Alibaba Cloud
Data Transmission Service

User Guide

Issue: 20191031

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Document conventions

Style	Description	Example
	A danger notice indicates a situation that will cause major system changes, faults, physical injuries, and other adverse results.	 **Danger:** Resetting will result in the loss of user configuration data.
	A warning notice indicates a situation that may cause major system changes, faults, physical injuries, and other adverse results.	 **Warning:** Restarting will cause business interruption. About 10 minutes are required to restart an instance.
	A caution notice indicates warning information, supplementary instructions, and other content that the user must understand.	 **Notice:** If the weight is set to 0, the server no longer receives new requests.
	A note indicates supplemental instructions, best practices, tips, and other content.	 **Note:** You can use Ctrl + A to select all files.
>	Closing angle brackets are used to indicate a multi-level menu cascade.	Click Settings > Network > Set network type.
Bold	Bold formatting is used for buttons, menus, page names, and other UI elements.	Click **OK**.
`Courier font`	Courier font is used for commands.	Run the `cd /d C:/window` command to enter the Windows system folder.
`Italic`	Italic formatting is used for parameters and variables.	`bae log list --instanceid` *`Instance_ID`*
[] or [a|b]	This format is used for an optional value, where only one item can be selected.	`ipconfig [-all|-t]`

Style	Description	Example
{} or {a|b}	This format is used for a required value, where only one item can be selected.	`switch {active|stand}`

Contents

1 Data migration

1.1 Migration from a user-created database to Alibaba Cloud

1.1.1 Migrate user-created standalone MongoDB databases to ApsaraDB for MongoDB through DTS

This topic describes how to use Data Transmission Service (DTS) to migrate data from user-created MongoDB databases to ApsaraDB for MongoDB. DTS supports full data migration and incremental data migration. You can use incremental data migration to migrate data seamlessly to ApsaraDB for MongoDB without any service interruptions.

Prerequisites

- **The service port of the user-created MongoDB instance is open to the public network.**
- **The database version of the source database must be 3.0, 3.2, 3.4 or 3.6. MongoDB 4.0 is not supported. For more information about data migration in MongoDB 4.0, see** *#unique_6*.
- **The storage space of the ApsaraDB for MongoDB instance must be larger than the storage space of the user-created MongoDB instance.**

Notes

- **Data in the admin database cannot be migrated even if it is selected.**
- **The config database is an internal database. We recommend that you do not migrate data from the config database unless otherwise specified.**
- **For user-created standalone MongoDB instances, you must first enable oplog to use DTS incremental data migration. For more details, see** *Preparations before incremental data migration*.
- **We recommend that you migrate your data during off-peak hours to avoid business interruptions.**

Billing information

Migration type	Configuration fee	Public network traffic fee
Full data migration	Not billed	Not billed
Incremental data migration	Billed. For more information, see *Data Transmission Service pricing*.	Not billed

Migration type description

- **Full data migration: All data from the user-created MongoDB database is migrated to the destination instance.**
  - **Migrates databases.**
  - **Migrates collections.**
  - **Migrates indexes.**
- **Incremental data migration: The incrementally updated data of the user-created database is synchronized to the database in the destination instance on the basis of full data migration.**
  - **Synchronizes the create and delete operations on databases.**
  - **Synchronizes the create, delete, and update operations on documents.**
  - **Synchronizes the create and delete operations on collections.**
  - **Synchronizes the create and delete operations on indexes.**

Migration permission requirements

If you use DTS to migrate MongoDB databases, you need different permissions when performing different types of migration. The details are as follows:

Source database	Full data migration	Incremental data migration
User-created MongoDB database	Read permissions	· Read permissions on the source database · Read permissions on the admin database · Read permissions on the local database
ApsaraDB for MongoDB	Read and write permissions	Read and write permissions

Note:

For more information about how to create and authorize a MongoDB account, see *db.createUser* in the official MongoDB documentation.

Preparations before incremental data migration

To use DTS for incremental data migration, you must first enable oplog for the source database. The following section describes how to enable oplog for user-created MongoDB databases. Skip this step if you only perform full data migration.

Note:

This operation requires the MongoDB service to be restarted, which will affect database access. We recommend that you perform this operation during off-peak hours.

1. **You can use the mongo shell to log on to the user-created MongoDB server. You must run the following commands to stop the MongoDB service of the user-created database.**

```
use admin
db.shutdownServer()
```

2. **Run the following command to start the MongoDB service from the back end as a replica set:**

```
mongod --port 27017 --dbpath /var/lib/mongodb --logpath /var/log/
mongodb/mongod.log --replSet rs0 --bind_ip 0.0.0.0 --auth --fork
```

Note:

- **This command uses the existing database path in the user-created MongoDB instance `/var/lib/mongodb` and the log file `/var/log/mongodb/mongod.log`. You can specify the directory path based on the actual directory path on the user-created server.**
- **This command uses 0.0.0.0 as the binding address of the MongoDB service, which allows access from all IP addresses.**
- **This command enables authentication. Users can only access the database after passing authentication.**
- **You can run the `kill` command to end the process.**

3. **Use the mongo shell to log on to the user-created MongoDB server and run the following commands to initialize the replica set:**

   ```
   use admin
   rs.initiate()
   ```

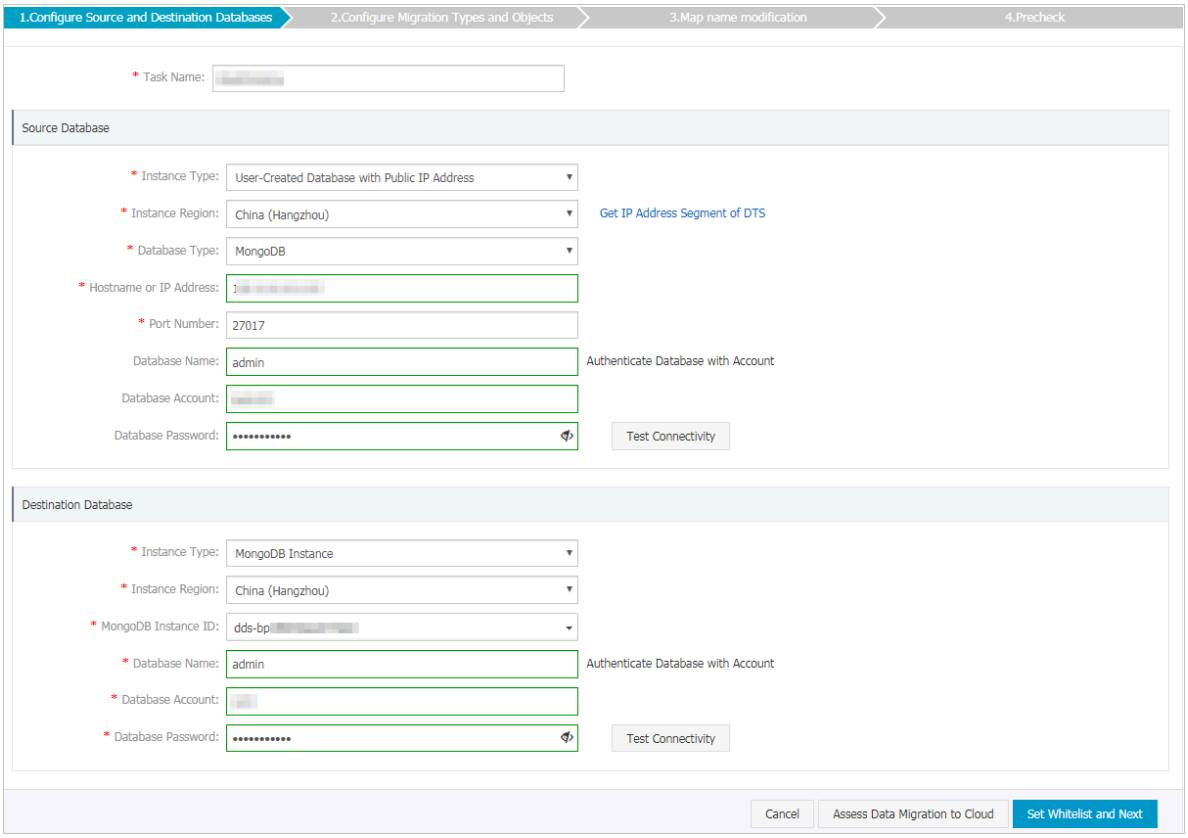
4. **Wait for a few minutes. The status of the current node will change to primary.**

You have enabled oplog for the user-created MongoDB database deployed in a standalone architecture. You can run the `rs.printReplicationInfo()` command to view the status of oplog.

The procedure of migrating data from MongoDB databases to ApsaraDB for MongoDB instances

1. **Log on to the *DTS console*.**
2. **In the left-side navigation pane, click Data Migration.**
3. **In the upper-right corner of the Data Migrati page, click Create Migration Task.**

4. Configure Source and Destination Databases of the migration task.



Parameter	Description
Task Name	· DTS automatically generates a name for each task. Task names are not required to be unique. · You can modify task names as needed. We recommend that you specify meaningful names for the tasks to help identify the tasks.

Parameter	Description
Source Database	· Instance Type: Select User-Created Database with Public IP Address. · Database Type: Select MongoDB. · Host Name or IP Address: Enter the address of the user-created MongoDB instance. This address must be a public IP address. · Port: Enter the service port of the user-created MongoDB instance. · Database Name: Enter the name of the authentication database of the user-created MongoDB database. · Database Account: Enter the account used to connect to the user-create database. For more information, see *Migration permission requirements*. · Database Password: Enter the password of the database account used to connect to the user-created MongoDB instance.
Destination Database	· Instance Type: Select MongoDB Instance. · Instance Region: Select the region where the destination MongoDB instance is located. · MongoDB instance ID: Select the instance ID of the destinatio n MongoDB instance. · Database Name: Enter the name of the authentication database in the destination instance. The default name is admin. · Database Account: Enter the account used to connect to the database of the destination MongoDB instance. For more information, see *Migration permission requirements*. · Database Password: Enter the password of the database account used to connect to the destination MongoDB instance.

5. After configuring the parameters, click, click Set Whitelist and Next in the lower-right corner.

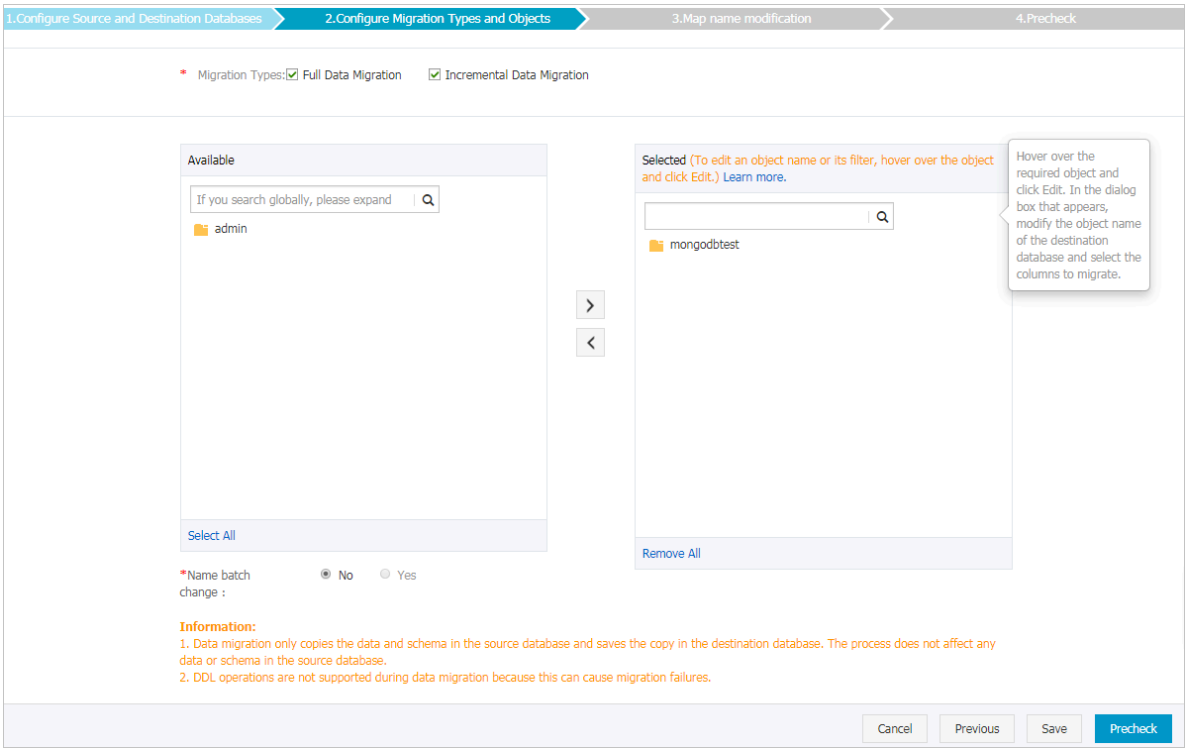
Note:

· The IP address of the DTS server is automatically added to the whitelist of the destination ApsaraDB for MongoDB instance. This ensures that the DTS server can connect to the ApsaraDB for MongoDB instance. After the migration

is complete, you can delete the whitelist if you no longer need it. For more information, see *#unique_7*.

- If a whitelist is configured for the user-created MongoDB database, you must perform the following operations: In the Source Database section, click Obtain DTS IP to obtain the IP address of the DTS server. Then, add the obtained IP address to the whitelist of the user-created MongoDB database.

6. Select the migration object and migration type.



Parameter	Description
Migration Types	• If you need to migrate all of the data, select Full Data Migration for Migration Types. **Note:** To ensure data consistency, do not write new data into the source MongoDB database during full data migration. • If you need to migrate the data without stopping businesses, select Full Data Migration and Incremental Data Migration for Migration Types. **Note:** For user-created standalone MongoDB instances, you must first enable oplog to use DTS incremental data migration. For more details, see *Preparations before incremental data migration*.

Parameter	Description
Migration objects.	· Select the database to be migrated from the Available section and click > to add the database to the Selected box. **Note:** - Data in the admin database cannot be migrated even if it is selected. - The config database is an internal database. Do not migrate data from the config database unless otherwise specified. · The migration object can be a database or a collection/function. · After an object is migrated to an ApsaraDB for MongoDB instance, the object name in ApsaraDB for MongoDB is the same as that in the user-created database. **Note:** If the migrated object has different names in the user-created source database and the destination instance, you can use the object name mapping function provided by DTS. For more information, see *Object name mapping*.

7. When you complete the preceding configurations, click Precheck in the lower-right corner.

   Note:

   · A precheck is performed before the migration task starts. The migration starts only after the precheck succeeds.

   · If the precheck fails, click the icon corresponding to the check items to view their details. Perform a precheck again after the problems are rectified.

8. After the precheck succeeds, click Next.
9. On the Confirm Settings page, set Channel Specification and select Data Transmission Service (Pay-As-You-Go) Service Terms.

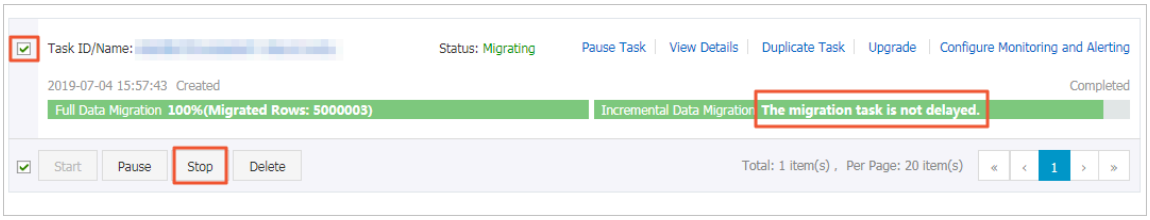
10. Click Buy and Start to start the migration.

- Full data migration

  Wait until the migration task stops automatically.

- Incremental data migration

  The migration task does not stop automatically. To stop the migration task, wait until the task is in the The migration task is not delayed state, and stop writing to the source database. After a few minutes, the task enters the The migration task is not delayed state again, and you can stop the task.



Check whether the data is correct. If yes, you can switch your business from the user-created database to the ApsaraDB for MongoDB instance.

More information

Connect to a standalone ApsaraDB for MongoDB instance through the mongo shell

1.1.2 Use DTS to migrate data

Currently, ApsaraDB for MongoDB provides two data migration solutions. You can use DTS or the built-in commands of MongoDB to migrate data. This topic describes how to use DTS to migrate data from a user-created MongoDB instance to an ApsaraDB for MongoDB instance. DTS supports full data migration and incremental data migration. Using DTS, you can smoothly migrate data from the user-created MongoDB instance to the ApsaraDB for MongoDB instance without interrupting the services of your local applications.

Constraints on using DTS to migrate data

- Instances involved must be standalone or replica set instances.
- Full data migration:

  You can use DTS to migrate all data stored for the migration object in the source instance to the target instance.

- **Incremental data migration:**

  You can dynamically synchronize incremental data stored in the user-created MongoDB instance to the ApsaraDB for MongoDB instance. Using incremental data migration, you can smoothly migrate data from the user-created MongoDB instance to the ApsaraDB for MongoDB instance without interrupting the services of the user-created MongoDB instance.

Migration features

- **ApsaraDB for MongoDB supports MongoDB 3.0, MongoDB 3.2, and MongoDB 3.4.**
- **You can use full data migration to:**
  - **Migrate databases.**
  - **Migrate collections.**
  - **Migrate indexes.**
- **You can use incremental data migration to:**
  - **Synchronize the add, delete, and update operations on documents.**
  - **Synchronize the add and delete operations on collections.**
  - **Synchronize the add and delete operations on databases.**
  - **Synchronize the add and delete operations on indexes.**

Required permissions

The following table lists the permissions required by migration accounts of the source and target instances when you use different migration types of DTS to migrate data from the user-created MongoDB instance to the ApsaraDB for MongoDB instance.

Migration type	Full data migration	Incremental data migration
User-created MongoDB instance	Read permission	· Read permission on the source database · Read permission on the admin database · Read permission on the local database
Target ApsaraDB for MongoDB instance	Read and write permissions	Read and write permissions

Preparation

If you have not created a migration account for the user-created MongoDB instance or ApsaraDB for MongoDB instance, run the following command to create a migration account:

```
    db.createUser({user:"username",pwd:"password",roles:[{role:"
rolename1",db:"database_name1"},{role:"rolename2",db:"database_name2
"}]})
```

For more information about the permissions required by the migration accounts, see the preceding table.

The parameters are described as follows:

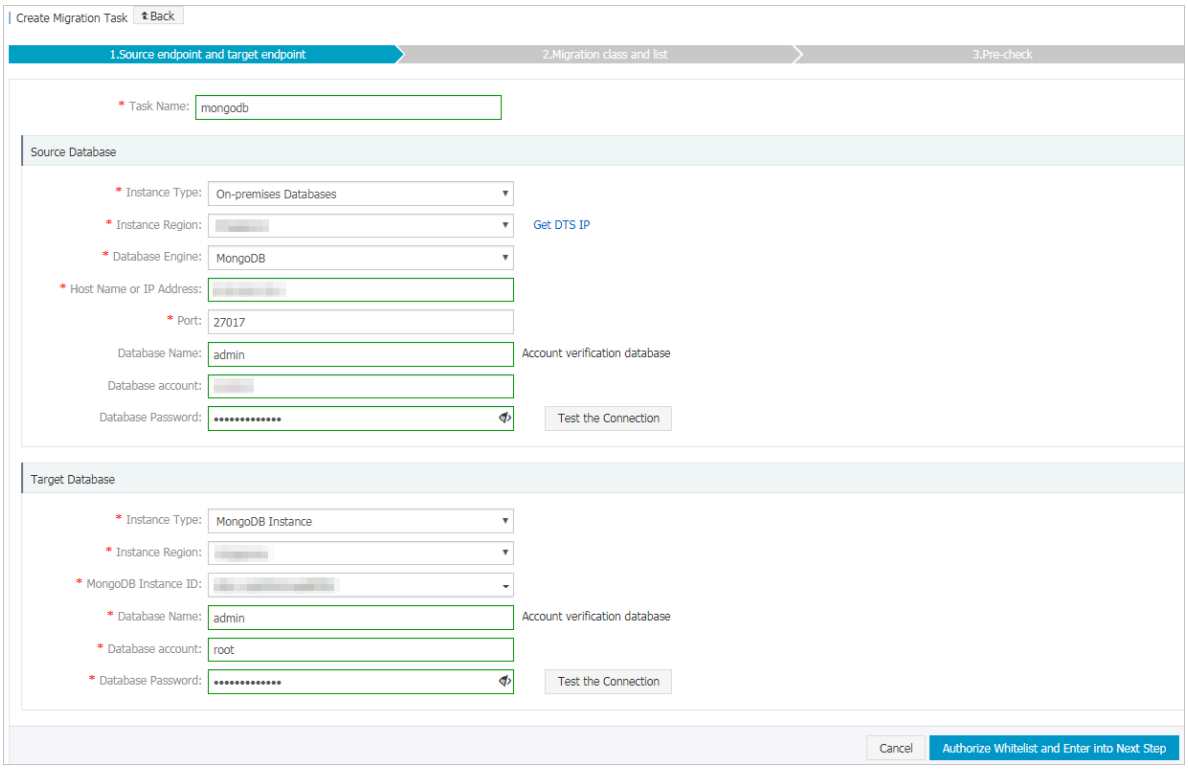
- username: The username of the account to be created.
- password: The password of the account to be created.
- rolename1 or rolename2: The role permission to be granted to the account, such as the read permission or read and write permissions.
- database_name1 or database_name2: The database whose role permission is to be granted to the account.
- For more information about how to grant the role permission on the user-created MongoDB instance to the account, see *db.createUser()*.

Procedure

The procedure for using DTS to migrate data is as follows:

1. Log on to the Alibaba Cloud *DTS console*. In the left-side navigation pane, click Data Migration. On the page that appears, click Create Migration Task to go to the

task configuration page. Enter the task name, source database information, and target database information, as shown in the following figure.



Source and target database information	
Task Name	· DTS automatically generates a task name for each task. Duplicate task names are allowed. · You can modify the task name as required. We recommend that you use a task name related to business so that you can easily identify the task in the future.
Source Database	· Instance Type: Select On-premises Databases. · Database Engine: Select MongoDB. · Host Name or IP Address: Specify the public address used to access the user-created MongoDB instance. · Port: Specify the listening port of the user-created MongoDB instance. · Database Name: Specify the database name of the user-created MongoDB instance. · Database Account: Specify the account used to log on to the user-created MongoDB instance. · Database Password: Specify the password of the account used to log on to the user-created MongoDB instance.

Source and target database information	
Target Database	· Instance Type: Select MongoDB Instance. · MongoDB Instance ID: Specify the ID of the target ApsaraDB for MongoDB instance. · DTS supports only ApsaraDB for MongoDB instances whose network type is classic network. If the network type of your ApsaraDB for MongoDB instance is VPC, you need to switch its network type to classic network before using DTS to migrate data to it. · Database Name: Enter the default database name of the ApsaraDB for MongoDB instance. · Database Account: Specify the account used to log on to the ApsaraDB for MongoDB instance. · Database Password: Specify the password of the account used to log on to the ApsaraDB for MongoDB instance.

2. After configuring the connection information, click Authorize Whitelist and Enter into Next Step in the lower-right corner.

   In this step, DTS adds the IP address of the DTS server to the whitelist of the target ApsaraDB for MongoDB instance to ensure that the DTS server can be successfully connected to the target ApsaraDB for MongoDB instance to facilitate data migration.

3. Select the migration object and migration type.

Migration object and migration type	
Migration Type	· ApsaraDB for MongoDB supports full data migration and incremental data migration. · If you need to migrate all data only, select Migrate existing data. · If you need to migrate data without service interruption, select both Migrate existing data and Replicate data changes.

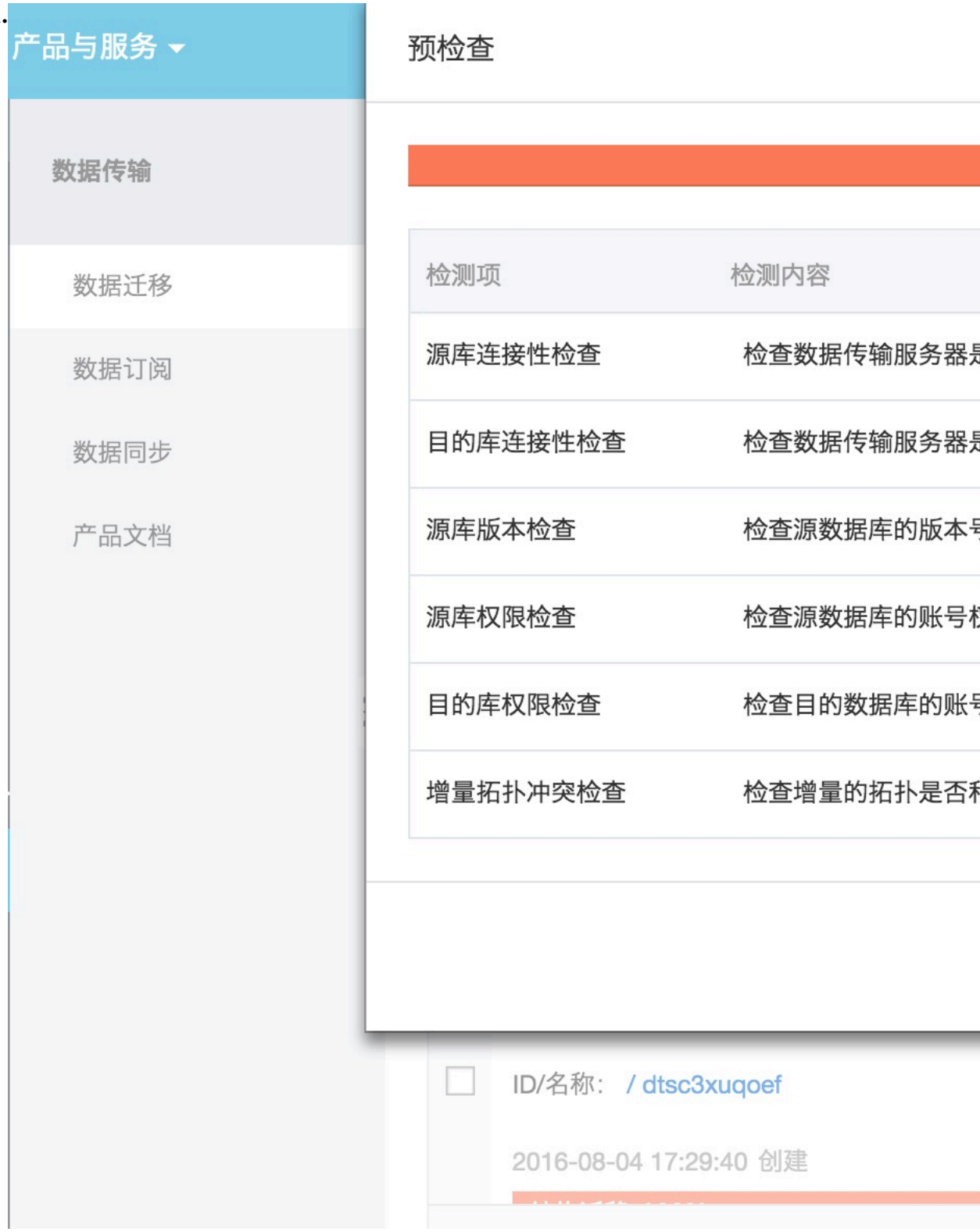
Migration object and migration type	
Migration objects	· You can select a database or a collection/function as the migration object. · After a selected object is migrated to the target ApsaraDB for MongoDB instance, the object name is the same as that in the user-created MongoDB instance by default.  Note: If your migration object has different names in the source and target instances, you need to use the object name mapping feature of DTS. For more information, see *Map database, table, and column names*.

4. Precheck the migration task.

   Before starting the migration task, DTS needs to check it in advance. Migration tasks can be started only after they have passed the precheck. For more information about the content and correction methods of the precheck, see *Precheck items* at the end of this topic.

   If a check item fails the precheck, you can click the check result of the failed item to view its details, correct the

item based on the failure cause, and start the precheck again.



5. **Start the migration task.**

   After passing the precheck, the migration task can be started. You can view the migration status and progress on the task list.

   To this end, you have created a migration task that migrates data from the user-created MongoDB instance to the ApsaraDB for MongoDB instance.

Precheck items

Before starting a migration task, DTS checks it in advance. The following table describes the content of the precheck for a migration task that migrates data from the user-created MongoDB instance to the ApsaraDB for MongoDB instance.

Item	Content	Remarks
Check source database connectivity	Check whether the DTS server can be connected to the user-created MongoDB instance.	· Check whether the connection information is correct. If any information is incorrect, correct it and start the precheck again. · [DO NOT TRANSLATE]
Check target database connectivity	Check whether the DTS server can be connected to the target ApsaraDB for MongoDB instance.	Check whether the connection information is correct. If any information is incorrect, correct it and start the precheck again.
Check source database version	Check whether DTS supports the database version of the user-created MongoDB instance.	Upgrade the database version to MongoDB 3.2 and start the precheck again.
Check source database permission	Check whether required permissions have been granted to the migration account of the user-created MongoDB instance.	If this item fails the precheck, grant permissions following relevant instructions in this topic and start the precheck again.
Check target database permission	Check whether required permissions have been granted to the migration account of the target ApsaraDB for MongoDB instance.	If this item fails the precheck, grant permissions following relevant instructions in this topic and start the precheck again.

Item	Content	Remarks
[DO NOT TRANSLATE]	[DO NOT TRANSLATE]	[DO NOT TRANSLATE]

1.2 Migration from a third-party cloud to Alibaba Cloud

1.2.1 Migrate MySQL data from AWS RDS to Alibaba Cloud RDS

This topic describes how to migrate MySQL data from AWS RDS to Alibaba Cloud RDS.

Background information

This topic describes how to use *Alibaba Cloud DTS* to migrate MySQL data from AWS RDS to Alibaba Cloud RDS.

Prerequisites

- **The source database instance to be migrated can access the Internet.**
- **You have created an RDS instance. For more information, see *Create an RDS instance*.**
- **You have created an account with read and write permissions. For more information, see *Create an account with read and write permissions*.**

Restrictions

- **Schema migration does not support the migration of events.**
- **DTS reads floating-point values (including float values and double values) in a column of the MySQL database by using the round(column,precision) method. If the value precision is not specified, the precision is 38 for float values and 308 for double values. Therefore, you must check whether the migration precision meets your service expectations.**
- **If object name mapping is enabled for an object, other objects depending on this object may fail to be migrated.**
- **If Incremental Data Migration is selected, binary logging must be enabled for the source MySQL instance.**
- **If Incremental Data Migration is selected, the binlog_format parameter of the source database must be set to row.**
- **If Incremental Data Migration is selected and the source MySQL version is 5.6 or later, the binlog_row_image parameter must be set to full.**

- **If binlog file ID disorder occurs in the source MySQL instance because of cross -host migration or reconstruction during incremental data migration, the incremental data being migrated may be lost.**

Precautions

- **We recommend that you back up data before performing migration tasks.**
- **DTS attempts to automatically recover abnormal tasks within seven days, which may lead to data in the source database overwriting the service data that has been written to the target database. Therefore, you must revoke the write permission of the DTS account that is used to access the target instance by running the `revoke` command.**

Procedure

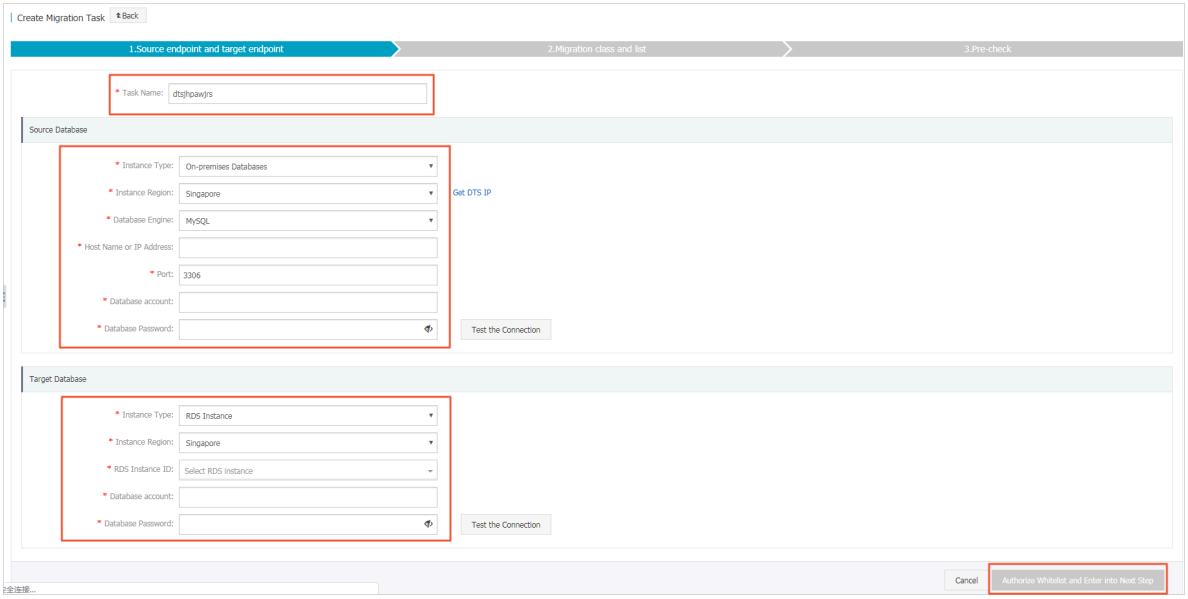
1. **Log on to the AWS MySQL database instance, and click Database Name. On the Connection page, view `Endpoint` and `Port`.**
2. **Log on to the *DTS console*.**
3. **In the left-side navigation pane, click Data Migration. In the right pane, click Create Migration Task in the upper-right corner.**
4. **Optional. Create a name for the task.**

   DTS generates a name for each task automatically. The task name is not required to be unique. You can modify the task name as required. We recommend that you choose an informative task name.
5. **Enter information about the source and target databases. The following table describes the parameters.**

Database type	Parameter	Description
Source database	Instance Type	The type of the source database instance. Select `User-Created Database with Public IP Address`.

Database type	Parameter	Description
	Instance Region	The region that the source database instance belongs to. If you have configured access control for your instance, you must allow the public IP address range of the specified region to access the instance before configuring a migration task. **Note:** You can click Get IP Address Segment of DTS to view and copy the IP address range of the region.
	Database Type	The source database type. Select `MySQL`.
	Hostname/IP Address	The `endpoint` of the AWS MySQL database.
	Port Number	The `port` of the AWS MySQL database.
	Database Account	An account with read and write permissions on the AWS MySQL database.
	Database Password	The password of the account for accessing the MySQL database.
Target database	Instance Type	Select `RDS Instance`.
	Instance Region	The region that the target database instance belongs to.
	RDS Instance ID	The ID of the target database instance in the selected region.
	Database Account	An account with read and write permissions on the target database instance.
	Database Password	The password of the account for accessing the target database instance.

Database type	Parameter	Description
	Encryption	Select Non-encrypted or SSL-encrypted. The latter greatly increases CPU consumption.

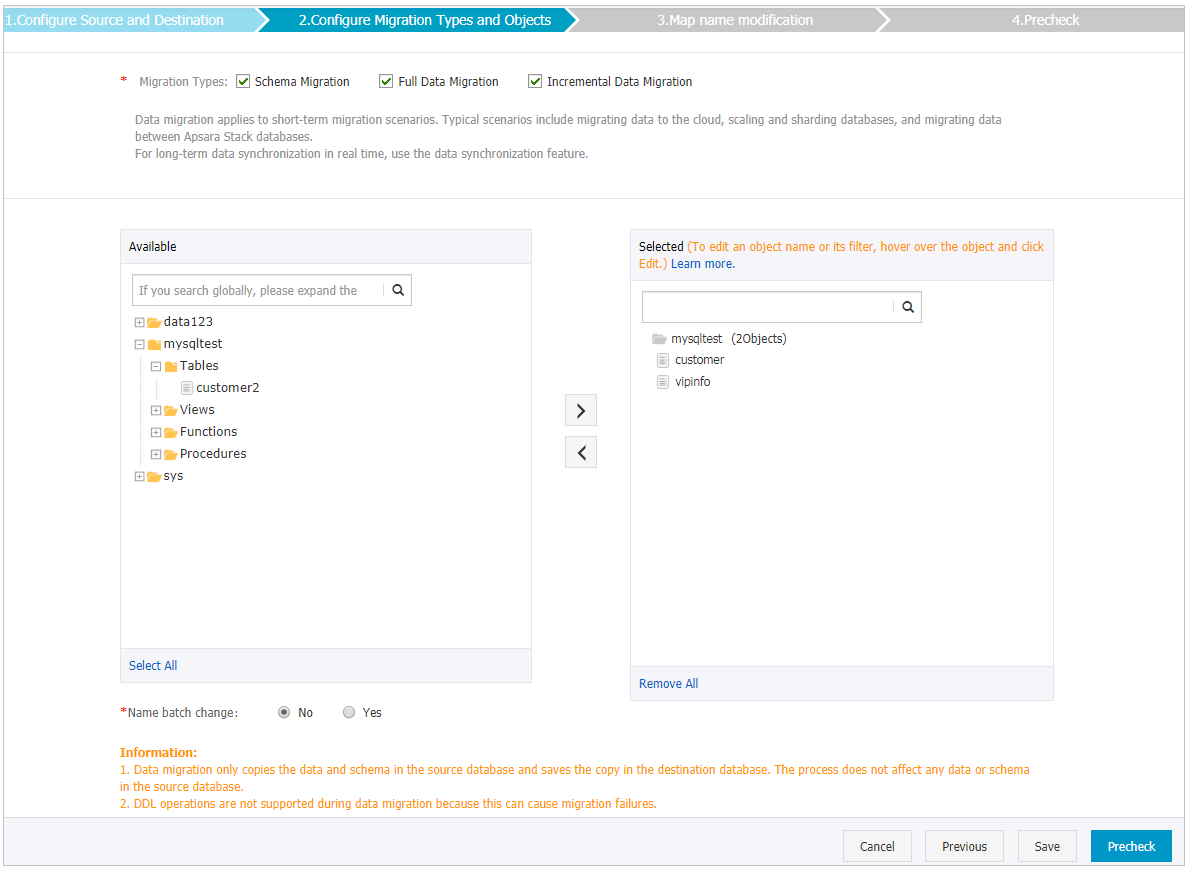


6. Click Test the Connection and confirm that the test results for both the source and target databases are `Passed`.
7. Click Authorize Whitelist and Enter into Next Step in the lower right corner of the page.
8. Select a migration type. In the Available area, select the target database and click  to add the database to the Selected area.

Note:

To maintain data consistency before and after migration, we recommend that you select Schema Migration, Full Data Migration, and Incremental Data Migration.

Currently, schema migration and full data migration are free of charge, while incremental data migration is charged by hour based on link specifications.



9. **Click Precheck and wait until the precheck ends.**

Note:

If the precheck fails, you can fix the problems as instructed and run the precheck again.

10. **Click Next. In the Confirm Settings dialog box that appears, read the term and agree to the Data Transmission Service (Pay-As-You-Go) Service Terms, and click Buy and Start.**

If you select Incremental Data Migration, DTS synchronizes updates of the source database to the target RDS instance during the migration. The migration task does not end automatically. If you want to switch your service from AWS RDS to Alibaba Cloud RDS, we recommend that you use the following method. Pause data to write to the source database for a few minutes when incrementa l migration has no latency. Wait until the incremental migration enters non-latency status again. Stop the migration task and switch the service to the target RDS instance.

11. Click the target region to view the migration status. The status will be Completed when the migration is completed.

 **Note:**

If no latency occurs during incremental data migration, the data on AWS and Alibaba Cloud RDS will be consistent and the migration task can be stopped.

AWS clears binlogs as quickly as possible, and incremental data migration depends on the binlogs of the source database. To prevent unsynchronized binlogs from being cleared, you can call the AWS RDS stored procedure `mysql.rds_set_configuration` to set the binlog retention period. For example, to prolong the binlog retention period to one day, you can run the following command to call the stored procedure:

```
call mysql.rds_set_configuration("binlog retention hours" 24)
```

Now you have migrated MySQL data from AWS RDS to Alibaba Cloud RDS.

1.2.2 Migrate data from Amazon RDS for Oracle to ApsaraDB RDS for MySQL

This topic describes how to migrate data from Amazon RDS for Oracle to ApsaraDB RDS for MySQL by using Data Transmission Service (DTS). DTS supports schema migration, full data migration, and incremental data migration. You can combine these methods to migrate databases without any service interruptions.

Prerequisites

- To ensure that DTS can access Amazon RDS for Oracle through the public network, you need to set Public Availability to Yes in Amazon RDS for Oracle.
- The version of Amazon RDS for Oracle must be V10g, V11g, or V12c.
- The version of ApsaraDB RDS for MySQL must be V5.6 or V5.7.
- The storage space of your ApsaraDB RDS for MySQL instance is at least twice the size of the data to be migrated from Amazon RDS for Oracle.

 **Note:**

The binlog files generated during the migration occupy some space. The files are automatically cleared after the migration is completed.

Precautions

- **If the source instance does not have a primary key or uniqueness constraint, and the fields in the table are not unique, there may be duplicate data in the destination database.**
- **Table names under the ApsaraDB RDS for MySQL instance are case-insensitive. If you create a table whose name contains uppercase letters, ApsaraDB RDS for MySQL converts the uppercase letters to lowercase letters before the table is created.**

  If the source database has tables that have the same name in different cases, the objects to be migrated may have the same name. This causes the "The object already exists" error to be displayed during schema migration. In this case, use the object name mapping feature provided by DTS to rename the objects with the same name when configuring the objects to be migrated. For more information, see *Object name mapping***.**
- **If the database to be migrated does not exist in the ApsaraDB RDS for MySQL instance, DTS will automatically create a new database. However, in the following two cases, you need to** *Create a database* **in the destination ApsaraDB RDS for MySQL instance.**
  - **The database name does not comply with the naming conventions of databases under ApsaraDB RDS for MySQL instances. For more information, see** *Create a database***.**
  - **The name of the database to be migrated in the source Amazon RDS for Oracle instance is different from that in the destination ApsaraDB RDS for MySQL instance.**

Billing information

Migration type	Configuration fee	Public network traffic fee
Full data migration	Not billed	Not billed
Incremental data migration	Billed. For more information, see *Data Transmission Service Pricing*.	Not billed

Migration type description

- **Schema migration**

  DTS supports schema migration of tables, indexes, constraints, and sequences . Other objects such as views, synonyms, triggers, stored procedures, stored functions, packages, and custom object types are not supported.
- **Full data migration**

  DTS migrates all the existing data of objects from the Amazon RDS for Oracle database to the database in the ApsaraDB RDS for MySQL instance.
- **Incremental data migration**

  In addition to migrating the existing data, DTS also captures the redo logs generated by the Amazon RDS for Oracle database. The incremental data of the Amazon RDS for Oracle database is synchronized to the ApsaraDB RDS for MySQL instance. Incremental data migration allows you to migrate Amazon RDS for Oracle databases without any service interruptions.

SQL operations that can be synchronized during incremental data migration

- **INSERT, DELETE, and UPDATE**
- **CREATE TABLE**

  Note:
  The CREATE TABLE operations for creating partition tables or tables that contain functions cannot be synchronized.
- **ALTER TABLE operations, only including ADD COLUMN, DROP COLUMN, RENAME COLUMN, and ADD INDEX**
- **DROP TABLE**
- **RENAME TABLE, TRUNCATE TABLE, and CREATE INDEX**

Migration permission requirements

Source database	Schema migration	Full data migration	Incremental data migration
Amazon RDS for Oracle database	Owner permissions on the schema to be migrated	Owner permissions on the schema to be migrated	Master user permissions

Source database	Schema migration	Full data migration	Incremental data migration
ApsaraDB RDS for MySQL instance	Read and write permissions on the destination database	Read and write permissions on the destination database	Read and write permissions on the destination database

How to create a database account and grant permissions to the account:

- **For operations in an Amazon RDS for Oracle database, see** *CREATE USER* **and** *GRANT*.
- **For operations in an ApsaraDB RDS for MySQL instance, see** *Create an account* **and** *Modify account permissions*.

Data types and mappings

There are some differences between MySQL and Oracle data types. Therefore, DTS maps the data types of Oracle and MySQL according to their definitions during schema migration. The following table describes the mappings of the data types.

Oracle data type	MySQL data type	Supported by DTS
varchar2(n [char/byte])	varchar(n)	Yes
nvarchar2[(n)]	national varchar[(n)]	Yes
char[(n [byte/char])]	char[(n)]	Yes
nchar[(n)]	national char[(n)]	Yes
number[(p[,s])]	decimal[(p[,s])]	Yes
float(p)]	double	Yes
long	longtext	Yes
date	datetime	Yes
binary_float	decimal(65,8)	Yes
binary_double	double	Yes
timestamp[(fractional_seconds_precision)]	datetime[(fractional_seconds_precision)]	Yes
timestamp[(fractional_seconds_precision)]with localtimezone	datetime[(fractional_seconds_precision)]	Yes

Oracle data type	MySQL data type	Supported by DTS
timestamp[(fractional_seconds_precision)]with localtimezone	datetime[(fractional_seconds_precision)]	Yes
clob	longtext	Yes
nclob	longtext	Yes
blob	longblob	Yes
raw	varbinary(2000)	Yes
long raw	longblob	Yes
bfile	-	No
interval year(year_precision) to month	-	No
interval day(day_precision)tosecond[(fractional_seconds_precision)]	-	No

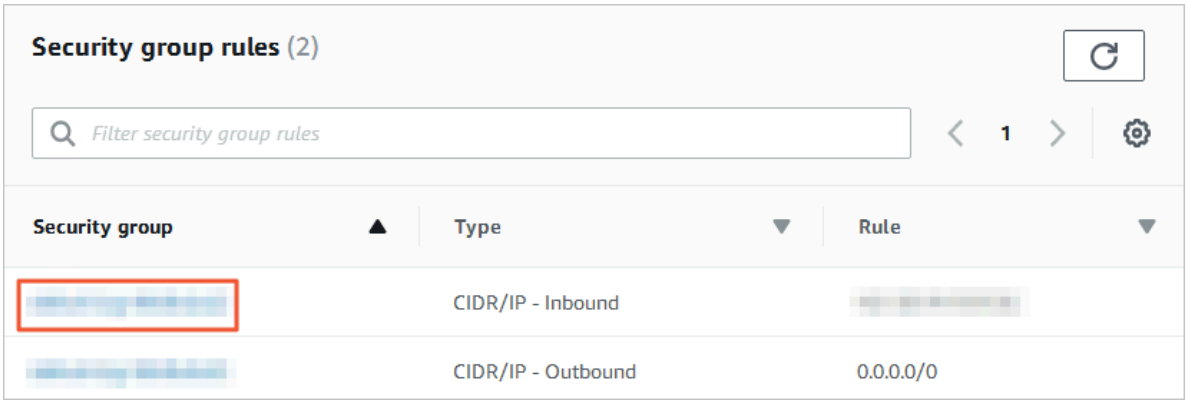
Note:

- A char column with a length greater than 255 Bytes is converted to the varchar(n) type.
- MySQL does not support Oracle data types such as bfile, interval year to month, and interval day to second. Therefore, these data types are not converted during schema migration.

  The schema migration fails if the table to be migrated contains these three data types. When you select a migration object, you must exclude columns with these three data types from the object to be migrated.
- The timestamp data type of MySQL does not contain the time zone information. However, Oracle provides timestamp with time zone and timestamp with local time zone data types that allow you to store datetime with the time zone information. Therefore, DTS converts the values of these data types from the current time zone to UTC for storage in the ApsaraDB RDS for MySQL instance.
- Some tables may fail to be migrated because MySQL limits the row size of tables. In this case, you must exclude these tables from the object to be migrated, or adjust the fields in these tables to meet the requirements of MySQL.

Premigration preparation

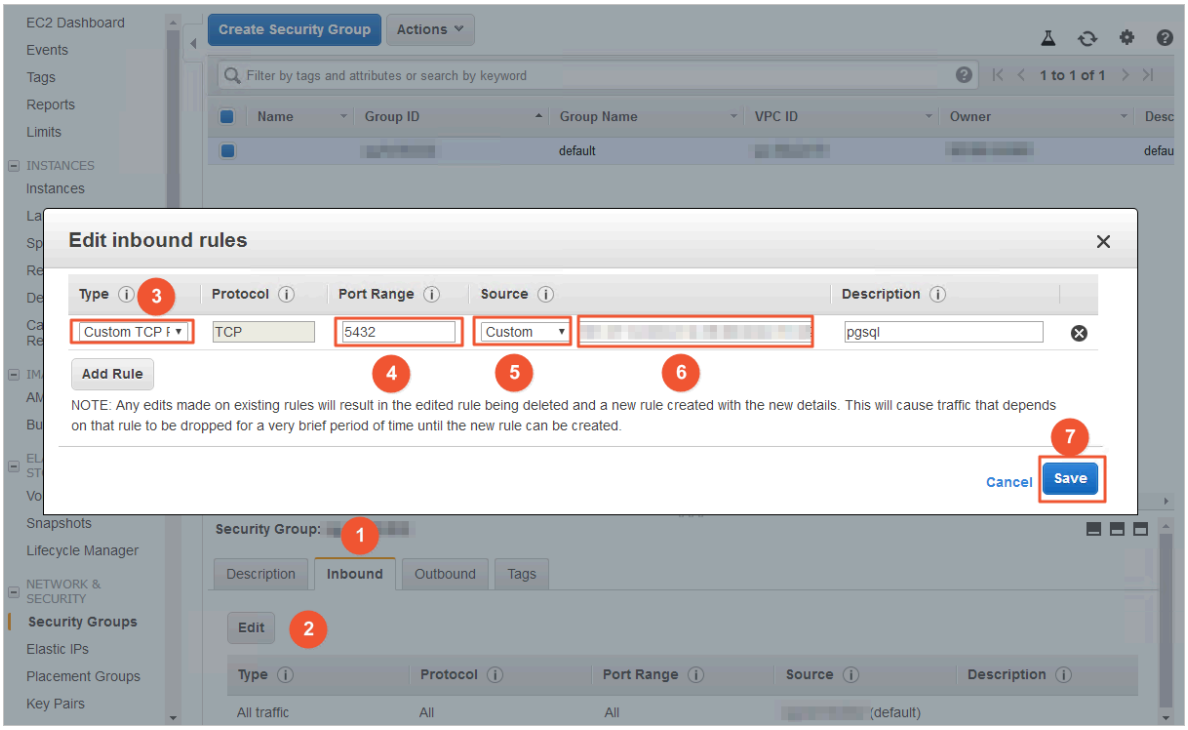
1. Log on to the Amazon RDS Management Console.
2. Go to the Basic Information page of the source Amazon RDS for Oracle instance.
3. In the Security group rules section, click the name of the security group corresponding to the existing inbound rule.



4. On the Security Groups page, click the Inbound tab in the Security Group section. On the Inbound tab, click Edit to add IP address ranges of the DTS server in the corresponding region to the inbound rule. For more information about the IP address ranges, see *DTS IP address ranges*.

> **Note:**
>
> - You only need to add the DTS IP address ranges corresponding to the region where the destination database is located. In this case, the source database is located in Singapore and the destination database is located in Hangzhou. You only need to add the DTS IP address ranges corresponding to China (Hangzhou).

- You can add the required IP address ranges to the inbound rule at one time.



5. Adjust log configuration of Amazon RDS for Oracle. Skip this step if you do not need to perform incremental data migration.

   a. Use the Master User account and the SQL*Plus tool provided by Oracle to connect to the Amazon RDS for Oracle database.

   b. Run the `archive log list;` command to confirm that the Amazon RDS for Oracle instance is in archiving mode.

   Note:

If the instance is not archived, enable the archiving mode. For more information, see *Managing Archived Redo Logs*.

c. **Enable the force logging mode.**

```
exec rdsadmin.rdsadmin_util.force_logging(p_enable => true);
```

d. **Enable primary key supplemental logging.**

```
begin rdsadmin.rdsadmin_util.alter_supplemental_logging(p_action
 => 'ADD',p_type => 'PRIMARY KEY');end;/
```

e. **Enable unique key supplemental logging.**

```
begin rdsadmin.rdsadmin_util.alter_supplemental_logging(p_action
 => 'ADD',p_type => 'UNIQUE');end;/
```

f. **Set the retention period of archived logs.**

Note:
We recommend that you set the retention period of archived logs to at least 24 hours.

```
begin rdsadmin.rdsadmin_util.set_configuration(name => 'archivelog
 retention hours', value => '24');end;/
```

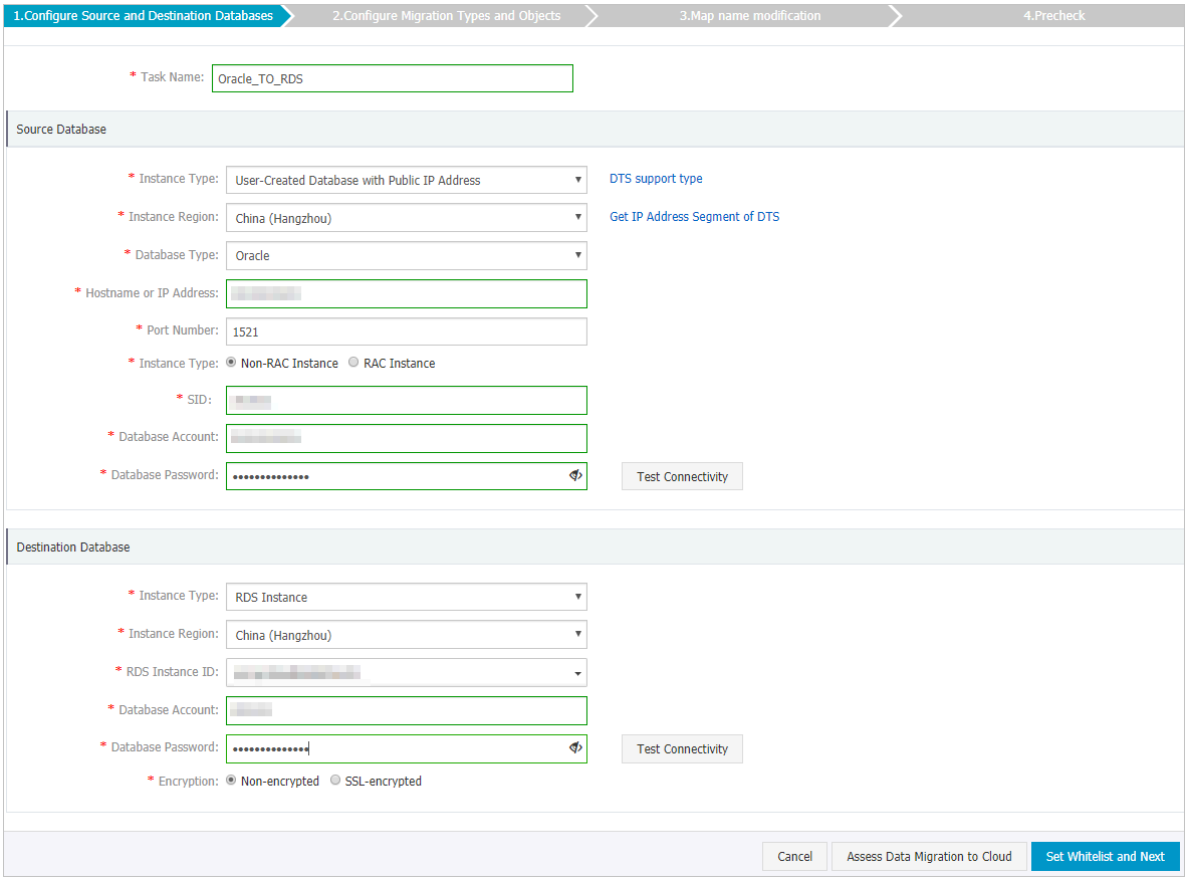
g. **Submit changes.**

```
commit;
```

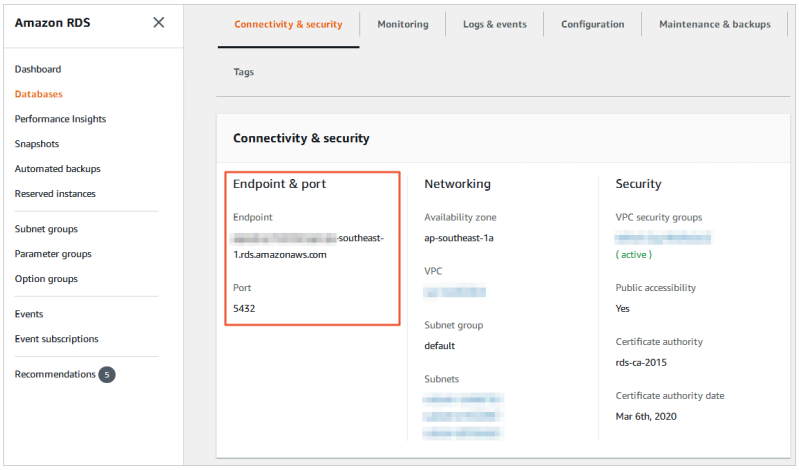
Procedure

1. **Log on to the *Data Transmission Service console*.**
2. **In the left-side navigation pane, click Data Migration.**
3. **In the upper-right corner, click Create Migration Task.**

4. Configure the parameters of Source and Destination Databases.



Category	Parameter	Description
Task Name	-	· DTS automatically generates a name for each task. Task names are not required to be unique. · You can modify task names as needed. We recommend that you specify meaningful names to help identify the tasks.
Source Database	Instance Type	Select User-Created Database with Public IP Address.
	Instance Region	When the instance type is set to User-Created Database with Public IP Address, you do not need to set Instance Region. **Note:** Click Get IP Address ranges of DTS corresponding to Instance Region to obtain IP address ranges of the DTS server and add the obtained IP address ranges to the inbound rule of Amazon RDS for Oracle. For more information, see *Premigration preparation*.

Category	Parameter	Description
	Database Type	Select Oracle.
	Hostname or IP Address	Enter the URL of the Amazon RDS for Oracle database. **Note:** You can query the database connection information on the Basic Information page of Amazon RDS for Oracle. 
	Port Number	Enter the port of the Amazon RDS for Oracle database. The default value is 1521.
	Instance Type	· Non-RAC Instance: After this option is selected, you also need to enter SID. · RAC Instance: After this option is selected, you also need to enter Service Name. In this case, select Non-RAC Instance and enter SID.
	Database Account	Enter the account used to connect to the Amazon RDS for Oracle database. For permission requirements, see *Migration permission requirements*.

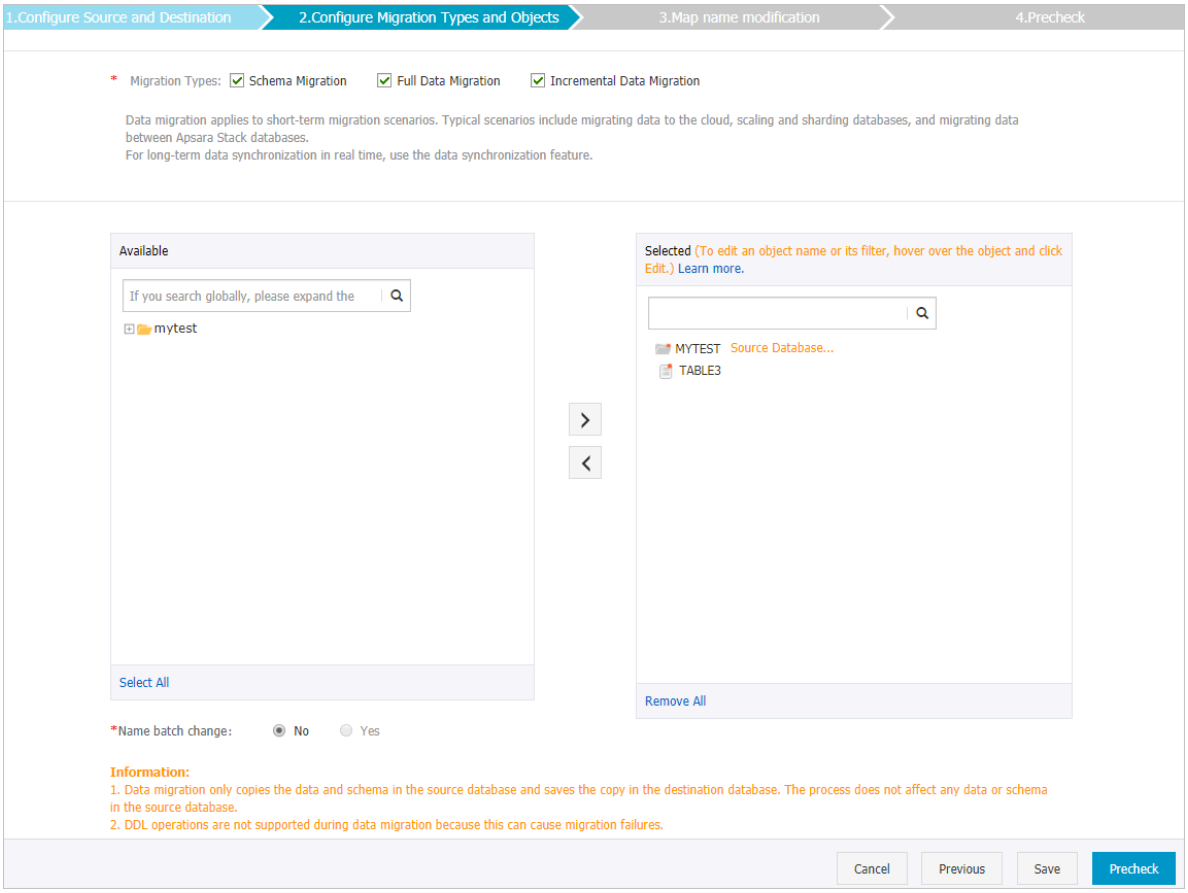
Category	Parameter	Description
	Database Password	Enter the password for the Amazon RDS for Oracle database account.  Note: After the source database information is specified, click Test Connectivity corresponding to the Database Password to verify whether the specified information is correct. If the source database information is correct, the Test Passed message is displayed. If the Test Failed message is displayed, click Diagnose in the Test Failed message. Adjust the entered source database information as prompted.
Destination Database	Instance Type	Select RDS Instance.
	Instance Region	Select the region of the destination instance.
	RDS Instance ID	Select the ID of the destination instance.
	Database Account	Enter the account used to connect to the database under the destination instance. For permission requirements, see *Migration permission requirements*.
	Database Password	Enter the password for the account of the database under the destination instance.  Note: After the destination database information is specified, click Test Connectivity corresponding to Database Password to verify whether the specified information is correct. If the destination database information is correct, the Test Passed message is displayed. If the Test Failed message is displayed, click Diagnose in the Test Failed message. Adjust the specified destination database information as prompted.

5. After the configuration is complete, click Set Whitelist and Next in the lower-right corner.

 Note:

The IP address of the DTS server is automatically added to the whitelist of the destination RDS instance. This ensures that the DTS server can connect to the destination instance. After the migration is complete, you can delete the IP address of the DTS server from the whitelist if you no longer need it. For more information, see *Configure a whitelist*.

6. **Configure migration objects and types.**



Parameter	Description
Migration Type	· If you only need to migrate the existing data, select Schema Migration and Full Data Migration. **Note:** To ensure data consistency, do not write new data to the Amazon RDS for Oracle database during full data migration. · If you need to migrate the data without stopping your business, select Schema Migration, Full Data Migration, and Incremental Data Migration.

Paramete	Description
Available	Select the database to be migrated from the Available section, and click the icon to move the database to the Selected section. **Note:** · The object to be migrated can be a database, a table, or a column. · After an object is migrated to the destination RDS instance, the name of the object remains the same as that in the Amazon RDS for Oracle database. If the object to be migrated has a different name in the destination instance, you can use the object name mapping feature provided by DTS. For more information, see *Object name mapping*.

7. In the lower-right corner, click Precheck.

   Note:

   · A precheck is performed before a migration task starts. The migration task starts only after the precheck succeeds.

   · If the precheck fails, click the icon corresponding to the failed items to view their details. Perform the precheck again after you have rectified the failed items.

8. After the precheck succeeds, click Next.
9. On the Confirm Settings page, set Channel Specification and select Data Transmission Service (Pay-As-You-Go) Service Terms.
10. Click Buy and Start to start the migration.

    · Full data migration

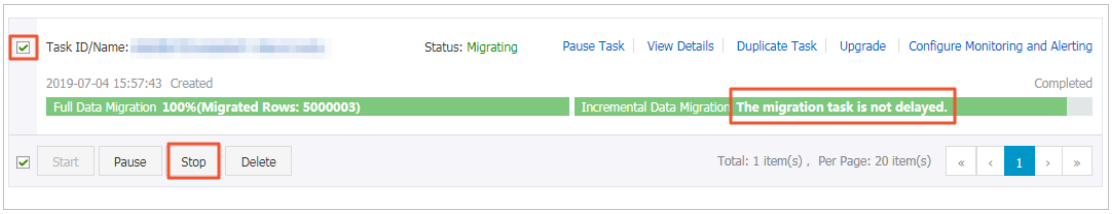
      Do not manually stop a migration task, because the system may fail to migrate the full data of the database. Wait until the migration task stops automatically.

    · An incremental data migration task does not automatically end. You need to manually end the migration task.

      Note:

Select an appropriate time point to manually end the migration task. For example, you can end the migration task during off-peak hours for business or before you migrate your business to the RDS instance.

a. **When the status of the migration task is The migration task is not delayed, stop writing data to the source database for several minutes. The latency may be displayed.**
b. **When the status of the migration task becomes The migration task is not delayed again, stop the migration task manually.**



c. **Migrate business to the RDS instance.**

Subsequent operations

The database account used for data migration has read and write permissions. To ensure database security, delete the accounts of both source and destination databases after the migration is complete.

1.3 Migration between Alibaba Cloud instances

1.3.1 Migrate data in a MongoDB replica set instance to a sharded cluster instance

You can use *Data Transmission Service (DTS)* to migrate data from a replica set instance to a sharded cluster instance. DTS supports full data migration and incremental data migration. You can use incremental data migration to migrate data seamlessly to ApsaraDB for MongoDB without any service interruptions.

Prerequisites

- **The database version of the source instance must be version 3.2, 3.4 or 4.0.**
- **The storage space of the destination instance must be larger than that of the source instance.**

Precautions

- **We recommend that you migrate your data during off-peak hours to avoid business interruptions.**
- **The database versions of the destination instance can be 3.2, 3.4, or 4.0.**
- **The storage engine of the destination instance can be WiredTiger, RocksDB, and TerarkDB.**
- **The data in the admin database cannot be migrated even if it is selected as a migration object.**

Billing information

Migration type	Configuration fee	Public network traffic fee
Full data migration	Not billed	Not billed
Incremental data migration	Billed. For more information, see *Data Transmission Service pricing*.	Not billed

Migration type description

- **Full data migration: All data of the database in the source instance is migrated to the database in the destination database.**
  - **Migrates databases.**
  - **Migrates collections.**
  - **Migrates indexes.**
- **Incremental data migration: The incrementally updated data of the database in the source instance is synchronized to the database in the destination instance on the basis of full data migration.**
  - **Synchronizes the create and delete operations on databases.**
  - **Synchronizes the create, delete, and update operations on documents.**
  - **Synchronizes the create and delete operations on collections.**
  - **Synchronizes the create and delete operations on indexes.**

Migration permission requirements

Instance type	Full data migration	Incremental data migration
Source MongoDB instance	Read permissions	· Read permissions on the source database · Read permissions on the admin database · Read permissions on the local database
Destination MongoDB instance	Read and write permissions	Read and write permissions

Premigration preparation

Configure data sharding based on business needs. For more information, see *Configure sharding to maximize the performance of shards*.

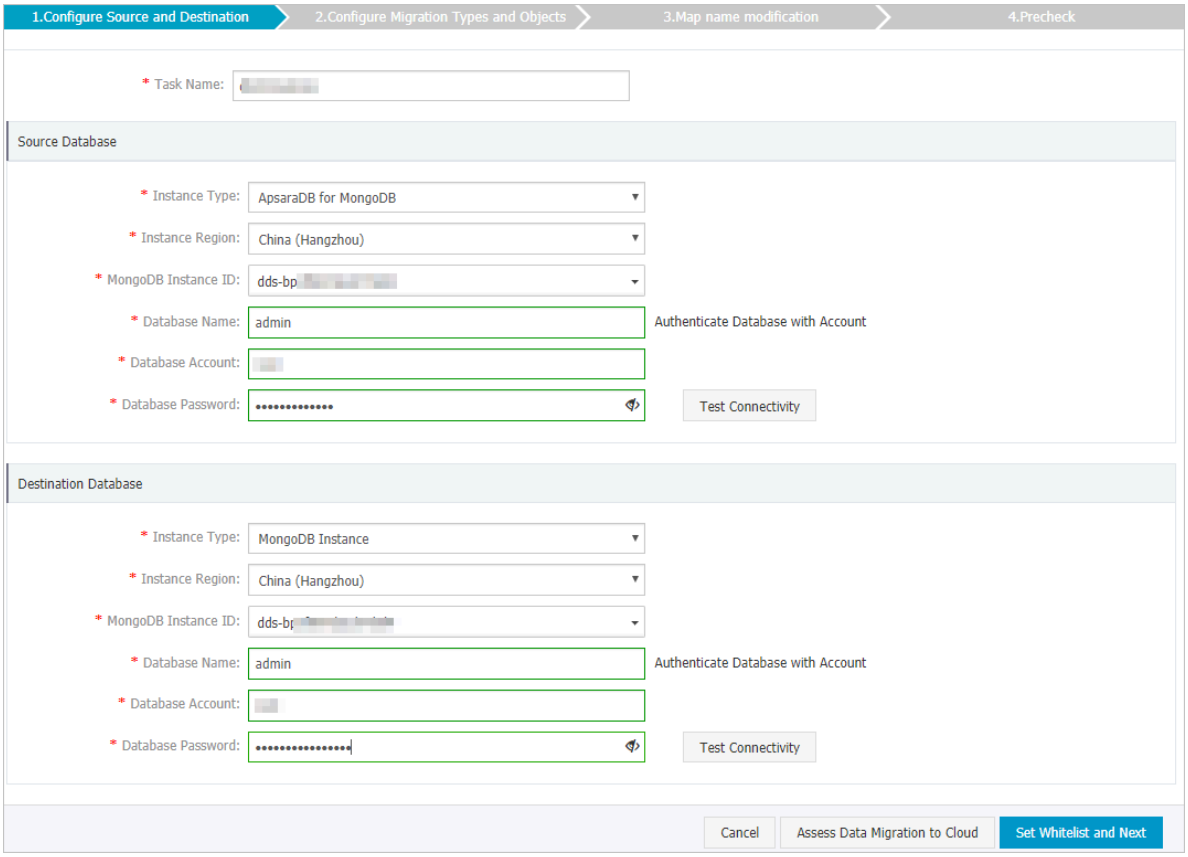
Note:

- **You can create a database and a set for data sharding in the destination instance in advance, and configure data sharding based on the database structure of the source instance. You can also configure data sharding after the data migration is complete.**
- **Skip this step if you do not need to configure data sharding.**

Migration procedure

1. **Log on to the** *DTS console*.
2. **In the left-side navigation pane, click Data Migration.**
3. **In the upper-right corner of the Data Migration page, click Create Migration Task.**

4. Configure Source and Destination Databases of the migration task.



Parameters for source and destination databases	
Task Name	· DTS automatically generates a name for each task. Task names are not required to be unique. · You can modify task names as needed. We recommend that you specify meaningful names for the tasks to help identify the tasks.
Source Database	· Instance Type: Select ApsaraDB for MongoDB. · Instance Region: Select the region where the source MongoDB instance is located. · MongoDB Instance ID: Select the ID of the source instance. · Database Name: Enter the name of the authentication database in the source instance. The default value is admin. · Database Account: Enter the database account of the source instance. For more information, see *Migration permission requirements*. · Database Password: Enter the password of the Database Account.

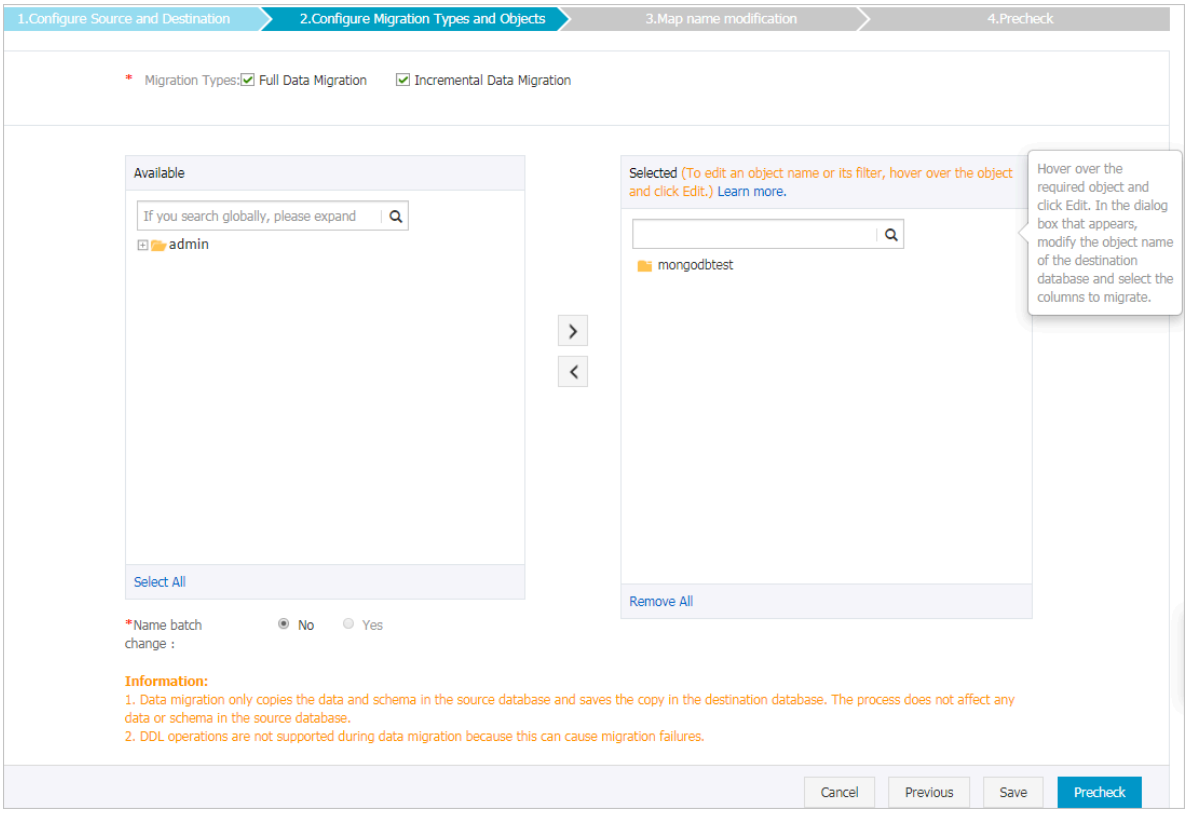
Parameters for source and destination databases	
Destination Database	· Instance Type: Select MongoDB Instance. · Instance Region: Select the region where the destination MongoDB instance is located. · MongoDB Instance ID: Select the ID of the destination instance. · Database Name: Enter the name of the authentication database in the destination instance. The default value is admin. · Database Account: Enter the database account of the destination instance. For more information, see *Migration permission requirements*. · Database Password: Enter the password of the Database Account.

5. After configuring the parameters, click Set Whitelist and Next in the lower-right corner.

Note:

The IP address of the DTS server is automatically added to the whitelist of the ApsaraDB for MongoDB instance.This ensures that the DTS server can connect to the ApsaraDB for MongoDB instance. After the migration is complete, you can delete the whitelist if you no longer need it. For more information, see *Configure a whitelist*.

6. Set Available and Migration Types.



Parameter	Description
Migration Types	· If you need to migrate all of the data, select Full Data Migration for Migration Types. **Note:** To ensure data consistency, do not write new data into the source database during full data migration. · If you need to migrate the data without stopping businesses, select Full Data Migration and Incremental Data Migration for Migration Types.

Parameter	Description
Migration object	· Select the database to be migrated from the Available area and click > to add the database to the Selected area. **Note:** The data in the admin database cannot be migrated even if it is selected as a migration object. · The migration object can be a database or a collection/function. · After an object is migrated to the destination MongoDB instance, the object name remains the same as that in the on-premises MongoDB instance by default. **Note:** If the migrated object has different names in the source instance and the destination instance, you can use the object name mapping function provided by DTS. For more information about the usage, see *Object name mapping*.

7. When you complete the preceding configurations, click Precheck in the lower-right corner.

   Note:

   · A precheck is performed before the migration task starts. The migration starts only after the precheck succeeds.

   · If the precheck fails, click the icon corresponding to the check items to view their details. Perform a precheck again after the problems are rectified.

8. After the precheck succeeds, click Next.
9. On the Confirm Settings page, set Channel Specification and select Data Transmission Service (Pay-As-You-Go) Service Terms.
10. Click Buy and Start to start the migration.

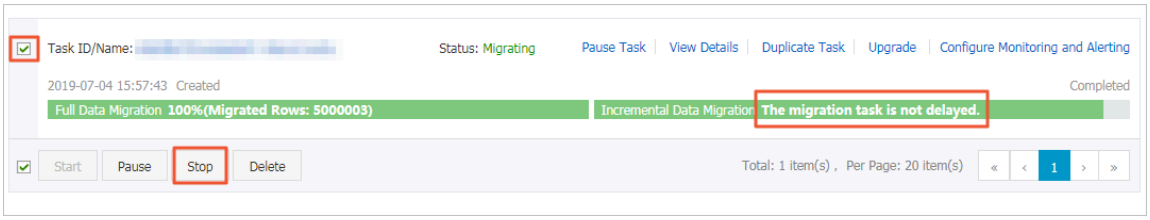
    · Full data migration

      Wait until the migration task stops automatically.

    · Incremental data migration

      The migration task does not stop automatically. To stop the migration task, wait until the task is in the Incremental Migration without Delay state, and

stop writing to the source database. After a few minutes, the task enters the Incremental Migration without Delay state again, and you can stop the task.



Switch your businesses to the ApsaraDB for MongoDB instance during off-peak hours to avoid negatively affecting your businesses.

More information

#unique_20

1.3.2 Use DTS to migrate MongoDB databases between different Alibaba Cloud accounts

This topic describes how to use Data Transmission Service (DTS) to migrate MongoDB databases between different Alibaba Cloud accounts. DTS supports full data migration and incremental data migration. You can use incremental data migration to migrate data seamlessly to ApsaraDB for MongoDB without any service interruptions.

Background information

This topic describes how to use DTS to migrate data from one Alibaba Cloud account to another. You can perform full data migration or incremental data migration by setting the source instance type to User-Created Database with Public IP Address.

Prerequisites

- **The source instance must be a standalone instance or replica set instance. If the source instance type is sharded cluster, see** *Use mongodump and mongorestore to migrate databases***.**

  Note:
  DTS does not support *incremental data migration* **of standalone instances.**

- **The storage space of the destination instance must be larger than the occupied storage space in use of the source instance.**

Precautions

We recommend that you migrate your data during off-peak hours to avoid business interruptions.

The data in the admin database cannot be migrated even if it is selected as a migration object.

Billing information

Migration type	Configuration fee	Public network traffic fee
Full data migration	Not billed	Not billed
Incremental data migration	Billed. For more information, see *Data Transmission Service pricing*.	Not billed

Migration type description

- **Full data migration: All data from the source instance database is migrated to the destination instance database.**
  - **Migrates databases.**
  - **Migrates collections.**
  - **Migrates indexes.**
- **Incremental data migration: The incrementally updated data of the source database is synchronized to the database in the destination instance on the basis of full data migration.**
  - **Synchronizes the create and delete operations on databases.**
  - **Synchronizes the create, delete, and update operations on documents.**
  - **Synchronizes the create and delete operations on collections.**
  - **Synchronizes the create and delete operations on indexes.**

Migration permission requirements

If you use DTS to migrate MongoDB databases, you need different permissions when performing different types of migration. The details are as follows:

Migration object	Full data migration	Incremental data migration
Source MongoDB instance	Read permissions	· Read permissions on the source database · Read permissions on the admin database · Read permissions on the local database
Destination MongoDB instance	Read and write permissions	Read and write permissions

Premigration preparation for the source instance

1. Log on to the *ApsaraDB for MongoDB console* with the Alibaba Cloud account to which the source instance belongs.
2. Apply for a public IP address to connect to the source instance through the Internet. For more information, see *#unique_23*.
3. Obtain required information from *DTS CIDR blocks*and add the CIDR block of the destination instance to the whitelist of the source instance. For more information, see *#unique_24*.

   For example, the source instance is located in Hangzhou and the destination instance is located in Shenzhen, add the DTS CIDR block of Shenzhen to the whitelist.

Premigration preparation for the destination instance

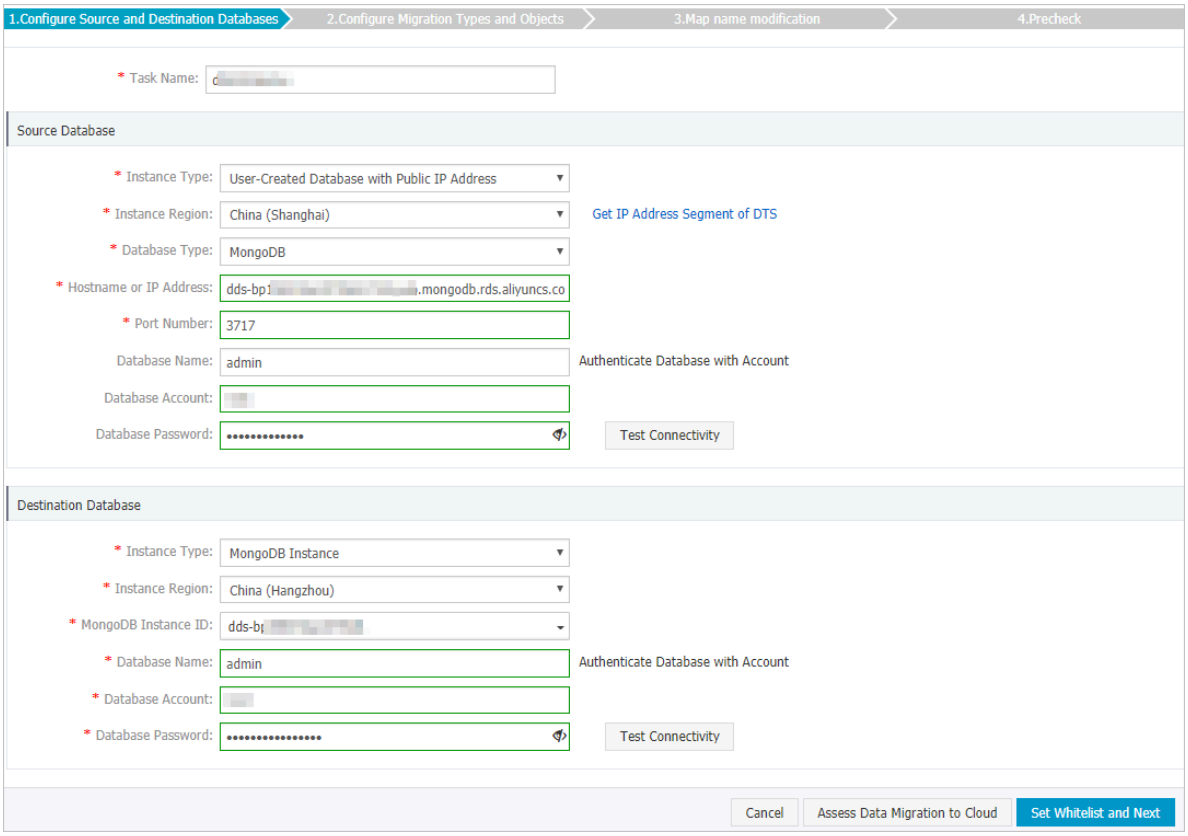
If you migrate data to a sharded cluster instance, we recommend that you shard the data as needed. For more information, see *Configure sharding to maximize the performance of shards*.

Note:

- You can create a database and a set for data sharding in the destination instance in advance, and configure data sharding based on the database structure of the source instance. You can also configure data sharding after the data migration is complete.
- Skip this step if you do not need to configure data sharding.

Migration procedure

1. **Log on to the *DTS console* with the Alibaba Cloud account to which the destination instance belongs.**
2. **In the left-side navigation pane, click Data Migration.**
3. **In the upper-right corner of the Data Migration page, click Create Migration Task.**
4. **Configure Source and Destination Databases of the migration task.**



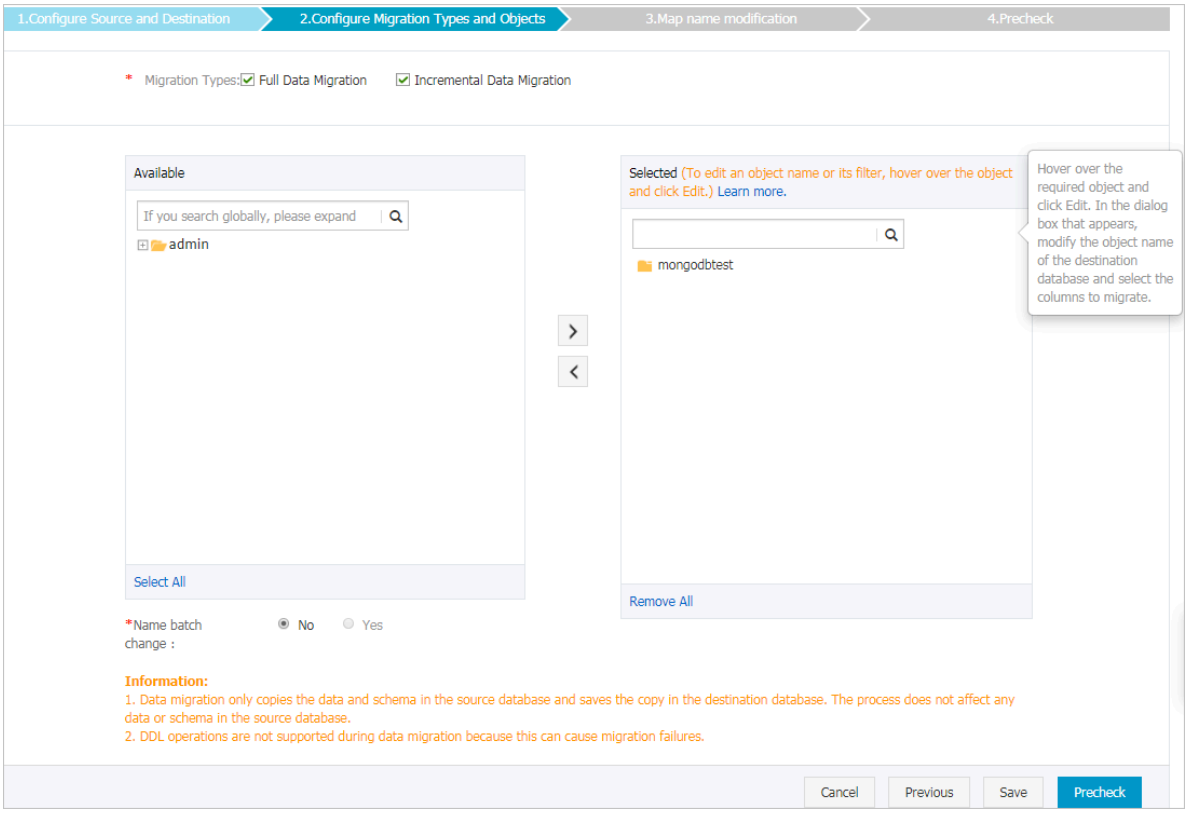
Parameter	Description
Task Name	· DTS automatically generates a name for each task. Task names are not required to be unique. · You can modify task names as needed. We recommend that you specify meaningful names for the tasks to help identify the tasks.

Parameter	Description
Source Database	· Instance Type: Select User-created Database with Public IP Address. · Database Type: Select MongoDB. · Hostname or IP Address: Enter the domain of the public IP address of the source instance. For example, dds-1udxxxxxxx-pub.mongodb.rds.aliyuncs.com. · Port Number: Enter the service port 3717 of the source instance. · Database Name: Enter the name of the authentication database in the source instance. · Database Account: Enter the account of the database in the source instance. For more information, see *Migration permission requirements*. · Database Password: Enter the password of the Database Account.
Destination Database	· Instance Type: Select MongoDB Instance. · Instance Region: Select the region where the destination instance is located. · MongoDB Instance ID: Select the ID of the destination instance. · Database Name: Enter the name of the authentication database in the destination instance. The default name is admin. · Database Account: Enter the database account of the destination instance. For the permission requirement, see *Migration permission requirements*. · Database Password: Enter the password of the Database Account.

5. After configuring the parameters, click Set Whitelist and Next in the lower-right corner.

> **Note:**
> The IP address of the DTS server is automatically added to the whitelist of the destination instance.This ensures that the DTS server can connect to the destination instance. After the migration is complete, you can delete the whitelist if you no longer need it. For more information, see *Configure a whitelist*.

6. Configure the migration objects and migration types.



Parameter	Description
Migration Types	· If you need to migrate all of the data, select Full Data Migration for Migration Types. **Note:** To ensure data consistency, do not write new data into the source instance during full data migration. · If you need to migrate the data without stopping businesses, select Full Data Migration and Incremental Data Migration for Migration Types.

Parameter	Description
Migration Objects	· Select the database to be migrated from the Available area and click the icon to add the database to the Selected area. Note: The data in the admin database cannot be migrated even if it is selected as a migration object. · The migration object can be a database or a collection/function. · After an object is migrated to ApsaraDB for MongoDB, the object name in ApsaraDB for MongoDB is the same as that in the source database. Note: If the migrated object has different names in the source instance and the destination instance, you can use the object name mapping function provided by DTS. For more information, see *Object name mapping*.

7. When you complete the preceding configurations, click Precheck in the lower-right corner.

   Note:

   · A precheck is performed before the migration task starts. The migration starts only after the precheck succeeds.

   · If the precheck fails, click the icon corresponding to the check items to view their details. Perform a precheck again after the problems are rectified.

8. After the precheck succeeds, click Next.
9. On the Confirm Settings page, set Channel Specification and select Data Transmission Service (Pay-As-You-Go) Service Terms.
10. Click Buy and Start to start the migration.

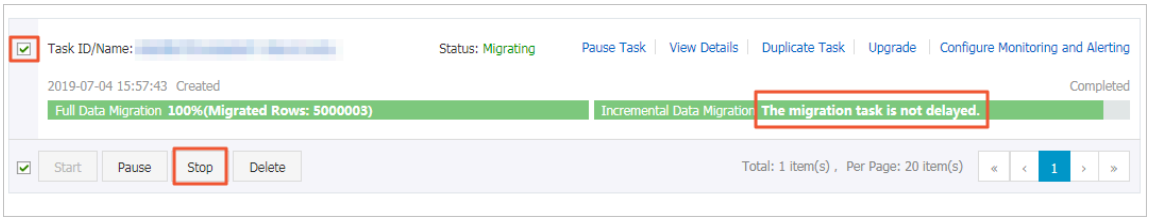
    · Full data migration

      Wait until the migration task stops automatically.

    · Incremental data migration

      The migration task does not stop automatically. To stop the migration task, wait until the task is in the Incremental Migration without Delay state, and

stop writing to the source database. After a few minutes, the task enters the Incremental Migration without Delay state again, and you can stop the task.



Switch your businesses to the ApsaraDB for MongoDB instance during off-peak hours to avoid negatively affecting your businesses.

More information

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