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ApsaraDB for RDS
Best Practices

Document Version: 20220712

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Document conventions

Style	Description	Example
⚠ Danger	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.
🔔 Warning	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 no longer 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 list --instanceid` *Instance_ID*
[] or [a|b]	This format is used for an optional value, where only one item can be selected.	`ipconfig [-all|-t]`
{} or {a|b}	This format is used for a required value, where only one item can be selected.	`switch {active|stand}`

Table of Contents

1.Overview of best practices

This topic lists the best practices of ApsaraDB RDS in various business scenarios.

Database engine	References
All supported database engines	• Build a high availability architecture • Use ApsaraDB RDS with self-managed database instances for geo-disaster recovery • Use ApsaraDB RDS with heterogeneous databases for diversified data storage • Use read/write splitting to increase the processing capability of an ApsaraDB RDS instance • Use ApsaraDB RDS with MaxCompute for data computing at scale • Use RAM policies to manage the permissions of RAM users on ApsaraDB RDS instances
MySQL	• Best practices of X-Engine • Import data from Excel to ApsaraDB RDS for MySQL • Configure a cyclic event on an ApsaraDB RDS for MySQL instance • Select and create an optimal index for faster data access
SQL Server	• Connect Kingdee K/3 WISE to ApsaraDB RDS for SQL Server • Use SSRS for an ApsaraDB RDS SQL Server instance
PostgreSQL	• Configure the collation of a database on an ApsaraDB RDS for PostgreSQL instance • Insert, update, and delete multiple data records at a time • Locate SQL statements with the highest resource consumption • Real-time precision marketing (user selection) • Image recognition, face recognition, similarity-based retrieval, and similarity-based audience spotting

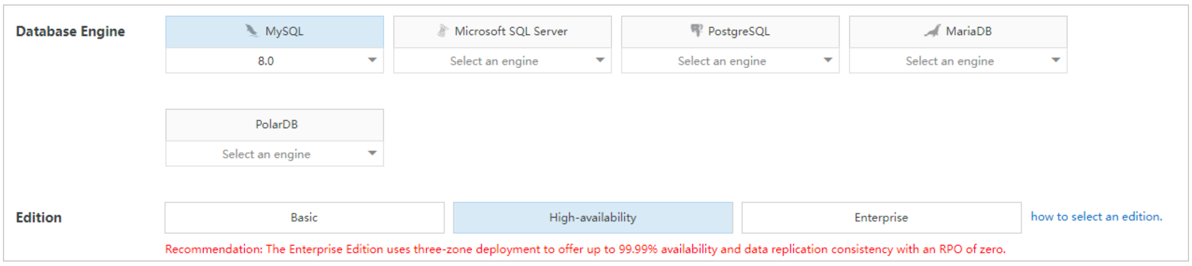
2.Build a high availability architecture

ApsaraDB for RDS provides a complete suite of high availability features such as the dedicated instance family, high availability-centered RDS editions, multi-zone deployment, and cross-region backup and restoration.

RDS editions and instance families

When you create an RDS instance, note the following high availability-related options:

- **Edition**: We recommend that you select the **High-availability**, **Enterprise**, or **Cluster (AlwaysOn)** Edition.
    - **High-availability**: The database system works in the classic high-availability architecture and consists of one primary instance and one secondary instance.
    - **Enterprise**: The database system consists of one primary instance and two secondary instances. The primary and secondary instances reside in three different zones within the same region to provide financial-level reliability.
    - **Cluster (AlwaysOn)**: This edition is only supported for SQL Server. The database system consists of one primary instance, one secondary instance, and up to seven read-only instances used to scale out the read capability.

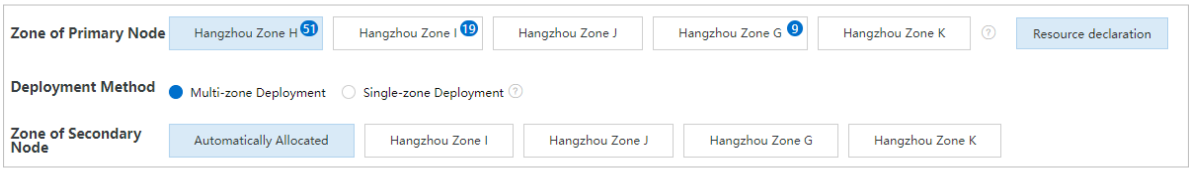


Database Engine: MySQL 8.0 | Microsoft SQL Server: Select an engine | PostgreSQL: Select an engine | MariaDB: Select an engine | PolarDB: Select an engine

Edition: Basic | High-availability | Enterprise | how to select an edition.

Recommendation: The Enterprise Edition uses three-zone deployment to offer up to 99.99% availability and data replication consistency with an RPO of zero.

- **Zone**: ApsaraDB for RDS supports both single-zone deployment and multi-zone deployment. We recommend that you use multi-zone deployment. If your database system spans multiple zones, it can provide zone-level disaster recovery.

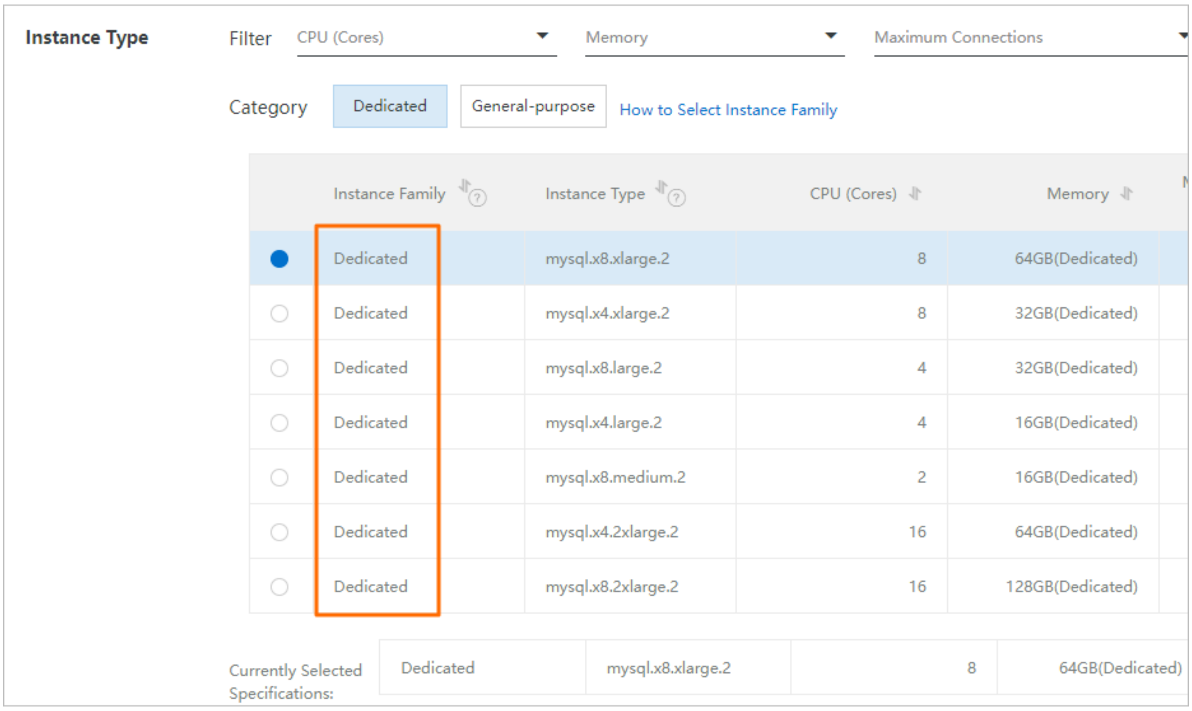


Zone of Primary Node: Hangzhou Zone H 51 | Hangzhou Zone I 19 | Hangzhou Zone J | Hangzhou Zone G 9 | Hangzhou Zone K | Resource declaration

Deployment Method: ● Multi-zone Deployment ○ Single-zone Deployment

Zone of Secondary Node: Automatically Allocated | Hangzhou Zone I | Hangzhou Zone J | Hangzhou Zone G | Hangzhou Zone K

- **Instance Type**: We recommend that you select the **Dedicated Instance** or **Dedicated Host** family.
    - **Dedicated Instance**: A dedicated instance occupies the exclusive CPU and memory resources allocated to it. Its performance and stability are independent of the other instances deployed on the same physical host.
    - **Dedicated Host**: This is the top configuration of the **Dedicated Instance** family. A dedicated host instance occupies all resources on the physical host where it is housed.



Instance Type

Filter: CPU (Cores) | Memory | Maximum Connections

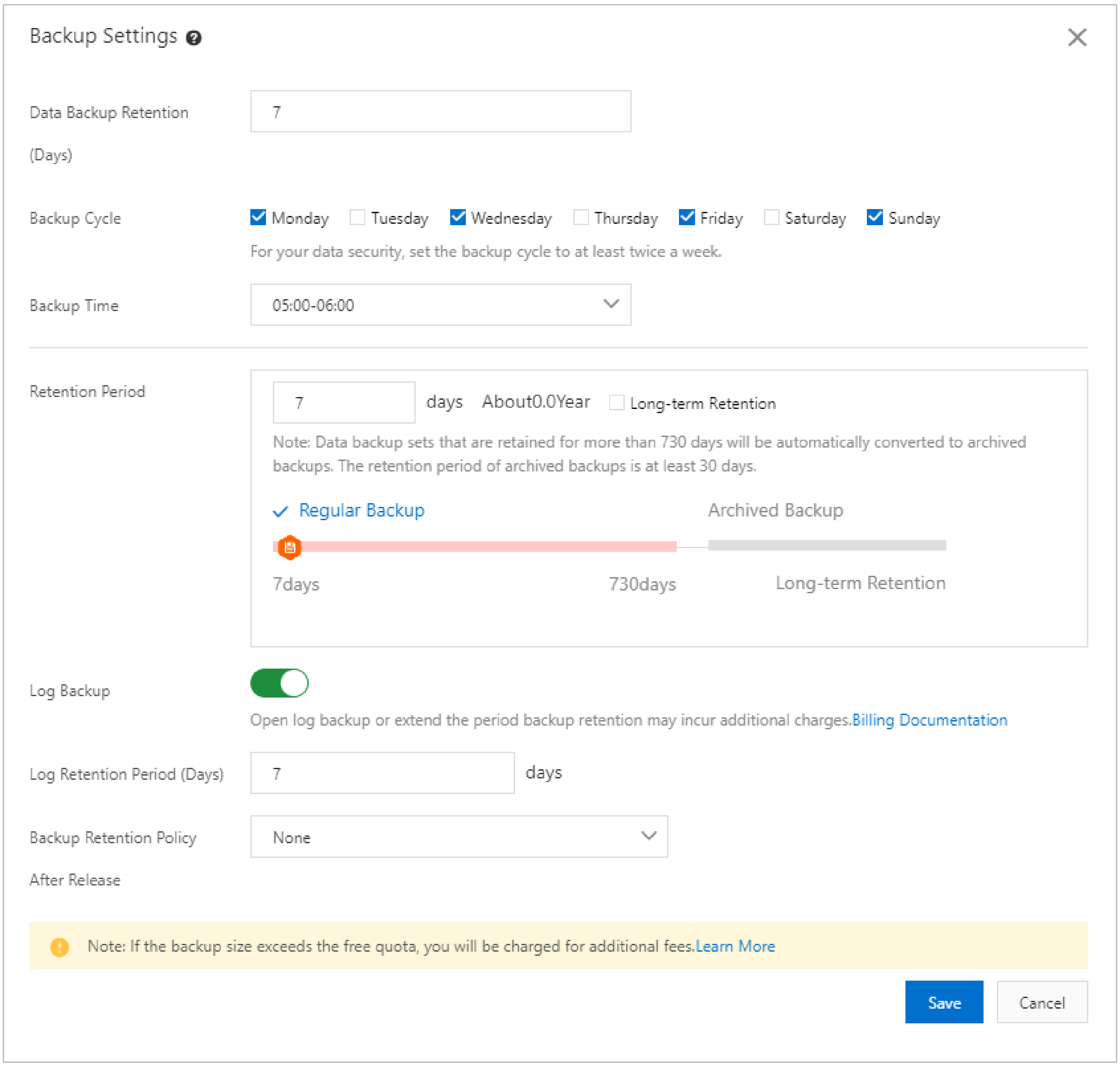
Category: Dedicated | General-purpose | How to Select Instance Family

	Instance Family	Instance Type	CPU (Cores)	Memory
●	Dedicated	mysql.x8.xlarge.2	8	64GB(Dedicated)
○	Dedicated	mysql.x4.xlarge.2	8	32GB(Dedicated)
○	Dedicated	mysql.x8.large.2	4	32GB(Dedicated)
○	Dedicated	mysql.x4.large.2	4	16GB(Dedicated)
○	Dedicated	mysql.x8.medium.2	2	16GB(Dedicated)
○	Dedicated	mysql.x4.2xlarge.2	16	64GB(Dedicated)
○	Dedicated	mysql.x8.2xlarge.2	16	128GB(Dedicated)

Currently Selected Specifications: Dedicated | mysql.x8.xlarge.2 | 8 | 64GB(Dedicated)

Automatic backup

We recommend that you configure an automatic backup policy for your ApsaraDB for RDS instance. If your instance becomes unavailable due to misoperations or other exceptions, you can use the backups to restore the instance to its latest state.



Backup Settings

Data Backup Retention (Days): 7

Backup Cycle: ☑ Monday □ Tuesday ☑ Wednesday □ Thursday ☑ Friday □ Saturday ☑ Sunday

For your data security, set the backup cycle to at least twice a week.

Backup Time: 05:00-06:00

Retention Period: 7 days About0.0Year □ Long-term Retention

Note: Data backup sets that are retained for more than 730 days will be automatically converted to archived backups. The retention period of archived backups is at least 30 days.

Log Backup: on

Open log backup or extend the period backup retention may incur additional charges.Billing Documentation

Log Retention Period (Days): 7 days

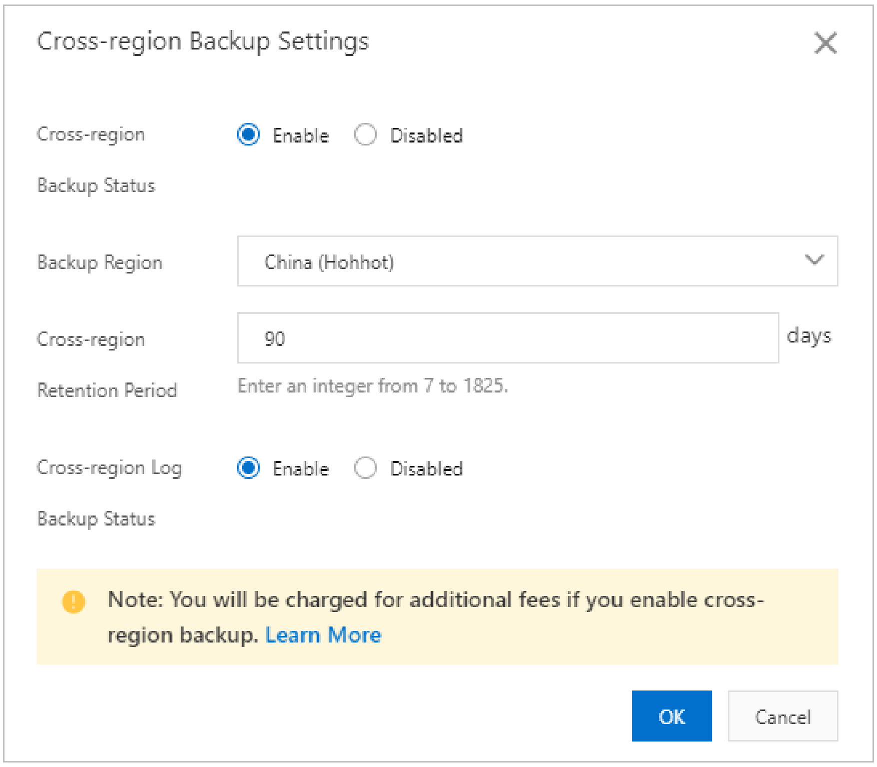
Backup Retention Policy After Release: None

Note: If the backup size exceeds the free quota, you will be charged for additional fees.Learn More

Cross-region disaster recovery

The cross-region disaster recovery feature helps secure your data and increases the availability of your RDS instances.

- Create a disaster recovery ApsaraDB RDS for MySQL instance: The primary instance and its remote disaster recovery instance synchronize data with each other in real time by using Data Transmission Service (DTS). Both the primary and disaster recovery instances are deployed based on the primary/secondary high availability architecture. If your application cannot connect to either the primary or secondary instance due to a natural disaster, you can switch services over to the remote disaster recovery instance and then update the endpoints on your application. This minimizes the downtime of your database system.
- Enable cross-region backups for an ApsaraDB RDS for MySQL instance: Your database system automatically replicates its backup files to OSS buckets in a different region.



Cross-region Backup Settings

Cross-region Backup Status ● Enable ○ Disabled

Backup Region: China (Hohhot)

Cross-region Retention Period: 90 days

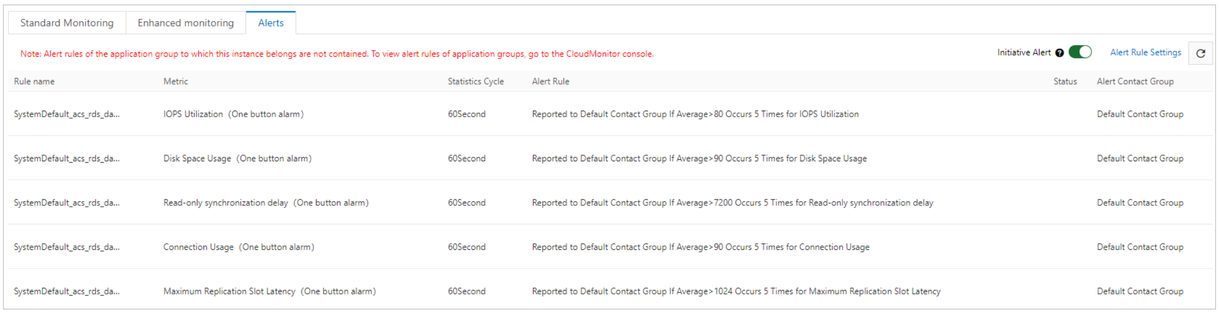
Enter an integer from 7 to 1825.

Cross-region Log Backup Status ● Enable ○ Disabled

Note: You will be charged for additional fees if you enable cross-region backup. Learn More

Monitoring and alerting

To prevent unavailability caused by CPU, disk, memory, connection, or other exceptions, we recommend that you monitor and configure thresholds for the performance metrics of your RDS instances. If the value of a metric reaches the preset threshold, the system reports alerts. For more information, see Configure alert rules for an ApsaraDB RDS MySQL instance.



Note: Alert rules of the application group to which this instance belongs are not contained. To view alert rules of application groups, go to the CloudMonitor console.

Rule name	Metric	Statistics Cycle	Alert Rule	Status	Alert Contact Group
SystemDefault_acs_rds_da...	IOPS Utilization (One button alarm)	60Second	Reported to Default Contact Group If Average>80 Occurs 5 Times for IOPS Utilization		Default Contact Group
SystemDefault_acs_rds_da...	Disk Space Usage (One button alarm)	60Second	Reported to Default Contact Group If Average>90 Occurs 5 Times for Disk Space Usage		Default Contact Group
SystemDefault_acs_rds_da...	Read-only synchronization delay (One button alarm)	60Second	Reported to Default Contact Group If Average>7200 Occurs 5 Times for Read-only synchronization delay		Default Contact Group
SystemDefault_acs_rds_da...	Connection Usage (One button alarm)	60Second	Reported to Default Contact Group If Average>90 Occurs 5 Times for Connection Usage		Default Contact Group
SystemDefault_acs_rds_da...	Maximum Replication Slot Latency (One button alarm)	60Second	Reported to Default Contact Group If Average>1024 Occurs 5 Times for Maximum Replication Slot Latency		Default Contact Group

Data restoration

If you have built a high availability architecture for your database system as instructed above, your business can run without downtime under normal scenarios and can even be restored within a short time in the event of exceptions.

- If a single RDS instance of your database system is faulty, you can switch services over to another RDS instance. This operation is unavailable in the Basic Edition.
- In the multi-zone deployment solution, the primary instance can be switched to another zone if the current zone is faulty. In the single-zone deployment solution, you must wait until the fault is rectified or switch services over to the disaster recovery instance.
- If the region of your database system is faulty, you can switch services over to the disaster recovery instance. You also have the option to restore the data to a new RDS instance by using cross-region backup.

For more information about how to restore data, see the following topics:

- Restore the data of an RDS instance
- Restore individual databases and tables of an ApsaraDB RDS for MySQL instance
- Restore the data of an ApsaraDB RDS for MySQL instance across regions

3.Use DMS to import a logical backup file into an ApsaraDB for RDS instance

This topic describes how to import a logical backup file into an ApsaraDB for RDS instance by using Alibaba Cloud Data Management (DMS).

For more information, see Import data.

4.Authorize a RAM user to manage ApsaraDB RDS instances

This topic describes how to authorize a RAM user to manage ApsaraDB RDS instances by using Resource Access Management (RAM).

Prerequisites

Create a RAM user

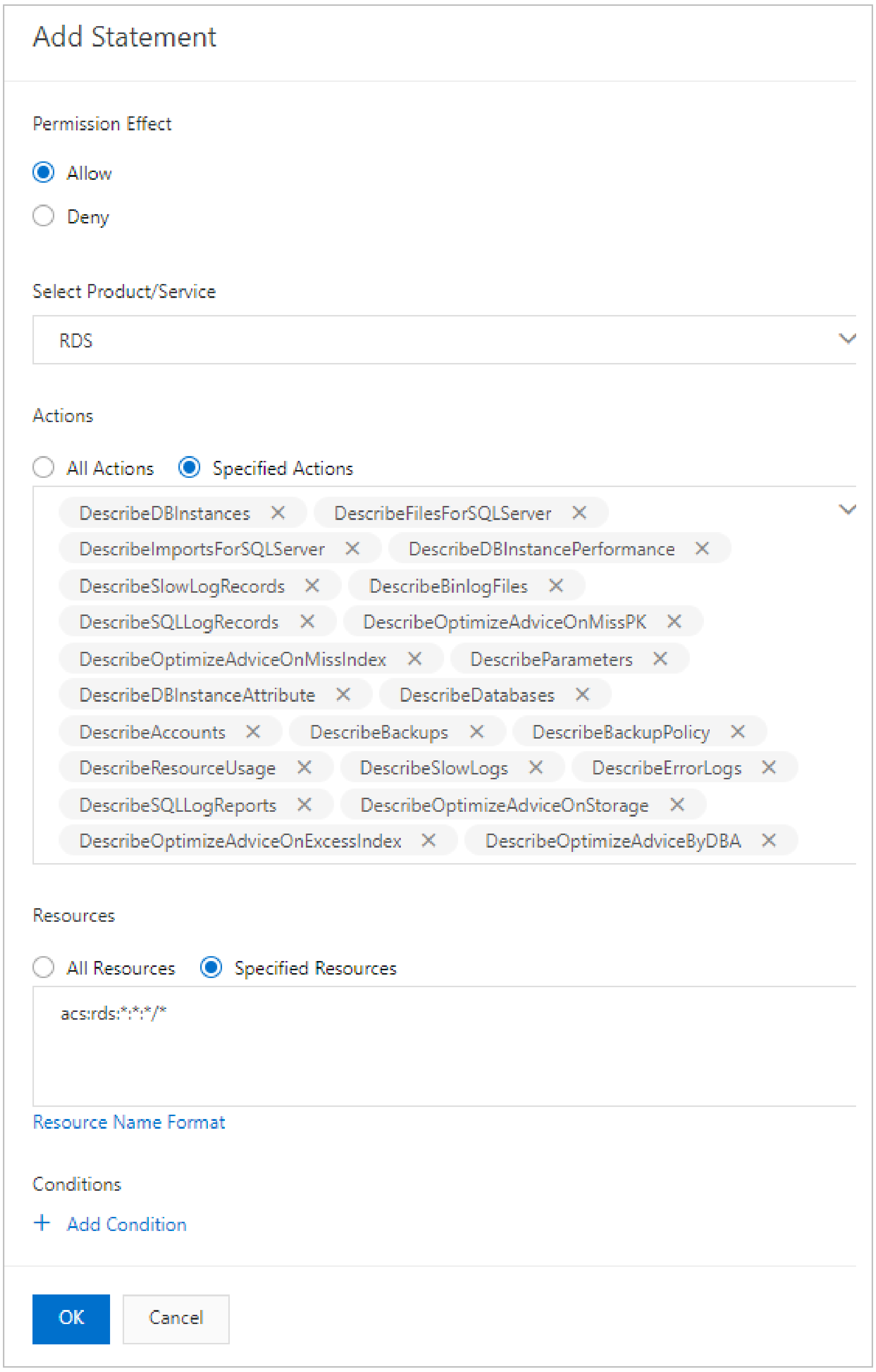
Context

You can grant the permissions to call API operations to RAM users. For example, if you grant a RAM user the permission to call the CreateDBInstance operation, the RAM user can create an RDS instance in the ApsaraDB RDS console.

The following procedure shows how to grant a RAM user the permission to check the information about RDS instances. The procedures to grant other permissions to a RAM user are similar.

Procedure

1. Log on to the RAM console.
2. In the left-side navigation pane, choose **Permissions > Policies**.
3. On the Policies page, click **Create Policy**.
4. On the Create Custom Policy page, specify the **Policy Name** and the **Note**.
5. Select a **Configuration Mode**.
    - **Visualized**
      If you select the Visualized configuration mode, click **Add Statement** and configure the following parameters.



Add Statement

Permission Effect

● Allow

○ Deny

Select Product/Service

RDS

Actions

○ All Actions ● Specified Actions

DescribeDBInstances ✕ DescribeFilesForSQLServer ✕ DescribeImportsForSQLServer ✕ DescribeDBInstancePerformance ✕ DescribeSlowLogRecords ✕ DescribeBinlogFiles ✕ DescribeSQLLogRecords ✕ DescribeOptimizeAdviceOnMissPK ✕ DescribeOptimizeAdviceOnMissIndex ✕ DescribeParameters ✕ DescribeDBInstanceAttribute ✕ DescribeDatabases ✕ DescribeAccounts ✕ DescribeBackups ✕ DescribeBackupPolicy ✕ DescribeResourceUsage ✕ DescribeSlowLogs ✕ DescribeErrorLogs ✕ DescribeSQLLogReports ✕ DescribeOptimizeAdviceOnStorage ✕ DescribeOptimizeAdviceOnExcessIndex ✕ DescribeOptimizeAdviceByDBA ✕

Resources

○ All Resources ● Specified Resources

acs:rds:*:*:*/*

Resource Name Format

Conditions

Parameter	Description
Permission Effect	Specify whether to grant the permissions on an Alibaba Cloud service to the RAM user. Valid values: Allow and Deny. In this example, select Allow.
Select Product/Service	Select the Alibaba Cloud service on which you want to grant permissions to the RAM user. In this example, select **RDS**.

Parameter	Description
Actions	Select the API operations on which you want to grant permissions to the RAM user. Valid values: **All Actions** and **Specified Actions**. If you select **Specified Actions**, you must also select the required API operations from the drop-down list that appears. In this example, select all API operations whose names start with `Describe` .
Resources	Select the resources on which you want to grant permissions to the RAM user. Valid values: **All Resources** and **Specified Resources**. If you select **Specified Resources**, you must also enter the names of the required resources in the following format: `acs:<service-name>:<region>:<account-id>:<relative-id>` . In this example, enter `acs:rds:*:*:*/*` . This way, the RAM user can be granted the permissions on all RDS instances that are created within your Alibaba Cloud account.
Conditions	Specify the limits on the permissions that you want to grant to the RAM user. For example, you can limit the source IP addresses from which the RAM user can log on.

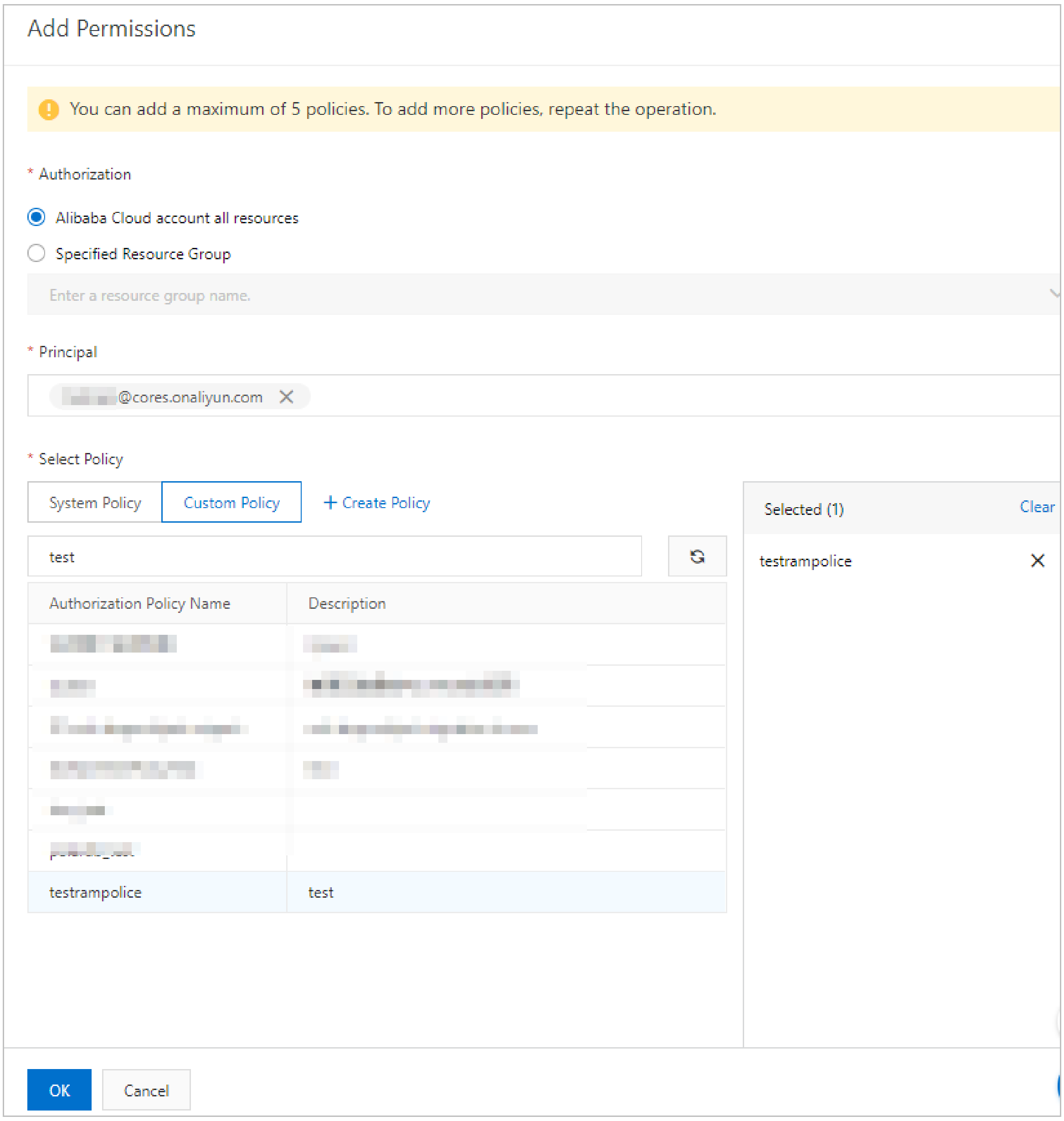
> ? **Note** If you select **Specified Actions**, we recommend that you select the `DescribeDBInstances` operation. If you do not select this API operation, you cannot view the RDS instances in a specified region.

- Script
  If you select the Script configuration mode, enter the following code snippet in the edit box that appears:

```
{    "Version": "1",
     "Statement": [
      {       "Effect": "Allow",
            "Action": [
                "rds:Describe*"      ],
            "Resource": [
                "acs:rds:*:*:*/*"
                ],
            "Condition": {}
        }
    ]
}
```

> **Note** The Script configuration mode is more efficient than the **Visualized** configuration mode. For example, in the Script configuration mode, you can enter `Describe*` in the edit box to specify all API operations whose names start with Describe. However, in the Visualized configuration mode, you can select only one API operation whose name starts with Describe at a time.

6. Click **OK**.
7. In the left-side navigation pane, choose **Identities > Users**.
8. Find the RAM user. Then, click **Add Permissions** in the **Actions** column.
9. In the **Select Policy** section, click **Custom Policy**, find the permission policy that you created, and then click **OK**.



Add Permissions

You can add a maximum of 5 policies. To add more policies, repeat the operation.

* Authorization

● Alibaba Cloud account all resources

○ Specified Resource Group

Enter a resource group name.

* Principal

[redacted]@cores.onaliyun.com ✕

* Select Policy

test

Authorization Policy Name	Description
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	
[redacted]	
testrampolice	test

Selected (1) Clear

testrampolice ✕

After the preceding steps are complete, you can log on to the ApsaraDB RDS console and check the information about RDS instances by using the credentials of the RAM user. You can also grant other permissions to a RAM user within your Alibaba Cloud account based on your business requirements.

- For more information about the ApsaraDB RDS API, see List of operations by function.
- For more information about the elements of a permission policy, see Policy elements.

5.Use RAM policies to manage the permissions of RAM users on ApsaraDB RDS instances

This topic describes how to attach Resource Access Management (RAM) policies to RAM users to manage the permissions of the RAM users on ApsaraDB RDS instances.

Introduction

Alibaba Cloud allows you to use RAM policies to improve the security of RDS instances. You can use RAM policies to grant different permissions to RAM users on RDS instances. For more information, see RAM policies for ApsaraDB RDS.

> ⓘ **Note** For more information about RAM policies, see Policy overview.

Procedure

1. Log on to the RAM console.
2. In the left-side navigation pane, choose **Permissions > Policies**.
3. On the page that appears, click **Create Policy**. On the **JSON** tab of the page that appears, enter the RAM policy script and click **Next Step**.

   > ⓘ **Note**
   >
   > - You can find the RAM policy script in the **Code** column in the "RAM policies for ApsaraDB RDS" section of this topic.
   > - For more information about the syntax and structure of RAM policies, see Policy structure and syntax.

4. In the **Basic Information** section of the page that appears, enter a policy name in the **Name** field. Then, click **OK**. You can find the name of the RAM policy in the **Policy** column in the "RAM policies for ApsaraDB RDS" section of this topic.

   > ⓘ **Note** You can also customize the name of the RAM policy. The name of the RAM policy must meet the following requirements:
   >
   > - The name must be 1 to 128 characters in length.
   > - The name can contain letters, digits, and hyphens (-).

5. On the page that appears, click **Grant Permission**.

i. Configure the **Authorized Scope** parameter.

- **Alibaba Cloud Account**: The authorization takes effect on all resources in the current Alibaba Cloud account.
- **Specific Resource Group**: The authorization takes effect on resources in a specified resource group.

> **Note** If you want to select the Specific Resource Group option, make sure that ApsaraDB RDS supports resource groups. For more information, see Services that work with Resource Group.

ii. Configure the **Principal** parameter.

> **Note** The **Principal** parameter specifies the RAM user to which you want to attach the RAM policy. You can enter a part of the username to perform a fuzzy match to search for the RAM user.

iii. Set the **Select Policy** parameter to **Custom Policy**.

iv. Select the RAM policy that you created in Step 4. Then, click **OK**.

> **Note** You can enter a part of the name of the RAM policy in the search box above the listed RAM policies to perform a fuzzy match to search for the RAM policy.

RAM policies for ApsaraDB RDS

Item	Policy	Code	Description
Instance creation	CreateRdsWithNonDiskEncryptionForbidden	Click to expand ❯	This policy is used to prevent users from creating RDS instances that do not use encrypted disks. **Note** This policy takes effect only when users create primary RDS instances. This policy does not take effect when users create read-only RDS instances or restore data to new RDS instances.
	CreateRdsWithNonVPCNetworkTypeForbidden	Click to expand ❯	This policy is used to prevent users from creating RDS instances whose network types are not Virtual Private Cloud (VPC). **Note** This policy takes effect only when users create primary RDS instances. This policy does not take effect when users create read-only RDS instances or restore data to new RDS instances.

Item	Policy	Code	Description
Network configurations	DatabaseConnectionNonVPCNetworkTypeForbidden	Click to expand ❯	This policy is used to prevent users from changing the network type of RDS instances to classic network.
Security configurations	DataSecuritySSLDisabledForbidden	Click to expand ❯	This policy is used to prevent users from disabling SSL encryption for RDS instances.
	DataSecurityTDEDisabledForbidden	Click to expand ❯	This policy is used to prevent users from disabling Transparent Data Encryption (TDE) for RDS instances.
Database proxy configurations	DatabaseProxyWithNonVPCNetworkTypeForbidden	Click to expand ❯	This policy is used to prevent users from specifying public endpoints when the users enable the database proxy feature for RDS instances.
	DatabaseProxyCreateEndpointAddressWithNonVPCNetworkTypeForbidden	Click to expand ❯	This policy is used to prevent users from specifying public endpoints when the users create endpoints to connect to the database proxies of RDS instances.
	DatabaseProxyModifyEndpointAddressWithNonVPCNetworkTypeForbidden	Click to expand ❯	This policy is used to prevent users from specifying public endpoints when the users modify the endpoints that are used to connect to the database proxies of RDS instances.
	DatabaseProxyDbProxyInstanceSslDisabledForbidden	Click to expand ❯	This policy is used to prevent users from disabling SSL encryption for the specified endpoints of the database proxies of RDS instances.
Back up-related configurations	BackupAndRestorationCrossBackupDisabledForbidden	Click to expand ❯	This policy is used to prevent users from disabling the cross-region backup feature for RDS instances.
	BackupAndRestorationBackupPolicyDisabledForbidden	Click to expand ❯	This policy is used to prevent users from disabling the log backup feature for RDS instances.
Event history	EventCenterActionEventEnableEventLogForbidden	Click to expand ❯	This policy is used to prevent users from enabling the event history feature for RDS instances.

6.Use DTS to perform vertical splitting on a database

If an RDS instance is overloaded, you can vertically split a database or table from this instance into a separate instance. This topic describes how to use the dual-write solution and simple splitting solution to achieve vertical splitting.

Context

Assume that Database A and Database B are deployed on an RDS instance. The instance is facing bottlenecks because of business growth. If you want to reduce the load on the instance, you can vertically split Database B into a separate instance. For more information, see, Dual-write solution and Simple splitting solution.

Precautions

- You must create a separate instance as the destination instance. The database account of the destination instance must have the same permissions as the database account of the source instance. For more information about the supported destination instance types, see Overview of data migration scenarios.

  > ⓘ **Note** We recommend that you create and authorize a database account for the source and destination instances. This allows you to distinguish session information and improve data security.

- You must add the connection string of the destination instance to the application.
- If you use the Simple splitting solution, you must pause your business and stop writing data to the database for a short period of time. To minimize the impact on your business when you change and release a program or switch instances, we recommend that you split the database during off-peak hours.

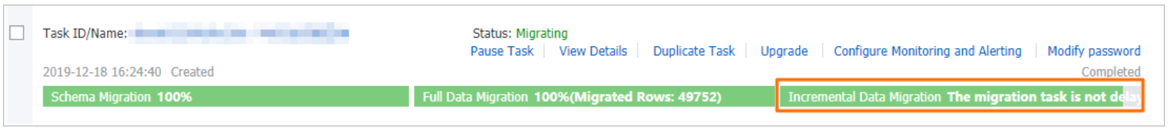
Dual-write solution

> ⓘ **Note** You can implement phased switchover and minimize the impact on the business. However, you must transform the application so that the application data can be written to Database B on the source and destination instances.

1. Configure a data migration task for the source and destination instances. Select Database B as the object to be migrated. For more information, see Overview of data migration scenarios.

   > ⓘ **Note** When you configure the data migration task, you must select **Schema Migration**, **Full Data Migration**, and **Incremental Data Migration** as the migration types.

2. Wait until the task progress bar shows "Incremental Data Migration" and "The migration task is not delayed" or a delay time of less than 5 seconds.



□ Task ID/Name: [redacted]

Status: Migrating

2019-12-18 16:24:40 Created

Completed

Schema Migration 100%

Full Data Migration 100%(Migrated Rows: 49752)

Incremental Data Migration The migration task is not dela

3. Check whether the data in Database B is consistent between the source and destination instances.

4. If the data is consistent, stop the data migration task. For more information, see Stop a data migration task.

   > Warning The database accounts that are used for data migration have the read and write permissions. After data is migrated, you must delete the accounts or revoke the write permission to ensure security.

5. Write the application data to Database B on the source and destination instances at the same time.

6. Log on to Database B on the source and destination instances and execute one of the following statements to view the session information. Select the statement based on the database type. Make sure that write operations are being performed in a new session.

   > **Note** The process or session information returned by the preceding statements includes the processes or sessions between DTS and Database B on the source and destination instances.

   MySQL SQL Server Oracle PostgreSQL Redis MongoDB

7. Write the application data to Database B on the source and destination instances at the same time. Make sure that the source and destination instances keep running for a business period, for example, seven days.

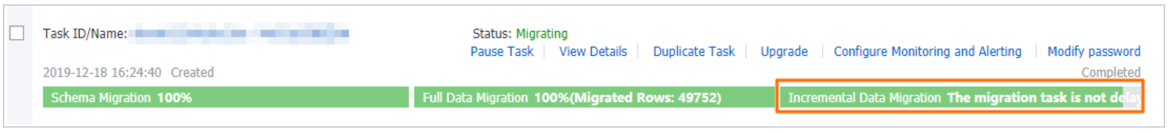
8. After you test all features related to your business and make sure that no issues are detected, shut down Database B on the source instance.

Simple splitting solution

> **Note** If you use this solution, you do not need to edit the code of your application. However, a rollback failure may occur.

1. Configure a data migration task for the source and destination instances. Select Database B as the object to be migrated. For more information, see Overview of data migration scenarios.

2. Wait until the task progress bar shows "Incremental Data Migration" and "The migration task is not delayed" or a delay time of less than 5 seconds.

   □ Task ID/Name: [redacted]

   2019-12-18 16:24:40 Created

   Status: Migrating

   Pause Task | View Details | Duplicate Task | Upgrade | Configure Monitoring and Alerting | Modify password

   Completed

   Schema Migration 100%

   Full Data Migration 100%(Migrated Rows: 49752)

   Incremental Data Migration The migration task is not dela

   > **Note** If you do not select **Incremental Data Migration** when you configure the data migration task, the task progress bar does not show "Incremental Data Migration". After data is migrated, the migration task automatically stops. In this case, you must pause your business and stop writing data to the source database before running the data migration task. Skip to Step 6 and proceed.

3. Check whether the data in Database B is consistent between the source and destination instances.

4. If the data is consistent, stop the data migration task. For more information, see Stop a data migration task.

> **Warning** The database accounts that are used for data migration have the read and write permissions. After data is migrated, you must delete the accounts or revoke the write permission to ensure security.

5. Disconnect the application from Database B.

> **Note** If the business of Database A is affected after the application is disconnected from Database B, you must disconnect the application from the source instance.

6. Log on to Database B on the source instance and execute one of the following statements to view the session information. Select the statement based on the database type. Make sure that no write operations are being performed in a new session.

> **Note** The process or session information returned by the preceding statements includes the process or session between DTS and Database B on the source instance.

MySQL SQL Server Oracle PostgreSQL Redis MongoDB

7. Create and start a data migration task in the opposite direction. The task migrates incremental data generated in Database B on the destination instance to Database B on the source instance.

   The data migration task created in this step provides a rollback solution. If an error occurs in the destination database, you can switch workloads to the source database.

> **Warning** When you configure a data migration task in the opposite direction, you must select only "Incremental Data Migration" in the "Configure Migration Types and Objects" step. Then, you must select the database or table to be migrated back to the source database.

8. Make sure that the application is disconnected from Database B on the source instance. Verify that data is consistent between Databases B on the source instance and Databases B on the destination instance. Then, switch the database services to Databases B on the destination instance and resume your business.
9. Log on to Database B on the destination instance and execute one of the following statements to view the session information. Select the statement based on the database type. Make sure that write operations are being performed in a new session.

> **Note** The process or session information returned by the preceding statements includes the process or session between DTS and Database B on the source instance.

MySQL SQL Server Oracle PostgreSQL Redis MongoDB

```
show processlist;
```

After you switch workloads to the destination database, make sure that the destination database 10 keeps running for a business period, for example, seven days.

11. Test all features related to your business and make sure that no issues are detected. Then, shut down Database B on the source instance and stop the data migration task in the opposite direction. For more information, see Stop a data migration task.

🔔 **Warning** The database accounts that are used for data migration have the read and write permissions. After data is migrated, you must delete the accounts or revoke the write permission to ensure security.

7.Typical applications

7.1. Use ApsaraDB RDS with self-managed database instances for geo-disaster recovery

This topic describes how to use ApsaraDB RDS together with self-managed database instances to implement geo-disaster recovery.

Use of an ApsaraDB RDS instance together with a self-managed database instance

You can use Data Transmission Service (DTS) to synchronize data from a self-managed database instance that is deployed in an on-premises data center or on an Elastic Compute Service (ECS) instance to an ApsaraDB RDS instance that resides in any Alibaba Cloud region in real time. If the data of the self-managed database instance is lost due to unexpected exceptions such as data center damages, you can use the data backups stored in the ApsaraDB RDS instance to restore the data.

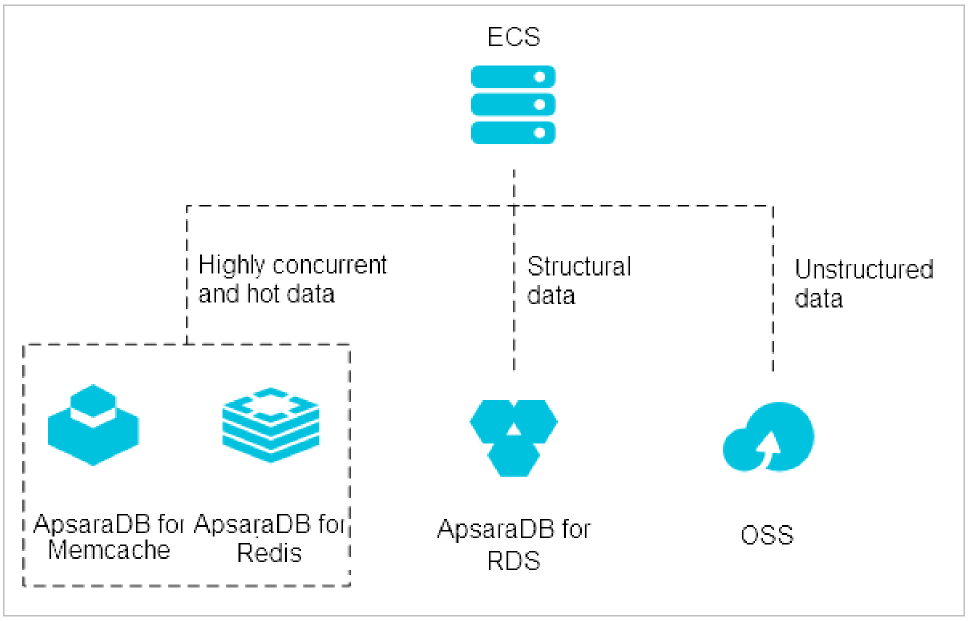
For more information, see Configure a data synchronization task.

Cross-region backup and restoration

ApsaraDB RDS for MySQL provides the cross-region backup feature. This feature allows an ApsaraDB RDS for MySQL instance to automatically synchronize the backup files stored in the RDS instance to an Object Storage Service (OSS) bucket that resides in a different region. You can use the cross-region backup files to manage and restore the RDS instance in the event of unexpected exceptions. For more information, see Enable cross-region backups for an ApsaraDB RDS for MySQL instance.

7.2. Use ApsaraDB RDS with heterogeneous databases for diversified data storage

This topic describes how to use ApsaraDB RDS with heterogeneous databases to store a wide range of data.
ApsaraDB RDS can be used with various Alibaba Cloud services, such as ApsaraDB for Redis, ApsaraDB for Memcache, and Object Storage Service (OSS), to store a wide range of data.



Persistence of cached data

You can use ApsaraDB RDS with ApsaraDB for Redis and ApsaraDB for Memcache to store data at high IOPS and low latency.

ApsaraDB for Redis and ApsaraDB for Memcache have the following advantages over ApsaraDB RDS:

- ApsaraDB for Redis and ApsaraDB for Memcache can respond to queries at higher speeds. In most cases, the latency per query is less than a few milliseconds.
- The caches of ApsaraDB for Redis and ApsaraDB for Memcache support larger numbers of queries per second (QPS).

For more information, see Cached data persistence.

Storage of data in different structures

OSS is a secure, cost-effective, and highly reliable cloud storage service that is provided by Alibaba Cloud. You can use ApsaraDB RDS together with OSS to store data in different structures.

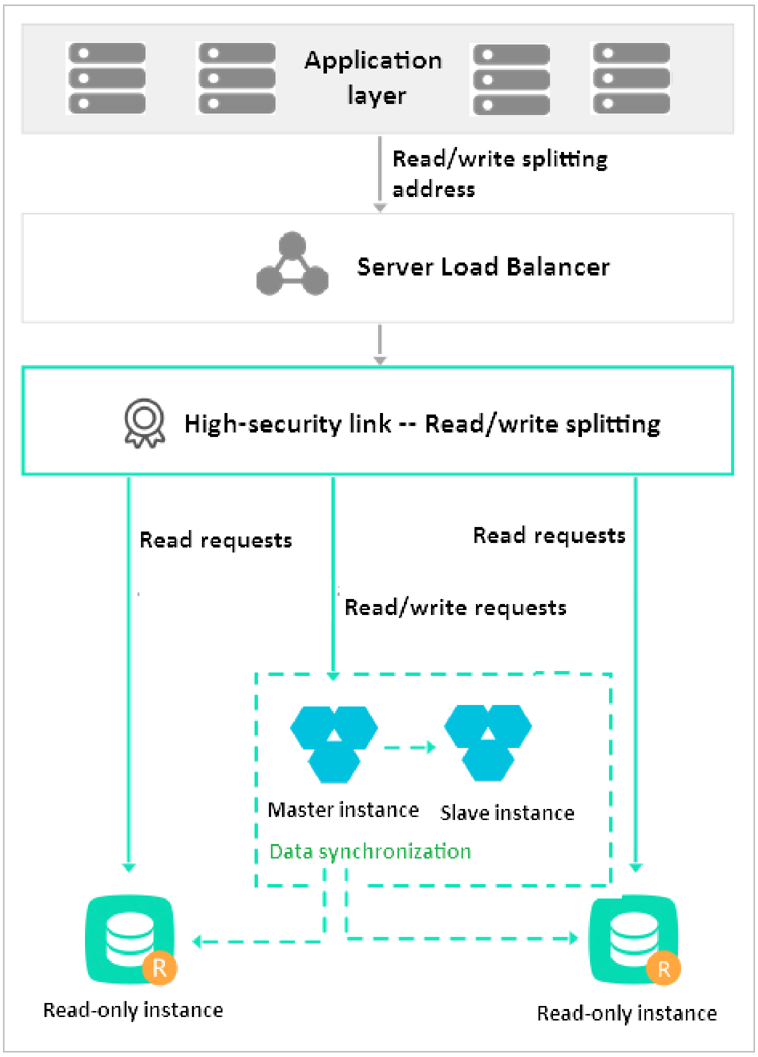
For example, you can use ApsaraDB RDS together with OSS for a forum application. This way, you can store resources such as the images from user profiles and the images from posts in OSS buckets to reduce the amount of storage that is occupied in ApsaraDB RDS.

For more information, see Use ApsaraDB RDS with OSS to store data in various structures.

7.3. Use read/write splitting to increase the processing capability of an ApsaraDB RDS instance

This topic describes the read/write splitting feature of ApsaraDB RDS. This feature allows you to create read-only RDS instances, which can offload read requests from the primary RDS instance of your database system. This feature is supported only for MySQL and SQL Server.

After you enable the read/write splitting feature, your database system generates a read/write splitting endpoint or a read-only routing endpoint. The generated endpoint can distribute read requests and write requests among the primary RDS instance and read-only RDS instances in your database system. To increase the processing capability of your database system, you need only to create read-only RDS instances. You do not need to modify the configuration data on your application.



References

- Create a read-only ApsaraDB RDS for MySQL instance
- Enable the read/write splitting feature for an ApsaraDB RDS for MySQL instance (shared proxy)
- Create a read-only ApsaraDB RDS for SQL Server instance
- Enable the read-only routing endpoint of an ApsaraDB RDS for SQL Server instance

7.4. Use ApsaraDB RDS with MaxCompute for data computing at scale

This topic describes how to use ApsaraDB RDS with MaxCompute.

MaxCompute, which is formerly known as ODPS, provides various data warehousing solutions to store large amounts of structured data. MaxCompute also provides analytics and modeling services for big data.

You can import a large amount of data from ApsaraDB RDS instances into MaxCompute by using Data Integration. Then, you can process the data by using MaxCompute.