

**LakeFormation**

# Quick Start

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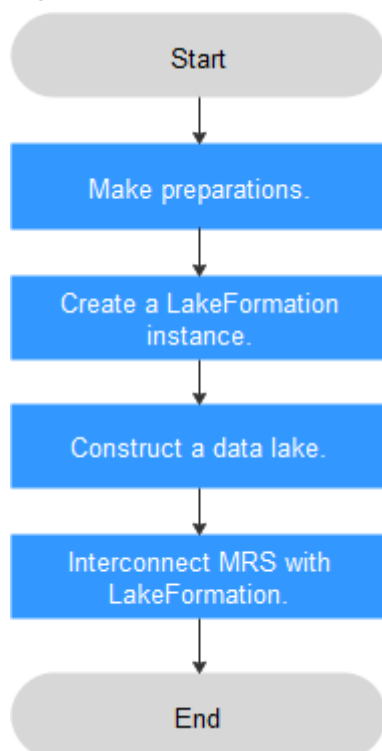
# 1 How to Use LakeFormation

This LakeFormation tutorial describes how to create a LakeFormation instance and interconnect it with MRS clusters to implement unified data lake metadata and permission management.

## General Use Procedure

The following figure shows the procedure of interconnecting MRS with LakeFormation.

**Figure 1-1** Procedure of using LakeFormation



## Restrictions and Constraints

- **Before interconnecting LakeFormation with MRS clusters, pay attention to the following restrictions:**

- MRS clusters and LakeFormation instances must belong to the same cloud account and region.
- The VPC where the access client created by LakeFormation resides must be in the same VPC as MRS clusters.
- The MRS cluster can only interconnect with the catalog named **hive** in the LakeFormation instance.
- For existing MRS clusters, you need to migrate the metadata database and permission policies to the LakeFormation instance, and then configure the interconnection.
- If metadata in multiple MRS clusters needs to be migrated to the same LakeFormation instance, the database names of the MRS clusters must be unique.
- **After MRS is interconnected with LakeFormation, MRS components are subject to the following constraints:**
  - Hive does not support temporary tables.
  - Hive does not support cross-cluster column encryption.
  - Hive WebHCat cannot interconnect with LakeFormation.
  - Hive cannot create an internal table if the designated directory already contains files.
  - Before creating a Hudi table, you need to add the path authorization of the Hudi table directory on LakeFormation to grant OBS read and write permissions.
  - Fields in a Hudi table cannot be edited on the LakeFormation console. You can only add, delete, or modify table fields on the Hudi client.
  - When Flink reads and writes Hive tables, only **hive\_sync.mode=jdbc** can be used to synchronize Hive tables. HMS is not supported.
  - If a low-permission user lacks OBS path access permission for the default database, Spark will display a permission error message but will still successfully create the database.
- **After MRS is interconnected with LakeFormation, the permission policy restrictions are as follows:**
  - In LakeFormation authorization, only LakeFormation roles can be used as authorization entities. IAM users or user groups cannot be used as authorization entities.
  - The PolicySync process does not modify the default policy of the RangerAdmin Hive module in the cluster. The default policy still takes effect.
  - After the PolicySync process is started, it compares the permissions with those of LakeFormation instances and deletes the non-default policies that do not exist in LakeFormation. You are advised to migrate the permission policies to LakeFormation instances first.
  - For the Hive module on the RangerAdmin web UI, do not add or delete non-default policies. Grant permissions on the data permission page of LakeFormation instances.
  - After the interconnection between the MRS cluster and LakeFormation is canceled, the non-default policies of RangerAdmin will not be cleared. You need to manually clear them.

- Hive does not support SQL statements for granting permissions. You need to grant permissions on the **Data Permissions** page.
- MRS does not support LakeFormation row filtering.

# 2 Creating a LakeFormation Instance and a Client Connection

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## Preparing a User


If you use LakeFormation for the first time, create a user and grant permissions to the user by referring to [Preparations](#).

This section demonstrates the entire process of using LakeFormation. You need to complete the following preparations in advance:

- An IAM service user and user group for authorization have been created in IAM, and the user has been associated with the user group.
- A parallel file system has been created in OBS, and a folder for mapping data tables has been created in the file system.
- You have created an agency required for interconnecting with LakeFormation. For example, if you plan to interconnect MRS clusters with LakeFormation, create an agency by referring to [Preparations](#).

## Creating a LakeFormation Instance

**Step 1** Log in to the LakeFormation console.

**Step 2** In the upper left corner, click  and choose **Analytics > LakeFormation** to access the LakeFormation console.

**Step 3** Click **Buy Now** or **Buy Instance** in the upper right corner.

If a LakeFormation instance exists on the page, **Buy Instance** is displayed. Otherwise, **Buy Now** is displayed.

**Step 4** Configure the parameters listed in the following table.

**Table 2-1** Parameters for creating a LakeFormation instance

Parameter	Description	Example Value
Type	Select the instance type. <ul style="list-style-type: none"><li>• <b>Shared</b></li><li>• <b>Exclusive</b></li></ul>	Exclusive
Region	Select a <b>region</b> . LakeFormation instances in different regions cannot communicate with each other over an intranet. For lower network latency and quick resource access, select the nearest region.	xxx
Billing Mode	Billing mode of instances. <ul style="list-style-type: none"><li>• <b>Pay-per-use</b></li></ul>	Pay-per-use
Project	Select the project to which the instance belongs.	xxx
Name	User-defined LakeFormation instance name.	lakeformation-test
QPS	Maximum number of requests per second. You do not need to set this parameter when <b>Type</b> is set to <b>Shared</b> .	10000
Enterprise Project	Enterprise project to which the cluster belongs. If no enterprise project is available, click <b>Create</b> to create one.	xxx
Description	Description of the instance.	-
Label	Enter content in the boxes and click <b>Add</b> to add a tag.	-

**Step 5** Click **Buy Now**, confirm the configured information, and pay.

**Step 6** Click **Back to Console**. You can view information about the newly created LakeFormation instance on the console.

 **NOTE**

When creating an instance, pay attention to quota notification. If a resource quota is insufficient, increase the resource quota as prompted and create an instance.


Wait until the instance status changes to  **Running**, indicating that the instance is created.

----End

## Creating an Access Client

**Step 1** Log in to the LakeFormation console.



- Step 2** In the upper left corner, click  and choose **Analytics > LakeFormation** to access the LakeFormation console.
- Step 3** Select the created LakeFormation instance (for example, **lakeformation-test**). For how to create an instance, see the operations described in [Creating a LakeFormation Instance](#). Click **Clients** in the navigation pane.
- Step 4** Click **Create**. In the displayed dialog box, set the following parameters and click **OK**.

If no suitable VPC or subnet is available, click **create one** to access the VPC console to create one.

**Table 2-2** Parameters for creating an access management client

Parameter	Description
Client	Enter a client name.
VPC	Select the VPC where the MRS service is located.
Subnet	Select the subnet where the MRS service is located.

- Step 5** Click **View Details** in the **Operation** column to view the VPC endpoint ID, access domain name, and access IP address.

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# 3 Constructing a Data Lake

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MRS can only connect to the **hive** catalog and the **default** database in LakeFormation.

After a LakeFormation instance is created, you can create catalogs and metadata such as databases and tables as required.

For example, perform the following steps to create a catalog named **hive** (fixed name, which cannot be customized) and create a database named **default** (fixed name, which cannot be customized) in the catalog. Assign permissions for the two data tables **table\_A** and **table\_B** contained in the database.

## Creating an OBS Path for Storing Metadata

**Step 1** Log in to the LakeFormation console.

**Step 2** Click  in the upper left corner of the page and choose **Storage > Object Storage Service** to access the **Object Storage Service** console.

**Step 3** Click **Parallel File Systems** and click **Create Parallel File System**. On the displayed page, set the parameters, and click **Create Now**.

- **File System Name:** Set the name of the parallel file system as required, for example, **lakeformation-test**.
- Set other parameters based on the site requirements.

**Step 4** On the **Parallel File Systems** page, click the name of the created file system, that is **lakeformation-test**.

**Step 5** Click **Files** in the navigation pane, click **Create Folder**, enter a folder name, and click **OK**. Click the folder name and click **Create Folder** to create a subfolder.


Repeat this step to create paths for storing metadata in sequence. The following paths are examples:

- Catalog storage path: **lakeformation-test/catalog1**
- Database storage path: **lakeformation-test/catalog1/database1**
- Table storage path: **lakeformation-test/catalog1/database1/table1** and **lakeformation-test/catalog1/database1/table2**

- Function storage path: **lakeformation-test/catalog1/database1/udf1**
- End

## Creating a Catalog


**Step 1** Log in to the LakeFormation console.

**Step 2** In the upper left corner, click  and choose **Analytics > LakeFormation** to access the LakeFormation console.

**Step 3** Select the created LakeFormation instance (for example, **lakeformation-test**). For how to create an instance, see the operations described in [Creating a LakeFormation Instance and a Client Connection](#). Choose **Metadata > Catalog** in the navigation pane.

You only need one **hive** catalog per instance. If you already have one in the current instance, you can skip creating another one.

**Step 4** Click **Create** in the upper right corner. On the displayed page, set the following parameters, and click **Submit**.


- **Catalog Name: hive**  
The name is fixed and cannot be customized.
- **Select Location:** Click , select a storage location, for example, **obs://lakeformation-test/catalog1**, and click **OK**.
- **Catalog Type: DEFAULT**
- Retain the default values for other parameters.

**Step 5** After the catalog is created, you can view the catalog information on the **Catalog** page.

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## Creating a Database

**Step 1** Log in to the LakeFormation console.

**Step 2** In the upper left corner, click  and choose **Analytics > LakeFormation** to access the LakeFormation console.

**Step 3** Select the created LakeFormation instance (for example, **lakeformation-test**). For how to create an instance, see the operations described in [Creating a LakeFormation Instance and a Client Connection](#). Choose **Metadata > Database** in the navigation pane.

**Step 4** Select **hive** from the **Catalog** drop-down list box in the upper right corner.


You only need one **default** database per instance. If you already have one in the current instance, you can skip creating another one.

**Step 5** Click **Create**, set related parameters, and click **Submit**.


- **Database Name: default**  
The name is fixed and cannot be customized.

- **Catalog:** **hive**
  - **Select Location:** Click **+**, select a storage location, for example, **obs://lakeformation-test/catalog1/database1**, and click **OK**.
  - Retain the default values for other parameters.
- Step 6** After the catalog is created, you can view the database information on the **Database** page.
- End

## Creating a Table

- Step 1** Log in to the LakeFormation console.
- Step 2** In the upper left corner, click  and choose **Analytics > LakeFormation** to access the LakeFormation console.
- Step 3** Select the created LakeFormation instance (for example, **lakeformation-test**) from the drop-down list box on the left. For how to create an instance, see [Creating a LakeFormation Instance and a Client Connection](#). Choose **Metadata > Table** in the navigation pane and select **hive** and **default** from the **Catalog** and **Database** drop-down lists in the upper right corner.
- Step 4** Click **Create**, set related parameters, and click **Submit**.
- **Table Name:** Enter a table name, for example, **table\_A**.
  - **Data Storage Location:** Click **+**, select a location for storing the table in the OBS parallel file system, for example, **obs://lakeformation-test/catalog1/database1/table1**, and click **OK**.
  - Set other parameters based on the site requirements.
- Step 5** Create another table named **table\_B** and set the storage path to **lakeformation-test/catalog1/database1/table2** by referring to [Step 4](#).
- Step 6** After these two tables are created, you can check these tables on the **Table** page.
- End

## Authorizing Metadata

- Step 1** Log in to the LakeFormation console.
- Step 2** In the upper left corner, click  and choose **Analytics > LakeFormation** to access the LakeFormation console.
- Step 3** Select the target LakeFormation instance from the drop-down list box on the left and choose **Data Permissions > Data Authorization**.
- Step 4** Click **Authorize**, authorize the **hive** catalog and the **default** database as required, and click **OK**.
- For details about authorization configurations and requirements, see [Granting permissions](#).
- End

# 4 Interconnecting MRS Clusters with LakeFormation

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## Preparations

For how to prepare for data connection, see [Preparations](#). Create an agency and configure a LakeFormation data connection by following the instructions.

## Connecting MRS to LakeFormation

Only MRS 3.3.0-LTS clusters can interconnect with LakeFormation instances.

For how to interconnect MRS with LakeFormation instances, see [Interconnecting MRS 3.3.0-LTS Clusters with LakeFormation](#).