Alibaba Cloud

ApsaraDB for RDS FAQ

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ApsaraDB for RDS FAQ·Legal disclaimer

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Document conventions

Style	Description	Example	
<u> Danger</u>	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.	
<u> </u>	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.	
Notice	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 relonger receives new requests.		
? Note	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 listinstanceid Instance_ID	
[] or [a b]	This format is used for an optional value, where only one item can be selected.	ipconfig [-all -t]	
{} or {a b}	This format is used for a required value, where only one item can be selected.	SWITCH JACTIVEIST AND J	

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ApsaraDB for RDS FAQ overview

1.FAQ overview

If an error message is displayed when you are using ApsaraDB RDS, you can check the information about the error in the API Error Center. If no information about the error can be found, try to find a solution in this topic.

Note The following topics cover a variety of issues and solutions. You can use the search box or press Ctrl+F to search for topics by keywords. If the issue persists, submit a.

Purchases and payments

- Why is the MyISAM storage engine automatically disabled for ApsaraDB RDS for MySQL?
- Why does ApsaraDB RDS for MySQL not support the MyISAM storage engine?
- How do I handle billing-related issues?
- How do I change the storage type of an ApsaraDB RDS instance from standard SSDs or ESSDs to local SSDs?
- How do I handle zone- and region-related issues?
- Why am I unable to find an ApsaraDB RDS instance?

Connections and networks

- How do I connect to an ApsaraDB RDS instance?
- How do I access an ApsarabB RDS instance from an ECS instance over an internal network?
- Why am I unable to connect to an ApsaraDB RDS for MySQL or ApsaraDB RDS for MariaDB TX instance from an on-premises device over the Internet?
- Do I need to configure my application to automatically reconnect to an ApsaraDB RDS instance?
- What do I do if the "ERROR 1045 (28000): Access denied for user" error message is displayed when I connect to an ApsaraDB RDS for MySQL instance?
- What do I do if the "ip not in whitelist" error message is displayed when I connect an ECS instance to an ApsaraDB RDS instance over an internal network?
- How do I connect an ECS instance to an ApsaraDB RDS instance over an internal network if these instances reside in different regions?
- How do I handle issues about network types?
- What do I do if the "Unknown MySQL server host" error message is displayed when I connect to an ApsaraDB RDS for MySQL instance from an on-premises device that runs a Linux operating system?
- How do I use Navicat to connect to an ApsaraDB RDS for MySQL instance?
- How do I determine the public IP address of an on-premises device or a client that is connected to an ApsaraDB RDS for SQL Server instance?
- How do I reduce the network latency between an ECS instance and an ApsaraDB RDS for PostgreSQL instance?
- What do I do if I cannot connect to an ApsaraDB RDS instance?
- What do I do if the "Can't connect to MySQL server on 'XXX'" error message is displayed when I connect to an ApsaraDB RDS for MySQL instance or an ApsaraDB RDS for MariaDB TX instance?
- How do I connect an ECS instance and an ApsaraDB RDS instance over an internal network if these instances reside in networks of different types?

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• How do I connect an ECS instance and an ApsaraDB RDS instance over an internal network if these instances reside in different VPCs?

- How do I connect an ECS instance to an ApsaraDB RDS instance if the instances are created within different Alibaba Cloud accounts?
- What do I do if excessive connections are established on an ApsaraDB RDS for PostgreSQL instance?
- How do I connect a Java program to an ApsaraDB RDS for MySQL instance?
- How do I obtain the public IP address of an on-premises device that is connected to an ApsaraDB RDS for PostgreSQL instance?
- How do I change the VPC of an ApsaraDB RDS instance?
- What do I do if a network-related or instance-specific error occurred when I attempt to connect to an ApsaraDB RDS for SQL Server instance?
- How do I change the vSwitch of an ApsaraDB RDS instance?
- How do I connect a Java application to an ApsaraDB RDS for SQL Server instance?
- What do I do if the establishment of a connection to an ApsaraDB RDS for PostgreSQL instance is interrupted?
- What do I do if the "Unknown MySQL server host" or "name or service not known" error message is displayed when I connect to an ApsaraDB RDS for MySQL instance or an ApsaraDB RDS for MariaDB TX instance?
- How do I connect to an ApsaraDB RDS instance from an external server?

Migration, synchronization, and change tracking

- What is DTS? What are the limits on DTS?
- How do I import multiple data records to an ApsaraDB RDS for SQL Server instance at the same time?
- What do I do if the "Connection timed out" error message is displayed when I use the change tracking feature of DTS?
- What do I do if the "client partition is empty" error message is displayed in DTS logs?
- What do I do if DTS prompts that the number of migrated data records exceeds the total number?
- What do I do if the schema existence check failed during the DTS precheck?
- How do I view the incremental data in an ApsaraDB RDS for MySQL instance?
- What do I do if an error occurred when I use the COPY statement to import data to an ApsaraDB RDS for PostgreSQL instance?
- What do I do if the "java.io.IOException: Parse message attribute failed" error message is reported by the change tracking feature of DTS?
- How do I migrate self-managed databases to ApsaraDB RDS?
- Why are read-only ApsaraDB RDS instances not supported by the change tracking feature of DTS?

Backup and restoration

- What are the differences between data migration, synchronization, and restoration?
- What do I do if the size of backup files on an ApsaraDB RDS instance exceeds the free quota for backup storage?
- How do I restore the backup files that are downloaded from an ApsaraDB RDS instance to a new ApsaraDB RDS instance?
- How do I use wget to download backup files in a Linux operating system?
- Which factors affect the amount of time that is required to change the specifications of an

ApsaraDB for RDS FAQ overview

ApsaraDB RDS for MySQL instance?

- How do I restore the data that is accidentally deleted from an ApsaraDB RDS instance?
- What do I do if the "The operation is not permitted due to no backup" error message is displayed when I create a temporary ApsaraDB RDS instance?
- How do I use RDSBackup to decompress the backup files of an ApsaraDB RDS for MySQL instance in a Windows operating system?
- How do I use get_rds_backup.py to download the backup files of an ApsaraDB RDS for MySQL instance?
- How do I rest ore individual databases on an ApsaraDB RDS for MySQL instance?
- How do I use DMS to export data as a CSV file?
- How do I configure the options of the mysqldump plug-in for ApsaraDB RDS for MySQL?
- How do I back up individual databases on an ApsaraDB RDS for SQL Server instance or an ApsaraDB RDS for MySQL instance?
- How do I rest ore individual databases on an ApsaraDB RDS for SQL Server instance?
- How do I restore data from a specific point in time in an ApsaraDB RDS for MySQL instance to a self-managed database?
- What do I do if a disaster recovery ApsaraDB RDS instance is paused?
- How do I use the mysqldump plug-in to migrate data?
- How do I back up or restore the databases of an ApsaraDB RDS for MySQL instance?

Read-only instances and read/write splitting

- What do I do if there is a latency when a read-only ApsaraDB RDS for MySQL instance synchronizes data from its primary instance?
- How do I enable read/write splitting for an ApsaraDB RDS for MySQL instance?
- Does ApsaraDB RDS support read-only instances and read/write splitting?
- How do I make sure that data is read in a timely manner on an ApsaraDB RDS for MySQL instance when the read/write splitting feature is enabled?

Performance, storage capacity, and memory

- How do I handle issues related to storage capacity?
- How do I expand the storage capacity of an ApsaraDB RDS instance?
- What is availability detection?
- How do I create and view a stored procedure in ApsaraDB RDS for MySQL?
- I executed an SQL statement on both an ECS instance and an ApsaraDB RDS instance. Why is the query result returned faster on the ECS instance?
- What are the limits on ApsaraDB RDS for MySQL?
- How do I configure and use the query cache feature of ApsaraDB RDS for MySQL?
- What do I do if an ApsaraDB RDS instance is in the Locked state?
- What do I do if the number of connections to an ApsaraDB RDS for MySQL instance reaches the upper limit?
- What is the maximum storage capacity that is allowed for an ApsaraDB RDS instance?
- How do I manage long-time queries in an ApsaraDB RDS for MySQL instance?
- How does ApsaraDB RDS for MySQL collect table statistics?

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 How do I view the current connection to an ApsaraDB RDS for SQL Server instance and the SQL statements that are executed over the current connection?

- How do I view the memory usage of an ApsarabB RDS for SQL Server instance?
- How do I reclaim the tablespace of an ApsaraDB RDS for SQL Server instance?
- How do I view the storage usage of an ApsaraDB RDS for SQL Server instance at the instance, database, and table levels?
- What do I do if I want to use the diagnostic report feature and obtain diagnostic reports in DAS and DMS?
- How do I use OSS to extend the tablespaces of an ApsaraDB RDS for PostgreSQL instance instance?
- How do I troubleshoot the issues that cause high CPU utilization on an ApsaraDB RDS for PostgreSQL instance?
- How do I troubleshoot the issues that cause abrupt increases in disk usage on an ApsaraDB RDS for PostgreSQL instance?
- What do I do if requests are blocked on an ApsaraDB RDS for SQL Server instance?
- What do I do if the CPU utilization of an ApsaraDB RDS for SQL Server instance is high?
- What do I do if an ApsaraDB RDS for SQL Server instance is automatically locked after its disk space is exhausted?
- What tools can I use to view the storage of an ApsaraDB RDS for SQL Server instance?
- Is disk space released when I use the DROP statement to delete indexes from InnoDB tables?
- What do I do if the CPU utilization is high and the usages of the memory, disk space, and IOPS are high?
- What do I do if an ApsaraDB RDS for MySQL instance is in the Locked state because its disk space is exhausted by data files?
- What do I do if the disk space of an ApsaraDB RDS for MySQL instance is exhausted by binary log files?
- What do I do if an ApsaraDB RDS for MySQL instance is in the Locked state because its disk space is exhausted by temporary files?
- What do I do if the disk space of an ApsaraDB RDS for MySQL instance is exhausted by system files?
- How do I view the events and threads that consume a large amount of memory in an ApsaraDB RDS for MySOL instance?
- What do I do if the CPU utilization of an ApsaraDB RDS for MySQL instance or an ApsaraDB RDS for MariaDB TX instance is high?
- What do I do if the IOPS usage of an ApsaraDB RDS for MySQL instance is high?
- How do I use the "optimize table" command to release the tablespace of an ApsaraDB RDS for MySQL instance?

Accounts and permissions

- How do I authorize a RAM user to use DMS to log on to an ApsaraDB RDS instance?
- What do I do if the "OPERATION need to be executed set by ADMIN" error message is displayed?
- How do I grant permissions to the users of an ApsaraDB RDS for PostgreSQL instance?

Upgrades

• What common errors may be reported when I upgrade the major engine version of an ApsaraDB RDS for PostgreSQL instance?

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Databases and tables

• Does ApsaraDB RDS for MySQL support online DDL operations? How do I perform online DDL operations on an ApsaraDB RDS for MySQL instance?

- What are the limits on table partitions in ApsaraDB RDS for MySQL?
- How do I perform online DDL operations on an ApsaraDB RDS for MySQL instance?
- What are the limits on the size of a single table in ApsaraDB RDS for MySQL?
- Does ApsaraDB RDS for MySQL support table partitioning?
- How do I change the time zone of an ApsaraDB RDS for PostgreSQL instance?
- How do I make sure that database character encoding is valid in ApsaraDB RDS for MySQL?
- How do I view the primary key fields of a table in an ApsaraDB RDS for MySQL instance?
- What do I do if the "There are 2 other sessions using the database" error message is displayed when I delete a database from an ApsaraDB RDS for PostgreSQL instance?
- What do I do if the "The Changes you have made require the following table" error message is displayed when I modify a schema?

Data synchronization, data migration, and data security

- How do I use DTS to replicate and rename databases in an ApsaraDB RDS instance?
- How do I change the encoding format of character sets of an ApsaraDB RDS for MySQL instance to utf8mb4?
- What are the descriptions of character sets in ApsaraDB RDS for MySQL?

Logs

- How do I handle issues related to binary logs?
- What rules does ApsaraDB RDS follow when it generates and deletes binary logs for an ApsaraDB RDS for MySQL instance?
- How do I remotely obtain and parse the binary logs of an ApsaraDB RDS for MySQL instance?
- What policies are used by ApsaraDB RDS to collect slow query logs?
- What do I do if the "mysqld:Sort aborted:Server shutdown in progress" error message is displayed when I use an ApsaraDB RDS for MySQL instance?
- How do I shrink the transaction logs of an ApsaraDB RDS for SQL Server instance?
- Can I use the binary logs of a read-only ApsaraDB RDS for MySQL instance?

SQL

- What do I do if the "Error 1709: Index column size too large. The maximum column size is 767 bytes." error message is displayed when I use an ApsaraDB RDS for MySQL instance?
- What do I do if the "Out of resources when opening file './xxx.MYD' (Errcode: 24)" error message is displayed when I use an ApsaraDB RDS for MySQL instance?
- What do I do if the "the table '/home/mysql/xxxx/xxxx/#tab_name' is full" error message is displayed when I use an ApsaraDB RDS for MySQL instance?
- What do I do if the "relation "xxx" already exists" error message is displayed when I attempt to modify a capitalized table name in an ApsaraDB RDS for PostgreSQL instance?
- How do I handle the issues related to the group_concat function in an ApsaraDB RDS for MySQL instance?

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• What do I do if the "SELECT command denied to user 'username'@'ip' for table 'user'" error message is displayed when I use an ApsaraDB RDS for MySQL instance?

- What do I do if the query results are inaccurate due to the large DECIMAL field of an ApsaraDB RDS for MySQL instance?
- How do I use the postgres_fdw and dblink plug-ins to query data across databases in an ApsaraDB RDS for PostgreSQL instance?
- How do I use the utf8mb4 character set to store emojis in an ApsaraDB RDS for MySQL instance?
- What do I do if the "Specified key was too long; max key length is 767 bytes" error message is displayed when I create indexes in an ApsaraDB RDS for MySQL instance?
- What do I do if the "OPERATION need to be executed set by ADMIN" error message is displayed when I install and use ThinkSNS to connect to an ApsaraDB RDS instance?

Parameter settings

- How do I configure timeout parameters for an ApsaraDB RDS for MySQL instance?
- How do I delete the values of ONLY_FULL_GROUP_BY for an ApsaraDB RDS for MySQL instance?

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2.Purchases and Payments 2.1. FAQ about regions and zones

This topic provides answers to some commonly asked questions about the regions and zones of ApsaraDB RDS.

Introduction to regions and zones

A region is a physical data center. After an RDS instance is created, you cannot change its region.

Zones in a region are physical areas with independent power supplies and network facilities. The network latency is low between RDS instances within the same zone.

Can instances in different regions communicate over an internal network?

No, instances in different regions can communicate only over the Internet by using public endpoints. For more information, see View and change the internal and public endpoints and port numbers of an ApsaraDB RDS for MySQL instance. If you want two instances in different regions to communicate over an internal network, use one of the following two methods:

- Method 1: Release one of the two instances and then create an instance in the same region as the other instance.
- Method 2: If you want your ECS and RDS instances in different regions to communicate over an internal network, configure their network types to VPC and create a Cloud Enterprise Network between the VPCs that host your ECS and RDS instances.

Can instances in different zones of the same region communicate over an internal network?

Yes, instances in different zones of the same region can communicate over an internal network by using internal endpoints. For more information, see View and change the internal and public endpoints and port numbers of an Apsarabb RDS for MySQL instance.

Can I change the region of my RDS instance?

No, you cannot change the region of your RDS instance after you confirm the purchase order. However, you can use Alibaba Cloud Data Transmission Service (DTS) to migrate the data of your original RDS instance to a new RDS instance in the destination region. Then, you can release your original RDS instance. For more information, see Overview of data migration scenarios and Release or unsubscribe from an ApsaraDB RDS for MySQL instance.

Can I change the zone of my RDS instance?

Yes, you can change the zone of your RDS instance. However, zones in the same region provide the same services. In this case, you do not need to change the zone of your RDS instance. If you want to change the zone of your RDS instance for specific reasons, see Migrate an Apsarabb RDS for MySQL instance across zones in the same region.

Which deployment method is recommended: single-zone deployment or multi-zone deployment?

Zones in the same region are independent physical areas that are accessible to one another. If your application requires high disaster recovery capabilities, we recommend that you choose multi-zone deployment to create your RDS instances in different zones of the same region.

Note For more information, see Create an ApsaraDB RDS for MySQL instance.

2.2. FAQs about Billing

This topic provides answers to some frequently asked questions about billing in ApsaraDB RDS.

What are the differences between the subscription and pay-as-yougo billing methods?

Can I switch between the subscription and pay-as-you-go billing methods?

Yes. For more information, see the following topics:

- Change the billing method of an ApsaraDB RDS for MySQL instance from subscription to pay-as-you-
- Change the billing method of an ApsaraDB RDS for MySQL instance from pay-as-you-go to subscript ion

Note After you switch your RDS instance to the pay-as-you-go billing method, a refund is returned based on the payment method that is used.

Refund = Fee actually paid - Fee for consumed resources

- The fee actually paid is the money that you paid and does not include the amount that is covered by coupons or vouchers.
- The fee for consumed resources is calculated based on the following formula: Fee for consumed resources = Daily fee x Consumed subscription duration x Discount for the consumed subscription duration. The daily fee is equal to the order-specific fee divided by
- The consumed subscription duration is accurate to the day. The part that is less than one day is counted as one day.

Is my RDS instance affected if I change its billing method?

No, your RDS instance is not affected if you change its billing method.

Why am I charged additional fees for my subscription RDS instance?

The fee that you pay when you purchase a subscription RDS instance covers the instance type and the storage capacity that you select. If you create read-only RDS instances, enable the SQL Explorer (SQL Audit) feature or the high-frequency performance monitoring feature, or consume more storage than the free quot a for backup storage, you are charged additional fees. For more information, see Billable items.

Am I charged for my pay-as-you-go RDS instance if I do not use the instance?

Yes, you are charged an hourly fee for every pay-as-you-go RDS instance that you create. These instances consume computing resources and storage resources even if you do not use these instances. If you do not intend to use a pay-as-you-go RDS instance for a long period of time, we recommend that you save the data that you require and release the RDS instance.

Am I charged for the inbound and outbound Internet traffic that I consume for my pay-as-you-go RDS instances and subscription RDS instances? What is the quota of the bandwidth plan that is provided for an RDS instance?

You are not changed for the inbound or outbound Internet traffic that you consume for your pay-as-you-go RDS instances and subscription RDS instances. The bandwidth of an RDS instance is unlimited.

2.3. Why am I unable to find an ApsaraDB RDS instance?

If an ApsaraDB RDS instance that you purchased cannot be found in the ApsaraDB RDS console, you can use the following methods to solve this problem.

Reason	Description	Method	
The region that you selected in the ApsaraDB RDS console is not the region where the RDS instance resides.	If you do not select the region where the RDS instance resides, you cannot find the RDS instance.	1. Log on to the ApsaraDB RDS console and check the region where the RDS instance resides. 2. In the top navigation bar of the Instances page, select the region where the RDS instance resides. Column Col	
The RDS instance is released due to expiration or overdue payments.	If the RDS instance is locked due to expiration or overdue payments, ApsaraDB RDS releases the RDS instance after a specific period of time. The RDS instance cannot be found after it is released.	You can unlock or rebuild an expired or overdue RDS instance within the specified period of time. For more information, see Unlock or rebuild an expired or overdue ApsaraDB RDS instance.	

Reason	Description	Method	
The zones that you selected cannot provide sufficient resources.	In rare cases, ApsaraDB RDS may fail to create an RDS instance due to insufficient resources. In this case, your payment is refunded.	Select other repositions can provide sufficient	
	Note You can view the refund information in the Type column of the Orders page.	Select other zones that can provide sufficient resources. For more information, see Create an RDS instance.	

2.4. The MyISAM engine is disabled for ApsaraDB RDS for MySQL instances by default

MyISAM tables do not support transactions. Read and write operations conflict with each other. MyISAM tables only support table-level locks. When a query or write operation takes a long time, other operations may be blocked, easily causing connection accumulation, and data may be lost after downtime. Therefore, InnoDB is recommended for ApsaraDB RDS for MySQL. If tables are imported or modified using MyISAM or rename Table, The InnoDB engine will be automatically used.

2.5. Why does ApsaraDB RDS for MySQL not support the MyISAM storage engine?

ApsaraDB RDS for MySQL does not support the MyISAM storage engine because of the following reasons:

- The data integrity protection mechanism of MyISAM has defects. These defects may cause data corruption or data loss. In addition, most of these defects are design issues and cannot be fixed without compromising compatibility.
- If your data stored in MyISAM is corrupted, you must manually restore most of the corrupted data. The corrupted data cannot be automatically restored.
- MyISAM is not an optimal storage solution for ApsaraDB RDS for MySQL in terms of I/O operations. Therefore, MyISAM does not have significant performance advantages over InnoDB.
- Data can be migrated from MyISAM to InnoDB at a low cost. For most applications, you need only to modify the table creation code to complete the migration.
- The preference on MyISAM is shifting to InnoDB. In MySQL 5.7 and MySQL 8.0, you can choose not to use MyISAM. The management of system data is also be transferred to InnoDB.

2.6. How do I migrate an ApsaraDB RDS instance from standard or enhanced SSDs to local SSDs?

This topic describes how to migrate an ApsaraDB RDS instance from standard or enhanced SSDs to local SSDs. This topic also provides a reference for you to migrate the RDS instance from local SSDs to standard or enhanced SSDs.

- If your RDS instance runs MySQL 5.7 on RDS Basic Edition, you can migrate the instance to local SSDs by changing the instance specifications. For more information, see Change the specifications of an ApsaraDB RDS for MySQL instance.
- If your RDS instance does not run MySQL 5.7 on RDS Basic Edition, you must create a RDS instance that uses the specified type of storage media. Then, you can use Data Transmission Service (DTS) to migrate the data of your RDS instance to the new RDS instance.

Prerequisites

- Your RDS instance runs one of the following database engines:
 - o RDS MySQL
 - o RDS SQL Server
 - o RDS PostgreSQL
- A new RDS instance is created with the specified type of storage media. For more information, see Create an ApsaraDB RDS for MySQL instance.
- The storage capacity of the new RDS instance is greater than or equal to the used storage space of your RDS instance.
- Your RDS instance and the new RDS instance reside in the same region.
- Your RDS instance and the new RDS instance run the same database engine, version, and RDS edition.
- The binlog_row_image parameter is set to *full* for your RDS instance. This applies if you select the incremental data migration method.

Precautions

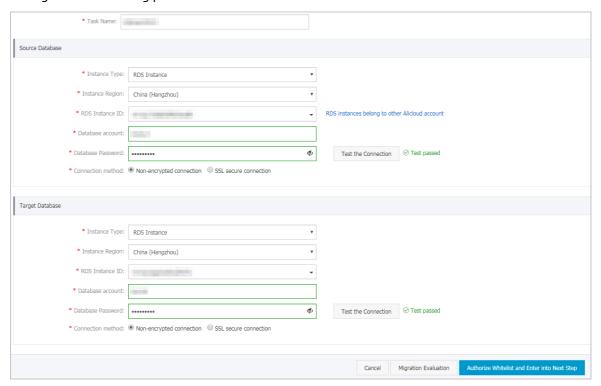
- After the migration, the information about your RDS instance changes. You must immediately update the configuration data on your application. This prevents interruptions to your workloads.
- During the migration, you cannot perform data definition language (DDL) operations on your RDS instance.
- The schema migration method does not support events.
- If the object name mapping feature is enabled for an object, DTS may fail to migrate the objects that depend on this object.

Procedure

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



3. Configure the following parameters.

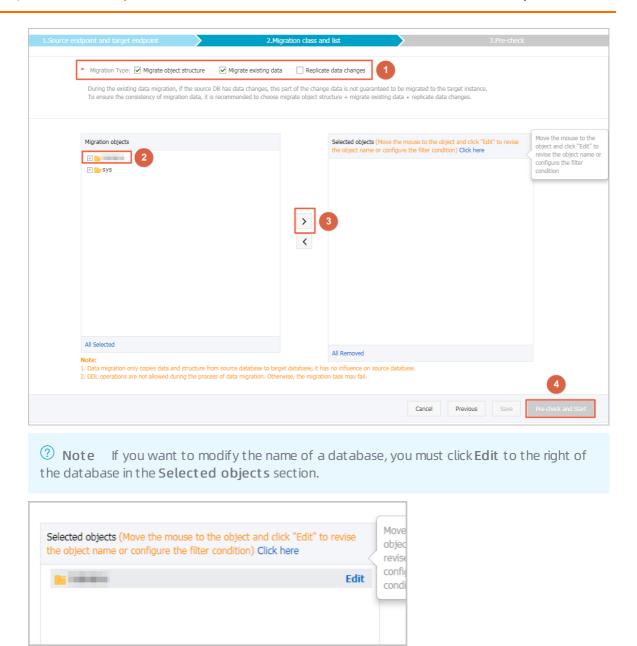


Parameter		Description	
Task Name		Enter the name of the migration task. By default, DTS generates a name for each task. We recommend that you change the automatically generated name to an informative name based on your business requirements.	
	Instance Type	Select RDS Instance.	
	Instance Region	Select the region to which your RDS instance belongs.	
	RDS Instance ID	Select the ID of your RDS instance.	
	Database Account	Enter the username of the account that is used to log on to your RDS instance. The account can be the privileged account. The account can also be a standard account that has the read and write permissions on all databases.	
Source Database			

Parameter		Description
	Database Password	Enter the password of the account that you have specified.
	Connection Method	Select Non-encrypted connection. If SSL encryption is enabled for your RDS instance, select SSL secure connection. For more information about SSL encryption, see Configure SSL encryption for an ApsaraDB RDS instance.
	Instance Type	Select RDS Instance.
	Instance Region	Select the region to which your RDS instance belongs.
	RDS Instance ID	Select the ID of the new RDS instance.
Destination Database	Database Account	Enter the username of the account that is used to log on to the new RDS instance. The account can be the privileged account. The account can also be a standard account that has the read and write permissions on all databases.
	Database Password	Enter the password of the account that you have specified.
	Connection Method	Select Non-encrypted connection. If SSL encryption is enabled for the new RDS instance, select SSL secure connection. For more information about SSL encryption, see Configure SSL encryption for an ApsaraDB RDS instance.

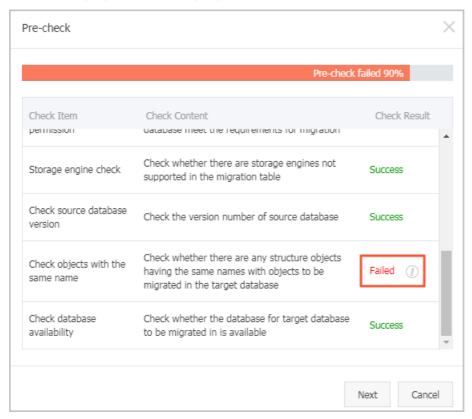
Note The parameters that you need to configure vary based on the values of the Instance Type and RDS Instance ID parameters.

- 4. Click Test Connectivity in both the Source Database and Destination Database sections.
 - **? Note** If your RDS instance and the new RDS instance pass the connectivity test, these instances can be connected. Otherwise, you must fix the errors that impair connectivity.
- 5. In the lower-right corner of the page, click **Set Whitelist and Next**.
- Specify the Migration Type parameter. Select objects in the Migration objects section. Click the > icon to move the selected objects to the Selected objects section. Then, click Pre-check and Start.



7. View the precheck results. This step is required only when the migration task fails the precheck. If the migration task passes the precheck, go to Step 10.

The following figure shows sample precheck results.

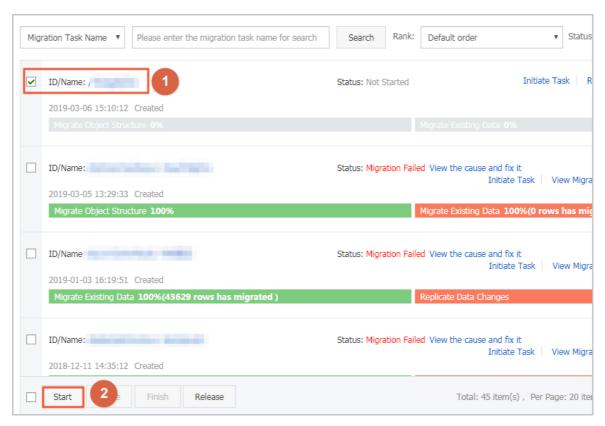


8. Click the

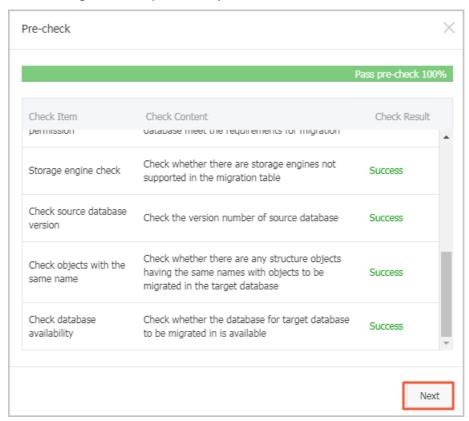


icon next to Failed in the Check Result column for each failed check item. View details about the failure. Then, troubleshoot the errors that cause the failure based on the failure details.

9. After all the errors are fixed, go to the page that displays a list of migration tasks, select the migration task that you have created, and then click **Start**.



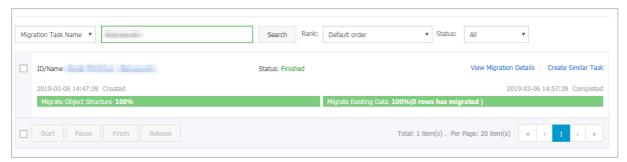
10. After the migration task passes the precheck, click Next.



11. Confirm the configuration of the migration task, select Service Terms, and then click **Buy and Start**.

What to do next

After the migration task is complete, you must immediately update the configuration data on your RDS instance. This update requires that you replace the endpoint of your RDS instance with the endpoint of the new RDS instance.



3.Connections and Networks 3.1. How do I connect to an ApsaraDB RDS instance?

This topic describes how to connect to an ApsaraDB RDS instance over the Internet or an internal network. We recommend that you establish a connection over an internal network to ensure data security and transmission efficiency.

Note You can check the network type of the RDS instance and choose a connection method based on the network type of the RDS instance. For more information, see Use a database client or the CLI to connect to an ApsaraDB RDS for MySQL instance.

Connect to an RDS instance over the Internet

If you want to connect to an RDS instance over the Internet, you must use the public endpoint of the RDS instance. By default, an RDS instance is not provided with a public endpoint. You must apply for a public endpoint for an RDS instance. For more information, see Apply for or release a public endpoint for an ApsaraDB RDS for MySQL instance.



- If you connect to an RDS instance by using the public endpoint, security is compromised. Proceed with caution.
- For faster transmission and higher security, we recommend that you migrate your application to an Elastic Compute Service (ECS) instance that resides in the same region and has the same network type as the RDS instance. This way, you can connect to the RDS instance by using the internal endpoint.

After you obtain a public endpoint, you can use the public endpoint to connect to the RDS instance. For more information, see the "References" section of this topic.

Connect to an RDS instance over an internal network

If you want to connect to an RDS instance over an internal network, you must use the internal endpoint of the RDS instance. For more information about how to view the internal endpoint of an RDS instance, see View and change the internal and public endpoints and port numbers of an ApsaraDB RDS for MySQL instance.

Prerequisites

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In most cases, you can connect to an RDS instance over an internal network only from an ECS instance. To connect to an RDS instance from an on-premises data center, you must establish a physical connection between the data center and the RDS instance. For more information, see Connect an on-premises data center to a VPC through a physical connection.

When you connect to an RDS instance over an internal network from an ECS instance, make sure that the following requirements are met:

• The ECS instance and the RDS instance are created within the same Alibaba Cloud account.

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- The ECS instance and the RDS instance reside in the same region.
- The ECS instance and the RDS instance reside in the same type of network.
- If the ECS instance and the RDS instance both reside in virtual private clouds (VPCs), these instances must reside in the same VPC.
- The private IP address of the ECS instance is added to an IP address whitelist of the RDS instance. For more information, see Configure a whitelist.

If all the preceding requirements are met, you can connect the ECS instance to the RDS instance by using the internal endpoint of the RDS instance. For more information, see the "References" section of this topic.

FAO

- How do I prohibit access to my RDS instance over the Internet?
 - Make sure that the IP address whitelists of your RDS instance contain only private IP addresses. You can also release the public endpoint of your RDS instance. For more information, see Apply for or release a public endpoint for an ApsaraDB RDS for MySQL instance.
- Why am I unable to change the network type of my RDS instance from VPC to classic network?

 Some RDS instances do not support the classic network type and support only the VPC network type.

 For more information, see Change the network type of an ApsaraDB RDS for MySQL instance.
- Why is my RDS instance disconnected from an ECS instance even though the public IP address of the ECS instance is added to an IP address whitelist of my RDS instance?
 - A possible cause is that the public IP address of the ECS instance is changed. In this case, you must add the new public IP address of the ECS instance to an IP address whitelist of your RDS instance.

References

- Use a database client or the CLI to connect to an ApsaraDB RDS for MySQL instance
- Connect to an ApsaraDB RDS for SQL Server instance
- Connect to an ApsaraDB RDS for PostgreSQL instance
- Connect to an ApsaraDB RDS for MariaDB TX instance

3.2. Navicat connects to databases such as apsaradb RDS for MySQL

This topic describes how to use Navicat to connect to RDS databases, such as MySQL, SQL Server, PostgreSQL, and MariaDB.

Note Alibaba Cloud has officially launched Data Management Service (DMS), which provides graphical Data Management functions. It can be used to manage relational databases and NoSQL databases, and supports Data Management, structure Management, user authorization, provides features such as security audit, data trend analysis, data tracing, BI charts, and performance and optimization.

We recommend that you use DMS to manage databases. For more information about how to use DMS to connect to a database, see Use DMS to log on to an ApsaraDB RDS for MySQL instance.

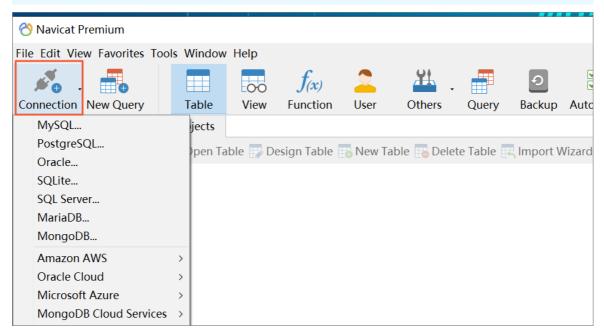
Prerequisites

You have completed the following operations:

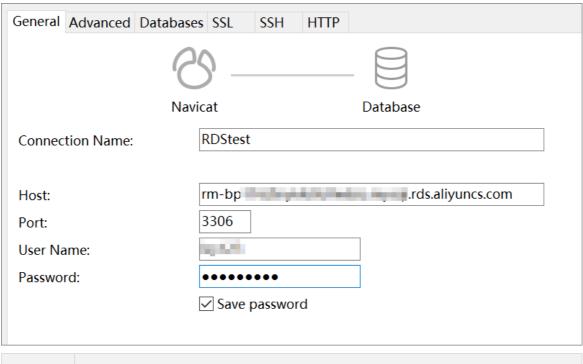
- Create a cluster
- Use a database client or the CLI to connect to an ApsaraDB RDS for MySQL instance
- Create a RAM user

Procedure

- 1. Start Navicat.
- 2. In the upper-left corner, connection to select the type of the database to be connected.
 - Note If no alibaba Cloud menu (Navicat version is too low), you can directly select MySQL, PostgreSQL and other databases.

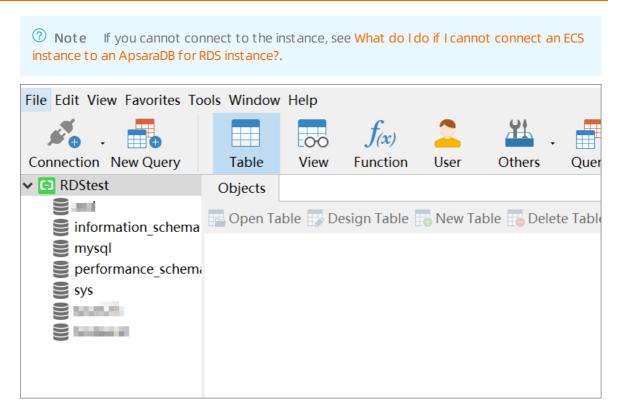


3. Enter information about the RDS instance you want to connect. The parameters are described as follows.



Paramete r or button	DO NOT TRANSLATE
Connect ion Name	The custom name of the connection.
	Enter the intranet address or internet address of the RDS instance. Instructions for using the intranet address and Internet address are as follows:
Host	 If your client is deployed in an ECS instance, and the instance is in the same region and has the same network type as the destination RDS instance, you can use the internal IP address. For example, ECS and RDS instances are both in the VPC located in China (Hangzhou). You can use the internal IP address provided to create secure connection. Use the public IP address for other situations.
	For more information about how to view the internal network endpoint and public network endpoint, see View and change the internal and public endpoints and port numbers of an ApsaraDB RDS for MySQL instance.
Port	If you connect to the instance over the internal network, enter the internal port of the instance. If you connect to the instance over the public network, enter the public port of the instance.
UID	Enter the name of the account used to access the RDS instance.
Passwor d	Username the password.

4. Click OK.



3.3. How do I access an RDS instance from an ECS instance over the intranet?

If your business is built on an ECS instance and you need to access an RDS instance from the ECS instance, we recommend that you establish the connection over the intranet. This increases the transmission rate and ensures security.

For more information, see How do I connect to an ApsaraDB RDS instance?.

3.4. Why am I unable to connect to my ApsaraDB RDS for MySQL or ApsaraDB RDS for MariaDB instance from a local server over the Internet?

Before you connect to your ApsaraDB RDS instance from a local server over the Internet, you must add the public IP address of the local server to an IP address whitelist of the RDS instance. This applies if the RDS instance runs MySQL or MariaDB. This topic describes how to obtain the public IP address of the local server.

Problem description

The public IP address of the local server is obtained by using the <code>ipconfig</code> command or a search engine. In addition, the public IP address of the local server is added to an IP address whitelist of the RDS instance.

In this case, the connection may fail because the obtained public IP address is invalid or dynamically changes.

Note The solution that is provided in this topic applies only when the local server is not an Alibaba Cloud Elastic Compute Service (ECS) instance. If the local server is an ECS instance, you can view the public and private IP addresses of the ECS instance in the ECS console.

Precautions

If the public IP address of the local server dynamically changes and the connection is used for a production environment, we recommend that you establish the connection over an internal network. Otherwise, we recommend that you add the public Classless Inter-Domain Routing (CIDR) block of the local server to an IP address whitelist of the RDS instance. This way, the RDS instance remains connected even if the public IP address of the local server dynamically changes.

Obtain the public IP address of the local server

- 1. Add the public CIDR block of the local server or the 0.0.0.0/0 entry to an IP address whitelist of the RDS instance. For more information, see Use a database client or the CLI to connect to an ApsaraDB RDS for MySQL instance.
 - **? Note** The 0.0.0.0/0 entry indicates that all devices can access the RDS instance. This may cause potential security risks. Proceed with caution when you add 0.0.0.0/0 to an IP address whitelist. If 0.0.0.0/0 is added, we recommend that you immediately delete the entry when it is no longer needed.
- 2. Connect to the RDS instance from the local server by using a database client or the command-line interface (CLI).

mysql -h<The endpoint that is used to connect to the RDS instance> -u<The username of the used account> -p<The password of the used account> -P3306

3. Query information about running processes.

```
show processlist
```

In the command output that is shown in the following figure, the **Host** in the row where **show processlist** resides is the actual public IP address of the local server.



4. Remove 0.0.0.0/0 and add the actual public IP address of the local server to the IP address whitelist.

FAO

• I cannot connect to my RDS instance from a local server. How do I determine whether the connection fails because the public IP address of the local server dynamically changes?

Add 0.0.0.0/0 to an IP address whitelist of your RDS instance and wait for about 1 minute. Then, all devices are granted access to your RDS instance. Connect to your RDS instance from the local server. If your RDS instance can be connected, remove 0.0.0.0/0 and add the public IP address of the local server to the IP address whitelist. Then, connect to your RDS instance from the local server again. If your RDS instance cannot be connected, the public IP address that you added to the IP address whitelist is not the current public IP address of the local server. This indicates that the public IP address of the local server dynamically changes.

• After I add the public IP address of a local server to an IP address whitelist of my RDS instance, why am I still unable to connect to my RDS instance from the local server?

If the public IP address of the local server dynamically changes, add the current public IP address of the local server to an IP whitelist of your RDS instance. The IP address whitelist requires about 1 minute to take effect.

The connection error may be caused by other issues. For more information, see Troubleshoot failures in connecting to an ApsaraDB RDS for MySQL instance

3.5. How SQL Server determines the public IP address of an external Server or client

This topic describes how to locate a real public IP address when the public IP address is not fixed.

Case 1

Solution

The public IP address of your computer dynamically changes, so the IP address you obtain by using a local IP address query tool may be incorrect. Errors are also reported when the RDS is connected. You can access the RDS instance only after you obtain the correct IP address of your client.

Considerations

If the public IP address of your computer dynamically changes and the established connection is used for a production environment, we recommend that you use an intranet connection instead. An appropriate public CIDR block is configured in the whitelist to guarantee the availability of the CIDR block when the IP address changes.

Obtain the IP address of the client

- 1. Add the IP address 0.0.0.0/0 to the whitelist of the RDS instance. For more information, see Configure an IP address whitelist for an ApsaraDB RDS for SQL Server instance.
 - Note The IP address 0.0.0.0/0 indicates that all IP addresses are allowed to access the RDS instance.
- 2. Use a client connect to the apsaradb RDS for SQL Server database.
- 3. Run the following command to guery the IP address of the client:

```
SELECT CONNECTIONPROPERTY('PROTOCOL_TYPE') AS PROTOCOL_TYPE,

CONNECTIONPROPERTY('CLIENT_NET_ADDRESS') AS CLIENT_NET_ADDRESS
```

4. Delete the IP address 0.0.0.0/0 you added to the IP address whitelist in step 1, and add the obtained real outbound IP address to the IP address whitelist.

Case 2

Solution

You can obtain all IP addresses that are connected to the RDS instance if you want to obtain the IP addresses of all databases connected to the RDS instance or locate some security risk such as link leakage.

Obtain the IP addresses of all connections to the database.

- 1. Add the IP address 0.0.0.0/0 to the whitelist of the RDS instance. For more information, see Configure an IP address whitelist for an ApsaraDB RDS for SQL Server instance.
- 2. Connect to the apsaradb RDS for SQL Server database from a client.
- 3. Run the following command to view all IP addresses that are connected to the RDS instance.

```
SELECT
SP.SPID,
SP.LOGINAME,
SP.LOGIN_TIME,
SP.HOSTNAME,
SP.PROGRAM_NAME,
DC.CLIENT_TCP_PORT,
DC.CLIENT_NET_ADDRESS
FROM SYS.SYSPROCESSES AS SP
INNER JOIN SYS.DM_EXEC_CONNECTIONS AS DC
ON SP.SPID = DC.SESSION_ID
WHERE SP.SPID > 50
AND DC.AUTH_SCHEME='SQL'
```

4. Delete the IP address 0.0.0.0/0 or the CIDR block containing your company's IP address segment that you added to the whitelist in 1.

View the parameter settings of a connection

After you obtain all IP addresses that are connected to the RDS instance, you can run the following command to view the parameter settings of a connection:

3.6. How do I reduce the network latency between an ECS instance and an ApsaraDB RDS for PostgreSQL instance?

If your application runs on an Elastic Compute Service (ECS) instance and the network latency between the ECS instance and the connected ApsaraDB RDS for PostgreSQL instance over an internal network is abnormally high, you can reduce the network latency by the operations provided in this topic.

Check network latency

- 1. Log on to the ECS console and open the Instances page. In the top navigation bar, select the region where the ECS instance resides. Then, find the ECS instance and click the instance ID.
- 2. In the **Network Information** section of the **Instance Details** page, check the **Primary Private IP Address** of the ECS instance.

3.

- 4. In the left-side navigation pane, click Data Security. On the Whitelist Settings tab of the page that appears, add the Primary Private IP Address of the ECS instance to an IP address whitelist of the RDS instance. For more information about how to configure an IP address whitelist, see Configure an IP address whitelist for an ApsaraDB RDS for PostgreSQL instance.
- 5. In the left-side navigation pane, click **Database Connection**. On the page that appears, check the **Internal Endpoint** of the RDS instance.
- 6. Connect to the ECS instance. Then, run the following command on the ECS instance to ping the RDS instance. For more information, see Guidelines on instance connection.

7. Check the response time of the RDS instance. If the response time is longer than 0.2 milliseconds, a network latency occurs between the ECS instance and the RDS instance.

Troubleshoot network latency

Check the configurations of the ECS instance and RDS instances. Then, modify the configuration of the ECS instance or RDS instance based on the check results. For more information, see the following table.

Check item	ECS instance	RDS instance	Troubleshooting

Check item	ECS instance	RDS instance	Troubleshooting
VPC	On the Instance Details page of the ECS instance, check the VPC in the Network Information section.	On the Database Connection page of the RDS instance, check the Network Type .	If the RDS instance resides in the classic network or resides in a different VPC than the ECS instance, change the network type or vSwitch of the ECS or RDS instance. Make sure that these instances reside in the same VPC and are connected by the same vSwitch. For more information, see the following topics: Change the VPC of an ECS instance. Change the network type of an ApsaraDB RDS for PostgreSQL instance and Switch to a new vSwitch for an ApsaraDB RDS for PostgreSQL instance.
vSwitch	On the Instance Details page of the ECS instance, check the VSwitch in the Network Information section.	On the Database Connection page of the RDS instance, check the Network Type .	
Zone	On the Instance Details page, check the Zone in the Basic Information section.	On the Basic Information page of the RDS instance, check the Zone .	If the zone of the ECS instance is different from that of the RDS instance, migrate the RDS instance to the zone of the ECS instance. For more information, see Migrate an ApsaraDB RDS for PostgreSQL instance across zones in the same region.

3.7. What do I do if I cannot connect an ECS instance to an ApsaraDB for RDS instance?

This topic describes what you can do if you cannot connect an ECS instance to an RDS instance in various situations.

If you fail to connect ECS to RDS, one common reason is that the network type of the ECS instance differs from that of the RDS instance. Another common reason is that the IP address whitelist for the RDS instance does not contain the required IP addresses. The most common reasons and corresponding solutions are as follows:

ECS and RDS belong to different network types

The ECS instance runs in a VPC while the RDS instance runs in a classic network.

- Solution 1 (recommended): Switch the RDS instance from its classic network to the VPC where the ECS instance resides. For detailed steps, see Switch the network type.
 - **Note** The RDS instance must run in the same VPC as the ECS instance after the switching so that they can communicate with each other through the intranet.
- Solution 2: Purchase another ECS instance that runs in the classic network because ECS instances cannot be switched from a VPC to the classic network. A VPC is safer than the classic network. Therefore, we recommend that you use a VPC.
- Solution 3: Connect the ECS instance to the RDS instance through the Internet by using the public address of the RDS instance. This solution is inferior to solutions 1 and 2 in terms of performance, security, and stability.

The ECS instance runs in the classic network while the RDS instance runs in a VPC.

- Solution 1 (recommended): Switch the ECS instance from the classic network to the VPC where the RDS instance resides.
 - Note The ECS instance must run in the same VPC as the RDS instance after the switching so that they can communicate with each other through the intranet.
- Solution 2: Switch the RDS instance from its VPC to the classic network. However, a VPC is safer than the classic network. Therefore, we recommend that you use a VPC.
- Solution 3: Use the ClassicLink function. This function allows the ECS instances in the classic network to communicate with the resources in a VPC through the intranet.
- Solution 4: Connect the ECS instance to the RDS instance through the Internet by using the public address of the RDS instance. This solution is inferior to solutions 1, 2, and 3 in terms of performance, security, and stability.

ECS and RDS are in different VPCs

Each VPC is a logically isolated network on Alibaba Cloud. If the ECS instance and RDS instance both run in VPCs, they must be in the same VPC so that they can communicate with each other through the intranet.

- Solution 1 (recommended): Switch the RDS instance to the VPC where the ECS instance is located.
 Specifically, switch the RDS instance from its VPC to the classic network and then switch from the classic network to the VPC where the ECS instance resides. For detailed steps, see Switch the network type.
- Solution 2: Establish an Express Connect channel between the two VPCs. For detailed steps, see Alibaba Cloud CEN tutorials.
- Solution 3: Connect the ECS instance to the RDS instance through the Internet. This solution is inferior to solutions 1 and 2 in terms of performance, security, and stability.

ECS and RDS are in different regions

If the ECS instance is located in a region different from the RDS instance, they cannot communicate with each other through the intranet.

- Solution 1: Release the ECS or RDS instance and purchase instances again.
- Solution 2: Set the network types of the ECS instance and RDS instance to VPCs, and establish an Express Connect channel between the two VPCs. For detailed steps, see Switch the network type

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and Alibaba Cloud CEN tutorials.

• Solution 3: Connect the ECS instance to the RDS instance through the Internet. This solution is inferior to solutions 1 and 2 in terms of performance, security, and stability.

Incorrect IP address whitelist settings

- The whitelist contains only the default IP address 127.0.0.1, which indicates that no devices are allowed to access the RDS instance. You need to add the IP address of the ECS instance to the whitelist. For detailed steps, see Configure a whitelist.
- The IP address in the whitelist is 0.0.0.0. However, the correct format is 0.0.0.0/0.

Note 0.0.0.0/0 indicates that all devices are allowed to access the RDS instance. Please use it with caution.

- The whitelist is set to the enhanced security mode. In this case, you need to check the following:
 - If you want the ECS instance to connect to the RDS instance through the VPC address, ensure that the private IP address of the ECS instance is added to the VPC whitelist of the RDS instance.
 - If you want the ECS instance to connect to the RDS instance through the classic network address, ensure that the private IP address of the ECS instance is added to the classic network whitelist of the RDS instance.
 - If you want the ECS instance to connect to the RDS instance through the Internet address, ensure that the public IP address of the ECS instance is added to the classic network whitelist of the RDS instance. The VPC whitelist does not restrict access from the Internet.
- The public IP address that you add to the whitelist is not the real outbound IP address of the ECS instance. Possible reasons are as follows:
 - The public IP address is not fixed and may change.
 - The IP address query tool or website may provide inaccurate IP addresses.

To find out the real IP address, see Locate the real IP address.

Domain name resolution failures

If your Domain Name Server (DNS) fails or its network interface card (NIC) configuration is changed, domain name resolution may fail. You can run the ping and telnet commands to check whether you can properly connect to the RDS instance.

```
ping <domain name>
telnet <domain name><port number>
```

Example:

If the communication is abnormal, you can modify the NIC configuration file of your DNS to resolve the problem by completing the following steps:

1. Modify the NIC configuration file.

```
vi /etc/sysconfig/network-scripts/<name of the NIC configuration file>
```

Note Fill the name of the NIC used by the ECS server in the <name of the NIC configuration file> field. You can run the ifconfig command to check the suffix. The default suffix is ifcfg-eth0.

2. Add the following information to the end of the NIC configuration file:

```
DNS1=100.100.2.136
DNS2=100.100.2.138
```

Note If the DNS1 and DNS2 parameters are set, you need to change their settings to the IP addresses shown above.

```
DEVICE=eth0
B00TPR0T0=dhcp
ONB00T=yes
DNS1=100.100.2.136
DNS2=100.100.2.138
```

3. Run the following command to restart your network service:

```
systemctl restart network
```

4. Run the following command to check whether the modification is successful:

```
cat /etc/resolv.conf
```

3.8. The network types of ECS and RDS are different, How to communicate through the intranet?

See What do I do if I cannot connect an ECS instance to an ApsaraDB for RDS instance?

3.9. ECS and RDS are located in different VPCs, How to interweave with each other?

See What do I do if I cannot connect an ECS instance to an ApsaraDB for RDS instance?

3.10. FAQ about network types

This topic describes the FAQ about network types of ApsaraDB RDS.

What network types does RDS support?

ApsaraDB RDS supports the following two network types:

- Virtual Private Cloud: A VPC is an isolated network environment. We recommend that you select the VPC type because it is more secure than the classic network. You can configure route tables, CIDR blocks, and gateways in a VPC. To smoothly migrate applications to the cloud, you can use the leased line or VPN method to create a virtual data center that consists of your data center and a VPC. For more information, see What is a VPC?.
 - Note All RDS instances support Virtual Private Cloud.
- **classic network**: Instances are not isolated through networks. You can only rely on the whitelist policy of the instances to block illegal access.
 - Note Only RDS instances with local disks support classic network.

What is the difference between Virtual Private Cloud and classic network?

The following table describes the differences between VPCs and the classic network.

ltem	VPC	Classic Network
Layer 2 logical isolation	Supported.	Not supported
Custom private CIDR block	Supported.	Not supported
Private IP address planning	Private IP addresses must be unique within a single VPC, but can be duplicate across VPCs.	Private IP addresses must be unique in the classic network.
Instance communication within or between private networks	Instances in the same VPC can communicate with each other. However, instances in different VPCs are isolated from each other.	Instances in the classic network can communicate with each other if they belong to the same region and the same account.
Tunneling	Supported.	Not supported
Custom router	Supported.	Not supported
Route table	Supported.	Not supported
The information about the vSwitch.	Supported.	Not supported
SDN	Supported.	Not supported
Self-managed NAT gateway	Supported.	Not supported
Self-managed VPN	Supported.	Not supported

Does the network type support switching and what is the impact of switching?

classic network can be switched to Virtual Private Cloud, Virtual Private Cloud cannot be switched to classic network. For more information about how to switch the network type and the impact of the switch, see Change the network type of an ApsaraDB RDS for MySQL instance.

Related information

- Create an ApsaraDB RDS for MySQL instance
- Change the network type of an ApsaraDB RDS for MySQL instance
- Configure the hybrid access solution for an ApsaraDB RDS for MySQL instance

3.11. What do I do if the "has more than 'max_user_connections'" or "has exceeded the 'max_user_connections'" error message is displayed when I connect to an ApsaraDB RDS for MySQL

The max_user_connections parameter specifies the maximum number of connections that are allowed for a database on an AparaDB RDS for MySQL instance. If the "has more than 'max_user_connections' active connections" error message, the "User 'xxx' has exceeded the 'max_user_connections' resource" error message, or an error message related to the max_user_connections parameter is displayed when you connect to a database on an RDS instance, you can use the solutions that are described in this topic to fix this issue.

Problem description

instance?

You cannot connect to a database on an RDS instance by using Data Management Service (DMS) or a database client, and an error message related to the max_user_connections parameter is displayed.

Cause

The number of connections to the database on the RDS instance reaches the upper limit.

Solution

- 1. View the details about the established sessions of the RDS instance.
 - i. Access the <u>Instances</u> page of the ApsaraDB RDS console. In the top navigation bar, select the region where the RDS instance resides. Then, find the RDS instance and click the instance ID.
 - ii. In the left-side navigation pane, choose **Autonomy Service > Diagnostics**.
 - iii. On the page that appears, click the Session Management tab. On the Session Management tab, view the details about the established sessions of the RDS instance. For more information, see Session management.
- 2. View the configuration of the max_user_connections parameter of the database on the RDS

instance.

Log on to the database that you want to check and execute the following statement to view the configuration of the max_user_connections parameter:

show variables like 'max_user_connections';

- **Note** You cannot modify the configuration of the max_user_connections parameter.
- 3. Restart the RDS instance to release connections. For more information, see Restart an ApsaraDB RDS for MySQL instance.

3.12. ECS and RDS are located in different regions, How can they communicate through the intranet?

See What do I do if I cannot connect an ECS instance to an ApsaraDB for RDS instance?

4. Migration and Synchronization

4.1. What are the limits for data subscription with DTS?

The data subscription feature can help you obtain the incremental data from the source database in real time and perform data analysis, message forwarding, and local disaster recovery. The limits for data subscription on ApsaraDB RDS for MySQL are as follows:

- binlog_row_image must be in FULL format.
- If you use an earlier subscription method, you must select a database version of 5.5, 5.6, or 5.7.

5.Backup and Restoration 5.1. Differences between data migration, synchronization, and recovery

This topic describes the differences between the following concepts for data replication: data migration, synchronization, and recovery.

Data Migration, synchronization, and recovery have the following differences:

- Differences between data migration and data restoration
 - Although data migration and restoration both can be used to replicate data to a new RDS instance, they differ in the following aspects:
 - The data migration feature enables you to use Alibaba Cloud Data transmission service (DTS) to migrate data from an on-premises database, a user-created database on an ECS instance, or a database on a third-party cloud platform to Alibaba Cloud. This feature also enables you to migrate data from Alibaba Cloud to a user-created database.
 - The data restoration solution enables you to restore an RDS instance from a data backup file, or restore an RDS instance to a specific point in time by using a data backup file and a binary log file.

You can use the data migration and restoration solutions together to meet your business needs. For example, you can restore an RDS instance to a new instance and then use DTS to migrate the data back to the original RDS instance. This way, you do not need to update the endpoints on your application.

Note The data restoration solution provided in the ApsaraDB for RDS console meets most business needs for data restoration and some business needs for data migration. However, it does not support incremental data migration.

- Comparison between data migration and synchronization
 - The data migration solution is used to migrate data to Alibaba Cloud. If you select the incremental
 data migration option when you create a migration task, the data updated in the original RDS
 instance is synchronized to the new RDS instance. However, this solution is different from the data
 synchronization solution, which supports more functions such as online updates of synchronized
 objects and two-way data synchronization. You can release a data migration task immediately
 after it is complete.
 - The data synchronization solution is used to synchronize data between two data sources in real time. It is suitable for various scenarios such as active geo-redundancy, disaster recovery, crossborder data synchronization, query load balancing, cloud BI systems, and real-time data warehousing. After you create a data synchronization task, it keeps synchronizing data between the specified data sources to ensure data consistency.

5.2. How to restore data from a single apsaradb RDS for MySQL database

For more information about how to restore a single RDS for MySQL database, see Restore individual databases and tables of an ApsaraDB RDS for MySQL instance.

5.3. What do I do if the size of backup files on my RDS instance exceeds free quota for backup storage?

If the size of backup files on your RDS instance exceeds free quota for backup storage, you can increase the storage capacity of your RDS instance or reduce the backup storage of backup files.

Backup files occupy backup storage. Each RDS instance is allocated a free quota for backup storage. If the total size of backup files on your RDS instance exceeds the free quota, you are charged for the excess backup storage that you use.

Billing

For more information about the backup storage pricing for an RDS instance that runs a different database engine, see the following topics:

- Backup storage pricing for an ApsaraDB RDS for MySQL instance
- Backup storage pricing for an ApsaraDB RDS for SQL Server instance
- Backup storage pricing for an ApsaraDB RDS for PostgreSQL instance

Solutions

Use the following solutions to resolve the problem:

- Increase the storage capacity of your RDS instance: The free quota is 50% of the storage capacity
 that you purchased for your RDS instance. Therefore, you can increase the storage capacity to
 increase the free quota. This is the recommended solution. For more information about how to
 increase the storage capacity of an RDS instance that runs a different database engine, see the
 following topics:
 - Change the specifications of an ApsaraDB RDS for MySQL instance
 - Change the specifications of an ApsaraDB RDS for SQL Server instance
 - Change the specifications of an ApsaraDB RDS for PostgreSQL instance
 - Change the specifications of an ApsaraDB RDS for MariaDB TX instance
- Shorten the backup retention period: You can set the data backup retention period and the log backup retention period to seven days. ApsaraDB RDS deletes the backup files that are stored for more than seven days to reduce backup storage. For more information, see the following topics:
 - Enable the automatic backup feature for an ApsaraDB RDS for MySQL instance
 - Back up an ApsaraDB RDS for SQL Server instance
 - Back up an ApsaraDB RDS for PostgreSQL instance
 - Automatically back up the data of an RDS MariaDB instance

- Note The log backup retention period must be shorter than or equal to the data backup retention period.
- Reduce the data backup frequency: You can reduce the data backup frequency to two times to three times a week. For data security purposes, you can reduce the backup frequency to at least twice a week. For more information, see the following topics:
 - Enable the automatic backup feature for an ApsaraDB RDS for MySQL instance
 - Back up an ApsaraDB RDS for SQL Server instance
 - Back up an ApsaraDB RDS for PostgreSQL instance
 - **Note** By default, the data of an ApsaraDB RDS for MariaDB TX instance is backed up on a daily basis. This backup frequency cannot be modified.
- Disable the log backup feature: If you do not need the log backup feature for your workloads, you can disable this feature. For more information, see the following topics:
 - Warning If you disable this feature, all log backup files are deleted and you cannot restore the data of your RDS instance to a specified point in time. Proceed with caution.
 - Enable the automatic backup feature for an ApsaraDB RDS for MySQL instance
 - Back up an ApsaraDB RDS for SQL Server instance
 - Back up an ApsaraDB RDS for PostgreSQL instance
 - Automatically back up the data of an RDS MariaDB instance

FAQ

Can I upload binary log files to Object Storage Service (OSS) to reduce the backup storage?

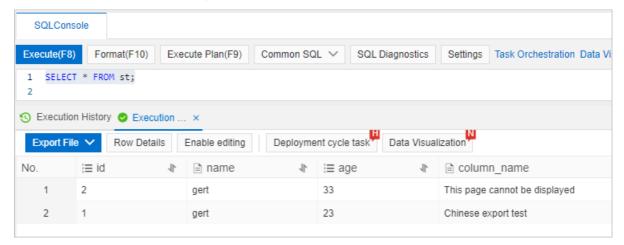
After binary log files are uploaded to OSS, they are referred to as log backup files. The log backup files occupy the backup storage. Therefore, you cannot reduce your backup storage by uploading binary log files to OSS.

5.4. Use DMS to export data to a CSV file

This topic describes how to use DMS to export data to a CSV file.

Check source data

In DMS, check that the data is displayed normally.



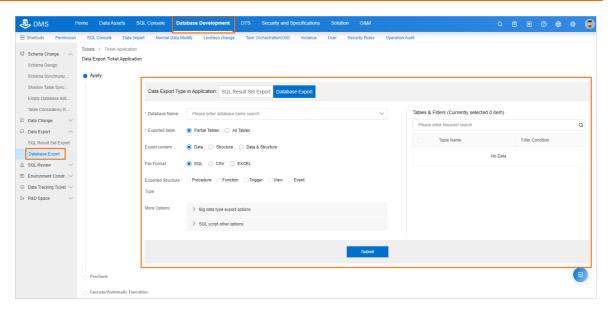
View the character set of a table

Execute the following statement to create a table:

```
show create table ;
```

Create an export task

- 1. In DMS, choose Database Development > Data Export > Database Export.
- 2. Choose Dat abase Export.
- 3. Select the table to be exported, set File Type and Character Set, and click Submit.



5.5. RDS MySQL mysqldump options

GTID feature

The GTID feature was introduced in ApsaraDB RDS for MySQL 5.6 to add the set-gtid-purged option to the mysqldump utility bundled with MySQL 5.6.

Option	The default value of the field.	Optional value	Purpose
set-gtid-purged	AUTO	ON OFF AUT O	Specifies whether to include a SET @@GLOBAL.GTID_PURGED statement in the mysqldump output.

? Note

- ON: A SET @@GLOBAL.GTID PURGED statement is included in the mysqldump output.
- OFF: A SET @@GLOBAL.GTID_PURGED statement is not included in the mysqldump output.
- AUTO: the default value. For an instance with GTID enabled, a SET @@GLOBAL.GTID_PURGED statement is included in the mysqldump output. For an instance that is not started or does not support GTID, no GTID information is generated.

If you use MySQL 5.6 or later versions of mysqldump to export data to instances of RDS MySQL 5.5 versions, you must set set-gtid-purged to OFF. Otherwise, the following error occurs:

```
Error: Server has GTIDs disabled.
or
mysqldump: Couldn't execute 'SELECT @@GTID_MODE': Unknown system variable 'GTID_MODE' <
1193>
```

Avoid table-level lock wait

In mysqldump, the lock-tables option is enabled by default to lock all tables before dumping them and prevent DML operations on these tables.

The InnoDB and TokuDB engines supported by apsaradb RDS for MySQL instances support transactions. We recommend that you use the single-transaction option to dump tables, rather than setting the lock-all-tables or lock-tables option.

Option	The default value of the field.	Optional value	Purpose
lock-all-tables	FALSE	T RUE FALSE	Specifies whether to lock all tables across all databases. This is achieved by acquiring a global read lock for the duration of the whole dump. All tables in all databases are readonly during the dump. This option automatically disables the lock-tables and single-transaction options. ApsaraDB for RDS does not support this option.
lock-tables	TRUE	TRUE FALSE	Specifies whether to lock tables before dumping them. By default, this option is enabled. You can specify the skip-lock-tables option to disable this option.
single-transaction	FALSE	TRUE FALSE	Specifies whether to start a transaction before dumping data. This option automatically disables the lock-tables option.

Set the character set for data to be dumped

If no character set is specified, mysqldump uses the UTF-8 character set to dump data.

Option	The default value of the field.	Optional value	Purpose
default-character- set	UT F8	Character sets supported by ApsaraDB RDS for MySQL instances	Sets the character set for the export.

Additional options to be noted when data is dumped

Option	The default value of the field.	Optional value	Purpose
no-defaults	N/A	NA	Reads the .mylogin.cnf option file only.
defaults- file=file_name	N/A	NA	Reads a specified option file.
add-drop-database	FALSE	TRUE FALSE	Specifies whether to add a DROP DATABASE statement before each CREATE DATABASE statement.
add-drop-table	TRUE	TRUE FALSE	Specifies whether to add a DROP TABLE statement before each CREATE TABLE statement. By default, this option is enabled. You can use the skip-add-drop-table option to disable this option.
add-locks	TRUE	TRUE FALSE	Specifies whether to surround each table-related statement with the LOCK TABLES tab_name WRITE and UNLOCK TABLES statements. This results in faster inserts when the dump file is reloaded.
compatible=name	NA	ansi postgresql oracl e mssql	Enhances compatibility with a specified database type.
compact	FALSE	TRUE FALSE	Specifies whether to enable the skip-add-drop-table, skip-add-locks, skip-comments, skip-disable-keys, and skip-set-charset options.
databases	TRUE	T RUE FALSE	Specifies whether to dump multiple databases. By default, mysqldump treats the first name argument on the command line as a database name and following names as table names. When this option is specified, mysqldump interprets all name arguments as database names and includes the CREATE DATABASE and USE DATABASE statements in the output before each new database.
disable-keys	TRUE	TRUE FALSE	Specifies whether to surround INSERT statements with /! 40000 ALTER TABLE tab_name DISABLE KEYS / and /! 40000 ALTER TABLE tab_name ENABLE KEYS / statements to speed up dump file loading. This option is effective only for non-unique indexes of MyISAM tables.
events	FALSE	T RUE FALSE	Specifies whether to dump scheduled events from dumped databases.

	Option	The default value of the field.	Optional value	Purpose
--	--------	---------------------------------	----------------	---------

extended-insert	TRUE	TRUE FALSE	Specifies whether to combine single-row INSERT statements into a single statement that inserts multiple table rows.
hex-blob	FALSE	T RUE FALSE	Specifies whether to export BINARY, VARBINARY, and BLOB types of data in hexadecimal notation. We recommend that you add this option when migrating data between different database versions.
ignore-table=db.tab	TRUE	TRUE FALSE	Specifies whether to ignore a table or view. Format: database name.table name (db.tab). You can use this option multiple times to ignore multiple tables.
max-allowed-packet	24MB	24MB-1GB	Specifies the maximum size of the buffer for communication between mysqldump and an ApsaraDB RDS for MySQL instance. The default value is 24MB. The maximum value is 1GB.
no-create-db	FALSE	TRUE FALSE	Specifies whether to exclude CREATE DAT ABASE statements from the output.
no-create-info	FALSE	TRUE FALSE	Specifies whether to exclude CREATE TABLE statements from the output.
no-data	FALSE	TRUE FALSE	Specifies whether to export an ApsaraDB RDS for MySQL database to a dump file without data.
opt	TRUE	T RUE FALSE	Specifies whether to enable the add-drop- table, add-locks, create-options, disable- keys, extended-insert, lock-tables, quick, and set-charset options. You can specify the skip- opt option to disable the opt option enabled by default.
dump-date	TRUE	T RUE FALSE	Specifies whether to add a dump date to the end of the output if the comments option is specified. By default, the comments option is enabled.
routines	FALSE	TRUE FALSE	Specifies whether to dump stored procedures and functions from dumped databases. By default, stored procedures and functions are not dumped.

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Option	The default value of the field.	Optional value	Purpose
result-file	TRUE	T RUE FALSE	Specifies whether to direct output to a specified file.
set-charset	TRUE	TRUE FALSE	Specifies whether to add SET NAMES default_character_set to the output.
triggers	TRUE	TRUE FALSE	Specifies whether to include triggers for each dumped table in the output.

Options not supported for apsaradb RDS for MySQL

Option	The default value of the field.	Optional value	Purpose
all-databases	FALSE	Character sets supported by ApsaraDB RDS for MySQL instances	Specifies whether to dump all databases, including the mysql database.
flush-logs	FALSE	TRUE FALSE	Specifies whether to execute the flush logs; statement in an ApsaraDB RDS for MySQL instance before starting the dump.
flush-privileges	FALSE	TRUE FALSE	Specifies whether to add a flush privileges; statement to the dump output after dumping the mysql database.
lock-all-tables	FALSE	TRUE FALSE	Specifies whether to lock all tables across all databases. This is achieved by acquiring a global read lock for the duration of the whole dump. All tables in all databases are readonly during the dump. This option automatically disables the lock-tables and single-transaction options.
tab=dir_name	N/A	NA	A tbl_name.sql file (including the table creation statement) and tbl_name.txt text format data files separated with tab are generated in a specified directory.

Unsupported options and reasons

• all-databases: RDS MySQL common user cannot export all database tables because they do not have permissions on some of the tables in the mysql database.

Error message

```
mysqldump: Couldn't execute 'show create table slow_log': SHOW command denied to user 'xx
x'@'xx.xx.xx' for table 'slow_log' (1142)
```

• The flush-logs: RDS MySQL common user does not have the reload permission and therefore cannot be executed. flush logs; command.

Error message

```
mysqldump: Couldn't execute 'FLUSH TABLES': Access denied; you need (at least one of) the RELOAD privilege(s) for this operation (1227)
```

- flush-privileges: This option is not required because apsaradb RDS for MySQL does not allow you to export the mysql database.
- lock-all-tables: RDS MySQL common user does not have the reload permission and therefore cannot be used.

Error message

```
mysqldump: Couldn't execute 'FLUSH TABLES': Access denied; you need (at least one of) the RELOAD privilege(s) for this operation (1227)
```

• tab=dir_name: This option is not supported because mysqldump and apsaradb RDS for MySQL instances are on the same physical machine. However, this option can be used together with the nodata option to obtain CREATE TABLE statements that create tables.

```
# This option can be used with the no-data option to obtain the tab_name.sql file that co
ntains the CREATE TABLE statement for each table in the test database.
mysqldump -no-defaults -uuser_name -ppass_word -hxxx.mysql.rds.aliyuncs.com -P3306 -set-
gtid-purged=off -single-transaction -tab=/tmp -no-data test
# The following error message appears if you use the no-data option to dump data:
mysqldump -no-defaults -uuser_name -ppass_word -hxxx.mysql.rds.aliyuncs.com -P3306 -set-
gtid-purged=off -single-transaction -tab=/tmp test
mysqldump: Got error: 1045: Access denied for user 'xxx'@'%' (using password: YES) when e
xecuting 'SELECT INTO OUTFILE'
```

5.6. How do I restore a downloaded RDS backup to a new RDS instance?

This topic describes how to restore data from a MySQL or SQL Server backup file to a new RDS instance.

Scenarios

This topic describes how to restore data to an apsaradb for RDS instance by using a backup client. You can restore data to a new RDS instance by using the backup client.

? Note

- Apsaradb RDS for PostgreSQL does not support restoring data by using physical backup files
 to an apsaradb RDS instance. You need to use a client to perform logical backup before
 releasing the instance. You need to use the pg_dump function to restore data to a new RDS
 instance when restoring data. For more information, see Manually migrate data from a usercreated PostgreSQL database hosted on ECS to an ApsaraDB RDS for PostgreSQL database.
- Currently, RDS for MariaDB does not allow you to download backup files.

Restore data in an apsaradb RDS for MySQL instance

You can recover data to the new RDS instance by following these steps:

- Restore the backup data of an apsaradb for RDS instance to an on-premises database. For more
 information, see Restore the data of an ApsaraDB RDS for MySQL instance from a physical backup
 file to a self-managed MySQL database or Restore the data of an ApsaraDB RDS for MySQL
 instance from a logical backup file to a self-managed MySQL instance.
- Use data transmission service (DTS) to migrate the local database to the new RDS instance. For
 more information, see Migrate data from a self-managed MySQL database to an ApsaraDB RDS for
 MySQL instance.

SQL Server Recovery method

You can restore data to a new RDS instance by migrating data from the OSS instance to the cloud. For more information, see Migrate the full backup data of a self-managed SQL Server database to an ApsaraDB RDS instance that runs SQL Server 2012, 2016, 2017, or 2019 or Migrate the full backup data of a self-managed SQL Server database to an ApsaraDB RDS instance that runs SQL Server 2008 R2.

5.7. Back up a single database RDS SQL Server or MySQL instance

- See Back up an ApsaraDB RDS for SQL Server instance the manual backup content of.
- See Enable the automatic backup feature for an ApsaraDB RDS for MySQL instance the manual backup content of.

5.8. Use wget to download backup files in Linux

For more information, see the following topics:

- ApsaraDB RDS MySQL downloads data backup files and binary log files
- ApsaraDB RDS SQL Server download data backup files and binary log files.
- ApsaraDB RDS PostgreSQL downloads data backup files and binary log files
- ApsaraDB RDS MariaDB TX downloads binary log files

.

5.9. How can I restore data of a RDS SQL Server database?

See Restore the data to an existing instance.

5.10. Which factors affect the time that is required to change the specifications of my ApsaraDB RDS for MySQL instance?

When you change the specifications of your ApsaraDB RDS for MySQL instance, you can estimate the time required based on the factors that are described in this topic. The specifications include the RDS edition, instance type, and storage capacity.

Notice The time required varies based on several factors. We recommend that you change the specifications when only a small amount of data is written to your RDS instance. Alternatively, we recommend that you stop writing data to your RDS instance before you change the specifications.

If your RDS instance uses local solid-state drives (SSDs), a specification change may trigger a data migration from your original RDS instance to a new RDS instance. In this case, the specification change requires a long period of time. The following table describes the crucial factors that affect the time required.

Note During the data migration process, ApsaraDB RDS backs up the data of your original RDS instance and restores the data to the new RDS instance.

Storage type	Cross- instance data migratio n required	Factor	Description
		The size of full data	The size of full data affects the time required for the data migration. The time required for the data migration is also affected by the backup speed and the network bandwidth.
		The size of redo logs	If the size of redo logs is large, more data needs to be backed up than indicated by the estimated amount. In this case, a long period of time is required to restore the data to the new RDS instance.

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Storage type	Cross- instance data migratio n required	Factor	Description
		Locks	When ApsaraDB RDS backs up the data of your original RDS instance during the data migration process, the related objects are locked. This affects the backup speed.
	Yes	The number of tables	-
Local SSDs		The size of incremental data	After the full data is migrated to the new RDS instance, ApsaraDB RDS also needs to migrate the incremental data that is generated during the data migration process. This affects the time required for the specification change.
		The speed to write incremental data	The speed to write incremental data is affected by several factors. The factors include the speed to replay the logged SQL statements, whether the logged SQL statements are executed on individual tables, and whether data definition languages (DDL) statements are executed on your original RDS instance.
		Data synchronization latency	Before the incremental data is written to the new RDS instance, you must establish a synchronization link between the new RDS instance and your original RDS instance. ApsaraDB RDS switches your workloads over from your original RDS instance to the new RDS instance only after the data synchronization is complete. The time required for the specification change is affected by the data synchronization latency. The latency is further affected by several factors. The factors include the write loads on your original RDS instance, whether DDL statements are executed on your original RDS instance, and whether joint queries are run on multiple tables.
	No	-	If your RDS instance uses local SSDs and no cross-instance data migration is required, the specification change requires a short period of time. In this case, you do not need to consider the previous factors.
Standard or enhance d SSDs	No	-	If your RDS instance uses standard or enhanced SSDs, you do not need to migrate the data of your original RDS instance to a new RDS instance. The specification change requires a short period of time. In this case, you do not need to consider the previous factors.

5.11. Use the log backup feature

After you enable the log backup feature for your RDS instance, the binary log files of your RDS instance are uploaded to backup storage in real time. The binary log files in the backup storage are called log backup files. You can use log backup files to restore data to a specific point in time within the backup retention period that you specified. This topic describes how to manage and view the log backup files of an ApsaraDB RDS for MySQL instance.

Billing

The log backup feature is provided free of charge, and a free quota on backup storage is provided. If the total size of the data backup files and log backup files of your RDS instance exceeds the free quota, you are charged for the excess backup storage. For more information, see Backup storage pricing of an ApsaraDB RDS for MySQL instance.

Enable or disable the log backup feature

1.

- 2. In the left-side navigation pane, click **Backup and Restoration**.
- 3. Click the Backup Settings tab. In the Local Log Backup Settings section of the tab that appears, click Edit.
- 4. Turn on or turn off Log Backup to enable or disable the log backup feature.



? Note

- After you turn on Log Backup, you can specify a log backup retention period. Log backup files can be retained for 7 to 730 days.
- o The retention period for log backup files cannot be longer than the retention period for dat a backup files.
- If your RDS instance runs MySQL 5.7 on RDS Basic Edition, the retention period for log backup files is fixed as seven days.

View log backup files

1.

- 2. In the left-side navigation pane, click **Backup and Restoration**.
- 3. Click the Log Backup tab.

If your RDS instance runs RDS High-availability Edition or RDS Enterprise Edition, log backup files are generated by your primary RDS instance and its secondary RDS instances. You can check the instance ID of each log backup file to identify the log backup files that are generated by your primary RDS instance and the log backup files that are generated by the secondary RDS instances.

View the total size of log backup files

1.

2. On the Basic Information page of the RDS instance, view the total size of log backup files in the Usage Statistics section.



- Log backup files are stored in the backup storage and do not consume the storage capacity of your RDS instance. The backup storage is inaccessible.
- After you update the minor engine version of your RDS instance, the value of the
 Backup Size parameter on the Basic Information page in the ApsaraDB RDS console
 may be displayed as 0. After the next scheduled backup is complete, this error is
 automatically fixed.

Delete log backup files

For more information, see Delete the backup files or reduce the backup frequency of an ApsaraDB RDS for MySQL instance

Download log backup files

For more information, see Download the backup files of an ApsaraDB RDS for MySQL instance

Restore data to a specific point in time

For more information, see Restore the data of an ApsaraDB RDS for MySQL instance and Restore individual databases and tables of an ApsaraDB RDS for MySQL instance.

FAQ

Category	Description
Data restoration	Can I use log backup files to restore data? After the log backup feature is enabled, you can restore data to a specific point in time within the backup retention period that you specified. The point in time can be accurate to seconds. For more information, see Restore the data of an ApsaraDB RDS for MySQL instance or Restore individual databases and tables of an ApsaraDB RDS for MySQL instance.
Backup fee	Am I charged for the log backup feature? No, you are not charged for enabling the log backup feature. A free quota on backup storage is provided. For more information, see Billing.

Category	Description			
Backup file check	 No log backup files are displayed on the Log Backup tab of my RDS instance. Why? This issue occurs due to one of the following reasons: The log backup feature is disabled for your RDS instance. For more information about how to enable the log backup feature, see Enable or disable the log backup feature. Your RDS instance is newly created, or the log backup feature is recently enabled for your RDS instance. In this case, log backup files have not been uploaded to the backup storage, and no log backup files are displayed on the Log Backup tab. The most recent log backup file is not displayed on the Log Backup tab. Why? Only the log backup files to which no new data is written are displayed on the Log Backup tab. Log backup files to which data is being written are not uploaded to the backup storage. If I set the log backup retention period to seven days, can I obtain log backup files that are generated seven days before the current date? No, you cannot obtain log backup files that are generated seven days before the current date in this case. ApsaraDB RDS automatically deletes the log backup files that are stored for a longer period of time than the specified log backup retention period. We recommend that you specify a log backup retention period based on your business requirements. 			
Disabling of the feature and reduction of log backups	 How do I delete log backup files after I disable the log backup feature? You do not need to delete log backup files. ApsaraDB RDS automatically deletes log backup files immediately after you disable the log backup feature. Why am I still able to query log backup files by executing the SHOW BINARY LOGS; statement after I disable the log backup feature? The files that you query by executing this statement are binary log files rather than log backup files. For more information about how to delete binary log files, see Delete the binary log files of an ApsaraDB RDS for MySQL instance. No storage is released after I disable the log backup feature. Why? Log backup files do not consume the storage capacity of your RDS instance. Binary log files consume the storage capacity of your RDS instance. Why does the size of log backup files suddenly increase? If you frequently add data, modify data, or delete data on your RDS instance, the size of log backup files increases. For more information about how to delete log backup files, see Delete the backup files or reduce the backup frequency of an ApsaraDB RDS for MySQL instance. 			

Related operations

Operation	Description
DescribeBackupPolicy	Queries the backup settings of an ApsaraDB RDS instance.
ModifyBackupPolicy	Modifies the backup settings of an ApsaraDB RDS instance.

6.Read-only Instances and Read/Write Splitting

6.1. Apsaradb RDS for MySQL implements read / write splitting

For more information about the provisioning process, see Enable the proxy terminal feature for an ApsaraDB RDS for MySQL instance.

6.2. How do I ensure the timeliness of reading data on an ApsaraDB RDS for MySQL instance when the read/write splitting feature is enabled?

ApsaraDB RDS ensures real-time transmission of binary logs between primary and read-only RDS instances. In normal cases, no latency occurs when you read data from a read-only RDS instance. For more information about read-only RDS instances, see Overview of read-only ApsaraDB RDS for MySQL instances. However, the MySQL database engine has a limit in replication. If the binary logs require a long time to apply, latency occurs in data synchronization. This limit cannot be removed. To minimize the synchronization latency when you apply the binary logs, we recommend that you use a read-only RDS instance whose specifications are higher than or equal to those of the primary RDS instance.

ApsaraDB RDS allows you to set a latency threshold. If the latency on a read-only RDS instance exceeds the threshold, ApsaraDB RDS no longer forwards requests to the read-only RDS instance. If the latency on all read-only RDS instances exceeds the threshold, ApsaraDB RDS directly routes all requests to the primary RDS instance. This applies regardless of whether a non-zero read weight is configured for the primary RDS instance.

If you want to perform real-time data queries by using SQL statements after read/write splitting is enabled, you can use hints to forcibly forward these statements to the primary RDS instance. Write the hints in the /*FORCE_MASTER*/ format. Example:

/*FORCE MASTER*/ SELECT * FROM table name;

6.3. Does ApsaraDB for RDS support read-only instances and read/write splitting?

Read-only instance

You can add read-only instances to your primary instance to process more read requests. For more information, see the following topics:

- Overview of read-only ApsaraDB RDS for MySQL instances
- Overview of read-only ApsaraDB RDS for SQL Server instances
- Overview of read-only ApsaraDB RDS for PostgreSQL instances

Read/write splitting

Read/write splitting is available to ApsaraDB for RDS instances that run MySQL, PostgreSQL and SQL Server. After you add read-only instances to your primary instance, you only need to enable read/write splitting. A read/write splitting endpoint is automatically generated to centrally receive and distribute query requests. For more information, see the following topics:

- Introduction to read/write splitting with ApsaraDB RDS for MySQL
- Introduction to read/write splitting with ApsaraDB RDS for SQL Server
- Introduction to read/write splitting with ApsaraDB RDS for PostgreSQL

Note ApsaraDB for RDS uses a primary/secondary architecture. In this architecture, the secondary instance does not process read or write requests but only serves as a backup to ensure high availability.

FAQ-Performance ApsaraDB for RDS

7.Performance

7.1. FAQ about storage capacity

This topic provides answers to some frequently asked questions about the storage capacity of ApsaraDB RDS instances.

Can I expand the storage capacity of my RDS instance without data migration? What is the impact of an expansion?

If the host on which your RDS instance is deployed can provide sufficient storage, a data migration is not required. If the host cannot provide sufficient storage, ApsaraDB RDS creates an RDS instance with the required storage capacity on an eligible host that can provide sufficient storage and migrates the data of your RDS instance to the new RDS instance.

For more information about how to expand the storage capacity of an RDS instance and whether transient connections occur during the expansion, see the following topics:

- Change the specifications of an ApsaraDB RDS for MySQL instance
- Change the specifications of an ApsaraDB RDS for PostgreSQL instance
- Change the specifications of an ApsaraDB RDS for SQL Server instance
- Change the specifications of an ApsaraDB RDS for MariaDB TX instance

What are the billing rules for storage capacity expansions?

After you expand the storage capacity of your RDS instance, the fees that are charged to you change. For more information, see Billing details about configuration change.

How do I troubleshoot an abrupt increase in storage usage?

- 1. Log on to the ApsaraDB RDS console and go to the Instances page. In the top navigation bar, select the region where your RDS instance resides. Then, find your RDS instance and click the instance ID.
- 2. In the left-side navigation pane of the page that appears, click **Monitoring and Alerts**. On the page that appears, view the data types and trends of the occupied storage.



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How do I release the occupied storage by deleting files?

For more information, see the following topics:

- Solution to the exhaustion of disk space on an ApsaraDB RDS for MySQL instance due to a large number of data files
- Solution to the exhaustion of disk space on an ApsaraDB RDS for MySQL instance due to a large number of system files
- Solution to the exhaustion of disk space on an ApsaraDB RDS for MySQL instance due to a large number of temporary files
- Solution to the exhaustion of disk space on an ApsaraDB RDS for MySQL instance due to a large number of system files

7.2. How do I scale an ApsaraDB RDS instance?

You can use one of the following methods to scale an ApsaraDB RDS instance:

Change the specifications of the RDS instance. For more information, see the following topics:

- Change the specifications of an ApsaraDB RDS for MySQL instance
- Change the specifications of an ApsaraDB RDS for PostgreSQL instance
- Change the specifications of an ApsaraDB RDS for SQL Server instance
- Change the specifications of an ApsaraDB RDS for MariaDB TX instance

Configure the RDS instance to automatically scale. For more information, see the following topics:

- Enable the automatic scale-up feature for an ApsaraDB RDS for MySQL instance
- Configure automatic storage expansion for an ApsaraDB RDS for MySQL instance

7.3. What is availability detection?

Alibaba Cloud uses one of the following two methods to check the availability (health status) of your ApsaraDB RDS instance: short-lived connection and persistent connection. By default, long-lived connections are used.

- If your application frequently establishes and closes connections to your RDS instance, we recommend that you use **short-lived connection** for the availability test.
- If your application uses a data connection pool, we recommend that you use **persistent connection** for the availability test.

? Note When you change the detection method, the workloads on your RDS instance continue to run as normal.

7.4. Create and view RDS MySQL stored procedure

FAO-Performance ApsaraDB for RDS

Create a procedure

You can use a DMS or MySQL client to log on to apsaradb for RDS and create a stored procedure. The sample code is as follows:

```
DROP PROCEDURE IF EXISTS TEST_PROC

DELIMITER //

CREATE PROCEDURE TEST_PROC(IN ID int,OUT NAME VARCHAR(50))

BEGIN

IF(ID = 1) THEN SET NAME = 'test1';

END IF;

IF(ID = 2) THEN SET NAME = 'test2';

END IF;

SELECT version();

END //;
```

View the stored procedure

In RDS for MySQL, there are two methods to view stored procedure in a database:

• Query by system table

Log on to the database and run the following command:

```
select * from mysql.proc where db='' and type='procedure' order by name
```

• Query by show status

Log on to the database and run the following command:

```
show procedure status show create procedure \G
```

7.5. Why is the query speed of SQL statement faster on ECS than on RDS

With the same simple SQL statement, the query time on ECS may be faster than RDS, because it does not require network transmission time.

However, this test does not reflect the overall performance of RDS. When the pressure and concurrency of RDS is large, its performance advantages will be very obvious. Please refer to the performance White Papers of each product for details.

7.6. Limits of ApsaraDB RDS for MySQL

See Limits.

7.7. Query Cache

ApsaraDB for RDS FAQ-Performance

Benefits and target scenarios

Features:

- Reduce CPU usage.
- Reduce IOPS utilization (in some cases).
- Reduces the response time of queries and increases system I/O throughput.

This topic is applicable in the following scenarios:

- Table data is not frequently updated, or is static.
- The same SELECT statement is frequently used.
- The query result is less than 1 MB.

Note This feature does not always improve query performance. Under some specific circumstances, enabling this feature may even decrease query performance. For example, when you query large amounts of data without frequently using the same SELECT statement, enabling this feature may decrease the query performance.

Description

RDS for MySQL uses a Hash function to calculate queries (Select statements) sent from clients and obtain the corresponding Hash values. It then uses the Hash values to match queries in query cache.

If a hash value matches a query stored in the cache, the result is directly returned to the client. RDS for MySQL will not translate or execute the query.

If the Hash value does not match any queries stored in the cache, the Hash value and the corresponding result will be stored in the cache for future use.

If a table changes, all cached queries that reference the table become invalid and the query results are deleted.

Limit

- Queries must be exactly the same to be considered identical. Queries that use different databases, different protocol versions, or different default character sets are considered different queries and are cached separately.
- A query is not cached if it is a subquery of an outer query.
- A query is not cached if it is executed within the body of a stored function, a stored procedure, a trigger, or an event.
- A query is not cached if it uses any of the following functions: now(), curdate(), last_insert_id(), and rand().
- A query is not cached if it references tables in the mysql, information_schema, and performance_schema databases.
- A query is not cached if it references temporary tables.
- A query is not cached if it triggers warnings.
- Do not cache Select... lock in share mode、Select… for update、Select * from… where autoincrement_col is NULL type of query.
- A query is not cached if it references a user-defined variable.
- A guery is not cached if it uses Hint SQL NO CACHE.

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Set

Set variables

Console parameters the settings are as follows:

• query_cache_limit (byte): indicates the maximum size of a single query result that can be stored in the query cache. The default value is 1 MB. Result sets exceeding the size are not cached.

- o query_cache_size (byte): the size of the query cache. The default value is 3 MB.
- query_cache_type: Specifies whether to enable query cache.

A value of 0 disables the query function.

A value of 1 enables query cache, but does not cache queries starting with Select SQL_NO_CACHE.

A value of 2 enables query cache, but only queries starting with Select SQL_CACHE are cached.





- To modify query_cache_type, you must restart the instance (the instance will restart automatically after the modification).
- The parameter query_cache_size must be an integer multiple of 1024. Otherwise, the prompt The parameter format is incorrect. Enter the parameter again..



• Enable a baseline

If the query_cache_size is greater than 0 and the query_cache_type is set to 1 or 2,

Close

Set the parameter query_cache_size to 0 or query_cache_type to 0 to disable Query caching.

Suggestion

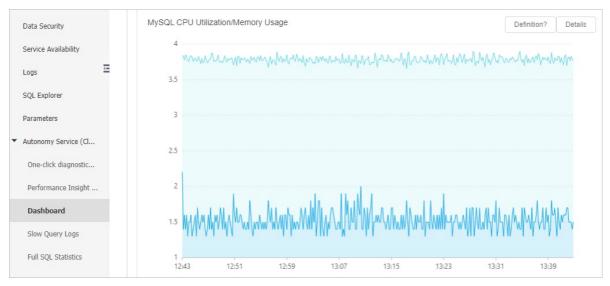
- query_cache_size, we do not recommend that you set a value that is too large. A large cache
 occupies memory space of other processes and increases the overhead when using Query Cache.
 We recommend that you set the storage space to a value between 10MB and 100 MB based on the
 instance type. Then, make adjustments based on the actual usage.
- We recommend that you change the value of the query_cache_size parameter to enable or disable the cache feature. After you modify query_cache_type parameter, the instance must be restarted for the parameter to take effect.

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 This feature applies to specific scenarios. You must run tests before enabling it to avoid issues including decrease in performance.

Verify results

Verify results in the console



· Verify results using SQL commands

You can run the following command to query the usage status of Query Cache:

```
show global status like 'Qca%';
```

- Qcache_hits: the number of query cache hits.
- Qcache inserts: The number of queries and query results added to the query cache.
- Qcache not cached: The number of queries that cannot be cached.
- Qcache_queries_in_cache: The number of queries registered in the query cache.



7.8. What do I do if my ApsaraDB RDS instance is in the Locking state?

Problem description

• On the **Basic Information** page of the RDS instance, the value of Status for the RDS instance is **Locking**.

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• The **INSERT** and **UPDATE** statements fail to be executed on the RDS instance because the RDS instance is in the **Locking** state.

Note For example, if the RDS instance runs MySQL and is in the Locking state and you execute the INSERT or UPDATE statement on the RDS instance, the PROR 1290 (HY000): The MYSQL server is running with the LOCK_WRITE_GROWTH option so it cannot execute this state ment error message is displayed.

Causes

- Cause 1: The storage of your RDS instance is exhausted.
- Cause 2: Your Alibaba Cloud account has overdue payments, or your RDS instance expires.

Handling method corresponding to Cause 1

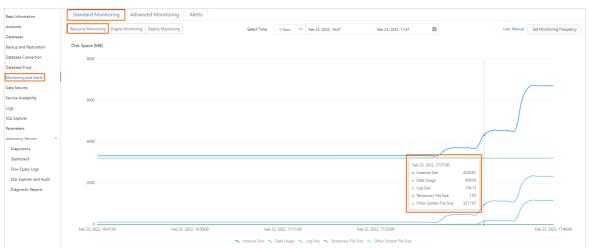
You can go to the **Basic Information** page of the RDS instance to check whether the storage of your RDS instance is exhausted in the Usage Statistics section.



Release the storage of your RDS instance

1.

2. In the left-side navigation pane, click **Monitoring and Alerts**. On the **Standard Monitoring** tab, click **Resource Monitoring** to view the storage that is occupied by each type of data.



3. Delete data to release storage based on the type of data.

? Note We recommend that you do not delete data unless necessary. If you want to delete data to release storage, you must back up the data before you delete it to prevent data loss. You can also expand the storage capacity of your RDS instance to unlock the RDS instance.

Data files

ApsaraDB for RDS FAQ•Performance

Database engine	Solution		
MySQL	 a. Use Data Management (DMS) to connect to your RDS instance. For more information, see Use DMS to log on to an ApsaraDB RDS for MySQL instance. b. Execute the following statement to view the size of the specified table in the database on your RDS instance and check the historical data or unnecessary data that can be deleted: 		
	<pre>SELECT TABLE_NAME, concat(round((DATA_LENGTH + INDEX_LENGTH) / 1024 / 1024,2),'MB') AS DATA FROM information_schema. TABLES WHERE TABLE_SCHEMA = '<database name="">' ORDER BY DATA + 0 DESC;</database></pre>		
	 c. Execute the DROP TABLE < Table name>; statement in the database to delete the data. d. Wait approximately 5 minutes for the system to unlock your RDS instance. 		
PostgreSQL	 a. Use DMS to connect to your RDS instance. For more information, see Use DMS to log on to an ApsaraDB RDS for MySQL instance. b. Execute the following statement to view the size of the specified table in the database on your RDS instance and check the historical data or unnecessary data that can be deleted: 		
	<pre>table_schema '.' table_name AS table_full_name, pg_total_relation_size('"' table_schema '"."' table_name '"') AS size FROM information_schema.tables ORDER BY pg_total_relation_size('"' table_schema '"."' table_name '"') DESC;</pre>		
	 c. Execute the DROP TABLE < Table name>; statement in the database to delete the data. d. Wait approximately 5 minutes for the system to unlock your RDS instance. 		

FAQ•Performance ApsaraDB for RDS

Database engine	Solution		
	 a. Use DMS to connect to your RDS instance. For more information, see Use DMS to log on to an ApsaraDB RDS for MySQL instance. b. Execute the following statement to view the size of the specified table in the database on your RDS instance and check the historical data or 		
SQL Server	<pre>unnecessary data that can be deleted: SELECT</pre>		

o Log files

Database engine	Solution	
MySQL	Delete the binary log files of an ApsaraDB RDS for MySQL instance	
PostgreSQL	You cannot manually delete the log files of an ApsaraDB RDS for PostgreSQL instance.	
SQL Server You cannot manually delete the log files of an ApsaraDB RDS for SQL Serve instance.		

 $\circ\;$ Temporary files: Restart your RDS instance to delete temporary files.

ApsaraDB for RDS FAO•Performance

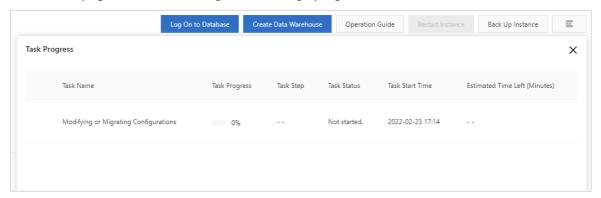
If the **Restart Instance** button is dimmed on the **Basic Information** page of your RDS instance, you can restart the instance by using the following method:

- a.
- b. In the left-side navigation pane, click Parameters.
- c. On the Editable Parameters tab, find a parameter whose **Force Restart** value is **Yes** and change the value of the parameter.
- **?** Note For more information about how to configure parameters for the RDS instance, see Modify the parameters of an ApsaraDB RDS for MySQL instance.
- o Systemfiles: You cannot delete systemfiles.

Expand the storage capacity of your RDS instance

- 1.
- 2. In the **Configuration Information** section of the Basic Information page, click **Change Specifications** to expand the storage capacity of the RDS instance. For more information, see

 Change the specifications of an ApsaraDB RDS for MySQL instance.
 - **?** Note If you cannot modify the configuration, submit a.
- 3. After you complete the payment, click the icon in the upper-right corner of the Basic Information page to view the configuration change progress.



The time required to expand the storage capacity varies based on the storage types. The following table describes the time required to expand the storage capacity.

Storage type Duration Description	
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FAQ-Performance ApsaraDB for RDS

Storage type	Duration	Description
Local SSD	Based on your business requirements.	 If the storage resources of an RDS instance cannot meet your business requirements, cross-instance data migration may be triggered, and the time required to expand the storage capacity varies based on multiple factors. We recommend that you expand the storage capacity during off-peak hours. A specification change causes a transient connection that lasts approximately 30 seconds. We recommend that you change the specifications of your RDS instance during off-peak hours. In addition, make sure that your application is configured to automatically reconnect to your RDS instance. During the transient connection, you cannot perform most of the operations that are related to databases, accounts, and network settings.
Standard SSD or enhanced SSD (ESSD)	About 5 minutes	 If your RDS instance runs MySQL or PostgreSQL and uses standard SSD or ESSDs (ESSD), no transient connections occur when you expand the storage capacity of the RDS instance. When you expand the storage capacity of an RDS instance that runs SQL Server and uses standard SSDs or ESSDs, a 30-second transient connection occurs. During the transient connection, you cannot perform most of the operations that are related to databases, accounts, and network settings on the RDS instance. We recommend that you expand the storage capacity of your RDS instance during off-peak hours or make sure that your application is configured to automatically reconnect to your RDS instance.

? Note After the specifications are changed, wait approximately 5 minutes. If the issue persists, submit a .

Handling method corresponding to Cause 2

- Subscription RDS instance: If your RDS instance expires and is not renewed, renew the instance. Wait approximately 5 minutes. Then, check whether the instance is in the **Running** state. For more information about how to renew an instance, see Manually renew an ApsaraDB RDS for MySQL instance.
- Pay-as-you-go RDS instance: If your Alibaba Cloud account has an overdue payment, top up your account. Wait approximately 5 minutes. Then, check whether the instance is in the **Running** state.

? Note After the RDS instance is renewed, wait approximately 5 minutes. If the issue persists, submit a.

O&M suggestions

ApsaraDB for RDS FAQ-Performance

We recommend that you perform the following configurations to prevent your RDS instance from being locked:

- Configure a notification policy for overdue payments and instance expiration.
 - i. Log on to the ApsaraDB RDS console.
 - ii. In the upper-right corner of the page that appears, click the \triangle icon to go to the **Message**Center page.
 - iii. In the left-side navigation pane, click Common Settings.
 - iv. In the Notification Type column of the Common Settings page, select Product Overdue Payment, Suspension, and Imminent Release Notifications and click Modify.
 - v. In the **Modify Contact** dialog box, select alert contacts and click **Save**.
- Configure alert rules for storage usage. We recommend that you configure an alert rule based on which an alert is triggered when the storage usage exceeds 90%. For more information, see Configure an alert rule for an ApsaraDB RDS for MySQL instance.
- Enable SQL Explorer (SQL Audit). If the storage usage significantly increases, you can query the SQL statements that are executed during the increase based on information on the Monitoring and Alerts page and optimize the SQL statements. For more information about SQL Explorer (SQL Audit), see Use the SQL Explorer and Audit feature on an ApsaraDB RDS for MySQL instance.
- Configure automatic storage capacity expansion. If the storage resources of your RDS instance are insufficient, ApsaraDB RDS automatically expands the storage capacity of your RDS instance. For more information, see Configure automatic storage expansion for an ApsaraDB RDS for MySQL instance.
- Optimize SQL statements to prevent frequent use of the ORDER BY and GROUP BY clauses in scenarios in which large temporary files are used.

Why is my RDS instance still locked although the instance has sufficient storage resources or is renewed?

A task, such as a configuration change task, on the RDS instance is in progress. After the task is complete, the RDS instance is automatically unlocked. You can click the icon in the upper-right corner of the Basic Information page to view the task progress.

7.9. What do I do if the "The transaction log for database xx is full due to 'LOG_BACKUP'" error message is displayed when I back up logs?

If the $\mbox{ The transaction log for database } \mbox{xx is full due to 'LOG_BACKUP'} \mbox{ error message is displayed when you back up the logs of an ApsaraDB RDS for SQL Server instance, you can handle the issue based on this topic.}$

Problem description

FAQ-Performance ApsaraDB for RDS

The The transaction log for database xx is full due to 'LOG_BACKUP' error message is displayed during the backup of logs on the RDS instance.

Causes

The storage of your RDS instance is exhausted.

Solution

- 1. Check the storage usage of your RDS instance.
 - i. Log onto the ApsaraDB RDS console and go to the Instances page. In the top navigation bar, select the region where the RDS instance resides. Then, find the RDS instance and click the instance ID.
 - ii. In the left-side navigation pane, choose CloudDBA > Storage Management.
 - iii. On the **Storage Management** page, check the storage usage of the RDS instance. For more information, see View the storage information of an ApsaraDB RDS for SQL Server instance.
 - iv. In the Top 10 Databases section, check the storage of the tempdb database.

If you cannot query the storage of the **tempdb** database in the **Top 10 Databases** section, log on to the **tempdb** database and execute the following statement to query the storage:

```
SELECT name AS FileName,
   size*1.0/128 AS FileSizeInMB,
   CASE max_size
       WHEN 0 THEN 'Autogrowth is off.'
        WHEN -1 THEN 'Autogrowth is on.'
       ELSE 'Log file grows to a maximum size of 2 TB.'
   END.
   growth AS 'GrowthValue',
    'GrowthIncrement' =
        CASE
            WHEN growth = 0 THEN 'Size is fixed.'
            WHEN growth > 0 AND is percent growth = 0
                THEN 'Growth value is in 8-KB pages.'
            ELSE 'Growth value is a percentage.'
        END
FROM tempdb.sys.database_files;
```

The sum of the values of the FileSizeInMB parameter is the total storage of the **tempdb** database.

- 2. Shrink transaction logs of your RDS instance.
 - If the total storage of the **tempdb** database is greater than or equal to 5 GB and the RDS instance can be restarted, perform the following operations:
 - a. Restart the RDS instance. For more information, see Restart an ApsaraDB RDS for SQL Server instance
 - b. In the left-side navigation pane of the instance details page, click **Backup and Restoration**.
 - c. On the page that appears, click **Shrink Transaction Log**.
 - d. In the message that appears, click **OK**.
 - o If the total storage of the **tempdb** database is less than 5 GB or the RDS instance cannot be

ApsaraDB for RDS FAQ•Performance

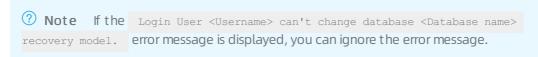
restarted, perform the following operations:

• If the RDS instance runs RDS Basic Edition, log on to the database and perform the following operations:

Note If the total storage of the **tempdb** database is less than 5 GB, you must break the log chain by using commands to shrink transaction logs. This operation affects the backup and recovery operations at the current point in time but does not affect your workloads. We recommend that you back up the database before you perform this operation.

a. Enable the simple recovery model for the database. In this mode, the log files are automatically truncated.

alter database CDatabase name> set recovery simple



b. View and shrink transaction logs.

```
use <Database name>
dbcc shrinkfile('<Database name>_log')
```

c. Change the recovery model of the database to full.

```
alter database <Database name> set recovery full
```

- If the RDS instance runs a different RDS edition, submit a ticket.
- 3. Optional. Optimize the storage that is used to store logs of the RDS instance.
 - If a large number of transactions exist or large transactions exist, the number of transaction logs rapidly increases. For example, 5 million rows of data are processed in a transaction. In this case, we recommend that you split the large transaction into 50 small transactions. In each small transaction, 100,000 rows of data are processed.
 - Upgrade the storage capacity of the RDS instance. For more information, see Change the specifications of an ApsaraDB RDS for SQL Server instance.

FAQ- Accounts ApsaraDB for RDS

8. Accounts

8.1. What do I do if the "ERROR 1044 (42000): Access denied for user 'xxxx'@'%' to database 'xxxx'" error message is displayed when I create a database on an ApsaraDB RDS for MySQL instance?

By default, a standard account for an ApsaraDB RDS for MySQL instance has only the permission to log on to databases. If you want to use the standard account to create a database, you must first use the privileged account to grant the CREATE permission to the standard account. Example statement:

```
GRANT CREATE ON *.* TO '<Name of the standard account>'@'%';
```

For more information, see Modify the permissions of a standard account on an ApsaraDB RDS for MySQL instance.

8.2. Authorize a Ram user to use DMS to log on to an RDS instance

See Manage permissions on instances.

8.3. Configure user permissions for an ApsaraDB RDS for PostgreSQL instance

RDS for PostgreSQL does not provide superusers, which brings difficulties to many cloud users. This is because of the following reasons:

- The superuser of PostgreSQL has almost all Database permissions, and can even directly modify system tables, which is potentially risky.
- The superuser of RDS for PostgreSQL uses O&M instances to manage operations such as stream replication and backups. In other words, it should be completely left to cloud services.
- The common user permissions of apsaradb RDS for PostgreSQL applications are sufficient to allow users to manage their data in the cloud.

Basic principles

• A common user can only create schemas in a database where it is the owner.

ApsaraDB for RDS FAQ• Accounts

• Objects in a database have a schema. Common user can create objects such as tables in public mode. Objects in other schemas must be the schema owner or be authorized.

• You must be the owner of an object (in addition to a user group) to manage a database object.

Exceptions and solutions

In a multi-user environment, apsaradb RDS for PostgreSQL users cannot use common user to manage objects created by other common user, and have no permissions on the operation objects.

You can use the Premier account created in the console to create an administrator account and then grant the sub-account permissions to the administrator account. Such a user group can be used to manage all other common user and their objects in the group using a single administrator account, it can manage the objects of multiple users and achieve a certain degree of permission isolation, you can also use this method to manage your instances in the cloud.

Note By default, the administrator account has the INHERIT permission, which determines whether a role inherits the permissions of the role to which it belongs. A role with an INHERIT attribute can automatically use any permissions that have been granted to the group to which it belongs, directly or indirectly.

FAQ·Upgrade ApsaraDB for RDS

9.Upgrade

9.1. Common errors reported when you upgrade the major engine version of an ApsaraDB RDS for PostgreSQL instance

For more information, see Introduction to the check report of a major engine version upgrade for an ApsaraDB RDS for PostgreSQL instance.

ApsaraDB for RDS FAQ• Dat abases

10.Databases

10.1. Does ApsaraDB RDS for MySQL support online DDL operations? How do I perform online DDL operations on an ApsaraDB RDS for MySQL instance?

Yes, ApsaraDB RDS for MySQL supports online DDL operations since MySQL 5.6 because online DDL operations are supported in open source MySQL from MySQL 5.6 onwards. You can perform online DDL operations to change the schemas of tables on an ApsaraDB RDS for MySQL instance without causing issues that block DML operations. For more information about how to perform online DDL operations on an ApsaraDB RDS for MySQL instance, see the official MySQL manuals.

Reference manuals

- If your RDS instance runs MySQL 8.0, see Online DDL Operations (MySQL 8.0).
- If your RDS instance runs MySQL 5.7, see Online DDL Operations (MySQL 5.7).
- If your RDS instance runs MySQL 5.6, see Online DDL Operations (MySQL 5.6).

Related features

Data Management (DMS) also allows you to change the schemas of tables without locking the tables. For more information, see DDL-based lockless change.

10.2. Restrictions of RDS MySQL Table partitions

ApsaraDB RDS for MySQL has the following limits on Table partitions:

- You can only partition an integer column in a table or convert a column to an integer column by using a partition function.
- The maximum number of partitions cannot exceed 1,024.
- If the index contains a unique index or primary key, partition key column must be included in all unique indexes or primary keys.
- Foreign keys are not supported.
- Full-text index (FULL TEXT). is not supported.

If the issue persists, contact the submit a.

10.3. How do I perform DDL operations online on ApsaraDB RDS

FAQ·Databases ApsaraDB for RDS

for MySQL?

Online DDL is a new feature available to ApsaraDB for RDS instances that run MySQL 5.6.

This feature allows you to perform data definition language (DDL) operations such as index creation on tables without blocking data manipulation language (DML) operations and SELECT queries that run concurrently with the DDL operations.

Note After you update your database engine version from an earlier version such as MySQL 5.5 to MySQL 5.6, you may not be able to perform DDL operations on a table for the first time because the table format is an earlier version. In this case, run the following command to convert the table format:

alter table <The name of the table whose format you want to convert> engine=innodb;

For information about more features supported by ApsaraDB RDS for MySQL, see AliSQL小版本Release Notes.

Limits

DDL operation	In-place supporte d	Table- copy required	DML concurren cy permitted	Query concurren cy permitted	Remarks
Create a common index on a table	Yes	No	Yes	Yes	None
Create a full-text index on a table	Yes	No	No	Yes	You must create the first full-text index by using the table-copy method. Then, you can create other full-text indexes on the table by using the in-place method.
Delete an index from a table	Yes	No	Yes	Yes	This DDL operation only modifies the metadata of the table.
Optimize a table	Yes	Yes	Yes	Yes	If a full-text index is created on the table, you cannot set the ALGORITHM option to INPLACE.
Set the default value in a column of a table	Yes	No	Yes	Yes	This DDL operation only modifies the metadata of the table.

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ApsaraDB for RDS FAQ·Dat abases

DDL operation	In-place supporte d	Table- copy required	DML concurren cy permitted	Query concurren cy permitted	Remarks
Set the default value in an auto-increment column of a table.	Yes	No	Yes	Yes	This DDL operation only modifies the metadata of the table.
Add a foreign key constraint to a table	Yes	No	Yes	Yes	You can run the set foreign_key_checks=0; command to disable the foreign_key_checks option, so you do not need to copy the table.
Delete a foreign key constraint from a table	Yes	No	Yes	Yes	You can enable or disable the foreign_key_checks option.
Rename a column of a table	Yes	No	Yes	Yes	If this DDL operation only changes the column name without changing the data type, concurrent DML operations are permitted.
Add a column to a table	Yes	Yes	Yes	Yes	If the column you want to add is an auto_increment column, you cannot perform concurrent DML operations. You can set the ALGORITHM option to INPLACE, but this setting reorganizes the table data and increases the overhead.
Delete a column from a table	Yes	Yes	Yes	Yes	You can set the ALGORITHM option to INPLACE, but this setting reorganizes the table data and increases the overhead.
Change the sequence of columns in a table	Yes	Yes	Yes	Yes	You can set the ALGORITHM option to INPLACE, but this setting reorganizes the table data and increases the overhead.

FAQ•Databases ApsaraDB for RDS

DDL operation	In-place supporte d	Table- copy required	DML concurren cy permitted	Query concurren cy permitted	Remarks
Modify the Row_For mat attribute of a table	Yes	Yes	Yes	Yes	You can set the ALGORITHM option to INPLACE, but this setting reorganizes the table data and increases the overhead.
Modify the Key_Block _Size attribute of a table	Yes	Yes	Yes	Yes	You can set the ALGORITHM option to INPLACE, but this setting reorganizes the table data and increases the overhead.
Set the values in a column of a table to NULL	Yes	Yes	Yes	Yes	You can set the ALGORITHM option to INPLACE, but this setting reorganizes the table data and increases the overhead.
Set the values in a column of a table to NOT NULL	Yes	Yes	Yes	Yes	This DDL operation only succeeds when the SQL_MODE option is set to STRICT_ALL_TABLES or STRICT_TRANS_TABLES and the column does not contain NULL values. You can set the ALGORITHM option to INPLACE, but this setting reorganizes the table data and increases the overhead.
Modify the data type of a column in a table	No	Yes	No	Yes	None
Add a primary key to a table	Yes	Yes	Yes	Yes	You can set the ALGORIT HM option to INPLACE, but this setting reorganizes the table data and increases the overhead. In addition, if you set the values in the column to NOT NULL, you cannot set the ALGORIT HM option to INPLACE.

ApsaraDB for RDS FAQ·Dat abases

DDL operation	In-place supporte d	Table- copy required	DML concurren cy permitted	Query concurren cy permitted	Remarks
Delete the primary key of a table and add a new one	Yes	Yes	Yes	Yes	You can only set the ALGORITHM option to INPLACE when you execute one ALTER TABLE statement to delete the existing primary key and add a new one. You can set the ALGORITHM option to INPLACE, but this setting reorganizes the table data and increases the overhead.
Delete the primary key of a table	No	Yes	No	Yes	None
Convert the character set of a table	No	Yes	No	Yes	If the new character set uses a different encoding format, you must rebuild the table.
Specify a new character set for a table	No	Yes	No	Yes	If the new character set uses a different encoding format, you must rebuild the table.
Rebuild a table with the force option	Yes	Yes	Yes	Yes	If a full-text index is created on the table, you cannot set the ALGORITHM option to INPLACE.
Rebuild a table alter table engine=in nodb	Yes	Yes	Yes	Yes	If a full-text index is created on the table, you cannot set the ALGORITHM option to INPLACE.
Set the persistent statistics attribute of a table	Yes	No	Yes	Yes	This DDL operation only modifies the metadata of the table.

FAQ• Dat abases ApsaraDB for RDS

• In-place supported: controlled by the ALGORITHM option in the DDL operation. This method consumes less disk space and I/O resources than the copy-table method.

- Copy-table required: controlled by the ALGORITHM option in the DDL operation. This method consumes more disk space and I/O resources than the in-place method.
- DML concurrency permitted: controlled by the LOCK option in the DDL operation.
- Query concurrency permitted: In most cases, queries concurrent with the DDL operation are permitted.
- For more information, see Online DDL Operations.
- The DDL operation on a table modifies the table metadata. Therefore, you may wait for the metadata lock on that table. For information about how to handle metadata locks, see Use DMS to release metadata locks.
- The in-place method works in opposite to the table-copy method. However, even if the in-place method is specified, a DDL operation may still involve table copying, for example, the DDL operation used to add a column to a table.

Configuration suggestions

ALGORITHM: When you perform a DDL operation, we recommend that you set this option to INPLACE
to avoid performance deterioration caused by disk space usage or I/O issues. If the DDL operation
does not support this setting, it returns an error.

```
alter table area_bak algorithm=inplace, modify father text;

ERROR 1846 (0A000): ALGORITHM=INPLACE is not supported. Reason: Cannot change column type
INPLACE. Try ALGORITHM=COPY.
```

• LOCK: When you perform a DDL operation, we recommend that you set this option to NONE. This ensures the smooth execution of DML operations concurrent with the DDL operation. If the DDL operation does not support this setting, it returns an error.

```
alter table area ALGORITHM=copy, lock=none, CONVERT TO CHARACTER SET utf8mb4; ERROR 1846 (0A000): LOCK=NONE is not supported. Reason: COPY algorithm requires a lock. Try LOCK=SHARED.
```

By default, ApsaraDB RDS for MySQL sets the ALGORITHM option to INPLACE and the LOCK option to NONE, so you do not need to configure these two options. However, if you are worried that a DDL operation may increase system loads or block DML operations on the target table, we recommend that you set the ALGORITHM option to INPLACE and the LOCK option to NONE separately for testing. Therefore, an error is returned when one of the two settings is not supported.

Example:

```
alter table area algorithm=inplace, lock=none, add index idx fa (father);
```

Note We recommend that you perform all DDL operations during off-peak hours to avoid interruptions to your business.

If your database engine version (for example, MySQL 5.5) does not support online DDL operations, you can use the pt-online-schema-change tool of Percona.

For information about the syntax for ALTER TABLE, see ALTER TABLE Syntax.

ApsaraDB for RDS FAQ· Dat abases

Troubleshooting

When you perform an online DDL operation on a large table with concurrent DML operations, the following error may be returned:

```
alter table rd_order_rec add index idx_cr_time_detail (cr_time,detail);
ERROR 1799(HY000): Creating index 'idx_cr_time_detail' required more than 'innodb_online_al ter_log_max_size' bytes of modification log. Please try again.
```

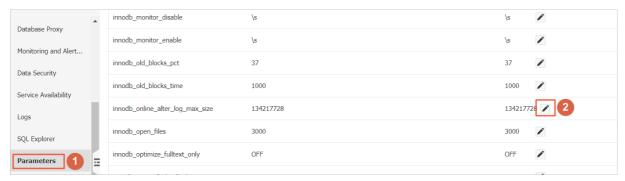
Cause

The system records any concurrent DML operations you perform during a DDL operation by creating a temporary log file when a table is modified or when an index is created. You can enlarge the temporary log file from the size specified by the innodb_sort_buffer_size parameter to the size specified by the nnodb_online_alter_log_max_size parameter.

If the temporary log file exceeds the maximum size, the DDL operation returns a failure message and rolls back all not committed concurrent DML operations. Therefore, we recommend that you use the innodb_online_alter_log_max_size parameter to specify a proper file size, so more concurrent DML operations are permitted. However, a larger file size increases the time taken by the DDL operation to lock the table and apply logged data to the table.

Solution

If your ApsaraDB for RDS instance runs MySQL 5.6 or 5.7, you can reconfigure the innodb_online_alter_log_max_size parameter in the ApsaraDB for RDS console. For more information, see Modify the parameters of an ApsaraDB RDS for MySQL instance.



10.4. Limits on the size of a single table in ApsaraDB RDS for MySQL

In most cases, the maximum size of a single table in an ApsaraDB RDS for MySQL instance is limited only by the largest file size that is allowed by the operating system.

Due to the overhead of specific metadata, the maximum size of a single table in an ApsaraDB RDS for MySQL instance is slightly less than 2 TB.

? Note We recommend that you make sure all tables in your ApsaraDB RDS for MySQL instance meet the following requirements to ensure optimal performance:

- The number of data records in each table does not exceed 20 million.
- The size of each table does not exceed 10 GB.

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If all tables in your ApsaraDB RDS for MySQL instance meet the preceding requirements but the performance of the instance still cannot meet your business requirements, contact Alibaba Cloud technical support.

10.5. Whether ApsaraDB RDS for MySQL supports table sharding

Currently, apsaradb RDS for MySQL does not support table sharding. However, cloud-native a distributed database PolarDB-X is highly compatible with the MySQL protocol. If you have distributed requirements, you can purchase a PolarDB-X Database. For more information, see PolarDB-X Product Overview.

10.6. Does the application have to support auto-reconnect to database?

Context

It is recommended that auto-reconnect is supported in your application connection to the database so that higher availability can be provided. When database switch or migration happens, the application will, without human intervention, be automatically restored. Moreover, since the short connection consumes a lot of performance and resources, persistent connection is recommended for connecting to the database

10.7. Change the time zone for an ApsaraDB RDS for PostgreSQL instance

This topic describes how to query the time zone of your ApsaraDB RDS for PostgreSQL instances and change the time zone.

Procedure

- 1. Use DMS to log on to an ApsaraDB RDS for PostgreSQL instance.
- 2. In the top navigation bar, choose **SQL Operations** > **SQL Window**.
- 3. Run the following command to view the supported time zones.

```
select * from pg timezone names
```

4. Run the following command to modify the time zone:

```
alter role all set timezone='<time zone name>';
```

Examples

```
alter role all set timezone='UTC ';
```

5. Run the following command to check the current time zone and check whether it has been modified:

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select * from pg_db_role_setting

FAQ-Logs ApsaraDB for RDS

11.Logs

11.1. Binlog FAQs

1. Q: Two binlog files have a similar start time and end time. Why has this occurred? Is the start time of one file consecutive with that of another?

A: The two files contain binlogs that were generated during the backup of the primary and secondary nodes. As a result, the two files have a similar start time and end time. The start time of each file is not the same.

- 2. Q: Are binlog files compressed?
 - A: Binlog files are not compressed.
- 3. Q: How are the generation, upload, and clearing of binlogs triggered?

A: When more than 500 MB of log data is written to a binlog file, a new binlog file is generated. Backup logs are uploaded to OSS based on local backup settings, and then local logs are cleared.

Recommended

For more information and operations about binary logs, see Introduction to binary log files and log backup files of an ApsaraDB RDS for MySQL instance.

11.2. Generation and clearing rules of MySQL binlogs

For more information, see Delete the binary log files of an ApsaraDB RDS for MySQL instance.

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ApsaraDB for RDS FAQ∙ SQL

12.SQL

12.1. What do I do if my ApsaraDB RDS for MySQL instance reports Error 1709?

Condition

When you create an index, the system may report the following error:

ERROR 1709 (HY000): Index column size too large. The maximum column size is 767 bytes.

Cause

The maximum indexed field length allowed by the InnoDB storage engine is 767 bytes. If you create an index on a multi-byte field or multiple fields, this error may be reported.

Note For example, utf8mb4 is a four-byte character set. The default indexed field length allowed by the utf8mb4 character set is 191 characters based on the following formula: 767 bytes/4 bytes per character ≈ 191 characters. If you create an index on a field of the varchar (255) or char (255) type, the index creation fails. For more information, see the MySQL documentation at the official MySQL website.

Remedy

Procedure

 Log on to the ApsaraDB for RDS console and navigate to the Parameters page. On the Editable Parameters tab, find the innodb_large_prefix parameter, change its value to ON or 1, and click Apply Changes.



Note After you set the innodb_large_prefix parameter to ON or 1, the maximum indexed field length allowed by InnoDB in the DYNAMIC or COMPRESSED row format increases to 3,072 bytes.

2. Specify the DYNAMIC or COMPRESSED row format during table creation. Example:

FAQ•SQL ApsaraDB for RDS

```
create table idx_length_test_02
(
  id int auto_increment primary key,
  name varchar(255)
)
ROW_FORMAT=DYNAMIC default charset utf8mb4;
```

? Note For a created table, you can run the following commands to change its row format to DYNAMIC or COMPRESSED:

```
alter table <The name of the table> row_format=dynamic;
alter table <The name of the table> row_format=compressed;
```

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ApsaraDB for RDS FAQ• Parameter

13.Parameter

13.1. Timeout parameters of an ApsaraDB RDS for MySQL instance

This topic describes the timeout parameters of an ApsaraDB RDS for MySQL instance.

Parameter	Description
connect_timeout	This parameter specifies the period of time during which the client can wait for a three-way handshake to complete when the client attempts to establish a connection to the RDS instance. If a connection times out because of poor network quality, we recommended that you increase the value of this parameter.
delayed_insert_timeout	This parameter specifies the period of time during which the system can wait for the INSERT statement to be executed.
innodb_lock_wait_timeout	This parameter specifies the period of time during which a transaction can wait for another transaction to release the shared or exclusive lock on the requested resource. A shared lock or an exclusive lock is different from a deadlock.
innodb_rollback_on_timeout	This parameter specifies whether a transaction is rolled back if a timeout occurs. If the value of this parameter is ON, the entire transaction is rolled back. If the value of this parameter is OFF, only the last statement in the transaction is rolled back.
interactive_timeout wait_timeout	These parameters specify the period of time for which the RDS instance can wait before the RDS instance closes an interactive connection or a non-interactive connection. We recommended that you do not set these parameters to large values. If you set these parameters to large values, the maximum number of connections that are allowed by the RDS instance may be depleted.
lock_wait_timeout	This parameter specifies the period of time after which a metadata lock times out.
net_read_timeout net_write_timeout	These parameters specify the period of time for which the RDS instance can wait before the network packets sent from the client are received and specify the period of time for which the RDS instance can wait before the network packets destined for the client are sent. These parameters are valid only for TCP/IP connections and the threads in the Activity state.
slave_net_timeout	This parameter specifies the period of time during which a secondary RDS instance can wait before it establishes a connection to synchronize data with its primary RDS instance. If the connection times out, ApsaraDB RDS re-establishes the connection.

References

FAQ•Parameter ApsaraDB for RDS

Modify the parameters of an ApsaraDB RDS for MySQL instance