Migrate the SQL Server database created on ECS to SQL Server of ApsaraDB for RDS

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Introduction

To migrate your local SQL Server database to the SQL Server database of ApsaraDB for RDS, you can use the data migration feature provided by Data Transmission Service (DTS) of Alibaba Cloud. The data migration feature of DTS helps you easily migrate your data to the cloud with just a few simple link configuration steps on the Data Transmission console.

This article introduces the solution of SQL Server database migration from Alibaba Cloud ECS to ApsaraDB for RDS., including the migration of data, views, user-defined functions, triggers and other objects.

This solution implements full migration and incremental migration of SQL Server database through DTS, from which you can you can learn how to use DTS to implement the full migration and incremental migration of SQL Server databases without terminating the application services.

Background information

The migration types for SQL Server database supported by DTS are structure migration, full migration, and incremental migration. The detailed information is as follows.

- Structure migration

  Structure migration migrates the structure definition of the migrated object to the destination instance. For SQL Server database, the objects supported by DTS for structure migration include tables, views, table triggers, synonyms, SQL storage procedures, SQL functions, plan GUIDs, custom types, rules and defaults. Other objects are not supported currently.

- Full migration

  Full migration migrates all data stored in the SQL Server instance to the destination RDS instance. If you only perform full migration, the newly added business writes to the local SQL Server database during the migration will not be synchronized to the destination RDS instance.

- Incremental migration

  Incremental migration synchronizes the incremental data of the local SQL Server database during the migration to the destination RDS instance, which enables the real-time synchronization of incremental data so that data consistency between the two databases can be ensured.

Restrictions

- DDL operations are not supported during migration.
- Structure migration does not support migration of assemblies, database-level stored procedures, service brokers, full-text indexes, full-text directories, distributed schemas, distributed functions, CLR scalar functions, CLR value functions, inner tables, aggregate functions, or systems.
- If object name mapping function is enabled, other objects dependent on this object may fail to be migrated.
- Incremental migration only supports tables with clustered indexes which are unique keys.

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- Incremental migration does not support synchronization of update statements that only update big fields.
- Incremental migration does not support tables containing computed columns.
- One incremental migration task only supports migration of one database. If you want to migrate incremental data for multiple databases, you need to create multiple migration tasks.

Environment preparation

- For the destination database on RDS
    a) Create a SQL Server instance on RDS.
    b) Create and configure the database and account used for migration in the SQL Server instance of RDS.

- For the source database on ECS
    a) Create an ECS instance with the operating system of Windows SQL Server 2008 R2 and an Internet IP address.
    b) Install SQL Server 2008 R2 on ECS.
    c) Create SQL Server database and configure the account used for migration on ECS.
- If you need migration without terminating the services, set the local SQL Server log format to full. The detailed procedure is as follows.
    a) In the source database, execute the following command to set the log format to full.

    `alter database database_name set recovery_model_desc='full'`

    Parameter description:

    database_name: The name of the database to be migrated.

    b) To ensure that the full log is enabled, you need to back up the log in the source database. In the source database, execute the following command.

    `BACKUP LOG database_name to DISK=backup_place WITH init`

    Parameters description:

    - database_name: The name of the database to be migrated.
    - backup_place: The path where the backup files are stored.

Migration procedure
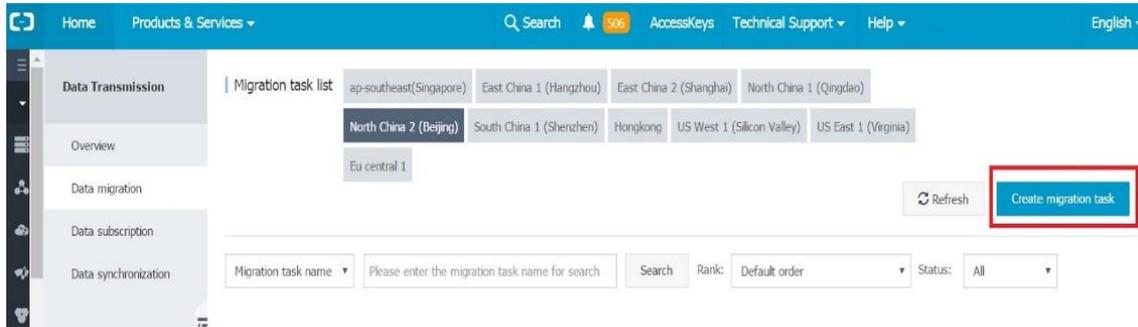
1. Log on to the RDS console.

2. Select the region where the target instance is located.

3. Click the instance ID to enter the **Basic Information** page.

4. Click Create **Data Migration Task** to log on to the Data Transmission console, as shown in the following figure.
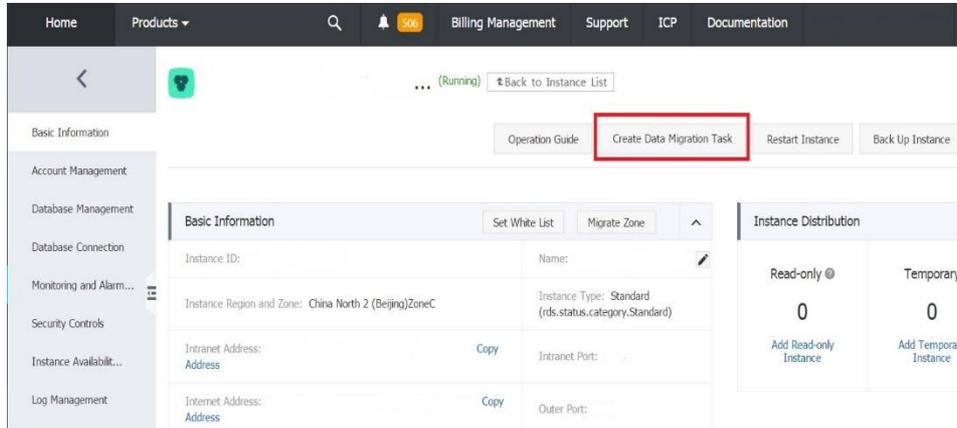
5. In the left-side navigation pane, select **Data migration** to enter the **Migration task list** page.

6. Click **Create migration task** to enter the Data Transmission task configuration page, as shown in the following figure.

7. Enter the information of the source and target databases, as shown in the following figure.

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Parameters description:

- Task name: By default, Data Transmission generates a name for every task automatically. The task name is not required to be unique. You can modify the name. A name indicating the specific services of the task is recommended to facilitate task identification.

- Source database

  - Instance type: Select **ECS-based databases**.
  - Instance region: Select the region where the ECS instance is located.
  - ECS instance ID: Select the ECS instance ID.
  - Database engine: Select **SQL Server**.
  - Port: The listener port of the SQL Server instance.
  - Database account: The account used to access the SQL Server instance.
  - Database password: The password corresponding to the account used to access the SQL Server instance.

- Target database

  - Instance type: Select **RDS instance**.
  - Instance region: Select the region where the RDS instance is located.
  - RDS instance ID: Select the ID of the target RDS instance to be migrated.

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◆ Database account: The account used to access the RDS instance.

◆ Database password: The password corresponding to the account used to access the RDS instance.

8. Click **Test the connection** in the Source database and Target database areas respectively to test whether the connection information is correct.

9. If **Test passed** appears, click **Authorize whitelist and enter into next step** to enter **the Migration class and list** page.

   Note: *If the connection test fails, view the diagnosis and rectify the faults accordingly first.*

10. Select the migration type and migration objects, as shown in the following figure.

Parameters description:

- Migration type

  ◆ DTS supports structure migration, full migration and incremental migration.

  ◆ If you need migration without stopping services, select all the three migration types.

  ◆ If you only need full migration, select **Migrate object structure** and **Migrate existing data**.

- Migration objects

  ◆ The migration object can be a database, a table or a column.

  ◆ By default, after the object is migrated to an RDS instance, the object name remains the same with that in the local SQL Server instance. If the object you migrate has different

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names on the source and destination instances, you need to use the object name mapping feature provided by DTS. Detailed usage can be found in Database Table Column Mapping.

11. Click **Pre-check and start**.

    Note: A pre-check will be performed before a migration task is formally started. Migration can be started only after the pre-check is successful. If the pre-check fails, check the failure details by clicking the button after the specific check items, rectify the faults accordingly, and perform a pre-check again.

12. If the pre-check is successful, click **Buy and start now** to start the migration task.

13. Go back to the Data Transmission console.

14. In the left-side navigation pane, select **Data migration** to enter the **Migration task list** page.

15. Select the region where the target RDS instance is located.

16. Find the migration task and view the progress, as shown in the following figure. If you want to view the migration details, click **View migration details**.

    Note: Incremental migration is a process of dynamic synchronization. We recommend that you verify the business on the destination database when the incremental migration achieves no latency. If the verification succeeds, you can stop the migration task and switch the business to the destination database.
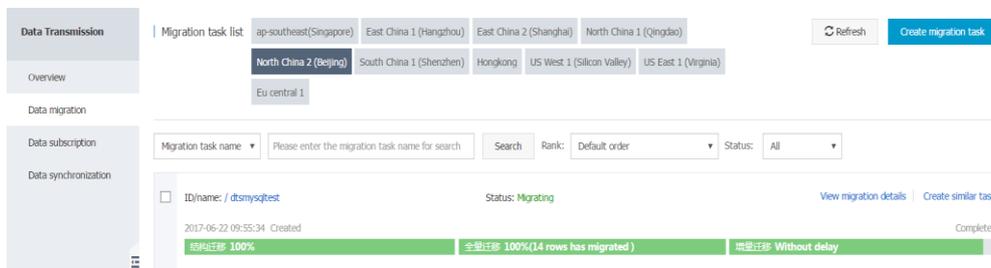
17. Verify whether the changes to the source database can be synchronized to the destination database during the migration process. The detailed procedure is as follows.

    a) Execute the following command to insert two records to the source database.
       insert into t1 values (8, 'dd', 'l'),(9,' mk' ,' lp');

    b) Execute the following command to query whether the new records are added to the source database.
       select * from t1;
       If the following result is returned, it indicates that the two records are added to Table t1 of the source database successfully.
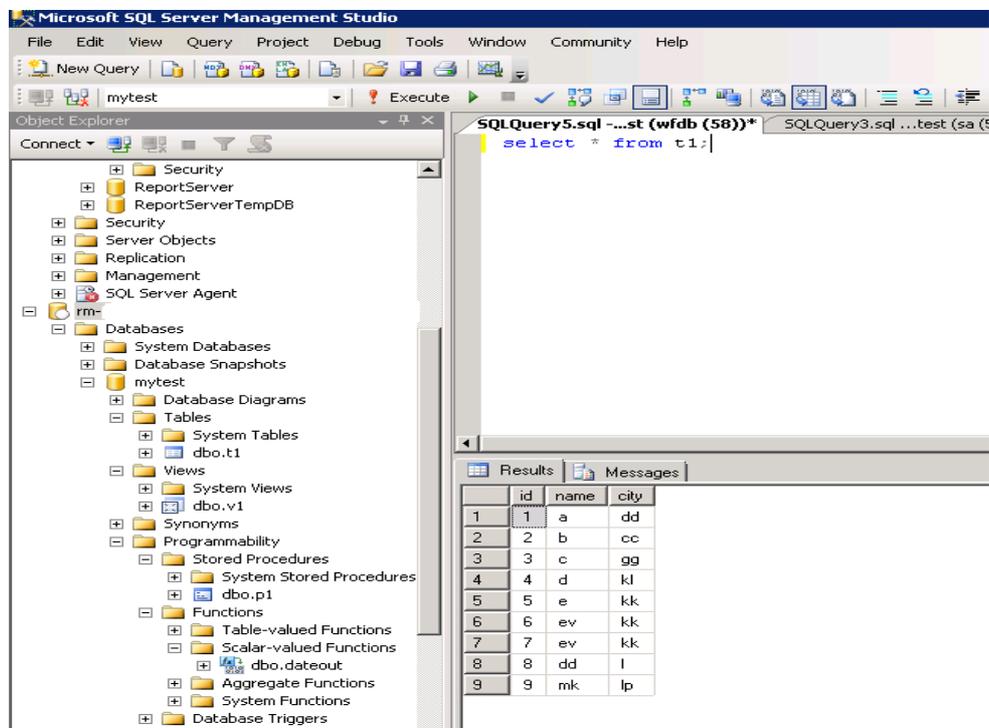
c) Execute the following command to query the new records in the destination database.

`select * from t1;`

If the following result is returned, it indicates that the records added to the source database during the migration process are synchronized to the destination database in real time.

Data validation after migration

- Table data

- Views
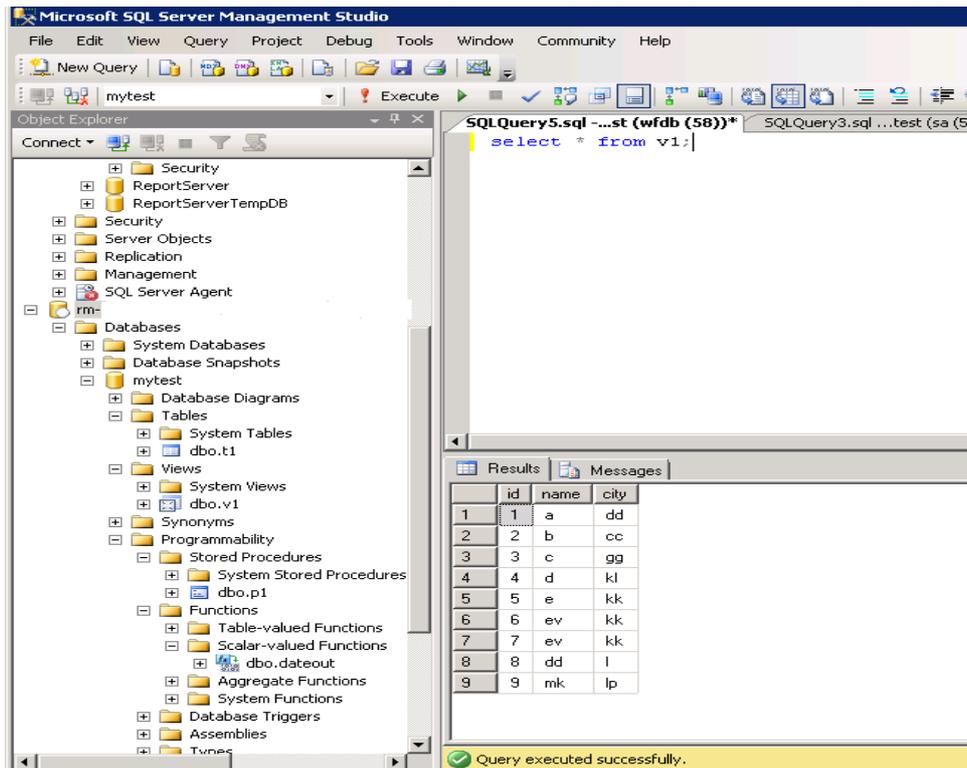
- Stored procedures
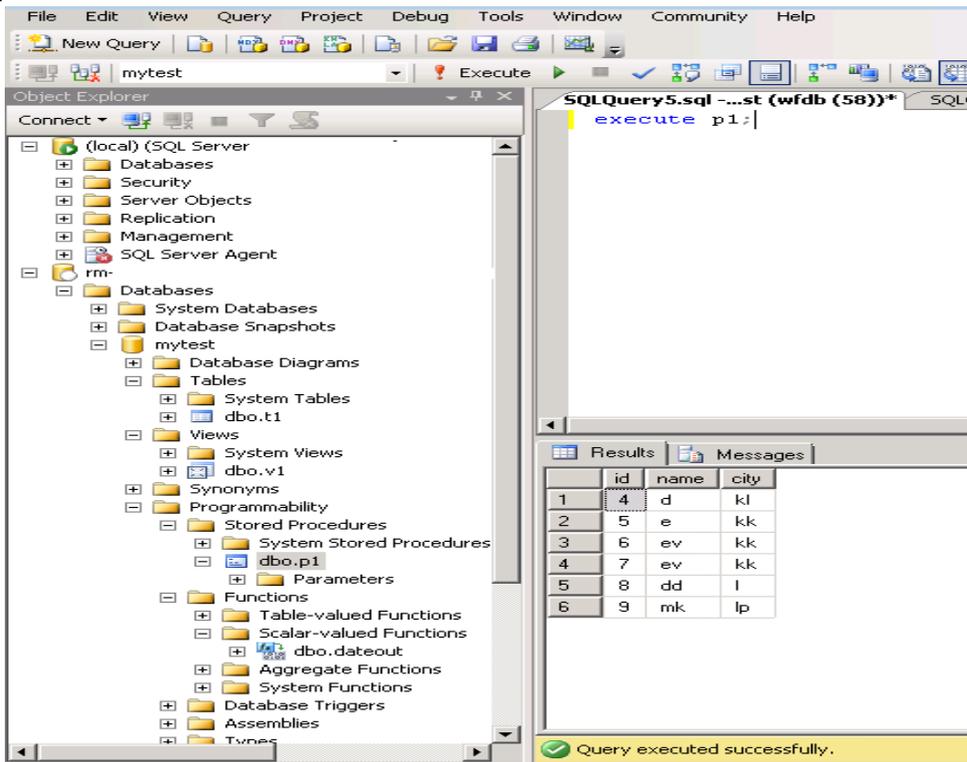
- User-defined functions
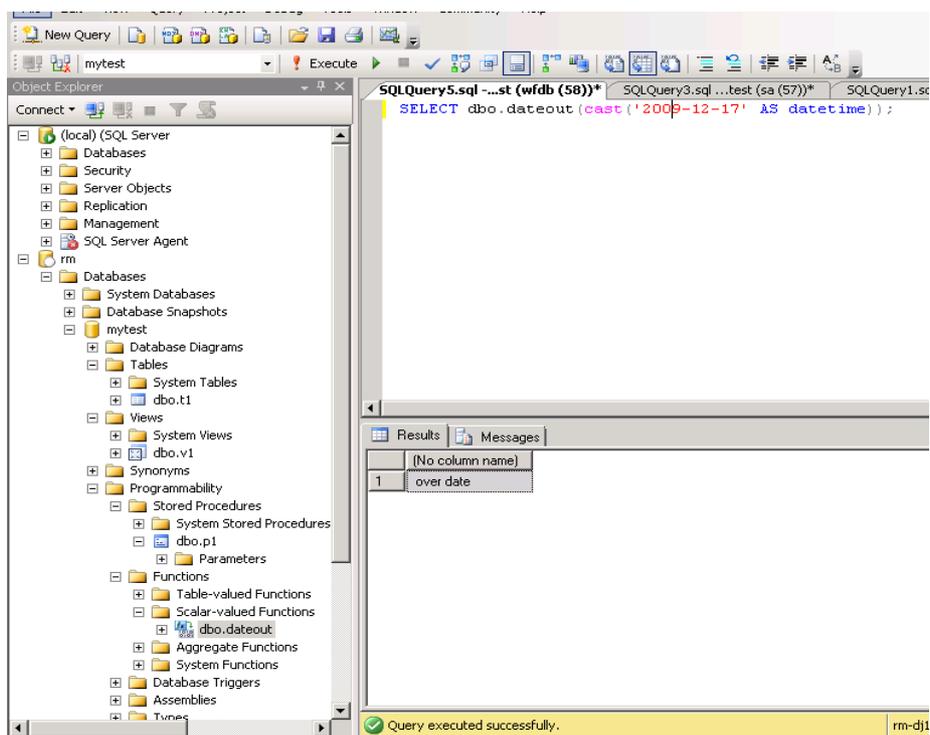
Further reading

Migrate Azure database for SQL to SQL Server of ApsaraDB for RDS