

# Relational Database Service

## Service Overview

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# 1 What Is RDS?

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Relational Database Service (RDS) is a reliable and scalable cloud database service that is easy to manage. RDS supports the following DB engines:

- [MySQL](#)
- [PostgreSQL](#)
- [MariaDB](#)

RDS includes a comprehensive performance monitoring system, multi-level security measures, and a professional database management platform, allowing you to easily set up and scale up a relational database. On the RDS console, you can perform almost all necessary tasks and no programming is required. The console simplifies operations and reduces routine O&M workloads, so you can stay focused on application and service development.

## RDS for MySQL

MySQL is one of the world's most popular open-source relational databases. It works with the Linux, Apache, and Perl/PHP/Python to establish a LAMP model for efficient web solutions. RDS for MySQL is reliable, secure, scalable, inexpensive, and easy to manage.

- It supports various web applications and is cost-effective, preferred by small- and medium-sized enterprises.
- A web-based console provides comprehensive visualized monitoring for easier operations.
- You can flexibly scale resources based on your service requirements and pay for only what you use.

For details about the versions supported by RDS for MySQL, see [DB Engines and Versions](#).

For more information, see the official documentation at <https://dev.mysql.com/doc/>.

## RDS for PostgreSQL

PostgreSQL is an open-source object-relational database management system that focuses on extensibility and standards compliance. It is known as the most

advanced open-source database available. RDS for PostgreSQL excels in processing complex online transaction processing (OLTP) transactions and supports NoSQL (JSON, XML, or hstore) and geographic information system (GIS) data types. It has earned a reputation for reliability and data integrity, and is widely used for websites, location-based applications, and complex data object processing.

- RDS for PostgreSQL supports the postgis plugin and provides excellent spatial performance.
- RDS for PostgreSQL is a good cost-effective solution for many different scenarios. You can flexibly scale resources based on your service requirements and pay for only what you use.

For details about the versions supported by RDS for PostgreSQL, see [DB Engines and Versions](#).

For more information, see the official documentation at <https://www.postgresql.org/docs/>.

## RDS for MariaDB

MariaDB was founded by Monty, the founder of MySQL, and is one of the most popular open-source databases.

RDS for MariaDB is highly compatible with MySQL. As a powerful, high-performance, secure, and reliable database management system, it is suitable for various applications. RDS for MariaDB has the following advantages:

- It allows you to easily migrate your databases to the cloud without refactoring existing applications.
- A web-based console provides comprehensive visualized monitoring for easier operations.
- You can flexibly scale resources to meet business needs and pay for only what you use.

For details about the versions supported by RDS for MariaDB, see [DB Engines and Versions](#).

For more information, see the official documentation at <https://mariadb.org/>.

# 2 Basic Concepts

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## DB Instances

The smallest management unit of RDS is the DB instance. A DB instance is an isolated database environment on the cloud. Each DB instance runs a DB engine. For details about DB instance types, specifications, engines, versions, and statuses, see [DB Instance Description](#).

## DB Engines

RDS supports the following DB engines:

- MySQL
- PostgreSQL
- MariaDB

For details about the supported versions, see [DB Engines and Versions](#).

## DB Instance Types

There are two types of RDS DB instances: single and primary/standby. Different series support different DB engines and instance specifications.

For details about DB instance types, see [DB Instance Introduction](#) and [Function Comparison](#).

## DB Instance Classes

The DB instance class determines the compute (vCPUs) and memory capacity (memory size) of a DB instance. For details, see [DB Instance Classes](#).

## Automated Backups

When you create a DB instance, an automated backup policy is enabled by default, but after the DB instance is created, you can modify the policy if needed. RDS will automatically create full backups for DB instances based on your settings.

## Manual Backups

Manual backups are user-initiated full backups of DB instances. They are retained until you delete them manually.

## Regions and AZs

A region and availability zone (AZ) identify the location of a data center. You can create resources in a specific region and AZ.

- Regions are defined by their geographical location and network latency. Each region is completely independent, improving fault tolerance and stability. After a resource is created, its region cannot be changed.
- An AZ is a physical location using independent power supplies and networks. Faults in an AZ do not affect other AZs. A region can contain multiple AZs, which are physically isolated but interconnected through internal networks. This ensures the independence of AZs and provides low-cost and low-latency network connections.

**Figure 2-1** shows the relationship between regions and AZs.

**Figure 2-1** Regions and AZs



## Projects

Projects are used to group and isolate OpenStack resources (compute, storage, and network resources). A project can be a department or a project team. Multiple projects can be created for a single account.



# 3 Advantages

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## 3.1 Easy Management

### Quick Setup

You can create a DB instance on the management console within minutes and access RDS from an ECS to reduce the application response time and avoid paying for the traffic that would be generated by regular public access.

### Elastic Scaling

Cloud Eye monitors changes in the load on your database and storage capacity. You can flexibly scale resources accordingly and pay for only what you use.

### High Compatibility

You use RDS database engines (DB engines) the same way as you would use a native engine. RDS is compatible with existing programs and tools.

### Easy O&M

Routine RDS maintenance and management operations, including hardware and software fault handling and database patching, are easy to perform. With a web-based console, you can reboot DB instances, reset passwords, modify parameters, view error or slow query logs, and restore data. Additionally, the system helps you monitor DB instances in real time and generates alarms if errors occur. You can check DB instance information at any time, including CPU usage, IOPS, database connections, and storage space usage.

## 3.2 High Security

### Network Isolation

RDS uses Virtual Private Cloud (VPC) and network security groups to isolate and secure your DB instances. VPCs allow you to define what IP address range can

access RDS. You can configure subnets and security groups to control access to DB instances.

## Access Control

RDS controls access through the account/IAM user and security groups. When you create an RDS DB instance, an account is automatically created. To separate out specific permissions, you can create IAM users and assign permissions to them as needed. VPC security groups have rules that govern both inbound and outbound traffic for DB instances.

## Transmission Encryption

RDS uses Transport Layer Security (TLS) and Secure Sockets Layer (SSL) to encrypt transmission. You can download a Certificate Agency (CA) certificate from the RDS console and upload it when connecting to a database for authentication.

## Storage Encryption

RDS encrypts data before storing it.

## Data Deletion

When you delete an RDS DB instance, its attached disks, storage space its automated backups occupy, and all data it stores will be deleted. You can restore a deleted DB instance using a manual backup.

## Security Protection

RDS is protected by multiple layers of firewalls to defend against various malicious attacks, such as DDoS attacks and SQL injections. For security reasons, you are advised to access RDS through a private network.

# 3.3 High Reliability

## Dual-Host Hot Standby

RDS uses the hot standby architecture, in which failover upon fault occurrence takes only some seconds.

## Data Backup

RDS automatically backs up data every day and stores backup files as packages in Object Storage Service (OBS). The backup files can be stored for 732 days and can be restored with just a few clicks. You can set a custom backup policy and create manual backups at any time.

## Data Restoration

You can restore data from backups to any point in time during the backup retention period. In most scenarios, you can use backup files to restore data to a

new DB instance at any time point within 732 days. After the data is verified, data can be migrated back to the primary DB instance.

## Data Durability

RDS provides a data durability of 99.9999999%, ensuring data security and reliability and protecting your workloads from faults.

## 3.4 Comparison Between RDS and On-Premises Databases

**Table 3-1** lists the advantages of RDS over on-premises databases.

**Table 3-1** Comparison

Item	Cloud Database RDS	On-Premises Database
Service availability	For details, see <i>Elastic Cloud Server User Guide</i> .	Requires device procurement, primary/standby relationship setup, and RAID setup.
Data reliability	For details, see <i>Elastic Volume Service User Guide</i> .	Requires device procurement, primary/standby relationship setup, and RAID setup.
Database backup	Supports automated backups, manual backups, and custom backup retention periods.	Requires device procurement, setup, and maintenance.
Hardware and software investment	Supports on-demand pricing and scaling without requiring hardware and software investment.	Requires large investment in database servers.
System hosting	Not required.	Requires two servers for primary/standby DB instances.
Maintenance cost	Not required.	Requires large labor investment and professional database administrator (DBA) for maintenance.
Deployment and scaling	Supports elastic scaling, fast upgrade, and on-demand enabling.	Requires procurement, deployment, and coordination of hardware that matches original devices.

# 4 Product Series

## 4.1 DB Instance Introduction

Currently, RDS DB instances are classified into the following types:

- Single
- Primary/Standby

Different series support different DB engines and instance specifications.

**Table 4-1** DB instance types

DB Instance Type	Description	Notes	Scenarios
Single	Uses a single-node architecture. More cost-effective than the mainstream primary/standby DB instances.	If a fault occurs on a single instance, the instance cannot recover in a timely manner.	<ul style="list-style-type: none"><li>• Personal learning</li><li>• Microsites</li><li>• Development and testing environment of small- and medium-sized enterprises</li></ul>

DB Instance Type	Description	Notes	Scenarios
Primary/Standby	Uses an HA architecture. A pair of primary and standby DB instances shares the same IP address.	<ul style="list-style-type: none"> <li>When a primary instance is being created, a standby instance is provisioned synchronously to provide data redundancy. The standby instance is invisible to you after being created.</li> <li>If the primary instance fails, a failover occurs, during which database connection is interrupted. If there is a replication delay between the primary and standby instances, the failover takes an extended period of time. The client needs to be able to reconnect to the instance.</li> </ul>	<ul style="list-style-type: none"> <li>Production databases of large and medium enterprises</li> <li>Applications for the Internet, Internet of Things (IoT), retail e-commerce sales, logistics, gaming, and other industries</li> </ul>

## 4.2 Function Comparison

Single DB instances use a single-node architecture. Different from the primary/standby DB instances, a single DB instance contains only one node and has no slave node for fault recovery.

### Advantage Comparison

- Single DB instances: Different from primary/standby DB instances that have two database nodes, a single DB instance has only one node. If the node fails, the restoration will take a long time. Therefore, single DB instances are not recommended for sensitive services that have high requirements on database availability.
- Primary/Standby DB instances: use the slave database node only for failover and restoration. The slave database node does not provide services. The

performance of single DB instances is similar to or even higher than the primary/standby DB instances.

**Table 4-2** Function comparisons

Function	Single	Primary/Standby
Number of nodes	1	2
Specifications	vCPUs: a maximum of 64 Memory: a maximum of 256 GB Storage: a maximum of 4,000 GB	vCPUs: a maximum of 64 Memory: a maximum of 256 GB Storage: a maximum of 4,000 GB
Monitoring and alarms	Supported	Supported
Security group	Supported	Supported
Backups and restorations	Supported	Supported
Parameter settings	Supported	Supported
SSL	Supported	Supported
Log management	Supported	Supported
Read replicas (need to be created)	Supported	Supported
High-frequency monitoring	Supported	Supported
Primary/standby switchover or failover	Not supported	Supported
Manual primary/standby switchover	Not supported	Supported
Instance class change	Supported	Supported

# 5 DB Instance Description

## 5.1 DB Instance Types

The smallest management unit of RDS is the DB instance. A DB instance is an isolated database environment on the cloud. Each DB instance can contain multiple user-created databases, and you can access a DB instance using the same tools and applications that you use with a stand-alone DB instance. You can easily create or modify DB instances using the management console or HTTPS-compliant application programming interfaces (APIs). RDS does not have limits on the number of running DB instances. Each DB instance has a DB instance identifier.

DB instances are classified into the following types.

**Table 5-1** DB instance types

DB Instance Type	Description	Notes
Single	A single-node architecture is more cost-effective than a primary/standby DB pair.	If a fault occurs on a single instance, the instance cannot recover in a timely manner.
Primary/Standby	An HA architecture. In a primary/standby pair, each instance has the same instance class.	<ul style="list-style-type: none"> <li>When a primary instance is being created, a standby instance is provisioned synchronously to provide data redundancy. The standby instance is invisible to you after being created.</li> <li>If a failover occurs due to a primary instance failure, your database client will be disconnected briefly. You need to reconnect the client to the instance.</li> </ul>

DB Instance Type	Description	Notes
Read replica	A single-node architecture (without a standby node)	<ul style="list-style-type: none"> <li>• A read replica is a single-node instance. If the physical server hosting a read replica is faulty or database replication between the read replica and its primary instance is abnormal, it takes a long time to rebuild and restore the read replica (depending on the data volume).</li> </ul>

You can use RDS to create and manage DB instances running various DB engines.

For details about differences and function comparison between different instance types, see [DB Instance Introduction](#) and [Function Comparison](#).

## 5.2 DB Instance Storage Types

The database system is generally an important part of an IT system and has high requirements on storage I/O performance. You can select a storage type based on service demands. You cannot change the storage type after the DB instance is created.

### Description

RDS supports **Cloud SSD** (also called **Ultra-high I/O**) and **Extreme SSD** to suit different performance requirements of your workloads.

- Cloud SSD or Ultra-high I/O
  - Cloud SSDs and Ultra-high I/O drives are both cloud drives used to decouple storage from compute. The maximum throughput is 350 MB/s.
    - For RDS for MySQL instances, this storage type is normally displayed as **Cloud SSD**, but for existing instances in certain regions it is displayed as **Ultra-high I/O**.
    - For RDS for MariaDB, RDS for PostgreSQL and RDS for SQL Server instances, this storage type is displayed as **Cloud SSD**.
- Extreme SSD
  - Uses 25GE network and RDMA technologies to provide you with up to 1,000 MB/s throughput per disk and sub-millisecond latency.
    - Only RDS for MySQL, RDS for PostgreSQL, and RDS for SQL Server support extreme SSDs.



## Performance Comparison

**Table 5-2** Performance comparison

Item	Cloud SSD	Extreme SSD
I/O performance	Sub-par I/O performance due to additional network I/O overheads	Higher I/O performance than cloud SSDs
Elastic scalability	Scaling in seconds	Scaling in seconds
Maximum IOPS	50,000	128,000
Maximum throughput	350 MB/s	1000 MB/s
Read/write latency	1 ms	Sub-millisecond

## 5.3 DB Engines and Versions

**Table 5-3** lists the DB engines and versions supported by RDS.

For new applications, you are advised to use the latest major version of the DB engine, for example, MySQL 8.0. When you create a DB instance, you can select a major DB engine version only (such as MySQL 8.0). The system will automatically select an appropriate minor version (such as 8.0.17) for you. After the DB instance is created, you can view the minor version in the **DB Engine Version** column on the **Instances** page. The DB engine and version vary according to site requirements.

**Table 5-3** DB engines and versions

DB Engine	Single	Primary/Standby
MySQL	<ul style="list-style-type: none"> <li>• 8.0</li> <li>• 5.7</li> </ul>	<ul style="list-style-type: none"> <li>• 8.0</li> <li>• 5.7</li> </ul>
PostgreSQL	<ul style="list-style-type: none"> <li>• 15</li> <li>• Enhanced Edition</li> <li>• 13</li> <li>• 12</li> <li>• 11</li> <li>• 10</li> <li>• 9.6</li> <li>• 9.5</li> </ul>	<ul style="list-style-type: none"> <li>• 15</li> <li>• Enhanced Edition</li> <li>• 13</li> <li>• 12</li> <li>• 11</li> <li>• 10</li> <li>• 9.6</li> <li>• 9.5</li> </ul>
MariaDB	10.5 Minor version: 10.5.16	10.5 Minor version: 10.5.16

## 5.4 DB Instance Statuses

### DB Instance Statuses

The status of a DB instance indicates the health of the DB instance. You can use the management console or API to view the status of a DB instance.

**Table 5-4** DB instance statuses

Status	Description
Available	A DB instance is available.
Abnormal	A DB instance is abnormal.
Creating	A DB instance is being created.
Creation failed	A DB instance has failed to be created.
Switchover in progress	A standby DB instance is being switched over to the primary DB instance.
Changing type to primary/standby	A single DB instance is being changed to primary/standby DB instances.
Rebooting	A DB instance is being rebooted.
Changing port	A DB instance port is being changed.
Changing instance class	The CPU or memory of a DB instance is being modified.
Scaling up	Storage space of a DB instance is being scaled up.
Backing up	A DB instance is being backed up.
Restoring	A DB instance is in the process of being restored from a backup.
Restore failed	A DB instance fails to be restored.
Storage full	Storage space of a DB instance is full. Data cannot be written to databases.
Deleted	A DB instance has been deleted and will not be displayed in the instance list.
Parameter change. Pending reboot	A modification to a database parameter is waiting for an instance reboot before it can take effect.

# 6 DB Instance Classes

## 6.1 RDS for MySQL Instance Classes

To learn about the DB engine versions supported by RDS for MySQL, see [DB Engines and Versions](#).

**Table 6-1** Instance classes

Instance Class	vCPUs	Memory (GB)	Supported DB Engine
General-purpose	2	8	MySQL
	4	16	MySQL
	8	32	MySQL
Dedicated	2	8	MySQL
	4	16	MySQL
	4	32	MySQL
	8	32	MySQL
	8	64	MySQL
	16	64	MySQL
	16	128	MySQL
	32	128	MySQL
	64	256	MySQL
	64	512	MySQL

The DB instance specifications vary according to site requirements.

## 6.2 RDS for MariaDB Instance Classes

To learn about the DB engine versions supported by RDS for MariaDB, see [DB Engines and Versions](#).

**Table 6-2** Instance classes

Instance Class	vCPUs	Memory (GB)	Supported DB Engine
General-purpose	2	8	MariaDB
	4	16	MariaDB
	8	32	MariaDB
Dedicated	2	8	MariaDB
	4	16	MariaDB
	4	32	MariaDB
	8	32	MariaDB
	8	64	MariaDB
	16	64	MariaDB
	16	128	MariaDB
	32	128	MariaDB
	64	256	MariaDB
	64	512	MariaDB

## 6.3 RDS for PostgreSQL Instance Classes

To learn about the DB engine versions supported by RDS for PostgreSQL, see [DB Engines and Versions](#).

**Table 6-3** Instance classes

Instance Class	vCPUs	Memory (GB)	Supported DB Engine
General-purpose	2	8	PostgreSQL
	4	16	PostgreSQL
	8	32	PostgreSQL
Dedicated	2	4	PostgreSQL

Instance Class	vCPUs	Memory (GB)	Supported DB Engine
	2	8	PostgreSQL
	2	16	PostgreSQL
	4	8	PostgreSQL
	4	16	PostgreSQL
	4	32	PostgreSQL
	8	16	PostgreSQL
	8	32	PostgreSQL
	8	64	PostgreSQL
	16	32	PostgreSQL
	16	64	PostgreSQL
	16	128	PostgreSQL
	32	64	PostgreSQL
	32	128	PostgreSQL
	64	128	PostgreSQL
	64	256	PostgreSQL
	64	512	PostgreSQL

The DB instance specifications vary according to site requirements.

# 7 Typical Use Cases

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## 7.1 Reducing Read Pressure with RDS Read/Write Splitting

RDS for MySQL and RDS for PostgreSQL support read replicas to offload read traffic from primary instances.

To offload read pressure on the primary DB instance, you can create one or more read replicas in the same region as the primary instance. These read replicas can process a large number of read requests and increase application throughput. You need to separately configure connection addresses for the primary instance and each read replica in your applications so that all read requests can be sent to read replicas and write requests to the primary instance.

# 8 Constraints

## 8.1 RDS for MySQL Constraints

The following tables list the constraints designed to ensure the stability and security of RDS for MySQL.

### Naming

**Table 8-1** Naming

Item	Constraints
Instance name	<ul style="list-style-type: none"> <li>• Must be 4 to 64 characters long.</li> <li>• Must start with a letter. Only letters (case sensitive), digits, hyphens (-), and underscores (_) are allowed.</li> </ul>
Database name	<ul style="list-style-type: none"> <li>• 1 to 64 characters long</li> <li>• Only letters, digits, hyphens (-), underscores (_), and dollar signs (\$) are allowed. The total number of hyphens (-) and dollar signs (\$) cannot exceed 10. (RDS for MySQL 8.0 does not support dollar signs (\$).)</li> </ul>
Account name	<ul style="list-style-type: none"> <li>• RDS for MySQL 5.6: The account name must be 1 to 16 characters long. Only letters, digits, hyphens (-), and underscores (_) are allowed.</li> <li>• RDS for MySQL 5.7 and 8.0: The account name must be 1 to 32 characters long. Only letters, digits, hyphens (-), and underscores (_) are allowed.</li> </ul>
Backup name	<ul style="list-style-type: none"> <li>• Must be 4 to 64 characters long.</li> <li>• Must start with a letter. Only letters (case sensitive), digits, hyphens (-), and underscores (_) are allowed.</li> </ul>

Item	Constraints
Parameter template name	<ul style="list-style-type: none"> <li>1 to 64 characters long</li> <li>Only letters (case sensitive), digits, hyphens (-), underscores (_), and periods (.) are allowed.</li> </ul>

## Security

Table 8-2 Security

Item	Constraints
root permissions	<p>Only the administrator account <b>root</b> is provided on the instance creation page. For details about the supported permissions, see <a href="#">root Permissions</a>.</p> <p><b>NOTE</b> Running <b>revoke</b>, <b>drop user</b>, or <b>rename user</b> on <b>root</b> may cause service interruption. Exercise caution when running any of these statements.</p>
root password	<ul style="list-style-type: none"> <li>8 to 32 characters long</li> <li>Must contain at least three types of the following characters: uppercase letters, lowercase letters, digits, and special characters (~!@\$#%^*_-=+?,()&amp;).</li> </ul>
Database port	1024 to 65535 (excluding 12017 and 33071, which are occupied by the RDS system)
Disk encryption	If you enable disk encryption during instance creation, the disk encryption status and the key cannot be changed later.
VPC	The VPC where a DB instance is located cannot be changed after the instance is created.
Security group	<ul style="list-style-type: none"> <li>By default, you can create a maximum of 100 security groups in your cloud account.</li> <li>By default, you can add up to 50 security group rules to a security group.</li> <li>One RDS DB instance can be associated with multiple security groups, and one security group can be associated with multiple RDS DB instances.</li> <li>When creating a DB instance, you can select multiple security groups. For better network performance, you are advised to select no more than five security groups.</li> </ul>



Item	Constraints
System account	<p>To provide O&amp;M services, the system automatically creates system accounts when you create RDS for MySQL DB instances. These system accounts are unavailable to you.</p> <ul style="list-style-type: none"> <li>● <b>rdsAdmin</b>: a management account with the highest permission. It is used to query and modify instance information, rectify faults, migrate data, and restore data.</li> <li>● <b>rdsRepl</b>: a replication account, used to synchronize data from the primary instance to the standby instance or read replicas.</li> <li>● <b>rdsBackup</b>: a backup account, used for backend backup.</li> <li>● <b>rdsMetric</b>: a metric monitoring account used by watchdog to collect database status data.</li> <li>● <b>rdsProxy</b>: a database proxy account, used for authentication when the database is connected through the read/write splitting address. This account is automatically created when you enable read/write splitting.</li> </ul>
Instance parameter	<p>To ensure optimal performance of RDS, you can modify parameters in the parameter template you created as needed.</p>

## Instance Operations

**Table 8-3** Instance operations

Item	Constraints
RDS for MySQL storage engine	<p>Only the InnoDB storage engine is supported. MyISAM, FEDERATED, and MEMORY are not supported.</p>
Instance deployment	<p>ECSs where DB instances are deployed are not directly visible to you. You can only access the DB instances through IP addresses and database ports.</p>

Item	Constraints
Data migration	<p>You can migrate data from DDM, GaussDB, GaussDB(for MySQL), self-managed MySQL databases, self-managed Oracle databases, or MySQL databases built on other clouds to RDS for MySQL, or from one RDS for MySQL instance to another RDS for MySQL instance.</p> <p>Data migration tools include Data Replication Service (DRS), mysqldump, and Data Admin Service (DAS). You are advised to use DRS because it is easy to use and can complete a migration task in minutes. DRS facilitates data transfer between databases, helping you reduce DBA labor costs and hardware costs.</p>
Primary/Standby replication	<p>RDS for MySQL uses a primary/standby dual-node replication cluster. You do not need to set up replication additionally. The standby DB instance is not visible to you and therefore you cannot access it directly.</p>
Rebooting a DB instance	<p>DB instances cannot be rebooted through commands. They must be rebooted through the RDS console.</p>
Viewing backups	<p>You can download automated and manual backups for local storage. To download a backup, you can use OBS Browser+, the current browser, or the download URL.</p>
Log management	<ul style="list-style-type: none"> <li>• RDS for MySQL logging is enabled by default and cannot be disabled.</li> <li>• Binary logging is enabled for RDS for MySQL by default and uses row-based logging.</li> <li>• Read replicas do not provide binlogs.</li> </ul>
Recycle bin	<p>RDS allows you to move unsubscribed yearly/monthly DB instances and deleted pay-per-use DB instances to the recycle bin. You can rebuild a DB instance that was deleted up to 7 days ago from the recycle bin.</p>

## root Permissions

**Table 8-4** root permissions

Permission	Level	Description	Supported
Select	Table	Query permissions	Yes
Insert	Table	Insert permissions	
Update	Table	Update permissions	
Delete	Table	Delete permissions	

Permission	Level	Description	Supported
Create	Database, table, or index	Permissions of creating databases, tables, or indexes	
Drop	Database or table	Permissions of deleting databases or tables	
Reload	Server management	Permissions of running the following commands: flush-hosts, flush-logs, flush-privileges, flush-status, flush-tables, flush-threads, refresh, and reload	
Process	Server management	Permissions of viewing processes	
Grant	Database, table, or stored program	Permissions of granting access control	
References	Database or table	Foreign key operation permissions	
Index	Table	Index permissions	
Alter	Table	Permissions of altering tables, such as adding fields or indexes	
Show_db	Server management	Permissions of viewing database connections	
Create_tmp_table	Server management	Permissions of creating temporary tables	
Lock_tables	Server management	Permissions of locking tables	
Execute	Stored procedure	Permissions of executing storage procedures	
Repl_slave	Server management	Replication permissions	
Repl_client	Server management	Replication permissions	
Create_view	View	Permissions of creating views	

Permission	Level	Description	Supported
Show_view	View	Permissions of viewing views	
Create_routine	Stored procedure	Permissions of creating storage procedures	
Alter_routine	Stored procedure	Permissions of altering storage procedures	
Create_user	Server management	Permissions of creating users	
Event	Database	Event triggers	
Trigger	Database	Triggers	
Super	Server management	Permissions of killing threads	No
File	File on the server	Permissions of accessing files on database server nodes	No
Shutdown	Server management	Permissions of shutting down databases	
Create_tablespace	Server management	Permissions of creating tablespaces	

## 8.2 RDS for MariaDB Constraints

The following shows the constraints designed to ensure the stability and security of RDS for MariaDB.

### Constraints on Usage

- Only the InnoDB storage engine is supported. Transparent Data Encryption (TDE) is not supported.
- DDL statements cannot be executed during full backup.
- DML operations cannot be performed on tables in system databases such as **mysql**, **information\_schema**, and **performance\_schema**.
- Operations that require the **SUPER** or **\*\_ADMIN** permissions are not supported.

## Naming

**Table 8-5** Naming

Item	Constraints
Instance name	<ul style="list-style-type: none"> <li>• 4 to 64 characters long</li> <li>• Must start with a letter. Only letters (case sensitive), digits, hyphens (-), and underscores (_) are allowed.</li> </ul>
Database name	<ul style="list-style-type: none"> <li>• 1 to 64 characters long</li> <li>• Only letters, digits, hyphens (-), and underscores (_) are allowed. The total number of hyphens (-) cannot exceed 10.</li> </ul>
Account name	<ul style="list-style-type: none"> <li>• 1 to 32 characters long</li> <li>• Only letters, digits, hyphens (-), and underscores (_) are allowed.</li> </ul>
Backup name	<ul style="list-style-type: none"> <li>• 4 to 64 characters long</li> <li>• Must start with a letter. Only letters (case sensitive), digits, hyphens (-), and underscores (_) are allowed.</li> </ul>
Parameter template name	<ul style="list-style-type: none"> <li>• 1 to 64 characters long</li> <li>• Only letters (case sensitive), digits, hyphens (-), underscores (_), and periods (.) are allowed.</li> </ul>

## Security

**Table 8-6** Security

Item	Constraints
root permissions	<p>Only the administrator account <b>root</b> is provided on the instance creation page. For details about the supported permissions, see <a href="#">Table 8-8</a>.</p> <p><b>NOTE</b> Running <b>revoke</b>, <b>drop user</b>, or <b>rename user</b> on <b>root</b> may cause service interruption. Exercise caution when running any of these statements.</p>
root password	<ul style="list-style-type: none"> <li>• 8 to 32 characters long</li> <li>• Must contain at least three types of the following characters: uppercase letters, lowercase letters, digits, and special characters (~!@\$#%^*_-=+?,()&amp;).</li> </ul>
Database port	1024 to 65535 (excluding 12017 and 33071, which are occupied by the RDS system)
VPC	The VPC where a DB instance is located cannot be changed after the instance is created.

Item	Constraints
Security group	<ul style="list-style-type: none"> <li>● By default, you can create a maximum of 100 security groups in your cloud account.</li> <li>● By default, you can add up to 50 security group rules to a security group.</li> <li>● One RDS DB instance can be associated with multiple security groups, and one security group can be associated with multiple RDS DB instances.</li> </ul>
System account	<p>To provide O&amp;M services, the system automatically creates system accounts when you create RDS for MariaDB DB instances. These system accounts are unavailable to you.</p> <ul style="list-style-type: none"> <li>● <b>mariadb.sys</b>: used to create views.</li> <li>● <b>rdsAdmin</b>: a management account, used to query and modify instance information, rectify faults, migrate data, and restore data.</li> <li>● <b>rdsRepl</b>: a replication account, used to synchronize data from the primary instance to the standby instance or read replicas.</li> <li>● <b>rdsBackup</b>: a backup account, used for backend backup.</li> <li>● <b>rdsMetric</b>: a metric monitoring account used by watchdog to collect database status data.</li> <li>● <b>rdsProxy</b>: a database proxy account, used for authentication when the database is connected through the read/write splitting address. This account is automatically created when you enable read/write splitting.</li> </ul>
Instance parameter	<p>To ensure the optimal performance of RDS, you can modify parameters in the parameter template you created as needed.</p>

## Instance Operations

**Table 8-7** Instance operations

Item	Description
Instance deployment	<p>EC2s where DB instances are deployed are not directly visible to you. You can only access the DB instances through IP addresses and database ports.</p>

Item	Description
Data synchronization	<p>You can synchronize data from self-managed MariaDB databases or MariaDB databases built on other clouds to RDS for MariaDB, or from one RDS for MariaDB instance to another RDS for MariaDB instance.</p> <p>The common data synchronization tool is Data Replication Service (DRS).</p> <p>DRS is easy to use and can complete a synchronization task in minutes. DRS facilitates data transfer between databases, helping you reduce DBA labor costs and hardware costs.</p>
Rebooting a DB instance	DB instances cannot be rebooted through commands. They must be rebooted through the RDS console.
Viewing backups	You can download automated and manual backups for local storage. To download a backup, you can use OBS Browser+, the current browser, or the download URL.
Log management	<ul style="list-style-type: none"> <li>• RDS for MariaDB logging is enabled by default and cannot be disabled.</li> <li>• Binary logging is enabled for RDS for MariaDB by default and uses row-based logging.</li> <li>• Read replicas do not provide binlogs.</li> </ul>
Recycle bin	RDS allows you to move deleted pay-per-use DB instances to the recycle bin. You can rebuild a DB instance that was deleted up to 7 days ago from the recycle bin.

## root Permissions

**Table 8-8** root permissions

Permission	Level	Description	Supported
Select	Table	Query permissions	Yes
Insert	Table	Insert permissions	
Update	Table	Update permissions	
Delete	Table	Delete permissions	
Create	Database, table, or index	Permissions of creating databases, tables, or indexes	
Drop	Database or table	Permissions of deleting databases or tables	

Permission	Level	Description	Supported
Reload	Server management	Permissions of running the following commands: flush-hosts, flush-logs, flush-privileges, flush-status, flush-tables, flush-threads, refresh, and reload	
Process	Server management	Permissions of viewing processes	
Grant	Database, table, or stored program	Permissions of granting access control	
References	Database or table	Foreign key operation permissions	
Index	Table	Index permissions	
Alter	Table	Permissions of altering tables, such as adding fields or indexes	
Show_db	Server management	Permissions of viewing database connections	
Create_tmp_table	Server management	Permissions of creating temporary tables	
Lock_tables	Server management	Permissions of locking tables	
Execute	Stored procedure	Permissions of executing storage procedures	
Repl_slave	Server management	Replication permissions	
Repl_client	Server management	Replication permissions	
Create_view	View	Permissions of creating views	



Permission	Level	Description	Supported
Show_view	View	Permissions of viewing views	
Create_routine	Stored procedure	Permissions of creating storage procedures	
Alter_routine	Stored procedure	Permissions of altering storage procedures	
Create_user	Server management	Permissions of creating users	
Event	Database	Event triggers	
Trigger	Database	Triggers	
Super	Server management	Permissions of killing threads	No
File	File on the server	Permissions of accessing files on database server nodes	No
Shutdown	Server management	Permissions of shutting down databases	
Create_tablespace	Server management	Permissions of creating tablespaces	

## 8.3 RDS for PostgreSQL Constraints

The following tables list the constraints designed to ensure the stability and security of RDS for PostgreSQL.

### Specifications

**Table 8-9** Specifications

Item	Constraints
Storage space	<ul style="list-style-type: none"> <li>Cloud SSD: 40 GB to 4,000 GB</li> <li>Extreme SSD: 40 GB to 4,000 GB</li> </ul>
IOPS	<ul style="list-style-type: none"> <li>Cloud SSD: a maximum of 50,000</li> <li>Extreme SSD: a maximum of 128,000</li> </ul>

## Naming

**Table 8-10** Naming

Item	Constraints
Instance name	<ul style="list-style-type: none"> <li>• 4 to 64 characters long</li> <li>• Must start with a letter. Only letters (case sensitive), digits, hyphens (-), and underscores (_) are allowed.</li> </ul>
Database name	<ul style="list-style-type: none"> <li>• 1 to 63 characters long</li> <li>• Only letters, digits, and underscores (_) are allowed. It cannot start with <b>pg</b> or a digit, and must be different from RDS for PostgreSQL template database names. RDS for PostgreSQL template databases include <b>postgres</b>, <b>template0</b>, and <b>template1</b>.</li> </ul>
Account name	<ul style="list-style-type: none"> <li>• 1 to 128 characters long</li> <li>• Only letters, digits, hyphens (-), and underscores (_) are allowed. It must be different from system accounts. System accounts include <b>rdsadmin</b>, <b>rdsuser</b>, <b>rdsbackup</b>, and <b>rdsmirror</b>.</li> </ul>
Backup name	<ul style="list-style-type: none"> <li>• 4 to 64 characters long</li> <li>• Must start with a letter. Only letters (case sensitive), digits, hyphens (-), and underscores (_) are allowed.</li> </ul>
Parameter template name	<ul style="list-style-type: none"> <li>• 1 to 64 characters long</li> <li>• Only letters (case sensitive), digits, hyphens (-), underscores (_), and periods (.) are allowed.</li> </ul>

## Security

**Table 8-11** Security

Item	Constraints
root password	<ul style="list-style-type: none"> <li>• 8 to 32 characters long</li> <li>• Must contain at least three types of the following characters: uppercase letters, lowercase letters, digits, and special characters (~!@#%^*_-=+?,).</li> </ul>
Database port	2100 to 9500
Disk encryption	If you enable disk encryption during instance creation, the disk encryption status and the key cannot be changed later.
VPC	The VPC where a DB instance is located cannot be changed after the instance is created.

Item	Constraints
Security group	<ul style="list-style-type: none"> <li>• By default, you can create a maximum of 100 security groups in your cloud account.</li> <li>• By default, you can add up to 50 security group rules to a security group.</li> <li>• One RDS DB instance can be associated with multiple security groups, and one security group can be associated with multiple RDS DB instances.</li> <li>• When creating a DB instance, you can select multiple security groups. For better network performance, you are advised to select no more than five security groups.</li> </ul>

Item	Constraints
System account	<p>To provide O&amp;M services, the system automatically creates system accounts when you create RDS for PostgreSQL DB instances. These system accounts are unavailable to you.</p> <ul style="list-style-type: none"> <li>• <b>rdsAdmin</b>: a management account with the highest permission. It is used to query and modify instance information, rectify faults, migrate data, and restore data.</li> <li>• <b>pg_execute_server_program</b>: an account that allows executing programs on the database server as the user the database runs as with COPY and other functions which allow executing a server-side program.</li> <li>• <b>pg_read_all_settings</b>: an account that reads all configuration variables.</li> <li>• <b>pg_read_all_stats</b>: an account that reads all <b>pg_stat_*</b> views and uses various extension-related statistics.</li> <li>• <b>pg_stat_scan_tables</b>: an account that executes monitoring functions that may take <b>ACCESS SHARE</b> locks on tables, potentially for a long time.</li> <li>• <b>pg_signal_backend</b>: an account that signals another backend to cancel a query or terminate its session.</li> <li>• <b>pg_read_server_files</b>: an account that allows reading files from any location the database can access on the server with COPY and other file-access functions.</li> <li>• <b>pg_write_server_files</b>: an account that allows writing to files in any location the database can access on the server with COPY and other file-access functions.</li> <li>• <b>pg_monitor</b>: an account that reads and executes various monitoring views and functions. This role is a member of <b>pg_read_all_settings</b>, <b>pg_read_all_stats</b>, and <b>pg_stat_scan_tables</b>.</li> <li>• <b>rdsRepl</b>: a replication account, used to synchronize data from the primary instance to the standby instance or read replicas.</li> <li>• <b>rdsBackup</b>: a backup account, used for backend backup.</li> <li>• <b>rdsMetric</b>: a metric monitoring account used by watchdog to collect database status data.</li> </ul>
Instance parameter	<p>To ensure the optimal performance of RDS, you can modify parameters in the parameter template you created as needed.</p>

## Instance Operations

**Table 8-12** Instance operations

Item	Constraints
Instance deployment	EC2s where DB instances are deployed are not directly visible to you. You can only access the DB instances through IP addresses and database ports.
Data migration	<p>You can migrate data from self-managed PostgreSQL databases, PostgreSQL databases built on other clouds, self-managed Oracle databases, RDS for MySQL, self-managed MySQL databases, or MySQL databases built on other clouds to RDS for PostgreSQL, or from one RDS for PostgreSQL instance to another RDS for PostgreSQL instance.</p> <p>Data migration tools include Data Replication Service (DRS), pg_dump, and Data Admin Service (DAS). You are advised to use DRS because it is easy to use and can complete a migration task in minutes. DRS facilitates data transfer between databases, helping you reduce DBA labor costs and hardware costs.</p>
Primary/Standby replication	RDS for PostgreSQL uses a primary/standby dual-node replication cluster. You do not need to set up replication additionally. The standby DB instance is not visible to you and therefore you cannot access it directly.
Rebooting a DB instance	DB instances cannot be rebooted through commands. They must be rebooted through the RDS console.
Viewing backups	You can download automated and manual backups for local storage. To download a backup, you can use OBS Browser+, the current browser, or the download URL.
Log management	RDS for PostgreSQL logging is enabled by default and cannot be disabled.
Recycle bin	RDS allows you to move unsubscribed yearly/monthly DB instances and deleted pay-per-use DB instances to the recycle bin. You can rebuild a DB instance that was deleted up to 7 days ago from the recycle bin.

# 9 Billing

Huawei Cloud RDS allows you to pay only for what you use. There is no minimum fee.

## Billing Items

You will be billed for RDS DB instances, database storage, and additionally used backup storage.

**Table 9-1** RDS billing items

Billing Item	Description
Instance class	Yearly/monthly and pay-per-use billing modes are available. The billing mode of instance class is the same as that of storage for the same instance.
Database storage	
Backup storage (optional)	RDS provides free backup storage of the same size as your purchased database storage. If the backup storage usage exceeds your purchased database storage, tiered pricing starts.
Public network traffic	RDS DB instances are accessible from both private and public networks. Only the traffic from public networks is billed.

## Billing Modes

RDS provides the following two billing modes:

- **Yearly/Monthly:** This billing mode offers a larger discount than pay-per-use and is recommended for users who can predict long-term resource usage.
- **Pay-per-use (hourly):** You can pay only for the resources you actually consume.

## Specification Changes

- **Modifying RDS DB instance specifications:** You can modify RDS DB instance specifications based on service requirements. After the modifications are complete, you are charged based on the new instance specifications.
- **Scaling up storage space:** You can scale up storage space based on service requirements. After scaling the storage space, you are charged based on the new storage space. Storage space can only be scaled up, not down. The minimum increment is 10 GB.

# 10 Related Services

**Table 10-1** Related services

Service Name	Description
Elastic Cloud Server (ECS)	Enables you to access RDS DB instances through an internal network. You can then access applications faster and you do not need to pay for public network traffic.
Virtual Private Cloud (VPC)	Isolates your networks and controls access to your RDS DB instances.
Object Storage Service (OBS)	Stores automated and manual backups of your RDS DB instances.
Cloud Eye	Monitors RDS resources in real time and reports alarms and warnings promptly.
Cloud Trace Service (CTS)	Records operations on cloud service resources for query, audit, and backtrack.
Distributed Database Middleware (DDM)	Connects to multiple RDS for MySQL DB instances and allows you to access distributed databases.
Data Replication Service (DRS)	Smoothly migrates databases to the cloud.



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# A Change History

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Released On	Description
2022-09-30	This issue is the first official release.