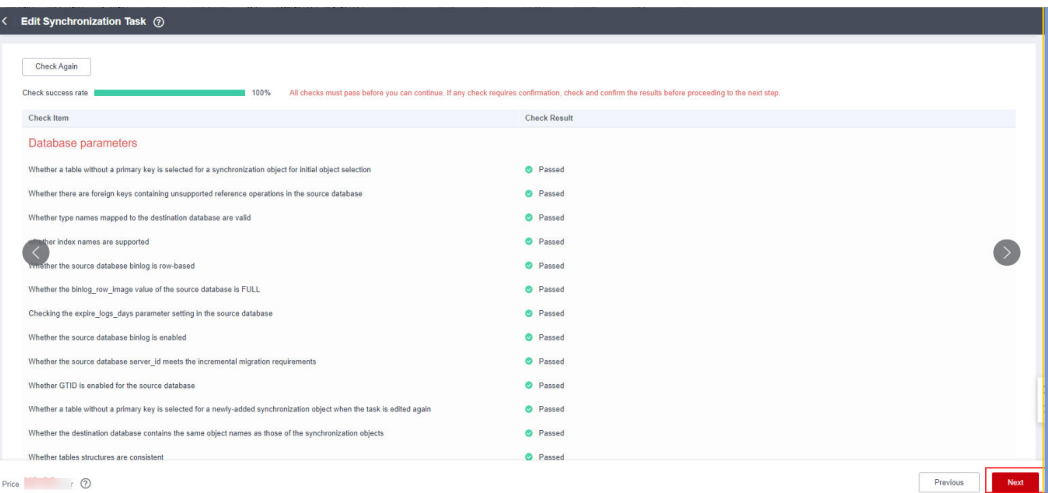
Figure 3-21 Edit Synchronization Task



Step 5 Select a data processing method as required. This solution instance does not require data processing. Click **Next**.

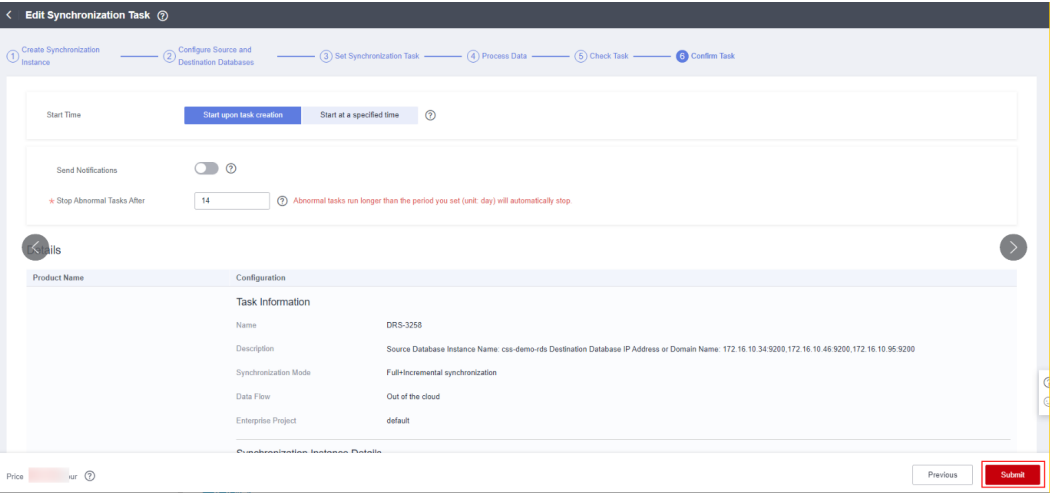
Step 6 Perform a pre-check, wait until the pre-check is complete, and click **Next**.

Figure 3-22 Performing a pre-check



Step 7 Click **Submit**. Wait until the full synchronization is completed and the incremental synchronization is started.

Figure 3-23 Confirming the task



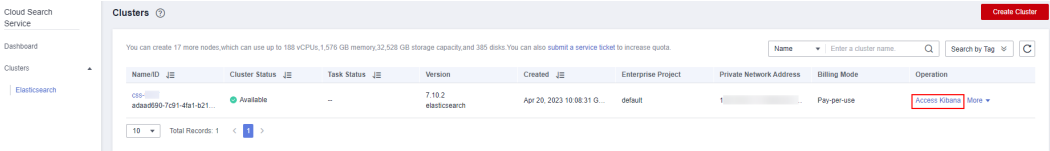
----End

## Query Test

This section describes how to use CSS to query data.

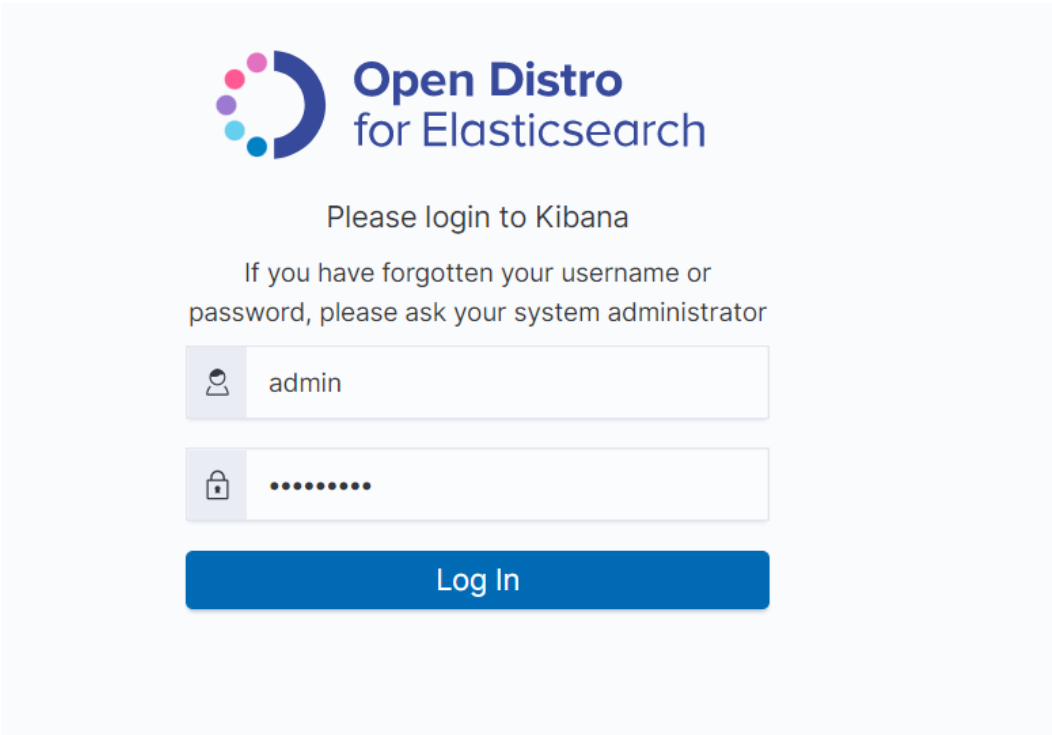
- Step 1** Log in to [CSS console](#). On the cluster management page, click **Kibana** in the **Operation** of the cluster created in this solution. The Kibana page is displayed.

Figure 3-24 CSS cluster management page



- Step 2** Enter the username (**admin**) and password (set during solution deployment) to log in to Kibana.

Figure 3-25 Logging in to Kibana




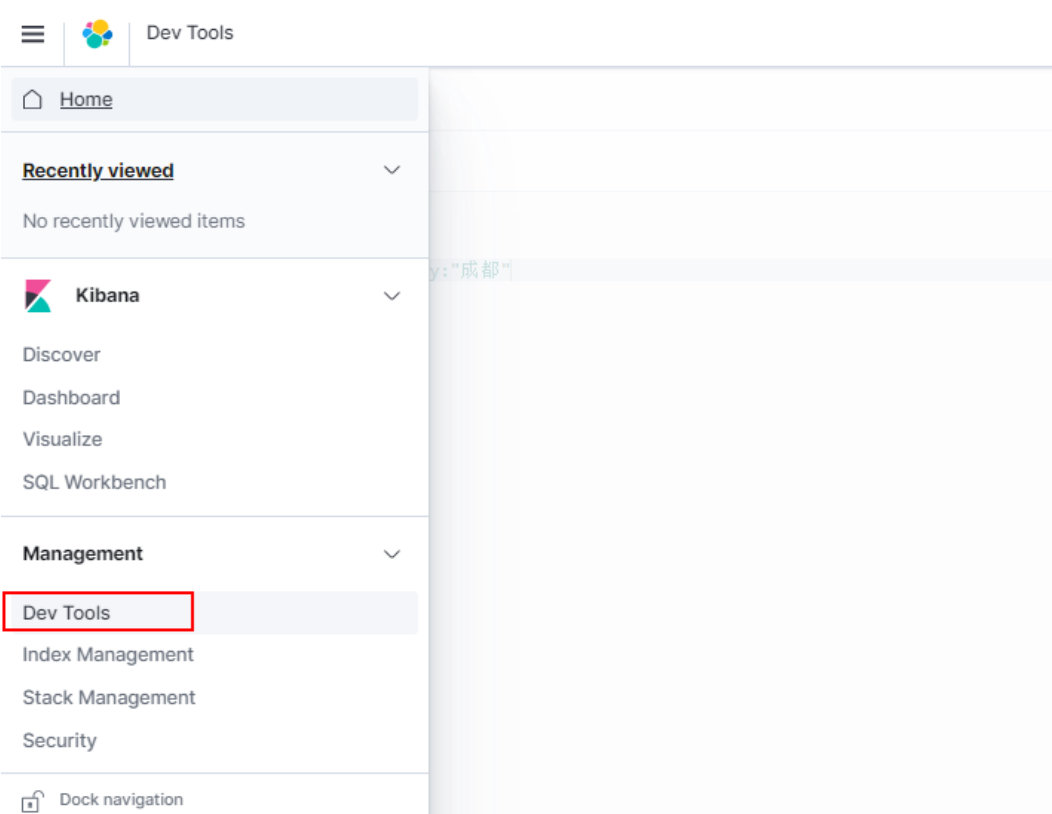
**Step 3** Click  in the upper left corner and choose **Dev Tools**.

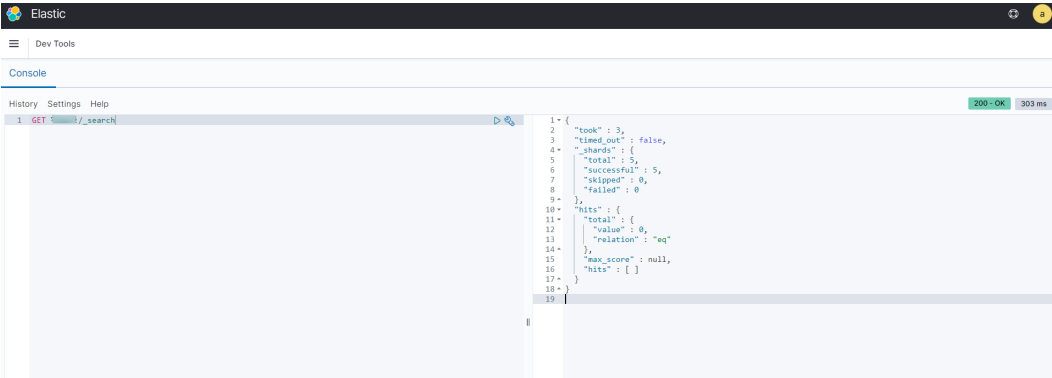
Figure 3-26 Dev Tools



**Step 4** On the debugging page of Dev Tools, run a query statement for debugging.

For example: **GET t\_user\_store\_info/\_search?q=city:"Singapore"** #Query all Singapore merchants in the merchant table.

**Figure 3-27** Query result



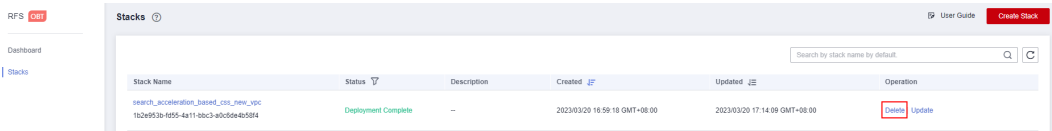
If the query result contains Singapore merchants, the query is successful.

----End

### 3.4 Quick Uninstallation

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

**Figure 3-28** Uninstalling the solution



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



**Figure 3-29** Confirming the uninstallation

×

### Delete Stack

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

Stack Name	Status	Created
search_acceleration_based_...	Deployment ...	2023/03/20 16:59:18 GMT+08:00

Enter Delete to delete the stack and resources.

Delete

OK

Cancel

----End

# 4 Appendix

---

## Terms

- RDS for MySQL: Quickly deploy and scale RDS for MySQL on the cloud - a fully managed database service powered by the world's most popular enterprise-grade open-source relational database system.
- Data Replication Service (DRS) is dedicated to helping you migrate your databases to the cloud with zero downtime. DRS supports migration between homogenous, heterogeneous, distributed, and sharded databases. With DRS, you can integrate and transmit data from and to databases, database warehouses, or various big data services in seconds, giving you a solid foundation for digital transformation.
- Cloud Search Service (CSS) facilitates data-driven O&M and business operations with a distributed search engine that is based on Elasticsearch, but fully hosted on Huawei Cloud. Compatible with Elasticsearch APIs, CSS vector search can help you quickly build AI-based applications involving image search, recommendation, and semantic search.

# 5 Change History

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Table 5-1 Description

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