

**ALIBABA CLOUD**

# **Alibaba Cloud**

## **ApsaraDB for RDS Product Introduction**

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 **Alibaba Cloud**

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# Document conventions

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

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# 1. What is ApsaraDB for RDS?

ApsaraDB for RDS is a stable, reliable, and scalable online database service. Based on Apsara Distributed File System and high-performance SSD storage of Alibaba Cloud, ApsaraDB for RDS supports the MySQL, SQL Server, PostgreSQL, PPAS (highly compatible with Oracle), and MariaDB database engines. It provides a portfolio of solutions for disaster recovery, backup, restoration, monitoring, and migration to facilitate database operations and maintenance.

## Why ApsaraDB for RDS

ApsaraDB for RDS allows you to quickly build a stable and reliable database system. It has the following advantages compared with user-created databases:

- Cost-effective and easy to use. You can choose flexible billing methods, change database configurations on demand, and obtain an out-of-the-box database service.
- High performance, including suggestions on parameter and SQL query optimization.
- High-availability architecture and multiple disaster recovery solutions.
- High security. Various preventive measures are used to protect data.

ApsaraDB for RDS has significant advantages in cost-effectiveness, availability, reliability, ease of use, and performance. Its cost is one third of the expense to build databases on ECS instances and one tenth of the expense to build databases on physical servers.

## Pricing

For more information, see [Pricing, billing items, and billing methods](#).

## Learning path

For more information about the concepts, basic operations, and advanced operations of ApsaraDB for RDS, visit [RDS Learning Path](#).

## Methods to manage RDS instances

You can use one of the following methods to manage RDS instances, such as creating instances, databases, and accounts, and configuring the network:

- ApsaraDB for RDS console: The console provides an easy-to-use web-based GUI. For more information, go to the [ApsaraDB for RDS console](#).
- CLI: All operations that are available in the ApsaraDB for RDS console can be performed by using the CLI. For more information, see [What is Alibaba Cloud CLI?](#)
- SDK: All operations that are available in the ApsaraDB for RDS console can be performed by using SDKs. For more information, see [SDK reference](#).
- API: All operations that are available in the ApsaraDB for RDS console can be performed by calling API operations. For more information, see [API overview](#).
- Quick start: This guide describes how to create and connect to an RDS instance. For more information, see [General workflow to use ApsaraDB for RDS](#).

After you create an RDS instance, you can connect to it by using one of the following methods:

- DMS: You can [log on to an RDS instance by using DMS](#) and develop databases on a web-based GUI.
- Client: ApsaraDB for RDS is compatible with native database protocols. This allows you to

connect to an RDS instance by using common database clients, such as MySQL Workbench, SQL Server Management Studio (SSMS), and pgAdmin.

## Features

ApsaraDB for RDS supports a wide range of features, such as instance management (including instance creation and specification changes), backup and restoration, log audit, and monitoring and alerting. For more information, see the following topics:

- [Features of ApsaraDB RDS for MySQL](#)
- [Features of ApsaraDB RDS for SQL Server](#)
- [Features of ApsaraDB RDS for PostgreSQL](#)
- [Features of ApsaraDB RDS for PPAS](#)
- [Features of ApsaraDB RDS for MariaDB TX](#)

## FAQ and troubleshooting

When you use ApsaraDB for RDS, you may encounter issues such as high CPU utilization and instance locking. For more information, see [Q&A](#) and [FAQ & Troubleshooting](#).

## Terms

Before you create an ApsaraDB for RDS instance, we recommend that you understand the following terms:

- **Instance:** a virtualized database server on which you can create and manage multiple databases.
- **Region:** a physical data center where the physical servers that host instances reside. In most cases, we recommend that you create RDS and ECS instances in the same region to ensure fast and stable access.
- **Zone:** a physical location that uses independent power supplies and networks in a region. There are no substantial differences between zones in the same region.
- **Database engine:** ApsaraDB for RDS supports the following database engines: MySQL, SQL Server, PostgreSQL, PPAS (highly compatible with Oracle), and MariaDB. For more information, see [Database engines](#).
- **Network type:** You can create an RDS instance in the classic network or a virtual private cloud (VPC). VPC is an isolated network environment on Alibaba Cloud. It is more secure than the classic network. We recommend that you select the VPC network type.
- **Edition:** ApsaraDB for RDS provides the Basic Edition, High-availability Edition, and Cluster Edition. For more information, see [ApsaraDB for RDS edition overview](#).
- **Instance family:** ApsaraDB for RDS provides the shared, general-purpose, and dedicated instance families. For more information, see [Instance families](#).
- **Storage type:** ApsaraDB for RDS supports local SSD, standard SSD, and ESSD. For more information, see [Storage types](#).

## Related services

- **Elastic Compute Service (ECS):** ECS provides high-performance cloud servers. If your ECS and RDS instances reside in the same region, they can communicate over the internal network. This ensures the optimal performance of the RDS instances. ECS and RDS instances are used in combination in a typical service access architecture.

- **ApsaraDB for Redis:** ApsaraDB for Redis is an in-memory database service that persists data on disks. You can use ECS, ApsaraDB for RDS, and ApsaraDB for Redis in combination to handle a large number of read requests and reduce response time.
- **ApsaraDB for MongoDB:** ApsaraDB for MongoDB is a stable, reliable, and scalable database service that is compatible with the MongoDB protocol. You can store structured data in ApsaraDB for RDS and unstructured data in ApsaraDB for MongoDB to meet diverse business needs.
- **MaxCompute:** MaxCompute (previously known as ODPS) is a fully hosted data warehousing solution that can quickly process terabytes or petabytes of data. MaxCompute supports comprehensive data import solutions and various classic distributed computing models. These solutions and models allow you to import data from RDS instances into MaxCompute and process large amounts of data.
- **Data Transmission Service (DTS):** DTS allows you to migrate data from on-premises databases to RDS instances and migrate data between RDS instances for disaster recovery.
- **Object Storage Service (OSS):** OSS is a secure, cost-effective, and highly reliable cloud storage solution. It allows you to store large amounts of data on the cloud.

## 2. Benefits

### 2.1. Benefits of ApsaraDB for RDS

As a comprehensive database-oriented service, ApsaraDB for Relational Database Service (known as RDS) provides RDS instances in three editions (Basic, High-availability, Cluster (AlwaysOn), and Enterprise) that meet the full scope of database requirements. RDS instances can be operated in the same way as a self-hosted database, which means no additional learning curve is presented.

#### Flexible billing

RDS provides two billing methods:

- Pay-as-you-go

For short-term requirements, create pay-as-you-go instances (billed by hour), which can be released at any time to save costs.

- Subscription

For long-term requirements, create subscription instances, which are more cost-effective. Furthermore, the longer the subscription, the higher the discount.

For more information, see [Pricing, billable items, and billing methods](#).

#### On-demand changes to instance specifications

You can upgrade or downgrade instance specifications as needed to make sure that you are only using the resources you require. For more information, see [Change the specifications of an ApsaraDB RDS instance](#) and [Specification change fees](#).

#### Easy deployment

- You do not need to purchase database server hardware or software.
- You can create RDS instances through the [RDS console](#) or [APIs](#) within a few minutes.

#### Compatible with existing programs and tools

- You can operate RDS databases in the way you operate your own database engines.
- RDS supports commonly used data import and export tools so that you can seamlessly migrate your database to the cloud. Additionally, Alibaba Cloud provides [DTS](#) that interoperates with RDS to simplify the operation.

#### Simple O&M

- Alibaba Cloud guarantees the normal operation of RDS through routine maintenance and management, such as hardware/software fault processing and database patch upgrades.
- RDS provides database management through the [RDS console](#) or [APIs](#), including adding, deleting, restarting, backing up, and restoring instances.

#### Get started

- [Quick Start](#)
- [Learning path](#)



## Related topics

- [RDS选型指南](#)
- [High performance](#)
- [High security](#)
- [High availability and disaster tolerance](#)
- [Competitive advantages of ApsaraDB for RDS instances over user-created databases](#)

## 2.2. High performance

ApsaraDB for RDS provides high-performance DB instances that feature parameter optimization, SQL optimization, high-speed access thanks to the high-end hardware used.

### Parameter optimization

Alibaba Cloud has top database experts who have optimized RDS parameters based on many years of experience in production. DBAs continuously optimize RDS throughout its life cycle to make sure that RDS is running with optimal performance.

### SQL optimization

Based on your application scenario, RDS locates low-efficiency SQL statements and offers recommendations for optimization.

### High-end hardware

All servers used by RDS have been evaluated by multiple parties to guarantee exceptional performance and stability.

### High-speed access

When RDS is used with ECS, ECS can access RDS through the intranet. This shortens response time and reduces Internet traffic.

### Performance white papers

- [RDS MySQL](#)
- [RDS SQL Server](#)

### Get started

- [Quick Start](#)
- [Learning path](#)
- [Competitive advantages of ApsaraDB for RDS instances over user-created databases](#)
- [Precautions on comparing ECS user-created databases and ApsaraDB for RDS instances in terms of performance](#)
- [Benefits of ApsaraDB for RDS](#)
- [High security](#)
- [High availability and disaster tolerance](#)

## Related topics

- [RDS选型指南](#)
- [Competitive advantages of ApsaraDB for RDS instances over user-created databases](#)
- [Precautions on comparing ECS user-created databases and ApsaraDB for RDS instances in terms of performance](#)
- [Benefits of ApsaraDB for RDS](#)
- [High availability and disaster tolerance](#)
- [High security](#)

## 2.3. High availability and disaster tolerance



ApsaraDB for RDS supports multiple disaster tolerance plans to protect you from data loss.

### Backup and recovery

- RDS supports automatic and manual backups. You can set the automatic backup frequency or manually create backups at any time. For more information, see [Backup and recovery](#).
- RDS supports data recovery by time or backup set. You can restore data of any point in time within the log retention period to a new instance, verify the data, and then transfer the data to the original instance. For more information, see [Backup and recovery](#).

### Disaster tolerance

Series	Disaster tolerance
Basic Edition	<ul style="list-style-type: none"> <li>• Data backups are stored as multiple copies on OSS or distributed cloud disks to prevent data loss. This applies to all RDS series.</li> <li>• The Basic Edition consists of a single node without a slave node as hot backup. Therefore, if fault occurs, the restoration time is long. Choose Basic Edition if you do not require high availability.</li> </ul>

Series	Disaster tolerance
High-availability Edition	<p>The High-availability Edition adopts the high-availability architecture with one master node and one slave node. It is applicable to over 80% of scenarios. If the master node fails, a switchover occurs within seconds without affecting your applications. If the slave node fails, a new slave node is automatically generated to ensure high availability.</p> <ul style="list-style-type: none"> <li>• <b>Single-zone instance:</b> The master and slave nodes are in the same zone but on different physical servers. All cabinets, air conditioners, electricity, and networks in the zone are redundant to ensure high availability.</li> <li>• <b>Multi-zone instance:</b> The master and slave nodes are in different zones of an area, providing area-level disaster tolerance ability.</li> </ul> <div data-bbox="384 651 1385 954" style="background-color: #e6f2ff; padding: 10px;"> <p> <b>Note</b></p> <ul style="list-style-type: none"> <li>• You can switch between single-zone instances and multi-zone instances. For details, see <a href="#">Migrate an ApsaraDB RDS MySQL instance across zones</a>.</li> <li>• When the slave node malfunctions, RDS instantly backs up the master node. When the backup process is about to finish, a global lock is generated and the master node runs in the read-only status for 5 seconds or less.</li> </ul> </div>
Cluster Edition	<p>Based on the AlwaysOn technology, it provides one master node, one slave node, and up to seven read-only nodes that horizontally scale read capabilities. The slave and read-only nodes synchronize data from the master node. The Cluster Edition provides the same availability as the High-availability Edition. Besides, the read-only nodes can be deployed in zones different from those of the master and slave nodes.</p> <div data-bbox="384 1469 1385 1854" style="background-color: #e6f2ff; padding: 10px;"> <p> <b>Note</b></p> <ul style="list-style-type: none"> <li>• Only RDS SQL Server 2017 provides the Cluster Edition. For more information, see <a href="#">Cluster Edition (AlwaysOn Edition)</a>.</li> <li>• For information about RDS MySQL read-only instances, see <a href="#">Overview of ApsaraDB RDS for MySQL read-only instances</a>.</li> <li>• For information about RDS PostgreSQL read-only instances, see <a href="#">Overview of read-only ApsaraDB RDS for PostgreSQL instances</a>.</li> <li>• For information about RDS PPAS read-only nodes, see <a href="#">Overview of read-only ApsaraDB RDS for PPAS instances</a>.</li> </ul> </div>

Series	Disaster tolerance
Enterprise Edition	<ul style="list-style-type: none"> <li>RDS MySQL 5.7 supports the Enterprise Edition.</li> <li>In the Enterprise Edition, your DB system has one master instance and two slave instances. Data is replicated between the master and slave instances through multiple replicas to guarantee data consistency and finance-level reliability. The Enterprise Edition can be used by large-sized enterprises to build core production databases.</li> <li>In the Enterprise Edition, the master and slave instances are located in three different zones in the same region.</li> </ul>

## Get started

- [Quick Start](#)
- [Learning path](#)

## Related topics

- [RDS选型指南](#)
- [Build a high availability architecture](#)
- [Benefits of ApsaraDB for RDS](#)
- [High performance](#)
- [High security](#)
- [Competitive advantages of ApsaraDB for RDS instances over user-created databases](#)

## 2.4. High security

ApsaraDB for RDS provides a complete set of security measures to guarantee data security.

### DDoS protection

If DDoS attacks are detected, the security system of RDS enables traffic cleaning first. If traffic cleaning fails or the attacks reach the blackhole threshold, blackhole filtering is triggered. For more information, see [Attack protection](#).

 **Note** We recommend that you access RDS instances through the intranet to prevent DDoS attacks.

### Access control

- IP addresses can access your RDS instance only after you add them to the whitelists of the RDS instance. IP addresses that are not in the whitelists cannot access the RDS instance.
- Each account can only view and operate its own databases.

For more information, see [access control](#).

### System security

- RDS is protected by multiple firewall layers that block various network attacks to guarantee data security.

- Direct logon to the RDS server is not allowed. Only the ports required by certain database services are open.
- The RDS server cannot initiate an external connection. It can only accept access requests.

For more information, see [Network isolation](#).

## Professional security team

Aliabab Cloud security team is responsible for guaranteeing the security of RDS.

## Get started

- [Quick Start](#)
- [Learning path](#)

## Related topics

- [RDS选型指南](#)
- [Benefits of ApsaraDB for RDS](#)
- [High performance](#)
- [High availability and disaster tolerance](#)
- [Competitive advantages of ApsaraDB for RDS instances over user-created databases](#)

# 2.5. Competitive advantages of ApsaraDB for RDS instances over user-created databases

ApsaraDB for RDS provides highly available, reliable, secure, and scalable cloud-hosted databases that are comparable to commercial databases, but at prices approximately two thirds lower than user-created databases hosted on ECS instances and nine tenths lower than user-created databases deployed on third-party database servers.

## Price comparison between ApsaraDB for RDS instances and user-created databases

Item	ApsaraDB for RDS instance	User-created database on ECS instance	User-created database on third-party database server

Item	ApsaraDB for RDS instance	User-created database on ECS instance	User-created database on third-party database server
Hardware, spare parts, and accessories	<p>You only need to pay for the RDS instances that you create. For example, an RDS instance that provides two CPUs, 4 GB of memory, and 100 GB of storage to deliver up to 6,800 IOPS costs USD 1,000 per year.</p>	<p>You must purchase at least two ECS instances to establish a primary/secondary architecture. Two ECS instances that each provide two CPUs, 4 GB of memory, and 100 GB of storage to deliver up to 6,800 IOPS costs USD 900 per year.</p>	<ul style="list-style-type: none"> <li>You must purchase at least two database servers. A database server that delivers up to 6,800 IOPS costs about USD 1,200.</li> <li>You must purchase one internal switch to connect to the frontend Web server. A 1U non-hosted switch costs about USD 140.</li> <li>You must purchase spare parts and accessories for future repairs and replacements. These spare parts and accessories cost at least 30% of the initial hardware fee.</li> <li>The total fee is about USD 3,300 based on the following formula: <math>(1200 \times 2 + 140) \times 130\% \approx 3300</math>.</li> </ul> <p>If the hardware, spare parts, and accessories are depreciated in three years, the annual fee is USD 1,100 based on the following formula: <math>3300/3 = 1100</math>.</p>
Data center hosting	<p>The cloud service provider pays the hosting fee. No fees are required from you.</p>	<p>The cloud service provider pays the hosting fee. No fees are required from you.</p>	<p>Every 1U of rack space costs USD 400 per year. The annual fee required to host two 1U database servers and one 1U internal switch is USD 1,200 based on the following formula: <math>400 \times 3 = 1200</math>.</p>
Bandwidth	<ul style="list-style-type: none"> <li>ECS and RDS instances in the same region can communicate over an internal network free of charge.</li> <li>ECS and RDS instances in different regions can communicate over the Internet, but you must pay for the Internet traffic that you consume. For more information, see <a href="#">ApsaraDB for RDS pricing</a>.</li> </ul>	<ul style="list-style-type: none"> <li>ECS instances in the same region can communicate over an internal network free of charge.</li> <li>ECS instances in different regions can communicate over the Internet, but you must pay for the Internet traffic that you consume. For more information, see <a href="#">Billing methods of public bandwidth</a>.</li> </ul>	<p>Your databases can communicate only over an internal network. You do not need to pay for Internet traffic, because you do not consume Internet traffic.</p>

Item	ApsaraDB for RDS instance	User-created database on ECS instance	User-created database on third-party database server
Database O&M	The cloud service provider pays the O&M fee. No fees are required from you.	The monthly salary of a junior database administrator is USD 5,000 or more. If a database project accounts for 30% of the total workload that a junior database administrator needs to complete, the annual fee required to maintain that database project is at least USD 18,000 based on the following formula: $5000 \times 12 \times 30\% = 18000$ .	The monthly salary of a junior database administrator is USD 5,000 or more. If a database project accounts for 30% of the total workload that a junior database administrator needs to complete, the annual fee required to maintain that database project is at least USD 18,000 based on the following formula: $5000 \times 12 \times 30\% = 18000$ .
Total	USD 1,000/year	USD 18,900/year	USD 20,300/year

## Advantages of ApsaraDB RDS for MySQL instances over user-created databases

Item	ApsaraDB RDS for MySQL instance	User-created database on ECS instance	User-created database on third-party database server
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Item	ApsaraDB RDS for MySQL instance	User-created database on ECS instance	User-created database on third-party database server
Cost-effectiveness	<ul style="list-style-type: none"> <li>Scalable resources are provided.</li> <li>AliSQL offers various features to improve user experience.</li> <li>A free tier of backup space that is equal to half the total storage capacity of your ApsaraDB RDS for MySQL instance is offered to store backups.</li> <li>Internet traffic is free of charge.</li> <li>User-provided domain names are supported free of charge.</li> <li>Updates to ApsaraDB RDS for MySQL are released by Alibaba Cloud sequentially with MySQL.</li> </ul>	<ul style="list-style-type: none"> <li>Scalable resources are provided.</li> <li>The open source MySQL edition is used, and no optimization is provided.</li> <li>You must pay for the backup space that you use.</li> <li>You must pay for the Internet traffic that you consume.</li> </ul>	<ul style="list-style-type: none"> <li>The initial investment cost is high.</li> <li>The open source MySQL edition is used, and no optimization is provided.</li> <li>You must allocate independent backup resources, which incur high costs.</li> <li>You must pay for the Internet traffic that you consume and the domain names that you use, which are charged at high rates.</li> </ul>



Item	ApsaraDB RDS for MySQL instance	User-created database on ECS instance	User-created database on third-party database server
Availability	<ul style="list-style-type: none"> <li>In the Basic Edition, your database system takes about 15 minutes to complete a failover.</li> <li>In the High-availability and Cluster Editions, your database system takes 30 seconds or less to complete a failover.</li> <li>You can create <b>read-only instances</b> to balance loads in your database system.</li> <li><b>Read/write splitting</b> allows your database system to distribute read and write requests by using a unified read/write endpoint.</li> <li>The use of analytic instances to analyze data of various businesses is under development.</li> </ul>	<ul style="list-style-type: none"> <li>In the Basic Edition, your databases take about 30 minutes to complete a failover.</li> <li>You must purchase additional software or hardware to set up a high availability architecture.</li> <li>You must purchase additional software or hardware to balance loads among your databases.</li> <li>If you want to analyze data, you must create analytic databases, which is time-consuming and costly.</li> </ul>	<ul style="list-style-type: none"> <li>Your databases are standalone. If a database server breaks down, repairs can take hours to weeks.</li> <li>You must purchase additional software or hardware to set up a high availability architecture.</li> <li>You must purchase additional software or hardware to balance loads among your databases.</li> <li>If you want to analyze data, you must create analytic databases, which is time-consuming and costly.</li> </ul>
Reliability	<ul style="list-style-type: none"> <li>Automated replication of data between primary and secondary instances, data backup, and log backup are provided to ensure high data reliability.</li> <li>The Enterprise Edition with MySQL 5.7 supports MySQL Group Replication (MGR) and delivers an RPO of 0 and a Recovery Time Objective (RTO) of less than 1 minute.</li> </ul>	<ul style="list-style-type: none"> <li>Your databases are highly available only if they are deployed in an optimal high availability architecture.</li> <li>To deliver an RPO of 0, you must purchase independent research and development (R&amp;D) services, which incur high costs.</li> </ul>	<ul style="list-style-type: none"> <li>Data reliability is moderate and varies based on the corruption probability of individual disks.</li> <li>To deliver an RPO of 0, you must purchase independent R&amp;D services, which incur high costs.</li> </ul>

Item	ApsaraDB RDS for MySQL instance	User-created database on ECS instance	User-created database on third-party database server
Usability	<ul style="list-style-type: none"> <li>• <b>Automated backup and restoration</b> support streaming backup, point in time recovery (PITR), and backup and restoration at the database level to minimize impacts on the performance of your database system.</li> <li>• <b>Automated monitoring and alerting</b> allow you to monitor all of the supported instance- and database-level performance metrics at a second-level frequency, and send alerts to you by using Short Message Service (SMS), email, and DingTalk. In addition, you are offered a free tier of SMS alerts based on your purchase details.</li> <li>• You can <b>update the kernel version with a few clicks</b>.</li> </ul>	<ul style="list-style-type: none"> <li>• Automated backup is not supported. You must purchase or configure the streaming backup and PITR features. This incurs high costs.</li> <li>• You must purchase an independent monitoring system and configure it in the CloudMonitor console.</li> <li>• Usability faces technical challenges.</li> <li>• Version updates are costly.</li> </ul>	<ul style="list-style-type: none"> <li>• Automated backup is not supported. You must purchase or configure the streaming backup and PITR features. This incurs high costs.</li> <li>• You must purchase or configure an independent monitoring system, which incurs high costs.</li> <li>• Remote data centers are costly and difficult to set up.</li> <li>• Version updates are costly.</li> </ul>

Item	ApsaraDB RDS for MySQL instance	User-created database on ECS instance	User-created database on third-party database server
Performance	<ul style="list-style-type: none"> <li>ApsaraDB RDS for MySQL instances with local SSDs excel in performance.</li> <li>ApsaraDB RDS for MySQL instances perform better with enhanced SSDs than with local or standard SSDs.</li> <li>You can create read-only instances to increase performance while balancing loads.</li> <li>The <b>SQL explorer feature</b> meets your business requirements in most of the database monitoring and performance optimization scenarios.</li> </ul>	<ul style="list-style-type: none"> <li>If you choose local disks, data reliability is reduced. However, if you choose cloud disks, you must plan a disk architecture, which incurs high costs.</li> <li>If the same enhanced SSDs are used, ECS-hosted user-created MySQL databases are inferior to ApsaraDB RDS for MySQL instances.</li> <li>The Cluster Edition is difficult to deploy due to high consultancy and maintenance costs.</li> <li>You must recruit experienced database administrators. This incurs high costs.</li> </ul>	<ul style="list-style-type: none"> <li>Database servers are updated at lower speeds than cloud computing hardware. Therefore, user-created databases on these servers are inferior to ApsaraDB RDS for MySQL instances.</li> <li>Computing-storage separation is difficult and can cost millions of US dollars on advanced storage media.</li> <li>The Cluster Edition is difficult to deploy due to high consultancy and maintenance costs.</li> <li>You must recruit experienced database administrators. This incurs high costs.</li> </ul>
Security	<ul style="list-style-type: none"> <li>The <b>whitelist, security group, and Virtual Private Cloud (VPC)</b> isolation mechanisms are provided.</li> <li>The <b>link encryption and disk encryption</b> protection mechanisms are provided, with Bring Your Own Keys (BYOKs) supported for various storage media.</li> <li>The <b>SQL explorer</b> audit mechanism is provided.</li> </ul>	<ul style="list-style-type: none"> <li>The whitelist, security group, and VPC isolation mechanisms are provided.</li> <li>You must purchase or configure the link encryption and disk encryption protection mechanisms. This incurs high consultancy costs due to difficulties in the rotation of BYOKs.</li> <li>SQL audit is difficult because you must store SQL logs separately.</li> </ul>	<ul style="list-style-type: none"> <li>You must configure the whitelist and VPC isolation mechanisms. This incurs high consultancy costs.</li> <li>You must purchase or configure the link encryption and disk encryption protection mechanisms. This incurs high consultancy costs due to difficulties in the rotation of BYOKs.</li> <li>SQL audit is difficult because you must store SQL logs separately.</li> </ul>

## Advantages of ApsaraDB RDS for SQL Server instances over user-created databases

Item	ApsaraDB RDS for SQL Server instance	User-created database on ECS instance	User-created database on third-party database server
Cost-effectiveness	<ul style="list-style-type: none"> <li>Scalable resources are provided.</li> <li>SQL Server Web editions are offered to increase cost-effectiveness.</li> <li>A free tier of backup space that is equal to half the total storage capacity of your ApsaraDB RDS for SQL Server instance is offered to store backups.</li> <li>Internet traffic is free of charge.</li> </ul>	<ul style="list-style-type: none"> <li>Scalable resources are provided.</li> <li>No SQL Server Web editions are offered.</li> <li>You must pay for the backup space that you use.</li> <li>You must pay for the Internet traffic that you consume.</li> </ul>	<ul style="list-style-type: none"> <li>The initial investment cost is high.</li> <li>No SQL Server Web editions are offered.</li> <li>You must allocate independent backup resources, which incur high costs.</li> <li>You must pay for the Internet traffic that you consume and the domain names that you use, which are charged at high rates.</li> </ul>
Availability	<ul style="list-style-type: none"> <li>In the Basic Edition, your database system takes about 15 minutes to complete a failover.</li> <li>In the High-availability and Cluster Editions, your database system takes 30 seconds or less to complete a failover.</li> <li>In the Cluster Edition, you can create read-only instances to balance loads in your database system.</li> <li>In the Cluster Edition, you can use read/write splitting to distribute read and write requests by using a unified read/write splitting endpoint.</li> </ul>	<ul style="list-style-type: none"> <li>In the Basic Edition, your databases take about 30 minutes to complete a failover.</li> <li>You must purchase additional software or hardware to set up a high availability architecture.</li> <li>You must purchase additional software or hardware to balance loads among your databases.</li> </ul>	<ul style="list-style-type: none"> <li>Your databases are standalone. If a database server breaks down, repairs can take hours to weeks.</li> <li>You must purchase additional software or hardware to set up a high availability architecture.</li> <li>You must purchase additional software or hardware to balance loads among your databases.</li> </ul>

Item	ApsaraDB RDS for SQL Server instance	User-created database on ECS instance	User-created database on third-party database server
Reliability	<ul style="list-style-type: none"> <li>Automated replication of data between primary and secondary instances, data backup, and log backup are provided to ensure high data reliability.</li> <li>The Cluster Edition delivers an RPO of 0.</li> </ul>	<ul style="list-style-type: none"> <li>Your databases are highly available only if they are deployed in an optimal high availability architecture.</li> <li>To deliver an RPO of 0, you must purchase independent R&amp;D services, which incur high costs.</li> </ul>	<ul style="list-style-type: none"> <li>Data reliability is moderate and varies based on the corruption probability of individual disks.</li> <li>To deliver an RPO of 0, you must purchase independent R&amp;D services, which incur high costs.</li> </ul>
Usability	<ul style="list-style-type: none"> <li><b>Automated backup and restoration</b> support streaming backup, PITR, and backup and restoration at the database level to minimize impacts on the performance of your database system.</li> <li><b>Automated monitoring and alerting</b> allow you to monitor all of the supported instance- and database-level performance metrics at a second-level frequency, and send alerts to you by using SMS, email, and DingTalk. In addition, you are offered a free tier of SMS alerts based on your purchase details.</li> <li>Remote disaster recovery is under development.</li> </ul>	<ul style="list-style-type: none"> <li>Automated backup is not supported. You must purchase or configure the streaming backup and PITR features. This incurs high costs.</li> <li>You must purchase an independent monitoring system and configure it in the CloudMonitor console.</li> <li>Usability faces technical challenges.</li> </ul>	<ul style="list-style-type: none"> <li>Automated backup is not supported. You must purchase or configure the streaming backup and PITR features. This incurs high costs.</li> <li>You must purchase or configure an independent monitoring system, which incurs high costs.</li> <li>Remote data centers are costly and difficult to set up.</li> </ul>

Item	ApsaraDB RDS for SQL Server instance	User-created database on ECS instance	User-created database on third-party database server
Performance	<ul style="list-style-type: none"> <li>Instances that run SQL Server 2008 R2 with local SSDs excel in performance. Instances that run SQL Server 201x support next-generation computing-storage separation, which benefits from hardware dividends.</li> <li>ApsaraDB RDS for SQL Server instances perform better with enhanced SSDs than with local or standard SSDs.</li> <li>You can create read-only instances to increase performance while balancing loads.</li> </ul>	<ul style="list-style-type: none"> <li>If you choose local disks, data reliability is reduced. However, if you choose cloud disks, you must plan a disk architecture, which incurs high costs.</li> <li>If the same enhanced SSDs are used, ECS-hosted user-created SQL Server databases are inferior to ApsaraDB RDS for SQL Server instances.</li> <li>The Cluster Edition is difficult to deploy due to high consultancy and maintenance costs.</li> <li>You must recruit experienced database administrators. This incurs high costs.</li> </ul>	<ul style="list-style-type: none"> <li>Database servers are updated at lower speeds than cloud computing hardware. Therefore, user-created databases on these servers are inferior to ApsaraDB RDS for MySQL instances.</li> <li>Computing-storage separation is difficult and can cost millions of US dollars on advanced storage media.</li> <li>The Cluster Edition is difficult to deploy due to high consultancy and maintenance costs.</li> <li>You must recruit experienced database administrators. This incurs high costs.</li> </ul>
Security	<ul style="list-style-type: none"> <li>The <b>whitelist</b> and <b>VPC</b> isolation mechanisms are provided.</li> <li>The <b>link encryption</b> and <b>disk encryption</b> protection mechanisms are provided.</li> <li>Updates to ApsaraDB RDS for SQL Server are released by Alibaba Cloud sequentially with the security updates released by Microsoft.</li> </ul>	<ul style="list-style-type: none"> <li>The whitelist, security group, and VPC isolation mechanisms are provided.</li> <li>You must purchase or configure the link encryption and disk encryption protection mechanisms. This incurs high consultancy costs.</li> <li>SQL audit is difficult because you must store SQL logs separately.</li> </ul>	<ul style="list-style-type: none"> <li>You must configure the whitelist and VPC isolation mechanisms. This incurs high consultancy costs.</li> <li>You must purchase or configure the link encryption and disk encryption protection mechanisms. This incurs high consultancy costs.</li> <li>SQL audit is difficult because you must store SQL logs separately.</li> </ul>

Item	ApsaraDB RDS for SQL Server instance	User-created database on ECS instance	User-created database on third-party database server
Legal liability	<ul style="list-style-type: none"> <li>ApsaraDB RDS for SQL Server is provided with a valid license. You do not need to bear any legal liabilities.</li> <li>User-provided licenses will be supported soon. These licenses reduce your overall expenditure.</li> </ul>	You must purchase a valid license.	You must purchase a valid license. Otherwise, you may bear legal liabilities.

## Advantages of ApsaraDB RDS for PostgreSQL over user-created databases

Item	ApsaraDB RDS for PostgreSQL instance	User-created database on ECS instance	User-created database on third-party database server
Cost-effectiveness	<ul style="list-style-type: none"> <li>Scalable resources are provided.</li> <li>The kernel is optimized to provide various features that increase user experience.</li> <li><b>A free tier of backup space</b> that is equal to half the total storage capacity of your ApsaraDB RDS for PostgreSQL instance is offered to store backups.</li> <li>Internet traffic is free of charge.</li> <li>User-provided domain names are supported free of charge.</li> <li>Updates to ApsaraDB RDS for PostgreSQL are released by Alibaba Cloud sequentially with the latest PostgreSQL releases.</li> </ul>	<ul style="list-style-type: none"> <li>Scalable resources are provided.</li> <li>The open source PostgreSQL edition is used, and no optimization is provided.</li> <li>You must pay for the backup space that you use.</li> <li>You must pay for the Internet traffic that you consume.</li> </ul>	<ul style="list-style-type: none"> <li>The initial investment cost is high.</li> <li>The open source PostgreSQL edition is used, and no optimization is provided.</li> <li>You must allocate independent backup resources, which incur high costs.</li> <li>You must pay for the Internet traffic that you consume and the domain names that you use, which are charged at high rates.</li> </ul>

Item	ApsaraDB RDS for PostgreSQL instance	User-created database on ECS instance	User-created database on third-party database server
Availability	<ul style="list-style-type: none"> <li>In the Basic Edition, your database system takes about 15 minutes to complete a failover.</li> <li>In the High-availability Edition, your database system takes 30 seconds or less to complete a failover.</li> <li>You can create <b>read-only instances</b> to balance loads in your database system.</li> </ul>	<ul style="list-style-type: none"> <li>In the Basic Edition, your databases take about 30 minutes to complete a failover.</li> <li>You must purchase additional software or hardware to set up a high availability architecture.</li> <li>You must purchase additional software or hardware to balance loads among your databases.</li> </ul>	<ul style="list-style-type: none"> <li>Your databases are standalone. If a database server breaks down, repairs can take hours to weeks.</li> <li>You must purchase additional software or hardware to set up a high availability architecture.</li> <li>You must purchase additional software or hardware to balance loads among your databases.</li> </ul>
Reliability	<ul style="list-style-type: none"> <li>Automated replication of data between primary and secondary instances, data backup, and log backup are provided to ensure high data reliability.</li> <li>RPO customization allows you to specify an RPO of 0.</li> </ul>	<ul style="list-style-type: none"> <li>Your databases are highly available only if they are deployed in an optimal high availability architecture.</li> <li>To deliver an RPO of 0, you must purchase independent R&amp;D services, which incur high costs.</li> </ul>	<ul style="list-style-type: none"> <li>Data reliability is moderate and varies based on the corruption probability of individual disks.</li> <li>To deliver an RPO of 0, you must purchase independent R&amp;D services, which incur high costs.</li> </ul>



Item	ApsaraDB RDS for PostgreSQL instance	User-created database on ECS instance	User-created database on third-party database server
Usability	<ul style="list-style-type: none"> <li>• <b>Automated backup and restoration</b> support streaming backup, PITR, and backup and restoration at the database level to minimize impacts on the performance of your database system.</li> <li>• <b>Automated monitoring and alerting</b> allow you to monitor all of the supported instance- and database-level performance metrics, and send alerts to you by using SMS, email, and DingTalk. In addition, you are offered a free tier of SMS alerts based on your purchase details.</li> </ul>	<ul style="list-style-type: none"> <li>• Automated backup is not supported. You must purchase or configure the streaming backup and PITR features. This incurs high costs.</li> <li>• You must purchase an independent monitoring system and configure it in the CloudMonitor console.</li> </ul>	<ul style="list-style-type: none"> <li>• Automated backup is not supported. You must purchase or configure the streaming backup and PITR features. This incurs high costs.</li> <li>• You must purchase or configure an independent monitoring system, which incurs high costs.</li> </ul>
Performance	<ul style="list-style-type: none"> <li>• ApsaraDB RDS for PostgreSQL instances with local SSDs excel in performance.</li> <li>• ApsaraDB RDS for PostgreSQL instances perform better with enhanced SSDs than with local or standard SSDs.</li> <li>• You can create read-only instances to increase performance while balancing loads.</li> <li>• <b>The SQL explorer feature</b> meets your business requirements in most of the database monitoring and performance optimization scenarios.</li> </ul>	<ul style="list-style-type: none"> <li>• If you choose local disks, data reliability is reduced. However, if you choose cloud disks, you must plan a disk architecture, which incurs high costs.</li> <li>• If the same enhanced SSDs are used, ECS-hosted user-created PostgreSQL databases are inferior to ApsaraDB RDS for PostgreSQL instances.</li> <li>• You must recruit experienced database administrators. This incurs high costs.</li> </ul>	<ul style="list-style-type: none"> <li>• Database servers are updated at lower speeds than cloud computing hardware. Therefore, user-created databases on these servers are inferior to ApsaraDB RDS for PostgreSQL instances.</li> <li>• Computing-storage separation is difficult and can cost millions of US dollars on advanced storage media.</li> <li>• You must recruit experienced database administrators. This incurs high costs.</li> </ul>

Item	ApsaraDB RDS for PostgreSQL instance	User-created database on ECS instance	User-created database on third-party database server
Security	<ul style="list-style-type: none"> <li>The <b>whitelist, security group, and VPC</b> isolation mechanisms are provided.</li> <li>The <b>link encryption and disk encryption</b> protection mechanisms are provided.</li> <li>The SQL audit mechanism is provided. For more information, see <b>Enable and disable SQL Audit (database audit) on an ApsaraDB RDS for PostgreSQL instance.</b></li> </ul>	<ul style="list-style-type: none"> <li>The <b>whitelist, security group, and VPC</b> isolation mechanisms are provided.</li> <li>You must purchase or configure the link encryption protection mechanism.</li> <li>SQL audit is difficult because you must store SQL logs separately.</li> </ul>	<ul style="list-style-type: none"> <li>You must configure the <b>whitelist and VPC</b> isolation mechanisms. This incurs high consultancy costs.</li> <li>You must purchase or configure the link encryption protection mechanism.</li> <li>SQL audit is difficult because you must store SQL logs separately.</li> </ul>

### Get started with ApsaraDB for RDS

- [Quick start](#)
- [RDS Learning Path](#)

For more information, see the following topics:

- [Quick Start](#)
- [Benefits of ApsaraDB for RDS](#)
- [High performance](#)
- [High security](#)
- [High availability and disaster tolerance](#)

## 3. Product editions

### 3.1. Overview of ApsaraDB for RDS editions

ApsaraDB for RDS offers four editions: Basic Edition, High-availability Edition, Cluster Edition, and Enterprise Edition. This topic describes how to view the edition of an RDS instance and provides a comparison between various editions.

For more information about the instance families that are supported by each edition, see [Instance families](#).

#### View the edition of an RDS instance

Log on to the ApsaraDB for RDS console, find the target RDS instance, and navigate to the **Basic Information** page. Then, you can view the edition of the RDS instance.

The screenshot displays the 'Basic Information' page for an RDS instance. The 'Instance Type & Edition' field is highlighted with a red box, indicating the instance is a 'Primary Instance (High-availability)'. Other visible fields include Instance ID, Instance Name, Region and Zone (SingaporeZoneC), Internal Endpoint, Public Endpoint, Storage Type (Local SSD), and Read/Write Splitting Endpoint.

#### Comparison between various editions

Edition	Description	Scenario
Basic Edition	Your database system consists of only one primary instance, and computing is separated from storage. This edition is cost-effective. For more information, see <a href="#">Basic Edition</a> .	<ul style="list-style-type: none"> <li>• Personal learning</li> <li>• Small-sized websites</li> <li>• Development and test environments for small- and medium-sized enterprises</li> </ul>
High-availability Edition	Your database system consists of one primary instance and one secondary instance. These instances work in the high-availability architecture. This edition is suitable for more than 80% of the actual business scenarios.	<ul style="list-style-type: none"> <li>• Production databases for large- and medium-sized enterprises</li> <li>• Databases in industries such as the Internet, Internet of Things (IoT), online retail, logistics, and gaming</li> </ul>

Edition	Description	Scenario
Cluster Edition	<p>Your database system consists of one primary instance, one secondary instance, and up to seven read-only instances that are used to increase the read capability. This edition is developed based on the AlwaysOn technology. It is supported only for SQL Server. By default, when you purchase the Cluster Edition, your database system consists of only a primary instance and a secondary instance. You must purchase read-only instances later based on your business requirements.</p> <p>For more information, see <a href="#">Cluster Edition (AlwaysOn Edition)</a>.</p>	<p>Production databases for large- and medium-sized enterprises, such as online retailers, automobile companies, and ERP providers</p>
Enterprise Edition	<p>Your database system consists of one primary instance and two secondary instances. Data is synchronously replicated from the primary instance to the secondary instances. This allows you to ensure data consistency and finance-level reliability.</p> <p>For more information, see <a href="#">Enterprise Edition</a>.</p>	<ul style="list-style-type: none"> <li>• Important databases in the finance, securities, and insurance industries that require high data security</li> <li>• Important production databases for large-sized enterprises</li> </ul>


## Features supported by various editions

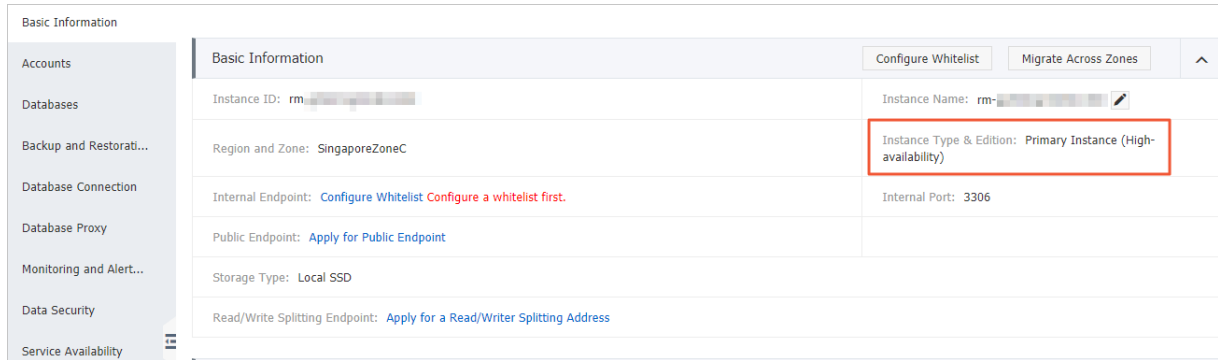
### Features

## 3.2. Basic Edition

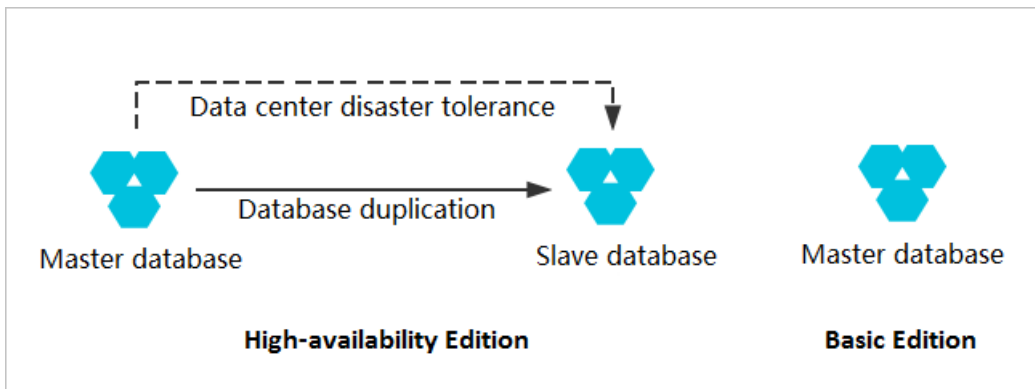
ApsaraDB for RDS offers four editions: Basic Edition, High-availability Edition, Cluster Edition, and Enterprise Edition. This topic describes the Basic Edition.

In the Basic Edition, your database system consists of only one primary instance, and computing is separated from storage. This edition is cost-effective.

 **Note** In the Basic Edition, the primary instance does not have a secondary instance as its hot backup. If the primary instance breaks down unexpectedly, is executing specification changes, or is updating its version, your database service may be unavailable for a long period of time. If you have strict requirements for service availability, we recommend that you select the High-availability, Cluster, or Enterprise Edition. Alternatively, you can upgrade the edition of your RDS instance from Basic to High-availability. For more information, see [Upgrade to High-availability Edition](#).



The following figure shows a comparison between the Basic and High-availability Editions.



## Benefits

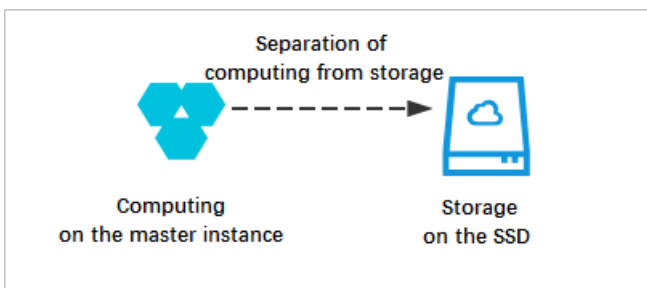
### Performance

No extra performance overhead is incurred because your primary instance does not need to replicate data to a secondary instance. This makes the Basic Edition perform better than the High-availability and Enterprise Editions with the same instance configuration.

### Reliability

- Computing is separated from storage. This prevents data losses in the event of failures on compute nodes.

**Note** If you set the Backup Frequency parameter to Every 30 Minutes, you can restore data to a point in time within the last 30 minutes in the event of SSD damages or other unexpected failures. This applies only when you are running SQL Server with the Basic Edition. For more information, see [Back up an ApsaraDB RDS for SQL Server instance](#).



- The ultra-large Apsara distributed storage system of Alibaba Cloud is used to maintain multiple data copies that help ensure reliability.

## Cost-effectiveness

Only one primary instance is deployed. This reduces the overall database cost by 50% compared with the High-availability Edition.

## Features

The Basic Edition supports basic features such as IP address whitelist, monitoring and alerting, and backup and restoration. The Basic Edition does not support the following features:

- [Primary/secondary switchover](#)
- [Cross-zone migration](#)
- [Log management](#)
- [Read-only instances](#)

For more information about the features that are supported by the Basic Edition, see [Overview of ApsaraDB for RDS editions](#).

## Scenarios

- **Small-sized websites and applications**  
The cost-effective Basic Edition relieves the need for database operation and maintenance (O&M). You can focus only on your business development.
- **Personal learning**  
If you are new with databases, you can use the Basic Edition for testing and learning.
- **Research and development (R&D)**  
The Basic Edition allows you to create and release RDS instances anytime and anywhere. This greatly improves R&D efficiency.

## Get started with the Basic Edition

The Basic Edition is supported for MySQL, SQL Server, and PostgreSQL. For more information about creating and connecting to an RDS instance that is running the Basic Edition, see the following topics:

- [Create an ApsaraDB RDS for MySQL instance](#)
- [Create an ApsaraDB RDS for SQL Server instance](#)
- [Create an ApsaraDB RDS for PostgreSQL instance](#)

## Upgrade to High-availability Edition

- If your RDS instance is running MySQL 5.7, you can upgrade its edition from Basic to High-availability by changing the instance specifications. For more information, see [Change the specifications of an ApsaraDB RDS for MySQL instance](#).
- If your RDS instance is running SQL Server, you can upgrade its edition from Basic to High-availability in the ApsaraDB for RDS console. For more information, see [Upgrade from Basic Edition to High-availability Edition](#).

## FAQ

- [Why does it take a long time to upgrade the Basic Edition of my RDS instance?](#)

In the Basic Edition, your database system consists of only one primary instance. When you upgrade the Basic Edition, your database system checks whether the physical server that hosts the primary instance provides sufficient resources. If the physical server does not provide sufficient resources, your database system replicates data to another suitable physical server and switches your database service to that physical server. This process takes a long time. In certain circumstances, your database service may be unavailable for more than 30 minutes. We recommend that you select the **High-availability Edition**, **三节点企业版**, or **Cluster Edition (AlwaysOn Edition)**. These editions use the high-availability architecture, which allows you to replicate data from a secondary instance without incurring interruptions to your database service.

- Why does the Basic Edition provide only a small number of features? And which features are supported by the Basic Edition?

The Basic Edition provides only one primary instance. Features that are supported by the High-availability Edition, Cluster Edition, and Enterprise Edition are unavailable in the Basic Edition. The Basic Edition is suitable only in a small number of business scenarios. For more information about the features that are supported by the Basic Edition, see the following topics:


- [Features of ApsaraDB RDS for MySQL](#)
- [Features of ApsaraDB RDS for SQL Server](#)
- [Features of ApsaraDB RDS for PostgreSQL](#)

 **Note** The Basic Edition is not supported for PPAS and MariaDB.

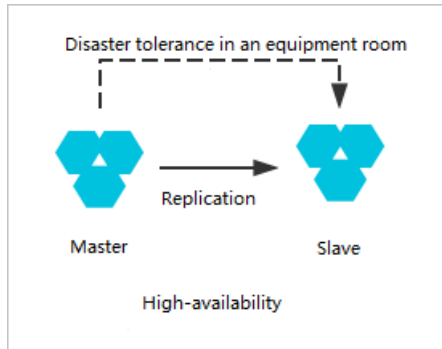
### 3.3. High-availability Edition

ApsaraDB for RDS offers four editions: Basic Edition, High-availability Edition, Cluster Edition, and Enterprise Edition. This topic describes the High-availability Edition.

The High-availability Edition is a widely used edition that allows for one primary instance and one secondary instance. These instances work in the high-availability architecture. This edition is suitable for more than 80% of the actual business scenarios, such as the Internet, Internet of Things (IoT), online retail, logistics, and gaming.

Basic Information		Configure Whitelist	Migrate Across Zones	^
Instance ID: rm- <span style="background-color: #ccc; color: #ccc;">XXXXXXXXXX</span>	Instance Name: <span style="background-color: #ccc; color: #ccc;">XXXXXXXXXX</span> 			
Region and Zone: China (Hangzhou)ZoneF	<b>Instance Type &amp; Edition: Primary Instance (High-availability)</b>			
Internal Endpoint: <a href="#">Configure Whitelist to view the internal IP address.</a>	Internal Port: 3306			
Public Endpoint: <a href="#">Apply for Public Endpoint</a>				
Storage Type: Local SSD				
Read/Write Splitting Address: <a href="#">Apply for a Read/Writer Splitting Address</a>				
<b>Note:</b> Use the preceding connection string to connect to the instance. You need to change the VIP in the connection string to the one used in your environment.				

### Topology



## Benefits

### High availability

In the High-availability Edition, data is synchronously replicated from the primary instance to the secondary instance. If the primary instance breaks down unexpectedly, your database system automatically fails over to the secondary instance.

You can deploy the primary and secondary instances in the same zone or in different zones.

**Note** If the secondary instance breaks down unexpectedly, the primary instance must back up data on itself in real time. When such a backup is about to complete, a global lock is triggered by the `FLUSH TABLE WITH READ LOCK (FTWRL)` statement. The global lock is held for up to 5 seconds. You can only read data from the primary instance when the global lock is held.

### Comprehensive functionality

The High-availability Edition supports all of the features that are provided by ApsaraDB for RDS. These features include automatic scaling, backup and restoration, performance optimization, read/write splitting, and SQL explorer. The SQL explorer feature allows you to query logs about the SQL statements executed. This makes database access traceable and ensures the security of important data.

## Limits

You must deploy the primary and secondary instances in the same region for stable performance.

## Upgrade to High-availability Edition

In the Basic Edition, the primary instance does not have a secondary instance as its hot backup. If the primary instance breaks down unexpectedly, is executing specification changes, or is updating its version, it may remain unavailable for a long period of time. If you have strict requirements for service availability, we recommend that you select the High-availability Edition.

In addition to creating an RDS instance designed to run the High-availability Edition, you can upgrade the edition of a created RDS instance from Basic to High-availability. After the upgrade, the new RDS instance inherits the lifecycle of the original RDS instance. Therefore, you do not need to migrate data or reclaim the original RDS instance.



**Note**

- If your RDS instance is running MySQL 5.7, you can upgrade its edition from Basic to High-availability by changing the instance specifications. For more information, see [Change the specifications of an ApsaraDB RDS for MySQL instance](#).
- If your RDS instance is running SQL Server, you can upgrade its edition from Basic to High-availability in the ApsaraDB for RDS console. For more information, see [Upgrade from Basic Edition to High-availability Edition](#).

## FAQ

- Can I access a secondary instance?

No, you cannot access a secondary instance. You can only access a primary instance. A secondary instance serves only as a backup and does not allow external access.

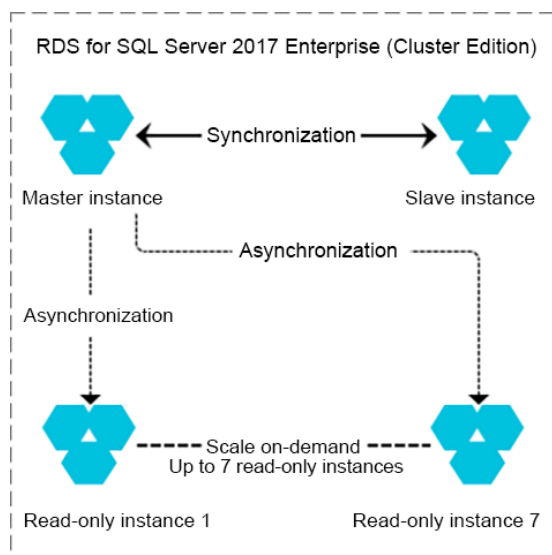
- Can I downgrade the edition of my RDS instance from High-availability to Basic?

No, you cannot downgrade the edition of your RDS instance from High-availability to Basic. You can create an RDS instance that runs the Basic Edition, migrate the data of your RDS instance to the new RDS instance, and then release your RDS instance. For more information, see [Migrate data between RDS instances](#).

## 3.4. Cluster Edition (AlwaysOn Edition)

Currently, only RDS SQL Server 2017 Enterprise Edition supports the Cluster Edition (AlwaysOn Edition), which is based on the native AlwaysOn technology of SQL Server. The Cluster Edition separates computing from storage, and supports read/write splitting. By default, each read-only instance in the cluster also provides an independent intranet connection string.


The following figure shows the architecture of the Cluster Edition.



### Advantages

- Horizontally scalable read capability

You can add read-only instances to linearly increase the cluster's read capability. Additionally, the specifications of read-only instances can be different from those of the master instance. Therefore, you can add read-only instances with high specifications to achieve even better read capability.

 **Note** By default, read-only instances do not support high availability. To implement high availability of read-only instances, at least two read-only instances are required.

- **Flexibly controllable costs**

In the Cluster Edition, you can create read-only instances of common specifications, which are cost-effective options. Additional read-only instances can process more read requests so that the overall system configuration is optimized.

In addition, specifications of read-only instances can be lower than those of the master instance. Therefore, you can choose cost-effective read-only instance with lower specifications for background applications, such as intelligent analysis applications.

In the near future, the Cluster Edition will also support the maximum performance mode, which can be used during peak hours to implement asynchronous replication between the master and slave nodes, so that the cluster performance is maximized.

## Scenarios

- **Use read-only instances to handle read requests during peak traffic hours**

For example, to prepare for peak trading events like Double 11 Festival, online retail enterprises can buy additional read-only instances with high specifications to process the majority of read requests while implementing read/write splitting and traffic control on the service level. In this way, the enterprises can handle several times the amount of usual traffic.

- **Assign analysis tasks to read-only instances**

Enterprises generally have demand for intelligent data analysis. An independent read-only instance dedicated for data analysis can reduce the probability of the master instance becoming unresponsive, improve concurrency, and reduce the impact on core service queries, thereby ensuring service stability.

# 4. Product specifications

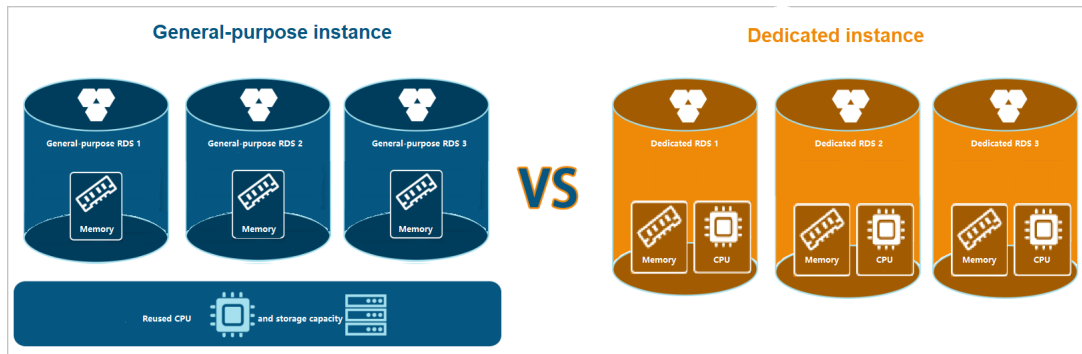
## 4.1. Instance families

This topic describes the three instance families of ApsaraDB for RDS. They are shared, general-purpose, and dedicated instance families.

### Instance families

Family	Description	Scenario
Shared instance family (Not supported)	<ul style="list-style-type: none"> <li>A shared instance exclusively occupies the memory resources allocated to it, but shares CPU and storage resources with the other shared instances that are deployed on the same server.</li> <li>CPU resources are highly reused among shared instances that are deployed on the same server to maximize CPU cost-effectiveness.</li> <li>Shared instances may compete for resources.</li> </ul>	<ul style="list-style-type: none"> <li>Users pursue cost-effectiveness.</li> <li>Users prefer high availability to stability.</li> </ul>
General-purpose instance family	<ul style="list-style-type: none"> <li>A general-purpose instance exclusively occupies the memory resources allocated to it, but shares CPU and storage resources with the other general-purpose instances that are deployed on the same server.</li> <li>CPU resources are moderately reused among general-purpose instances that are deployed on the same server to increase CPU cost-effectiveness.</li> <li>The storage capacity of a general-purpose instance is independent of CPU cores and memory capacity. You can flexibly configure the storage capacity based on your business requirements.</li> </ul>	Users are less concerned with performance and stability.
Dedicated instance family	<p>A dedicated instance exclusively occupies the CPU and memory resources allocated to it. Its performance remains stable for a long term and is not affected by the other instances that are deployed on the same server.</p> <p>The top configuration of this instance family is dedicated host. A dedicated host instance occupies all of the resources on the server where it resides.</p>	Users are engaged in database-centered businesses, such as finance, e-commerce, governmental affairs, and large- and medium-sized Internet services.

The following figure shows the differences between the three instance families.



### Cost-effectiveness comparison

The three instance families each have some unique performance metrics and therefore cannot be directly compared. The following table is a comparison of cost-effectiveness between the three instance families by using instance types with similar specifications as examples. This comparison provides a basis for you to make purchase decisions.

Family	CPU cores and memory capacity	Storage capacity	Maximum number of connections	Maximum IOPS	Monthly subscription fee
Shared or general-purpose instance family	4 CPU cores, 16 GB	500 GB	4,000	7,000	USD 320
Dedicated instance family	4 CPU cores, 32 GB	500 GB	5,000	9,000	USD 550

Based on the preceding comparison, a dedicated instance costs 70% more but provides twice as much memory capacity, 25% more connections, and 28% higher input/output operations per second (IOPS) than a shared or general-purpose instance. The dedicated instance family delivers high cost-effectiveness if it is used in suitable business scenarios.

### Instance types


For more information about instance types and their specifications, such as the number of CPU cores, memory capacity, storage capacity, maximum number of connections, and IOPS, see [Primary instance types](#).

### Pricing

For more information about the price of each instance type, visit [ApsaraDB RDS for MySQL](#).

### Change the instance family

You can change the family and specifications of your RDS instance based on your business requirements.

 **Note** You cannot directly upgrade your RDS instance from the shared instance family to the general-purpose or dedicated family. You must create an RDS instance that belongs to the general-purpose or dedicated instance family. Then, you can use Alibaba Cloud Data Transmission Service (DTS) to migrate the data of your RDS instance to the new RDS instance. For more information, see [Data migration solutions](#).

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 SQL Server instance](#)
- [Change the specifications of an ApsaraDB RDS for PostgreSQL instance](#)
- [Change the specifications of an ApsaraDB RDS for PPAS instance](#)
- [Change the specifications of an ApsaraDB RDS for MariaDB instance](#)

## FAQ

Why does an entry-level instance outperform an enterprise-level instance? An entry-level instance belongs to the shared or general-purpose instance family, whereas an enterprise-level instance belongs to the dedicated instance family.

Therefore, an entry-level instance supports a larger maximum number of connections and delivers higher IOPS than an enterprise-level instance when the same CPU and memory specifications are used. However, an enterprise-level instance is more stable because it exclusively occupies the CPU and memory resources allocated to it. For more information, see [Overview](#).

## 4.2. Primary instance types


This topic provides an overview of primary ApsaraDB for RDS instance types.

ApsaraDB for RDS allows you to create [read-only instances](#) to scale the read capability of your database system. For more information about read-only instance types, see [Read-only instance types](#).

After you select a primary instance type, you can [create an instance](#) and perform subsequent operations.

## IOPS


The maximum input/output operations per second (IOPS) of an RDS instance equipped with local SSDs varies based on the instance type. The maximum IOPS of an RDS instance equipped with standard SSDs or enhanced SSDs (ESSDs) varies based on the instance type and the storage capacity. The following table provides formulas to calculate the maximum IOPS of an RDS instance equipped with standard SSDs or ESSDs.

 **Note** If the throughput of an RDS instance equipped with standard SSDs or ESSDs reaches the upper limit, the IOPS of the RDS instance is also affected.

Storage type	ESSD			Standard SSD
Performance level	PL3	PL2	PL1	N/A
Maximum IOPS (Storage capacity measured in GB)	$\min\{1800 + 50 \times \text{Storage capacity}, 1000000\}$	$\min\{1800 + 50 \times \text{Storage capacity}, 100000\}$	$\min\{1800 + 50 \times \text{Storage capacity}, 50000\}$	$\min\{1800 + 30 \times \text{Storage capacity}, 25000\}$

## Throughput

ApsaraDB for RDS instances equipped with standard SSDs or ESSDs can be deployed on the sixth-generation ECS instances. In this situation, the maximum throughput of an RDS instance equipped with standard SSDs or ESSDs varies based on the ECS instance type. For more information, see [Storage I/O performance of the new generation of enterprise-level instance families](#).

 **Note** If the IOPS of an RDS instance equipped with standard SSDs or ESSDs reaches the upper limit, the throughput of the RDS instance is also affected.

## Primary ApsaraDB RDS for MySQL instances

RDS edition	MySQL version	Instance family	Instance type	CPU and memory	Maximum connections	Maximum IOPS	Storage capacity
Basic Edition	5.7 and 8.0	General-purpose instance	mysql.n1.micro.1	1 core, 1 GB	2,000	See <a href="#">IOPS</a> .	20 GB to 6,000 GB
			mysql.n2.small.1	1 core, 2 GB	2,000		
			mysql.n2.medium.1	2 cores, 4 GB	4,000		
			mysql.n4.medium.1	2 cores, 8 GB	6,000		
			mysql.n4.large.1	4 cores, 16 GB	8,000		
			mysql.n4.xlarge.1	8 cores, 32 GB	10,000		
			rds.mysql.t1.small	1 core, 1 GB	300	600	
			rds.mysql.s1.small	1 core, 2 GB	600	1,000	

RDS edition	MySQL version	Instance family	Instance type	CPU and memory	Maximum connections	Maximum IOPS	Storage capacity
High-availability Edition	5.5, 5.6, 5.7, and 8.0	General-purpose instance	rds.mysqls2.large	2 cores, 4 GB	1,200	2,000	5 GB to 2,000 GB
			rds.mysqls2.xlarge	2 cores, 8 GB	2,000	4,000	
			rds.mysqls3.large	4 cores, 8 GB	2,000	5,000	
			rds.mysqlm1.medium	4 cores, 16 GB	4,000	7,000	
			rds.mysqlc1.large	8 cores, 16 GB	4,000	8,000	
			rds.mysqlc1.xlarge	8 cores, 32 GB	8,000	12,000	
			rds.mysqlc2.xlarge	16 cores, 64 GB	16,000	14,000	5 GB to 3,000 GB
			rds.mysqlc2.xlp2	16 cores, 96 GB	24,000	16,000	
		rds.mysqlc2.2xlarge	16 cores, 128 GB	32,000	16,000		
		Dedicated instance (with a large memory capacity)	mysql.x8.medium.2	2 cores, 16 GB	2,500	4,500	50 GB to 1,000 GB
			mysql.x8.large.2	4 cores, 32 GB	5,000	9,000	50 GB to 1,000 GB
			mysql.x8.xlarge.2	8 cores, 64 GB	10,000	18,000	500 GB to 3,000 GB
			mysql.x8.2xlarge.2	16 cores, 128 GB	20,000	36,000	500 GB to 3,000 GB
			mysql.x8.4xlarge.2	32 cores, 256 GB	40,000	72,000	1,000 GB to 6,000 GB
mysql.x8.8xlarge.2	64 cores, 512 GB		80,000	144,000	1,000 GB to 6,000 GB		

RDS edition	MySQL version	Instance family	Instance type	CPU and memory	Maximum connections	Maximum IOPS	Storage capacity
		Dedicated instance (with a large number of CPU cores)	mysql.x4.large.2	4 cores, 16 GB	2,500	4,500	50 GB to 2,000 GB
			mysql.x4.xlarge.2	8 cores, 32 GB	5,000	9,000	500 GB to 3,000 GB
			mysql.x4.2xlarge.2	16 cores, 64 GB	10,000	18,000	500 GB to 3,000 GB
			mysql.x4.4xlarge.2	32 cores, 128 GB	20,000	36,000	1,000 GB to 6,000 GB
		Dedicated host	rds.mysql.st.h43	60 cores, 470 GB	100,000	120,000	3,000 GB, 4,000 GB, 5,000 GB, or 6,000 GB
			rds.mysql.st.v52	90 cores, 720 GB	100,000	140,000	1,000 GB to 6,000 GB
		General-purpose instance	mysql.n2.small.25	1 core, 2 GB	600	1,000	5 GB to 2,000 GB
			mysql.n2.medium.25	2 cores, 4 GB	1,200	2,000	5 GB to 2,000 GB
			mysql.n4.medium.25	2 cores, 8 GB	2,000	4,000	5 GB to 2,000 GB
			mysql.n2.large.25	4 cores, 8 GB	2,000	5,000	5 GB to 2,000 GB
			mysql.n4.large.25	4 cores, 16 GB	4,000	7,000	5 GB to 2,000 GB
			mysql.n2.xlarge.25	8 cores, 16 GB	4,000	8,000	5 GB to 2,000 GB
			mysql.n4.xlarge.25	8 cores, 32 GB	8,000	12,000	5 GB to 2,000 GB
			mysql.n4.2xlarge.25	16 cores, 64 GB	16,000	14,000	5 GB to 3,000 GB



RDS edition	MySQL version	Instance family	Instance type	CPU and memory	Maximum connections	Maximum IOPS	Storage capacity
Enterprise Edition	5.7 and 8.0	Dedicated instance (with a large number of CPU cores)	mysql.n8.2xlarge.25	16 cores, 128 GB	32,000	16,000	5 GB to 3,000 GB
			mysql.x4.large.25	4 cores, 16 GB	2,500	4,500	50 GB to 2,000 GB
			mysql.x4.xlarge.25	8 cores, 32 GB	5,000	9,000	500 GB to 3,000 GB
			mysql.x4.2xlarge.25	16 cores, 64 GB	10,000	18,000	500 GB to 3,000 GB
			mysql.x4.4xlarge.25	32 cores, 128 GB	20,000	36,000	1,000 GB to 6,000 GB
		Dedicated instance (with a large memory capacity)	mysql.x8.medium.25	2 cores, 16 GB	2,500	4,500	50 GB to 2,000 GB
			mysql.x8.large.25	4 cores, 32 GB	5,000	9,000	50 GB to 2,000 GB
			mysql.x8.xlarge.25	8 cores, 64 GB	10,000	18,000	500 GB to 3,000 GB
			mysql.x8.2xlarge.25	16 cores, 128 GB	20,000	36,000	500 GB to 3,000 GB
			mysql.x8.4xlarge.25	32 cores, 256 GB	40,000	72,000	1,000 GB to 6,000 GB
		Dedicated host	mysql.st.8xlarge.25	60 cores, 470 GB	100,000	120,000	3,000 GB, 4,000 GB, 5,000 GB, or 6,000 GB
			mysql.st.12xlarge.25	90 cores, 720 GB	100,000	140,000	1,000 GB to 6,000 GB

## Primary ApsaraDB RDS for SQL Server instances

RDS edition	SQL Server version	Instance family	Instance type	CPU and memory	Maximum connections	Maximum IOPS	Storage capacity
Basic Edition	2012 EE	General-purpose instance	rds.mssql.s2.large	2 cores, 4 GB	Unlimited	See <a href="#">IOPS</a> .	20 GB to 3,000 GB
			rds.mssql.s2.xlarge	2 cores, 8 GB			
			rds.mssql.s3.large	4 cores, 8 GB			
			rds.mssql.m1.medium	4 cores, 16 GB			
			rds.mssql.c1.large	8 cores, 16 GB			
			rds.mssql.c1.xlarge	8 cores, 32 GB			
			rds.mssql.c2.xlarge	16 cores, 64 GB			
	2012 Web and 2016 Web	Dedicated instance	mssql.x2.medium.w1	2 cores, 4 GB	Unlimited	See <a href="#">IOPS</a> .	20 GB to 3,000 GB
			mssql.x4.medium.w1	2 cores, 8 GB			
			mssql.x2.large.w1	4 cores, 8 GB			
			mssql.x4.large.w1	4 cores, 16 GB			
			mssql.x2.xlarge.w1	8 cores, 16 GB			
			mssql.x4.xlarge.w1	8 cores, 32 GB			
			mssql.x2.2xlarge.w1	16 cores, 32 GB			
			mssql.x4.2xlarge.w1	16 cores, 64 GB			

RDS edition	SQL Server version	Instance family	Instance type	CPU and memory	Maximum connections	Maximum IOPS	Storage capacity		
	2008 R2	General-purpose instance	rds.mssql.s2.large	2 cores, 4 GB	1,200	2,000	10 GB to 2,000 GB		
			rds.mssql.s2.xlarge	2 cores, 8 GB	2,000	4,000			
			rds.mssql.s3.large	4 cores, 8 GB	2,000	5,000			
			rds.mssql.m1.medium	4 cores, 16 GB	4,000	7,000			
			rds.mssql.c1.large	8 cores, 16 GB	4,000	8,000			
			rds.mssql.c1.xlarge	8 cores, 32 GB	8,000	12,000			
			rds.mssql.c2.xlarge	16 cores, 64 GB	16,000	14,000			
		Dedicated instance	mssql.x8.medium.2	2 cores, 16 GB	2,500	4,500	250 GB		
			mssql.x8.large.2	4 cores, 32 GB	5,000	9,000	500 GB		
			mssql.x8.xlarge.2	8 cores, 64 GB	10,000	18,000	1,000 GB		
			mssql.x8.2xlarge.2	16 cores, 128 GB	20,000	36,000	2,000 GB		
		Dedicated host	rds.mssql.st.d13	30 cores, 220 GB	64,000	20,000	2,000 GB		
			rds.mssql.st.h43	60 cores, 470 GB	100,000	50,000	2,000 GB		
					mssql.x4.medium.e2	2 cores, 8 GB			
					mssql.x8.medium.e2	2 cores, 16 GB			
					mssql.x4.large.e2	4 cores, 16 GB			
					mssql.x8.large.e2	4 cores, 32 GB			

RDS edition	SQL Server version	Instance family	Instance type	CPU and memory	Maximum connections	Maximum IOPS	Storage capacity
High-availability Edition	2008 R2 with SSD, 2012 EE and 2016 EE	Dedicated instance	mssql.x4.xlarge.e2	8 cores, 32 GB	Unlimited	See <a href="#">IOPS</a> .	20 GB to 4,000 GB
			mssql.x8.xlarge.e2	8 cores, 64 GB			
			mssql.x4.2xlarge.e2	16 cores, 64 GB			
			mssql.x8.2xlarge.e2	16 cores, 128 GB			
			mssql.x4.3xlarge.e2	24 cores, 96 GB			
			mssql.x4.4xlarge.e2	32 cores, 128 GB			
			mssql.x8.4xlarge.e2	32 cores, 256 GB			
			mssql.x8.7xlarge.e2	56 cores, 480 GB			
			mssql.x4.8xlarge.e2	64 cores, 256 GB			
			mssql.x8.8xlarge.e2	64 cores, 512 GB			
	General-purpose instance	mssql.s2.medium.s2	2 cores, 4 GB				
		mssql.s2.large.s2	4 cores, 8 GB				
		mssql.s2.xlarge.s2	8 cores, 16 GB				
		mssql.s2.2xlarge.s2	16 cores, 32 GB				
		mssql.s4.2xlarge.s2	16 cores, 64 GB				
		mssql.s8.2xlarge.s2	16 cores, 128 GB				

RDS edition	SQL Server version	Instance family	Instance type	CPU and memory	Maximum connections	Maximum IOPS	Storage capacity
	2012 SE, 2016 SE, 2017 SE and 2019 SE	Dedicated instance	mssql.x4.medium.s2	2 cores, 8 GB			
			mssql.x8.medium.s2	2 cores, 16 GB			
			mssql.x4.large.s2	4 cores, 16 GB			
			mssql.x8.large.s2	4 cores, 32 GB			
			mssql.x4.xlarge.s2	8 cores, 32 GB			
			mssql.x8.xlarge.s2	8 cores, 64 GB			
			mssql.x4.2xlarge.s2	16 cores, 64 GB			
			mssql.x8.2xlarge.s2	16 cores, 128 GB			
			mssql.x4.3xlarge.s2	24 cores, 96 GB			
Cluster		Dedicated	mssql.x4.medium.e2	2 cores, 8 GB			
			mssql.x4.large.e2	4 cores, 16 GB			
			mssql.x4.xlarge.e2	8 cores, 32 GB			
			mssql.x4.2xlarge.e2	16 cores, 64 GB			
			mssql.x4.4xlarge.e2	32 cores, 128 GB			
			mssql.x4.8xlarge.e2	64 cores, 256 GB			
			mssql.x8.medium.e2	2 cores, 16 GB			

Cluster RDS Edition	2017 SQL Server version	Instance family	Instance type	CPU and memory	Unlimited Maximum connections	See IOPS. Maximum IOPS	20 GB to 1,024 GB capacity
			mssql.x8.large.e2	4 cores, 32 GB			
			mssql.x8.xlarge.e2	8 cores, 64 GB			
			mssql.x8.2xlarge.e2	16 cores, 128 GB			
			mssql.x8.4xlarge.e2	32 cores, 256 GB			
			mssql.x8.8xlarge.e2	64 cores, 512 GB			

### Primary ApsaraDB RDS for PostgreSQL instances (with local SSDs)

RDS edition	PostgreSQL version	Instance family	Instance type	CPU and memory specifications	Maximum number of connections	Maximum IOPS	Storage capacity
High-		General-purpose instance	rds.pg.s1.small	1 CPU core, 2 GB	200	1,000	20 GB
			rds.pg.s2.large	2 CPU cores, 4 GB	400	2,000	
			rds.pg.s3.large	4 CPU cores, 8 GB	800	5,000	
			rds.pg.c1.large	8 CPU cores, 16 GB	1,500	8,000	
			rds.pg.c1.xlarge	8 CPU cores, 32 GB	2,000	12,000	
			rds.pg.c2.xlarge	16 CPU cores, 64 GB	2,000	14,000	

Availability Edition RDS edition	9.4 and 10 PostgreSQL version	Instance family	Instance type	CPU and memory specifications	Maximum number of connections	Maximum IOPS	Storage capacity
		Dedicated instance (with a large memory capacity)	pg.x8.medium.2	2 CPU cores, 16 GB	2,500	4,500	to 6,000 GB
			pg.x8.large.2	4 CPU cores, 32 GB	5,000	9,000	
			pg.x8.xlarge.2	8 CPU cores, 64 GB	10,000	18,000	
			pg.x8.2xlarge.2	16 CPU cores, 128 GB	12,000	36,000	
		Dedicated host instance	rds.pg.st.h43	60 CPU cores, 470 GB	4,000	50,000	

**Primary ApsaraDB RDS for PostgreSQL instances (with standard or enhanced SSDs)**

RDS edition	PostgreSQL version	Instance family	Instance type	CPU and memory specifications	Maximum number of connections	Maximum IOPS	Storage capacity
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RDS edition	PostgreSQL version	Instance family	Instance type	CPU and memory specifications	Maximum number of connections	Maximum IOPS	Storage capacity
Basic Edition	10, 11, and 12	General-purpose instance	pg.n2.small.1	1 CPU core, 2 GB	200	For more information, see the "IOPS" section in <a href="#">Primary instance types</a> .	Standard SSD: 20 GB to 6,000 GB Enhanced SSD: 50 GB to 32,000 GB
			pg.n2.medium.1	2 CPU cores, 4 GB	400		
			pg.n4.medium.1	2 CPU cores, 8 GB	800		
			pg.n2.large.1	4 CPU cores, 8 GB	800		
			pg.n4.large.1	4 CPU cores, 16 GB	1,600		
			pg.n2.xlarge.1	8 CPU cores, 16 GB	1,600		
			pg.n4.xlarge.1	8 CPU cores, 32 GB	3,200		
			pg.n2.2xlarge.1	16 CPU cores, 32 GB	3,200		
			pg.n4.2xlarge.1	16 CPU cores, 64 GB	6,400		
			pg.n8.2xlarge.1	16 CPU cores, 128 GB	10,000		
			pg.n4.4xlarge.1	32 CPU cores, 128 GB	12,800		
			pg.n8.4xlarge.1	32 CPU cores, 256 GB	20,000		
			pg.n4.8xlarge.1	56 CPU cores, 224 GB	22,000		
			pg.n8.8xlarge.1	56 CPU cores, 480 GB	48,000		



RDS edition	PostgreSQL version	Instance family	Instance type	CPU and memory specifications	Maximum number of connections	Maximum IOPS	Storage capacity
		General-purpose instance	pg.n2.small.2c	1 CPU core, 2 GB	50		
			pg.n2.medium.2c	2 CPU core, 4 GB	100		
			pg.x2.medium.2c	2 CPU cores, 4 GB	400		
			pg.x4.medium.2c	2 CPU cores, 8 GB	800		
			pg.x8.medium.2c	2 CPU cores, 16 GB	1,600		
			pg.x2.large.2c	4 CPU cores, 8 GB	800		
			pg.x4.large.2c	4 CPU cores, 16 GB	1,600		
			pg.x8.large.2c	4 CPU cores, 32 GB	3,200		
			pg.x2.xlarge.2c	8 CPU cores, 16 GB	1,600		
			pg.x4.xlarge.2c	8 CPU cores, 32 GB	3,200		
			pg.x8.xlarge.2c	8 CPU cores, 64 GB	6,400		
			pg.x2.3large.2c	12 CPU cores, 24 GB	2,400		
			pg.x4.3large.2c	12 CPU cores, 48 GB	4,800		
			pg.x8.3large.2c	12 CPU cores, 96 GB	9,600		
			pg.x2.2xlarge.2c	16 CPU cores, 32 GB	3,200		
			pg.x4.2xlarge.2c	16 CPU cores, 64 GB	6,400		

RDS edition	PostgreSQL version	Instance family	Instance type	CPU and memory specifications	Maximum number of connections	Maximum IOPS information, see the "IOPS" section in <a href="#">Primary instance types</a> .	Standard SSD: 20 GB to 6,000 GB capacity Fully encrypted standard SSD: 50 GB to 6,000GB Enhanced SSD: 50 GB to 32,000 GB Enhanced SSD of PL2: 500 GB to 32,000 GB Enhanced SSD of PL3: 1,500 GB to 32,000 GB
High-availability Edition	10, 11, and 12	Dedicated instance	pg.x8.2xlarge.2c	16 CPU cores, 128 GB	12,800		
			pg.x2.3xlarge2c	24 CPU cores, 48 GB	4,800		
			pg.x4.3xlarge.2c	24 CPU cores, 96 GB	9,600		
			pg.x8.3xlarge.2c	24 CPU cores, 192 GB	19,200		
			pg.x2.4xlarge.2c	32 CPU cores, 64 GB	6,400		
			pg.x4.4xlarge.2c	32 CPU cores, 128 GB	12,800		
			pg.x8.4xlarge.2c	32 CPU cores, 256 GB	25,600		
			pg.x2.13large.2c	52 CPU cores, 104 GB	10,400		
			pg.x4.13large.2c	52 CPU cores, 192 GB	19,200		
			pg.x8.13large.2c	52 CPU cores, 384 GB	38,400		
			pg.x2.8xlarge.2c	64 CPU cores, 128 GB	12,800		
			pg.x4.8xlarge.2c	64 CPU cores, 256 GB	25,600		
			pg.x8.8xlarge.2c	64 CPU cores, 512 GB	51,200		

RDS edition	PostgreSQL version	Instance family	Instance type	CPU and memory specifications	Maximum number of connections	Maximum IOPS	Storage capacity
			pg.x2.13xlarge.2c	104 CPU cores, 192 GB	19,200		
			pg.x4.13xlarge.2c	104 CPU cores, 384 GB	38,400		
			pg.x8.13xlarge.2c	104 CPU cores, 768 GB	76,800		

### ApsaraDB RDS for PPAS instances

RDS edition	PPAS version	Instance family	Instance type	CPU and memory	Maximum connections	Maximum IOPS	Storage capacity
		General-purpose instance	rds.ppas.t1.small	1 core, 1 GB	100	1,200	150 GB
		Dedicated instance	ppas.x4.small.2	1 core, 4 GB	200	5,000	250 GB
			ppas.x4.medium.2	2 cores, 8 GB	400	10,000	
			ppas.x8.medium.2	2 cores, 16 GB	2,500	15,000	
			ppas.x4.large.2	4 cores, 16 GB	2,500	20,000	250 GB or 500 GB
			ppas.x8.large.2	4 cores, 32 GB	5,000	30,000	
				ppas.x4.xlarge.2	8 cores, 32 GB	5,000	40,000
			ppas.x8.xlarge.2	8 cores, 64 GB	10,000	60,000	
High-availability Edition	10						

RDS edition	PPAS version	Instance family	Instance type	CPU and memory	Maximum connections	Maximum IOPS	Storage capacity
			ppas.x4.2xlarge.2	16 cores, 64 GB	10,000	80,000	1,000 GB or 2,000 GB
			ppas.x8.2xlarge.2	16 cores, 128 GB	12,000	120,000	
			ppas.x4.4xlarge.2	32 cores, 128 GB	12,000	160,000	2,000 GB or 3,000 GB
			ppas.x8.4xlarge.2	32 cores, 256 GB	12,000	240,000	
		Dedicated host	rds.ppas.st.h43	60 cores, 470 GB	12,000	450,000	3,000 GB, 4,000 GB, 5,000 GB, or 6,000 GB

## ApsaraDB RDS for MariaDB TX instances

RDS edition	Instance family	Instance type	CPU and memory	Maximum connections	Storage	
					Maximum IOPS	Storage capacity
High-availability	General-purpose instance	mariadb.n2.small.2c	1 core, 2 GB	2,000		20 GB to 1,000 GB
		mariadb.n2.medium.2c	2 cores, 4 GB	4,000		
	Dedicated	mariadb.x2.large.2c	4 cores, 8 GB	6,000		
		mariadb.x4.large.2c	4 cores, 16 GB	8,000		
		mariadb.x2.xlarge.2c	8 cores, 16 GB	8,000		
		mariadb.x4.xlarge.2c	8 cores, 32 GB	10,000		
		mariadb.x2.2xlarge.2c	16 cores, 32 GB	10,000		

Availability Edition Edition	Instance family	Instance type	CPU and memory	Maximum connections	See <a href="#">IOPS</a> . Storage	Storage capacity
					Maximum IOPS	
		mariadb.x4.2xlarge.e2c	16 cores, 64 GB	15,000		26 GB to 6,000 GB
		mariadb.x8.2xlarge.e2c	16 cores, 128 GB	20,000		
		mariadb.x4.4xlarge.e2c	32 cores, 128 GB	20,000		
		mariadb.x8.4xlarge.e2c	32 cores, 256 GB	64,000		
	Dedicated host	mariadb.x4.8xlarge.e2c	56 cores, 224 GB	64,000		
		mariadb.x8.8xlarge.e2c	56 cores, 480 GB	100,000		

## Phased-out ApsaraDB RDS for MySQL instance types

The following table lists phased-out ApsaraDB RDS for MySQL instance types. These instance types are no longer available to new instances.

Instance type	CPU cores	Memory capacity	Maximum connections	Maximum IOPS
rds.mys2.small	2	240 MB	60	150
rds.mys2.mid	4	600 MB	150	300
rds.mys2.standard	6	1,200 MB	300	600
rds.mys2.large	8	2,400 MB	600	1,200
rds.mys2.xlarge	9	6,000 MB	1,500	3,000
rds.mys2.2xlarge	10	12,000 MB	2,000	6,000
rds.mys2.4xlarge	11	24,000 MB	2,000	12,000
rds.mys2.8xlarge	13	48,000 MB	2,000	14,000
rds.mysql.st.d13	30	220 GB	64,000	20,000
mysql.x8.medium.3	2	16 GB	2,500	4,500
mysql.x4.large.3	4	16 GB	2,500	4,500

Instance type	CPU cores	Memory capacity	Maximum connections	Maximum IOPS
mysql.x8.large.3	4	32 GB	5,000	9,000
mysql.x4.xlarge.3	8	32 GB	5,000	9,000
mysql.x8.xlarge.3	8	64 GB	10,000	18,000
mysql.x4.2xlarge.3	16	64 GB	10,000	18,000
mysql.x8.2xlarge.3	16	128 GB	20,000	36,000
mysql.x4.4xlarge.3	32	128 GB	20,000	36,000
mysql.x8.4xlarge.3	32	256 GB	40,000	72,000
mysql.st.8xlarge.3	60	470 GB	100,000	120,000
mysql.n2.2xlarge.1	16	32 GB	10,000	See <b>IOPS</b> .
mysql.n4.2xlarge.1	16	64 GB	15,000	
mysql.n8.2xlarge.1	16	128 GB	20,000	
mysql.x2.3xlarge.2c	24	48 GB	24,000	
mysql.n4.4xlarge.1	32	128 GB	20,000	
mysql.n8.4xlarge.1	32	256 GB	64,000	
mysql.n4.8xlarge.1	56	224 GB	64,000	
mysql.n8.8xlarge.1	56	480 GB	64,000	

## Phased-out ApsaraDB RDS for SQL Server instance types

The following table lists phased-out ApsaraDB RDS for SQL Server instance types. These instance types are no longer available to new instances.

Instance type	CPU cores	Memory capacity	Maximum connections	Maximum IOPS
rds.mssql.s1.small	1	2 GB	600	1,000
rds.mss1.small	6	1,000 MB	100	500
rds.mss1.mid	8	2,000 MB	200	1,000
rds.mss1.standard	9	4,000 MB	400	2,000
rds.mss1.large	10	6,000 MB	600	3,000
rds.mss1.xlarge	11	8,000 MB	800	4,000
rds.mss1.2xlarge	12	12,000 MB	1,200	6,000
rds.mss1.4xlarge	13	24,000 MB	2,000	12,000
rds.mss1.8xlarge	13	48,000 MB	2,000	14,000
rds.mssql.c2.xlp2	16	96 GB	24,000	16,000
pg.n1.micro.1	1	1 GB	100	See <a href="#">IOPS</a> .

## Phased-out instance types of ApsaraDB RDS for PostgreSQL

The following table describes the phased-out instance types of ApsaraDB RDS for PostgreSQL. These instance types are no longer available to new instances.

Instance type	CPU cores	Memory capacity	Maximum connections	Maximum IOPS
rds.pg.t1.small	1	1GB	100	600
pg.x8.4xlarge.2	32	256GB	20000	50000
pg.n1.micro.1	1	1GB	100	See <a href="#">IOPS</a> .
pg.gn5i-c2g1.large.1	2	8 GB	800	
pg.gn5i-c4g1.xlarge.1	4	16 GB	1,600	
pg.gn5i-c8g1.2xlarge.1	8	32 GB	3,200	
pg.gn5i-c16g1.4xlarge.1	16	64 GB	6,400	

Instance type	CPU cores	Memory capacity	Maximum connections	Maximum IOPS
pg.gn5i-c16g1.8xlarge.1	32	128 GB	12,800	
pg.gn5i-c28g1.14xlarge.1	56	224 GB	22,000	

## Phased-out ApsaraDB RDS for PPAS instance types

The following table lists phased-out ApsaraDB RDS for PPAS instance types. These instance types are no longer available to new instances.

Instance type	CPU cores	Memory capacity	Maximum connections	Maximum IOPS
rds.ppas.s1.small	1	2 GB	200	1,000
rds.ppas.s2.large	2	4 GB	400	2,000
rds.ppas.s3.large	4	8 GB	800	5,000
rds.ppas.m1.medium	4	16 GB	1,500	8,000
rds.ppas.c1.xlarge	8	32 GB	2,000	12,000
rds.ppas.c2.xlarge	16	64 GB	2,000	14,000
rds.pg.c2.2xlarge	16	128 GB	3,000	16,000

## FAQ

**Q:** Why does an entry-level RDS instance support a larger maximum number of connections and deliver higher IOPS than an enterprise-level RDS instance when the same CPU cores and memory capacity are used?

**A:** An entry-level RDS instance belongs to the shared or general-purpose instance family, whereas an enterprise-level RDS instance belongs to the dedicated instance family. The shared and general-purpose instance families reuse CPU resources. This allows an entry-level RDS instance to support a larger maximum number of connections and deliver higher IOPS. However, the dedicated instance family occupies more exclusive CPU and memory resources. This allows an enterprise-level RDS instance to run more stably. For more information, see [Instance families](#).

## 4.3. Read-only instance types

This topic introduces the read-only instance types supported by ApsaraDB for RDS.

You can add [read-only instances](#) to scale the read capability of your database system.

For more information about primary instance types, see [Primary instance types](#).



## Prices of RDS read-only instances

Please download the following files to check the price of RDS read-only instances.

[Monthly prices of RDS read-only instance specifications](#)

For prices of pay-as-you-go specifications and capacities, see:

- [RDS MySQL](#)
- [RDS SQL Server](#)
- [RDS PostgreSQL](#)
- [RDS PPAS](#)

## ApsaraDB RDS for MySQL read-only instances

Category	MySQL version	Instance family	Instance type	CPU and memory	Maximum number of connections	Maximum IOPS	Storage capacity
		General-purpose instance	rds.mysql.t1.small	1 core, 1 GB	300	600	5 GB to 2,000 GB
			rds.mysql.s1.small	1 core, 2 GB	600	1,000	
			rds.mysql.s2.large	2 cores, 4 GB	1,200	2,000	
			rds.mysql.s2.xlarge	2 cores, 8 GB	2,000	4,000	
			rds.mysql.s3.large	4 cores, 8 GB	2,000	5,000	
			rds.mysql.m1.medium	4 cores, 16 GB	4,000	7,000	
			rds.mysql.lc1.large	8 cores, 16 GB	4,000	8,000	
			rds.mysql.lc1.xlarge	8 cores, 32 GB	8,000	12,000	
			rds.mysql.lc2.xlarge	16 cores, 64 GB	16,000	14,000	5 GB to 3,000 GB
			rds.mysql.lc2.xlp2	16 cores, 96 GB	24,000	16,000	

Category	MySQL version	Instance family	Instance type	CPU and memory	Maximum number of connections	Maximum IOPS	Storage capacity
Read-only instance	5.6, 5.7, and 8.0	Dedicated instance (with a large memory capacity)	mysqlro.x8.medium.1	2 cores, 16 GB	2,500	4,500	50 GB to 2,000 GB
			mysqlro.x8.large.1	4 cores, 32 GB	5,000	9,000	50 GB to 2,000 GB
			mysqlro.x8.xlarge.1	8 cores, 64 GB	10,000	18,000	500 GB to 3,000 GB
			mysqlro.x8.2xlarge.1	16 cores, 128 GB	20,000	36,000	500 GB to 3,000 GB
			mysqlro.x8.4xlarge.1	32 cores, 256 GB	40,000	72,000	1,000 GB to 6,000 GB
			mysqlro.x8.8xlarge.1	64 cores, 512 GB	80,000	144,000	1,000 GB to 6,000 GB
		Dedicated instance (with a large number of CPU cores)	mysqlro.x4.large.1	4 cores, 16 GB	2,500	4,500	50 GB to 2,000 GB
			mysqlro.x4.xlarge.1	8 cores, 32 GB	5,000	9,000	500 GB to 3,000 GB
			mysqlro.x4.2xlarge.1	16 cores, 64 GB	10,000	18,000	500 GB to 3,000 GB
			mysqlro.x4.4xlarge.1	32 cores, 128 GB	20,000	36,000	1,000 GB to 6,000 GB

## ApsaraDB RDS for SQL Server read-only instances

Category	SQL Server version	Instance family	Instance type	CPU and memory	Maximum number of connections	Maximum IOPS	Storage capacity
Read-only instance	2017 EE	General-purpose instance	rds.mssql.s2.large	2 cores, 4 GB	Unlimited	See <a href="#">IOPS</a> .	20 GB to 4,000 GB
			rds.mssql.s3.large	4 cores, 8 GB			
			rds.mssql.c1.large	8 cores, 16 GB			
			rds.mssql.s2.xlarge	2 cores, 8 GB			
			rds.mssql.m1.medium	4 cores, 16 GB			
			rds.mssql.c1.xlarge	8 cores, 32 GB			
			rds.mssql.c2.xlarge	16 cores, 64 GB			
		Dedicated instance	mssql.x4.medium.ro	2 cores, 8 GB			
			mssql.x4.large.ro	4 cores, 16 GB			
			mssql.x4.xlarge.ro	8 cores, 32 GB			
			mssql.x4.2xlarge.ro	16 cores, 64 GB			
			mssql.x4.4xlarge.ro	32 cores, 128 GB			
			mssql.x4.8xlarge.ro	64 cores, 256 GB			
			mssql.x8.medium.ro	2 cores, 16 GB			
			mssql.x8.large.ro	4 cores, 32 GB			
mssql.x8.xlarge.ro	8 cores, 64 GB						

Category	SQL Server version	Instance family	Instance type	CPU and memory	Maximum number of connections	Maximum IOPS	Storage capacity
			mssql.x8.2xlarge.ro	16 cores, 128 GB			
			mssql.x8.4xlarge.ro	32 cores, 256 GB			
			mssql.x8.7xlarge.ro	56 cores, 480 GB			
			mssql.x8.8xlarge.ro	64 cores, 512 GB			

### ApsaraDB RDS for PostgreSQL read-only instances (with local SSDs)

Category	PostgreSQL version	Instance family	Instance type	CPU and memory	Maximum number of connections	Maximum IOPS	Storage capacity
Read-only instance	10	Dedicated instance (with a large memory capacity)	pg.x8.xlarge.2	8 cores, 64 GB	10,000	18,000	20 GB to 6,000 GB
			pg.x8.2xlarge.2	16 cores, 128 GB	12,000	36,000	
		Dedicated instance (with a large number of CPU cores)	pg.x4.xlarge.2	8 cores, 32 GB	5,000	9,000	
			pg.x4.2xlarge.2	16 cores, 64 GB	10,000	18,000	
			pg.x4.4xlarge.2	32 cores, 128 GB	12,000	36,000	
		Dedicated host	rds.pg.st.h43	60 cores, 470 GB	4,000	50,000	

### ApsaraDB RDS for PPAS read-only instances

Category	PPAS version	Instance family	Instance type	CPU and memory	Maximum number of connections	Maximum IOPS	Storage capacity
Read-only instance	10	General-purpose instance	rds.ppas.t1.small	1 core, 1 GB	100	1,200	150 GB
		Dedicated instance	ppas.x4.small.2	1 core, 4 GB	200	5,000	250 GB
			ppas.x4.medium.2	2 cores, 8 GB	400	10,000	
			ppas.x8.medium.2	2 cores, 16 GB	2,500	15,000	
			ppas.x4.large.2	4 cores, 16 GB	2,500	20,000	250 GB or 500 GB
			ppas.x8.large.2	4 cores, 32 GB	5,000	30,000	
			ppas.x4.xlarge.2	8 cores, 32 GB	5,000	40,000	500 GB or 1,000 GB
			ppas.x8.xlarge.2	8 cores, 64 GB	10,000	60,000	
			ppas.x4.2xlarge.2	16 cores, 64 GB	10,000	80,000	1,000 GB or 2,000 GB
			ppas.x8.2xlarge.2	16 cores, 128 GB	12,000	120,000	
			ppas.x4.4xlarge.2	32 cores, 128 GB	12,000	160,000	2,000 GB or 3,000 GB
		ppas.x8.4xlarge.2	32 cores, 256 GB	12,000	240,000		
		Dedicated host	rds.ppas.st.h43	60 cores, 470 GB	12,000	450,000	3,000 GB, 4,000 GB, 5,000 GB, or 6,000 GB

## 5.Storage types

ApsaraDB for RDS supports three types of storage media. They are local SSDs, standard SSDs, and enhanced SSDs. All of these storage types meet the reliability, persistence, and read/write performance requirements that are specified in Alibaba Cloud service level agreement (SLA).

### Introduction

These storage types are provided to meet your specific business requirements in various scenarios.

- Local SSD

This is a recommended storage type. A local SSD resides on the same server as the database engine. You can store data on local SSDs to reduce I/O latency.

- Standard SSD

A standard SSD is an elastic block storage device that is designed based on a distributed storage architecture. You can store data on standard SSDs to separate computing from storage.

- Enhanced SSD

This is also a recommended storage type. This new SSD product is designed by Alibaba Cloud based on the next-generation distributed block storage architecture. It integrates 25 Gigabit Ethernet and remote direct memory access (RDMA) technologies to provide super high performance at low latency. An enhanced SSD can process up to 1 million random read/write requests per second. Supported enhanced SSDs come in the following three performance levels (PLs):

- PL1: An enhanced SSD of PL1 is a regular enhanced SSD.
- PL2: An enhanced SSD of PL2 delivers input/output operations per second (IOPS) and throughput that are twice as high as those delivered by an enhanced SSD of PL1.
- PL3: An enhanced SSD of PL3 delivers IOPS that is 20 times as high as the IOPS delivered by an enhanced SSD of PL1. It also delivers throughput that is 11 times as high as the throughput delivered by an enhanced SSD of PL1. Enhanced SSDs of PL3 are ideal for workloads that require high I/O performance in processing concurrent requests and stable read/write latency.

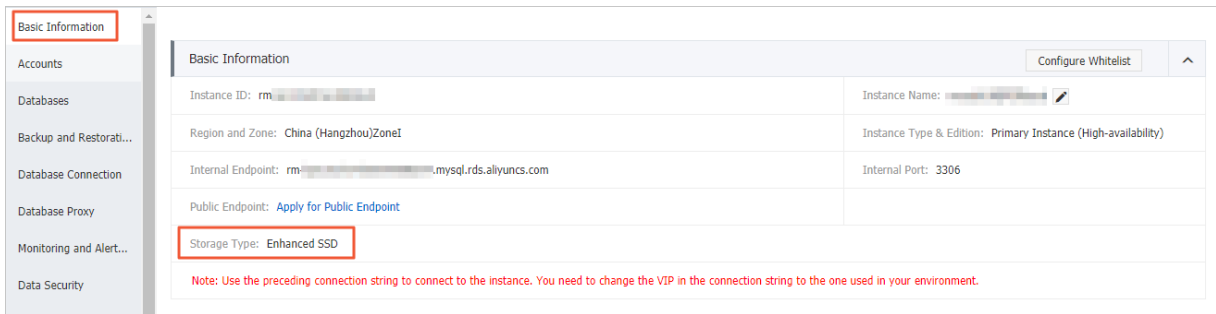
For more information about PLs, see [Block Storage performance](#).

**Note** All of these storage types meet the reliability, persistence, and read/write performance requirements that are specified in Alibaba Cloud SLA.

- **Local SSDs:** This type of SSD is suitable for the **RDS High-availability Edition** that allows for one primary instance and one secondary instance. This type of SSD is also suitable for the **RDS Enterprise Edition** that allows for one primary instance and two secondary instances. Both editions support failovers. If the primary instance becomes faulty, your database system fails over to a secondary instance in seconds.
- **Standard and enhanced SSDs:** Both types of SSDs work in a distributed storage architecture. This architecture allows you to ensure reliability by using multiple data copies. If you are using the **RDS Basic Edition**, your database system requires a long period of time to recover from a fault. If you are using the **RDS High-availability, Cluster, or Enterprise Edition**, your database system can fail over to a secondary instance in seconds in the event of a fault.

### View the storage type of an RDS instance

Log on to the ApsaraDB for RDS console, go to the Basic Information page of the RDS instance, and in the Basic Information section view the storage type of the RDS instance.



### Comparison between storage types

#### Feature comparison

Item	Local SSD	Standard SSD	Enhanced SSD (recommended)
I/O performance	★★★★★ Provides high I/O performance at low I/O latency.	★★★★ Causes additional network I/O overheads, which decrease I/O performance.	★★★★★ Provides higher I/O performance than a standard SSD.

Item	Local SSD	Standard SSD	Enhanced SSD (recommended)
Configuration flexibility	<p>★★★★</p> <p>Provides a number of configuration options and allows you to adjust the storage capacity. However, some instance types provide a specific amount of storage capacity that cannot be adjusted.</p>	<p>★★★★★</p> <p>Provides a number of configuration options and allows you to adjust the storage capacity.</p>	<p>★★★★★</p> <p>Provides a number of configuration options and allows you to adjust the storage capacity.</p>
Scalability	<p>★★★</p> <p>Requires hours to copy data when you scale the database system.</p>	<p>★★★★★</p> <p>Allows you to scale the database system in minutes.</p>	<p>★★★★★</p> <p>Allows you to scale the database system in minutes.</p>

## Product support

For more information about the storage types and features that are supported by various database engines, see the following topics:

- [Features of ApsaraDB RDS for MySQL](#)
- [Features of ApsaraDB RDS for SQL Server](#)
- [Features of ApsaraDB RDS for PostgreSQL](#)
- [Features of ApsaraDB RDS for PPAS](#)
- [Features of ApsaraDB RDS for MariaDB TX](#)



## 6.Features

The features supported by an RDS for MySQL instance vary depending on the instance engine version, RDS edition, and storage type. This topic describes the features supported for each engine.

- [Features of ApsaraDB RDS for MySQL](#)
- [Features of ApsaraDB RDS for SQL Server](#)
- [Features of ApsaraDB RDS for PostgreSQL](#)
- [Features of ApsaraDB RDS for PPAS](#)
- [Features of ApsaraDB RDS for MariaDB TX](#)

## 7.Q&A

This topic provides answers to some commonly asked questions about ApsaraDB for RDS.

- **Basic concepts**
  - [What is a database instance?](#)
  - [What are primary and secondary RDS instances?](#)
  - [What are read-only RDS instances?](#)
- **Billing and purchase**
  - [Why am I charged additional fees for my subscription-billed RDS instance?](#)
  - [After I create an RDS instance, why does the ApsaraDB for RDS console not respond and why am I unable to find the RDS instance that I created?](#)
  - [Will I be charged for my pay-as-you-go-billed RDS instance that I am not using?](#)
  - [Can I switch between subscription billing and pay-as-you-go billing?](#)
  - [How much do I need to pay if I change the specifications of my subscription-billed RDS instance?](#)
  - [What will happen if my subscription-billed RDS instance expires or its payment is overdue?](#)
  - [Is the inbound and outbound Internet traffic that is consumed for my pay-as-you-go- and subscription-billed RDS instances free of charge?](#)
  - [Do I need to pay when I apply for a public endpoint?](#)
  - [When the same CPU and memory specifications are used, an entry-level RDS instance supports a larger maximum number of connections and delivers higher input/output operations per second \(IOPS\) than an enterprise-level RDS instance. Why?](#)
- **Instance management**
  - [How do I authorize a RAM user to manage my RDS instance?](#)
  - [How do I change the storage type of my RDS instance among local SSD, standard SSD, and enhanced SSD?](#)
  - [How much time is required to expand the storage capacity of my RDS instance?](#)
  - [When I upgrade my primary RDS instance, will ApsaraDB for RDS automatically upgrade its read-only RDS instances?](#)
  - [When I change the specifications of my RDS instance, will my online workloads be interrupted?](#)
  - [After I change the specifications of my RDS instance, will its endpoints change?](#)
  - [How do I change the VPC of my RDS instance?](#)
  - [Can I access my secondary RDS instance?](#)
  - [If my RDS instance resides in a VPC, how many private IP addresses does it occupy?](#)
- **Security**
  - [After I configure an IP address whitelist for my RDS instance, is the IP address whitelist immediately applied?](#)
  - [Why do I find IP address whitelists that I did not create?](#)
  - [If I disable Internet access and enable only internal network access, will my RDS instance be exposed to security risks?](#)

- If I do not update the expired SSL certificate, will my RDS instance malfunction or its data security deteriorate?
- **Audit**
  - How do I obtain the size of SQL logs that are generated by the SQL Explorer feature?
- **Connection**
  - What do I do if I cannot connect an ECS instance to an ApsaraDB for RDS instance?
  - If my application resides outside the VPC of my RDS instance, can it communicate with my RDS instance?
  - Does a primary/secondary switchover trigger changes to the endpoints and port numbers of my RDS instance?
- **Database and account management**
  - Can I manage accounts on my RDS instance at more granular levels, such as the source IP address and table levels?
  - Which specific permissions do privileged and standard accounts have?
  - Does ApsaraDB for RDS provide accounts that are equivalent to root or super users?
  - Can I manage the accounts created on my primary RDS instance from its read-only RDS instances?
- **Read-only instance and read/write splitting**
  - When I upgrade my primary RDS instance, will ApsaraDB for RDS automatically upgrade its read-only RDS instances?
  - After I set the read weight of a read-only instance to 0, can I still connect to the read-only RDS instance?
  - If I release a read-only RDS instance, will my workloads be interrupted?
  - What can I do if read/write splitting becomes abnormal?
- **Backup and restoration**
  - Can I disable the data backup function of my ApsaraDB RDS for MySQL instance?
  - Can I disable the log backup function of my ApsaraDB RDS for MySQL instance?
  - Why does a backup fail?
  - Why do I find two log backup files with the same name on the Log Backup tab?
  - What can I do with the data and log backup files that I downloaded?
  - Why does my RDS instance have a small volume of data but the size of the generated snapshot is large?

## What is a database instance?

A database instance is a database server on which you can create one or more databases. Each database can house one or more tables.

## What are primary and secondary RDS instances?

In the RDS High-availability, Cluster, or Enterprise Edition, your database system consists of one primary RDS instance and one or two secondary RDS instances. The primary RDS instance is used to communicate with your application. In addition, the primary RDS instance synchronizes data to its secondary RDS instance in real time.

If the primary RDS instance is working as normal, its secondary RDS instance serves as a backup and does not provide database services. If the primary RDS instance becomes abnormal, your database system fails over to its secondary RDS instance. In this case, the primary RDS instance is demoted as a secondary RDS instance, and its secondary RDS instance is promoted as the primary RDS instance. During the failover, your database service remains available. However, a transient connection error may occur.

For more information about the primary and secondary RDS instances in each RDS edition, see [Overview of ApsaraDB for RDS editions](#).

## What are read-only RDS instances?

Read-only RDS instances are provided to scale the read capability of your database system. If a large number of read requests overwhelm the primary RDS instance, your workloads may be interrupted. In this case, you can create one or more read-only RDS instances to offload read requests from the primary RDS instance. This ensures the stability of your database system and increases the throughput of your application.

For more information, see [Overview of ApsaraDB RDS for MySQL read-only instances](#).

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

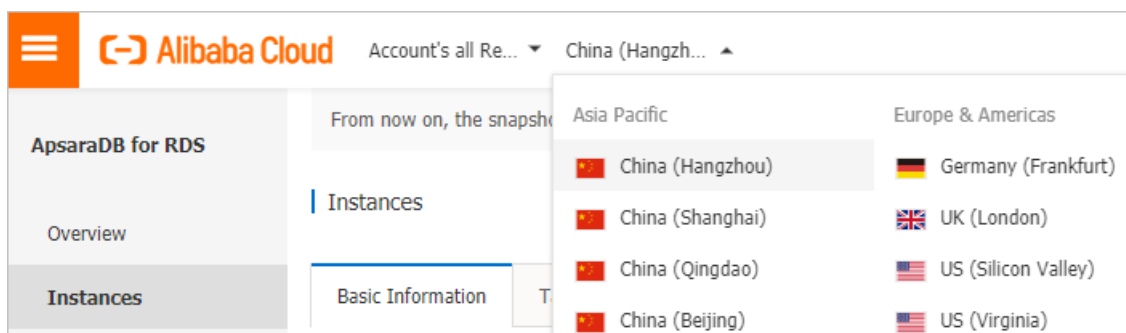
The fee that you pay when you purchase your subscription-billed RDS instance covers only the instance and its storage capacity. If you create read-only RDS instances, enable the SQL Explorer or performance monitoring feature, or use more storage than that is allowed by the free quota for backup storage, you must pay the required additional fees. For more information, see [Pricing, billable items, and billing methods](#).

## After I create an RDS instance, why does the ApsaraDB for RDS console not respond and why am I unable to find the RDS instance that I created?

This issue may occur due to the following two reasons:

- The RDS instance that you created does not reside in the selected region.

In the top navigation bar, select the region where the RDS instance resides. Then, you can find the RDS instance that you created.



- The selected zone cannot provide sufficient resources.

Resources in zones are dynamically allocated. After you submit your purchase order, the selected zone may be unable to provide sufficient resources. As a result, the RDS instance cannot be created. In this case, we recommend that you select another zone and try again. If the RDS instance cannot be created, you can go to [the Orders page](#) in the Billing Management console to view the refunded fees.

## Will I be charged for my pay-as-you-go-billed RDS instance that I am not using?

Yes, you are still charged an hourly fee for your pay-as-you-go-billed instance that you are not using. This is because a pay-as-you-go-billed RDS instance consumes computing and storage resources even if it is not used. If you do not intend to use your pay-as-you-go-billed RDS instance for a long period of time, we recommend that you save the required data and then release the instance.

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

Yes, you can switch between subscription billing and pay-as-you-go billing. For more information, see [Switch the billing method from pay-as-you-go to subscription](#) and [Switch the billing method from subscription to pay-as-you-go](#).

## How much do I need to pay if I change the specifications of my subscription-billed RDS instance?

For more information, see [Specification change fees](#).

## What will happen if my subscription-billed RDS instance expires or its payment is overdue?

For more information, see [Unlock or rebuild an expired or overdue ApsaraDB for RDS instance](#).

## Is the inbound and outbound Internet traffic that is consumed for my pay-as-you-go- and subscription-billed RDS instances free of charge?

Yes, all of the inbound and outbound Internet traffic that is consumed for your pay-as-you-go- and subscription-billed RDS instances is free of charge.

## Do I need to pay when I apply for a public endpoint?

No, you are not charged when you apply for a public endpoint.

## When the same CPU and memory specifications are used, an entry-level RDS instance supports a larger maximum number of connections and delivers higher input/output operations per second (IOPS) than an enterprise-level RDS instance. Why?

An entry-level RDS instance belongs to the shared or general-purpose instance family, whereas an enterprise-level RDS instance belongs to the dedicated instance family. The shared and general-purpose instance families support the reuse of CPU resources. This allows an entry-level RDS instance to support a larger maximum number of connections and deliver higher IOPS. However, the dedicated instance family supports the exclusive allocations of CPU and memory resources. This allows an enterprise-level RDS instance to run more stably. For more information, see [Instance families](#).

## How do I authorize a RAM user to manage my RDS instance?

For more information, see [Use RAM to manage ApsaraDB for RDS permissions](#).

## How do I change the storage type of my RDS instance among local SSD, standard SSD, and enhanced SSD?

For more information, see [How do I change an SSD to a local SSD?](#)

## How much time is required to expand the storage capacity of my RDS instance?

The required time varies based on whether the physical host that houses your RDS instance can provide sufficient remaining storage capacity for your expansion plan. If the remaining storage capacity is sufficient, you do not need to migrate the data of your RDS instance and therefore the required time is short. If the remaining storage capacity is insufficient, you must migrate the data of your RDS instance to another qualified physical host before you start the expansion. This is complex and time-consuming.

## When I upgrade my primary RDS instance, will ApsaraDB for RDS automatically upgrade its read-only RDS instances?

No, after you upgrade your primary RDS instance, you must manually upgrade its read-only RDS instances.

## When I change the specifications of my RDS instance, will my online workloads be interrupted?

No, when you change the specifications of your RDS instance, your online workloads will not be interrupted. However, a transient connection error of about 30 seconds may occur during the subsequent switchover.

## After I change the specifications of my RDS instance, will its endpoints change?

After you change the specifications of your RDS instance, its internal, public, and read/write splitting endpoints remain unchanged. However, the IP addresses that are associated with the endpoints may change. For more information, see [View and change the internal and public endpoints and port numbers of an ApsaraDB RDS for MySQL instance](#) and [Enable the read/write splitting function in the shared proxy of an ApsaraDB RDS for MySQL instance](#). We recommend that you use the internal, public, or read/write splitting endpoint of your RDS instance to establish a connection from your application.

## How do I change the VPC of my RDS instance?

- If your RDS instance supports VPC and VSwitch changes, you can directly perform these changes. For more information, see [Switch to a new VPC and VSwitch for an RDS MySQL instance](#).
- If your RDS instance supports network type changes, perform the following operations:
  - i. Change the network type from VPC to classic network.
  - ii. Change the network type from classic network to VPC with the required VPC selected.
- If your RDS instance does not support network type changes, perform the following

operations:

Purchase a new RDS instance that resides in the required VPC, and then migrate the data of your RDS instance to the new RDS instance. For more information, see [Migrate data between ApsaraDB for RDS instances](#).

## Can I access my secondary RDS instance?

No, you cannot access your secondary RDS instance. You can access only your primary RDS instance. Your secondary RDS instance serves only as a backup and does not provide services.

## If my RDS instance resides in a VPC, how many private IP addresses does it occupy?

The number of private IP addresses that your RDS instance occupies varies based on the selected database engine and RDS edition.

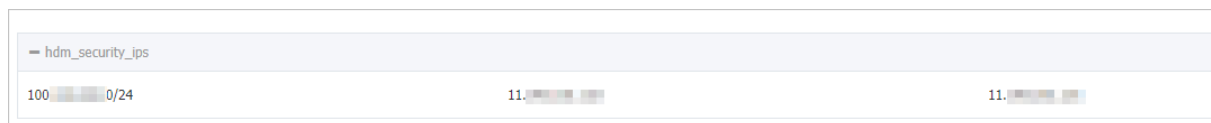
- MySQL 5.5, 5.6, 5.7, and 8.0 on RDS High-availability Edition (with local SSDs): 1
- MySQL 5.6, 5.7, and 8.0 on RDS Enterprise Edition (with local SSDs): 1
- MySQL 5.7 on RDS Basic Edition (with standard SSDs): 1
- MySQL 8.0 on RDS Basic Edition (with standard SSDs): 2
- MySQL 5.7 and 8.0 on RDS High-availability Edition (with standard or enhanced SSDs): 3
- MySQL 5.7 and 8.0 on RDS Enterprise Edition (with standard or enhanced SSDs): 1

## After I configure an IP address whitelist for my RDS instance, is the IP address whitelist immediately applied?

No, after you configure an IP address whitelist for your RDS instance, the IP address whitelist requires about 1 minute to be applied.

## Why do I find IP address whitelists that I did not create?

If the IP address whitelists consist of private IP addresses, these IP address whitelists are probably created by other Alibaba Cloud services, such as Data Management (DMS) and Database Autonomy Service (DAS). These IP address whitelists do not affect your data and can be ignored.



## If I disable Internet access and enable only internal network access, will my RDS instance be exposed to security risks?

We recommend that you change the network type of your RDS instance to VPC. In this case, only an ECS instance in the same VPC can access your RDS instance after the required IP address is added to an IP address whitelist of your RDS instance. For more information, see [Change the network type of an ApsaraDB RDS for MySQL instance](#).

## If I do not update the expired SSL certificate, will my RDS instance malfunction or its data security deteriorate?

If you do not update the expired SSL certificate, your RDS instance can still run and its data security does not deteriorate. However, your application that uses encrypted connections to communicate with your RDS instance is disconnected.

## How do I obtain the size of SQL logs that are generated by the SQL Explorer feature?

Log on to the ApsaraDB for RDS console, find your RDS instance, and go to the **Basic Information** page. In the **Usage Statistics** section of the page, you can view the size of SQL logs that are generated by the SQL Explorer feature.



Usage Statistics	
Storage Space: Used 2.25G (Capacity:150.00G) ⓘ	Space Used for Backup: Data Size: 0.00K; Log Size: 96.64M (Free quota for backup is 76800 MB.) <a href="#">View Details</a>
Log Size: 0.00K <a href="#">View Details</a>	

## If my application resides outside the VPC of my RDS instance, can it communicate with my RDS instance?

If the IP address of your application is added to an IP address whitelist of your RDS instance, your application can communicate with your RDS instance over the Internet. This applies regardless of whether your application resides in a VPC or the classic network. For more information, see [Control access to an ApsaraDB RDS for MySQL instance](#).

## Does a primary/secondary switchover trigger changes to the endpoints and port numbers of my RDS instance?

No, a primary/secondary switchover does not trigger changes to the endpoints or port numbers of your RDS instance. Only the IP addresses that are associated with the endpoints change. Your application can still connect to your RDS instance by using the endpoints.

## Can I manage accounts on my RDS instance at more granular levels, such as the source IP address and table levels?

Yes, you can log on to your RDS instance and then use commands to grant permissions to accounts at more granular levels. For more information, see [Connect to an ApsaraDB RDS for MySQL instance](#).

## Which specific permissions do privileged and standard accounts have?

For more information, see [Create accounts and databases for an ApsaraDB RDS for MySQL instance](#).

## Does ApsaraDB for RDS provide accounts that are equivalent to root or super users?

No, ApsaraDB for RDS does not provide accounts that are equivalent to root or super users. This allows you to protect your RDS instance from data losses and leaks caused by unintentional operations.

## Can I manage the accounts created on my primary RDS instance from its read-only RDS instances?



No, although the accounts created on your primary RDS instance are synchronized to its read-only RDS instances, you cannot manage the accounts on the read-only RDS instances. The accounts only have the read permissions on the read-only RDS instances.

### **When I upgrade my primary RDS instance, will ApsaraDB for RDS automatically upgrade its read-only RDS instances?**

No, after you upgrade your primary RDS instance, you must manually upgrade its read-only RDS instances. For more information, see [Change the specifications of an ApsaraDB RDS for MySQL instance](#).

### **After I set the read weight of a read-only instance to 0, can I still connect to the read-only RDS instance?**

Yes, after you set the read weight of a read-only RDS instance to 0, you can connect to the read-only RDS instance by using its internal or public endpoint. However, you cannot connect to the read-only RDS instance by using its read/write splitting endpoint. For more information, see [View and change the internal and public endpoints and port numbers of an ApsaraDB RDS for MySQL instance](#). This function is provided for you to configure a read-only RDS instance to process only specific workloads.

### **If I release a read-only RDS instance, will my workloads be interrupted?**

Yes, if you release a read-only RDS instance, your workloads will be interrupted. Before you release a read-only RDS instance, we recommend that you set its read weight to 0. For more information, see [Modify the latency threshold and read weights of ApsaraDB RDS for MySQL instances](#). However, the cached connection with your database system remains valid on the released read-only RDS instance. You must close the connection and establish a new one.

### **What can I do if read/write splitting becomes abnormal?**

For more information, see [FAQ on read/write splitting](#).

### **Can I disable the data backup function of my ApsaraDB RDS for MySQL instance?**

No, you cannot disable the data backup function of your ApsaraDB RDS for MySQL instance. However, you can reduce the backup frequency to as low as twice a week. The data backup retention period must span at least seven days.

### **Can I disable the log backup function of my ApsaraDB RDS for MySQL instance?**

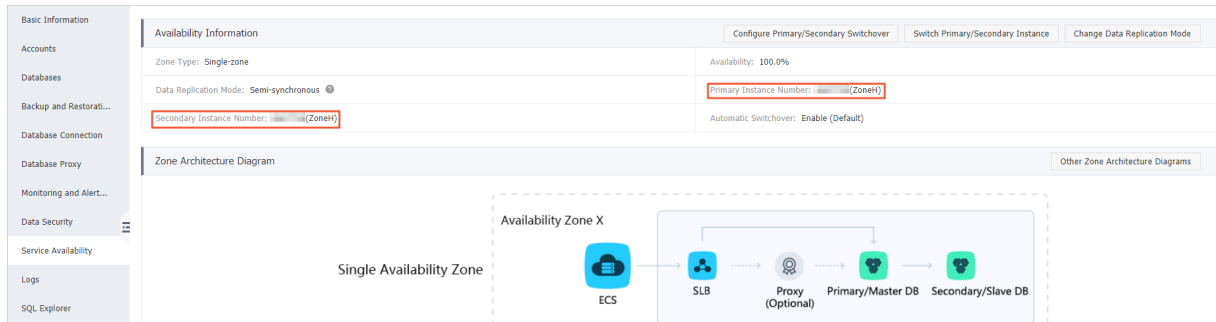
Yes, if your ApsaraDB RDS for MySQL instance does not run the RDS Basic Edition, you can disable the log backup function in the ApsaraDB for RDS console.

### **Why does a backup fail?**

Data definition language (DDL) statements trigger locks on tables. If you execute DDL statements during a backup, the backup may fail as a result of the table locks.

### **Why do I find two log backup files with the same name on the Log Backup tab?**

In the RDS High-availability Edition, your database system consists of a primary RDS instance and a secondary RDS instance. Both instances generate log backup files. Each log backup file is identified by an Instance ID on the Log Backup tab. The instance IDs allow you to distinguish the log backup files that are generated by the primary RDS instance from those that are generated by the secondary RDS instance. On the Service Availability page, you can view the IDs of the primary and secondary RDS instances based on the Primary Instance No. and Secondary Instance No. fields.



### What can I do with the data and log backup files that I downloaded?

You can use the downloaded data and log backup files to restore data at any time. For more information, see [Use a physical backup file to restore an ApsaraDB RDS for MySQL instance to a user-created MySQL database](#) and [Restore data from logical backup files of an ApsaraDB RDS for MySQL instance to a user-created database](#).

### Why does my RDS instance have a small volume of data but the size of the generated snapshot is large?

When ApsaraDB for RDS takes a snapshot of your RDS instance, it eliminates empty blocks. This allows the size of the snapshot to be smaller than the required disk space. Each block is 2 MB in size. If write operations are dispersed, a large number of blocks are not full. For example, 3 MB of data may be written into two, three, or four blocks, and none of these blocks is full. When ApsaraDB for RDS calculates the size of the snapshot, it counts in all of these non-empty blocks to which data is written. As a result, the disk space occupied by the snapshot is greater than the actual size of the snapshot.

# 8. Typical applications

## 8.1. Remote disaster recovery

### Remote disaster recovery from a user-created database to an RDS instance

You can use DTS to synchronize the data of a database in any user-created data center or an ECS-hosted database in one region to an RDS instance in another region in real time. In such case, you can always retrieve a backup of your data on Alibaba Cloud even if your data center is damaged.

For more information about how to synchronize data, see [Create a data synchronization task](#).

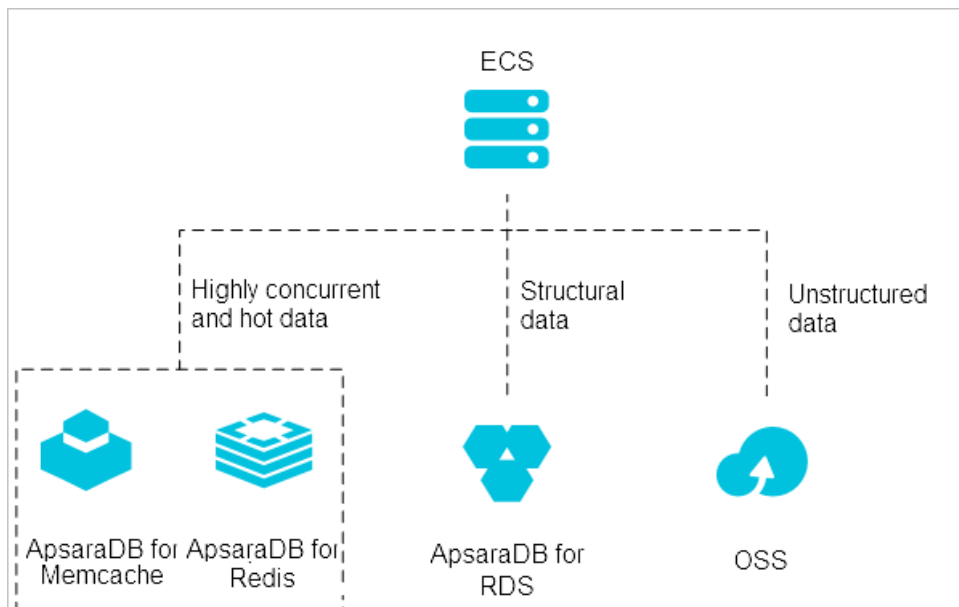
### Cross-region backup and restoration

RDS MySQL can automatically replicate backup files from your computer to an OSS bucket that is located in a region different from your computer. The backup file replicates are used to manage and restore your RDS instance. For more information, see [Restore an ApsaraDB RDS for MySQL instance across regions](#).

## 8.2. Diversified data storage

This topic describes the application of ApsaraDB for RDS in a diversified storage solution. You can use ApsaraDB for RDS along with multiple Alibaba Cloud and third-party services to develop diversified database scenarios.

The following figure shows a multi-service architecture that includes ApsaraDB for RDS, ApsaraDB for Memcache, ApsaraDB for Redis, and OSS.



### Diversified storage solution

In a multi-database architecture, ApsaraDB for RDS, ApsaraDB for Memcache, and ApsaraDB for Redis can be used to form a high-throughput and low-latency storage solution. RDS supports access to structured data, whereas ApsaraDB for Memcache and ApsaraDB for Redis support high-speed access to frequently-requested data (hot data).

These cache products have two characteristics:

- Fast response with a request delay of only a few milliseconds
- Higher QPS (queries per second) than RDS

For more information, see [Cached data persistence](#).

## Multi-structure data storage

You can integrate RDS with OSS to create a database solution that includes structured and unstructured data.

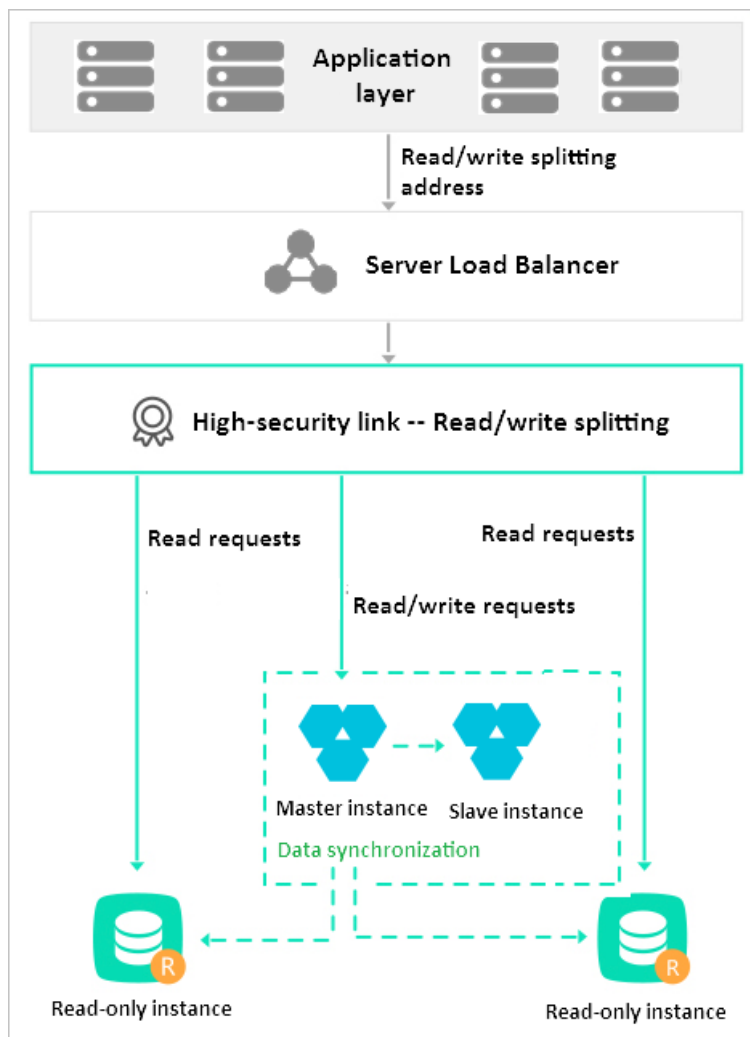
For example, you can use RDS and OSS to deliver a website hosting solution whereby unstructured data to be accessed (such as images) can be stored in OSS to reduce access pressure on RDS.

For more information, see [Multi-structure data storage](#).

## 8.3. Read/write splitting

This topic describes the read/write splitting function of ApsaraDB for RDS. This function is supported only for MySQL and SQL Server. It allows you to create read-only instances that are used offload read requests from the primary instance. Your database system automatically forwards read and write requests to the primary and read-only instances based on the specified read weights.

After you enable read/write splitting, your database system generates a read/write splitting endpoint or read-only endpoint. This endpoint is used to implement read/write splitting. You can increase the processing capability of your database system by creating read-only instances. This relieves you from the need to modify the configuration data on your application.



## References

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

## 8.4. Big data analysis

The Open Data Processing Service (MaxCompute) is formerly known as the Big Data Computing Service (ODPS). It stores and computes structured data in batches, providing solutions for massive data warehouses as well as big data analysis and modeling.

With the data integration service, RDS data can be imported into MaxCompute to achieve large-scale data computing.

## 9. ApsaraDB for RDS usage notes

This topic describes the usage notes of ApsaraDB for RDS.

After you create an RDS instance, you do not need to conduct basic database operation and maintenance (O&M), such as high availability configuration and security patching. However, you must note the following information:

- **Instance upgrade**

While you upgrade your RDS instance, a brief disconnection of up to 30 seconds may occur. To avoid interruptions to your business, we recommend that you configure your application to automatically reconnect to your RDS instance.

- **Failover**

In the High-availability or Enterprise Edition, if your primary RDS instance breaks down unexpectedly, your database system fails over to a secondary RDS instance within 30 seconds. During this process, a brief disconnection of about 30 seconds may occur. To avoid interruptions to your business, we recommend that you configure your application to automatically reconnect to your database system.

- **Internet/internal network switchover**

While you switch your RDS instance between the Internet and an internal network, the server on which your application is running is disconnected from your RDS instance, and the IP address used for connection also changes. After the switchover is complete, immediately update the configuration data on your application to include the new endpoint that is used to connect to your RDS instance.

- **Data restoration**

We recommend that you back up the important data of your RDS instance on a regular basis to avoid data losses. If you want to restore the important data, we recommend that you follow these steps: Create a temporary or clone instance, restore the important data to the temporary or clone instance, verify the important data on the temporary or clone instance, and then migrate the important data back to your RDS instance.

- **Storage capacity**

After the storage capacity of your RDS instance is exhausted, your RDS instance will be locked and can only process read requests. We recommend that you check the storage usage on a regular basis.

- **Performance optimization**

- Check whether the number of CPU cores, memory capacity, input/output operations per second (IOPS), storage capacity, and maximum number of connections for your RDS instance are adequate. Optimize or upgrade your RDS instance if necessary.
- Check whether your RDS instance is properly running. For example, check whether a large number of SQL statements are executed at low speeds, whether SQL statements need to be optimized, and whether some indexes are unnecessary or missing. Resolve all of the issues that you can identify.