

**GaussDB(for MySQL)**

# **Service Overview**

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For vulnerability information, enterprise customers can visit the following web page:

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# 1 What Is GaussDB(for MySQL)?

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GaussDB(for MySQL) is an enterprise-grade cloud-native database fully compatible with MySQL. Data functions virtualization (DFV) is used to decouple storage from compute and can auto scale up to 128 TB per instance. A failover can be performed within seconds. It provides the superior performance of a commercial database at the price of an open-source database.

GaussDB(for MySQL) currently supports the DB engines and versions listed in [DB Engines and Versions](#).

## Progressive Knowledge

You can go to [Progressive Knowledge](#) to learn the basic concepts and usage of GaussDB(for MySQL).

## Using GaussDB(for MySQL)

You can create and manage GaussDB(for MySQL) instances on the web-based [management console](#).

To help you make the most of GaussDB(for MySQL), see [Product Benefits](#).

## Advantages

- Performance
  - By decoupling compute and storage and using a "log as database" architecture, GaussDB(for MySQL) delivers seven times the performance of open-source databases.
  - The RDMA protocol is used for database transmission to break through the I/O performance bottleneck.
  - GaussDB(for MySQL) supports kernel features, such as query result cache, query plan cache, and online DDL, to improve user experience.
- Scalability
  - Horizontal scaling: In addition to a primary node, you can add up to 15 read replicas for an instance to meet high-concurrent requests.
  - Vertical scaling: You can scale up or down vCPUs and memory for an instance as needed.

- Reliability
  - You can deploy an instance across AZs or regions to improve DR capabilities.
  - Three copies of the storage layer ensure data security.
  - GaussDB(for MySQL) uses shared distributed storage. If the primary node is faulty, a read replica is automatically promoted to be primary with a zero RPO.
  - The latency of the primary node and read replicas for a DB instance is several milliseconds, ensuring high availability.
- Security
  - With shared distributed storage, GaussDB(for MySQL) can achieve service recovery within seconds and near-zero data loss.
  - VPCs, security groups, SSL connections, and data encryption are used to strictly control access security.
  - GaussDB(for MySQL) has passed over 15 security certifications, including ISO 27001, CSA, Trusted Cloud, and China's level-3 certification for information security protection. It is the first in China to obtain the highest NIST CSF certification.
- Compatibility

GaussDB(for MySQL) is fully compatible with MySQL. You can easily migrate your MySQL databases to GaussDB(for MySQL) without reconstructing existing applications.
- Backup
  - Snapshots are created in seconds and can be used to restore data quickly.
  - Based on the multi-time-point feature of the underlying storage system, data can be restored to any point in time without replaying incremental logs.
- Storage
  - Based on Huawei-developed data functions virtualization (DFV) distributed storage, GaussDB(for MySQL) supports up to 128 TB of storage.
  - GaussDB(for MySQL) automatically grows storage as needed.
- Operator pushdown

Operations such as column projection, condition filtering, and aggregation calculation are pushed to multiple nodes on a distributed storage layer for parallel execution. This improves query processing capabilities and reduces network traffic pressure on compute nodes. Operator pushdown is integrated with parallel query to execute the entire process in parallel.

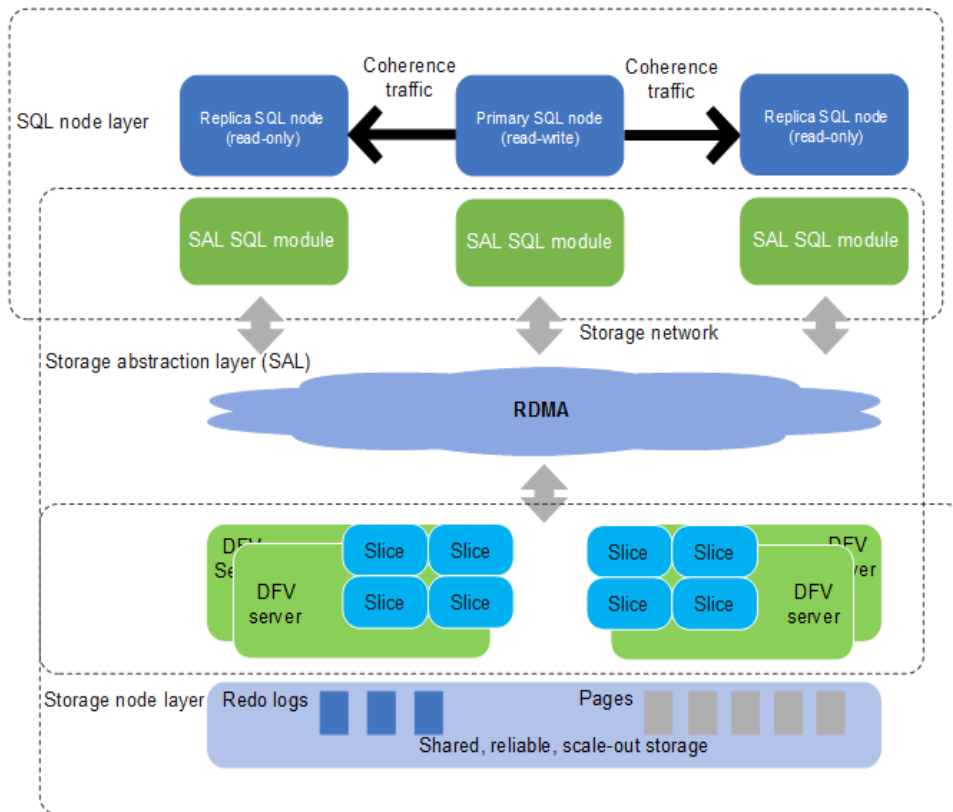
# 2 Product Architecture

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The GaussDB(for MySQL) architecture consists of three layers. From bottom to top, they are:

1. Storage node layer. Data functions virtualization (DFV) storage provides distributed, strong-consistency, and high-performance storage, featuring high data reliability and excellent horizontal scalability. The data reliability is no less than 99.999999999% (11 nines). DFV is a solution for a data-centric full-stack service architecture with decoupled storage and compute.
2. Storage abstraction layer. This layer is key to ensuring database performance. It connects to the DFV storage pool below it and provides semantics upward for ensuring efficient storage scheduling. Table file operations are abstracted into distributed storage.
3. SQL parsing layer: 100% compatible with open-source MySQL 8.0. You can use MySQL-native syntax and tools to migrate your workloads from MySQL to GaussDB(for MySQL), saving your time and efforts. In addition to full compatibility with MySQL, GaussDB(for MySQL) comes with an optimized kernel and a hardened system. It is part of an open ecosystem and provides commercial capabilities of native MySQL.

Figure 2-1 Product architecture





# 3 Basic Concepts

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Before using GaussDB(for MySQL), you should be familiar with the following concepts.

- **Primary/standby instances:** GaussDB(for MySQL) has an architecture with decoupled storage and compute that auto-scales up to 128 TB per instance. A primary/standby instance can contain a primary node and up to 15 read replicas which can be created in minutes.
- **Single-node instances:** A single-node instance contains only one primary node and there are no read replicas. Single-node instances do not involve data synchronization of nodes and can easily ensure atomicity, consistency, isolation, and durability of transactions.
- **Regions** are defined by a combination of geographical location and network latency. Public services, such as Elastic Cloud Server (ECS), Elastic Volume Service (EVS), Object Storage Service (OBS), Virtual Private Cloud (VPC), Elastic IP (EIP), and Image Management Service (IMS), are shared within the same region. Regions can be universal or dedicated. A universal region provides all sorts of cloud services for all users. A dedicated region provides only services of a given type or only for specific users. Generally, GaussDB(for MySQL) instances and ECSs must be located in the same region for high access performance.
- **Availability zone (AZ):** An AZ contains one or multiple physical data centers. Each AZ has independent cooling, fire extinguishing, moisture-proofing, and electricity facilities. Within an AZ, computing, network, storage, and other resources are logically divided into instances. An AZ is a geographic location with independent power supply and network facilities in a region.  

AZs are physically isolated but interconnected over an intranet. Each AZ provides cost-effective and low-latency network connections that are unaffected by faults in other AZs. As a result, provisioning GaussDB(for MySQL) instances in separate AZs protects your applications against local faults that occur in a single location. AZs within the same region have no functional differences.
- **Instance specifications:** Each instance is configured with compute and memory resources, for example, 16 vCPUs and 64 GB.
- **Compatibility between GaussDB(for MySQL) and browsers:** see [Which Browsers Are Supported?](#)

# 4 Product Benefits

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GaussDB(for MySQL) is an enterprise-grade cloud database with decoupled compute and storage.

## Performance

GaussDB(for MySQL) can deliver seven times the performance of open-source MySQL for certain service loads and achieve millions of queries per second (QPS).

## Scalability

- Horizontal scaling: You can add up to 15 read replicas within minutes as required.
- Vertical scaling: You can change the vCPUs and memory of instances to process uncertain workload growth.
- Storage scaling: The storage automatically grows as the amount of data in your database increases. An instance supports up to 128 TB of storage.

## Reliability

GaussDB(for MySQL) supports cross-AZ and remote disaster recovery for financial-grade reliability.

There are three data copies to ensure data security.

## Compatibility

GaussDB(for MySQL) is fully compatible with MySQL, so there is no need to reconstruct applications.

## Cost

Only 10% of the commercial databases

## Middleware-free architecture

When the service performance is normal, Distributed Database Middleware (DDM) is not required.

# 5 Instance Description

## 5.1 Instance Specifications

GaussDB(for MySQL) supports x86 and Arm CPU architectures. For details about their descriptions, see [Table 5-1](#). For detailed specifications of x86 and Arm instances, see [Table 5-3](#) and [Table 5-4](#).

- x86 instances support general-purpose and dedicated editions.
- Arm instances support only dedicated edition.

 **NOTE**

For information about Transactions Per Second (TPS) and Queries Per Second (QPS), see [Performance White Paper](#).

**Table 5-1** Instance specification types

Instance Specifications	Description	Scenario	Constraint
Dedicated (recommended)	An instance contains one primary node and up to 15 read replicas. Its CPU and memory resources are dedicated for use and performance is stable without being affected by other instances on the same physical machine.	It is suitable for scenarios that require high performance stability.	It is available only for regions listed in <a href="#">Table 5-2</a> .

Instance Specifications	Description	Scenario	Constraint
General-purpose	An instance contains one primary node and up to 15 read replicas. CPU and memory resources are shared with other general-purpose DB instances on the same physical machine. CPU usage is maximized through resource overcommitment. It is cost-effective.	It is suitable for scenarios where performance stability is not critical.	It is available only for regions listed in <a href="#">Table 5-2</a> .

**Table 5-2** Regions

Specifications	Region
Dedicated	CN North-Beijing4
	CN East-Shanghai1
	CN South-Guangzhou and CN South-Guangzhou-InvitationOnly
	CN Southwest-Guiyang1
	CN North-Ulanqab1
	AP-Singapore and AP-Jakarta
	TR-Istanbul
	LA-Sao Paulo1
General-purpose	CN North-Beijing4
	CN East-Shanghai1
	CN South-Guangzhou

**Table 5-3** x86 instance specifications (general-purpose and dedicated)

Instance Specifications	Specification Code	vCPUs	Memory (GB)
Dedicated	gaussdb.mysql.large.x86.4	2	8

Instance Specifications	Specification Code	vCPUs	Memory (GB)
	gaussdb.mysql.large.x86.8	2	16
	gaussdb.mysql.xlarge.x86.4	4	16
	gaussdb.mysql.xlarge.x86.8	4	32
	gaussdb.mysql.2xlarge.x86.4	8	32
	gaussdb.mysql.2xlarge.x86.8	8	64
	gaussdb.mysql.4xlarge.x86.4	16	64
	gaussdb.mysql.4xlarge.x86.8	16	128
	gaussdb.mysql.8xlarge.x86.4	32	128
	gaussdb.mysql.8xlarge.x86.8	32	256
	gaussdb.mysql.16xlarge.x86.4	60	256
	gaussdb.mysql.16xlarge.x86.8	64	512
General-purpose	gaussdb.mysql.large.x86.normal.4	2	8
	gaussdb.mysql.xlarge.x86.normal.2	4	8
	gaussdb.mysql.xlarge.x86.normal.4	4	16
	gaussdb.mysql.2xlarge.x86.normal.2	8	16
	gaussdb.mysql.2xlarge.x86.normal.4	8	32
	gaussdb.mysql.4xlarge.x86.normal.2	16	32
	gaussdb.mysql.4xlarge.x86.normal.4	16	64

Instance Specifications	Specification Code	vCPUs	Memory (GB)
	gaussdb.mysql.8xlarge.x86.normal.2	32	64
	gaussdb.mysql.8xlarge.x86.normal.4	32	128

**Table 5-4** Kunpeng instance specifications (dedicated)

Instance Specifications	Specification Code	vCPUs	Memory (GB)
Dedicated	gaussdb.mysql.xlarge.arm.4	4	16
	gaussdb.mysql.xlarge.arm.8	4	32
	gaussdb.mysql.2xlarge.arm.4	8	32
	gaussdb.mysql.2xlarge.arm.8	8	64
	gaussdb.mysql.4xlarge.arm.4	16	64
	gaussdb.mysql.4xlarge.arm.8	16	128
	gaussdb.mysql.8xlarge.arm.4	32	128
	gaussdb.mysql.8xlarge.arm.8	32	256
	gaussdb.mysql.12xlarge.arm.4	48	192
	gaussdb.mysql.12xlarge.arm.8	48	384
	gaussdb.mysql.15xlarge.arm.8	60	480

The DB instance specifications vary according to site requirements.

 **NOTE**

You can use **max\_connections** to configure the maximum number of connections for an instance.

## 5.2 Instance Statuses

### Instance Statuses

The status of an instance reflects the health of the instance. You can view the instance status on the console.

**Table 5-5** Instance statuses

Status	Description
Available	The instance is available.
Abnormal	The instance is abnormal.
Creating	The instance is being created.
Creation failed	The instance failed to be created.
Rebooting	The instance is being rebooted.
Changing a DB instance name	The instance name is being changed.
Changing port	The instance port is being changed.
Changing instance specifications	The CPU and memory specifications of the instance are being changed.
Adding read replicas	Read replicas are being added to the instance.
Deleting a read replica	The read replica is being deleted from the DB instance.
Promoting to primary	A read replica is being promoted to primary.
Isolating	The read replica is being isolated.
Isolated	The read replica was isolated.
Creating	The backup is being created.
Scaling up	The storage space of the instance is being scaled up.
Frozen	The DB instance is frozen when the account balance is less than or equal to \$0 USD. Frozen instances are unfrozen only after your account is recharged and the overdue payments are cleared.
Changing certificate settings	The certificate settings of the instance are being changed.

Status	Description
Changing serverless compute resources	The compute resources of the serverless instance are being changed.
Upgrading minor version	The kernel version of the instance is being upgraded.
Deleted	The instance has been deleted and will not be displayed in the instance list.

## 5.3 DB Engines and Versions

**Table 5-6** lists the DB engines and versions supported by GaussDB(for MySQL).

**Table 5-6** DB engines and versions

DB Engine	Version	Minor Kernel Version
GaussDB(for MySQL)	MySQL 8.0	<ul style="list-style-type: none"><li>• 2.0.45.230900</li><li>• 2.0.42.230600</li><li>• 2.0.39.230300</li><li>• 2.0.28.18</li><li>• 2.0.28.17</li><li>• 2.0.28.16</li><li>• 2.0.28.15</li><li>• 2.0.28.12</li><li>• 2.0.28.10</li><li>• 2.0.28.9</li><li>• 2.0.28.7</li><li>• 2.0.28.4</li><li>• 2.0.28.1</li></ul>

### NOTE

For details about the updates in each minor kernel version, see [Kernel Version Release History](#).



# 6 Security

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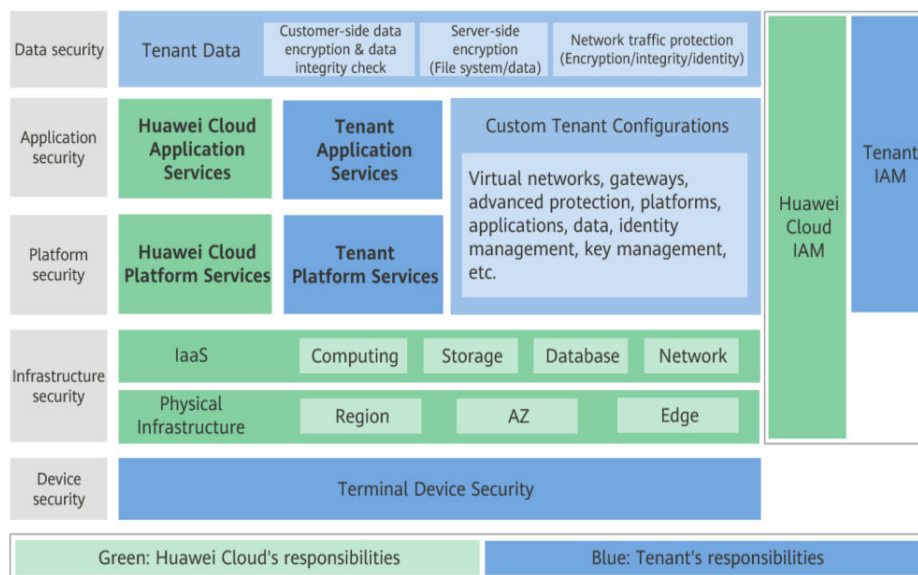
## 6.1 Shared Responsibilities

Huawei guarantees that its commitment to cyber security will never be outweighed by the consideration of commercial interests. To cope with emerging cloud security challenges and pervasive cloud security threats and attacks, Huawei Cloud builds a comprehensive cloud service security assurance system for different regions and industries based on Huawei's unique software and hardware advantages, laws, regulations, industry standards, and security ecosystem.

The shared responsibility model for Huawei Cloud and the tenants who use Huawei Cloud services is illustrated in [Figure 6-1](#). Responsibilities are as follows:

- **Huawei Cloud:** Ensure the security of cloud services and provide secure clouds. Huawei Cloud's security responsibilities include ensuring the security of our IaaS, PaaS, and SaaS services, as well as the physical environments of the Huawei Cloud data centers where our IaaS, PaaS, and SaaS services operate. Huawei Cloud is responsible for not only the security functions and performance of our infrastructure, cloud services, and technologies, but also for the overall cloud O&M security and, in the broader sense, the security and compliance of our infrastructure and services.
- **Tenant:** Use the cloud securely. Tenants of Huawei Cloud are responsible for the secure and effective management of the tenant-customized configurations of cloud services including IaaS, PaaS, and SaaS. This includes but is not limited to virtual networks, the OSs of virtual machine hosts and guests, virtual firewalls, API Gateway, advanced security services, all types of cloud services, tenant data, identity accounts, and key management.

[Huawei Cloud Security White Paper](#) elaborates on the ideas behind and measures used to ensure Huawei Cloud security, including cloud security strategies, the shared responsibility model, compliance and privacy, security organizations and personnel, infrastructure security, tenant service and security, engineering security, O&M security, and ecosystem security.

**Figure 6-1** Huawei Cloud shared security responsibility model

## 6.2 Identity Authentication and Access Control

### Identity Authentication

When you access GaussDB(for MySQL), the system authenticates your identity using password and IAM authentication.

- **Password Verification**

To manage your instance, you need to use Data Admin Service (DAS) to log in to your instance. The login is successful only after your account and password are verified.

- **IAM Verification**

You can use **Identity and Access Management (IAM)** to provide fine-grained control of GaussDB(for MySQL) permissions. IAM provides identity authentication, permissions management, and access control, helping you secure access to your Huawei Cloud resources. IAM users can use GaussDB(for MySQL) resources only after their accounts and passwords are verified. For details, see [Step 2: Create IAM Users and Log In](#).

### Access Control

- **Permissions control**

If you need to assign different permissions to different employees in your enterprise to access your instance resources, IAM is a good choice. For details, see [Permissions Management](#).

- **VPC and subnet**

A VPC is a logically isolated, configurable, and manageable virtual network. It helps improve the security of cloud resources and simplifies network deployment. You can define security groups, virtual private networks (VPNs), IP address segments, and bandwidth for a VPC. This facilitates internal

network configuration and management and allows you to change your network in a secure and convenient network manner.

A subnet provides dedicated network resources that are logically isolated from other networks for security.

For details, see [Creating a VPC](#).

- **Security group**

A security group is a logical group that provides access control policies for the ECSs and GaussDB(for MySQL) instances that have the same security protection requirements and are mutually trusted in a VPC. To ensure database security and reliability, you need to configure security group rules to allow only specific IP addresses and ports to access instances.

## 6.3 Data Protection

GaussDB(for MySQL) provides a series of methods and features to ensure data security and reliability.

**Table 6-1** Methods for data security

Method	Description
Transmission encryption (HTTPS)	HTTP and HTTPS are both supported, but HTTPS is recommended for enhanced security.
Data backup	You can back up and restore databases to ensure data reliability.
Critical operation protection	With this function enabled, the system authenticates user's identity when they perform any risky operations, like deleting a bucket. This enhances the protection for your data and configuration.
SSL	You can use SSL to encrypt the connection between GaussDB(for MySQL) and the client. It provides privacy, authentication, and integrity to Internet communications.

## 6.4 Audit and Logs

### Audit

Cloud Trace Service (CTS) records operations on the cloud resources in your account. You can use the logs generated by CTS to perform security analysis, track resource changes, audit compliance, and locate faults.

For details about how to enable and configure CTS, see [Enabling CTS](#).

With CTS, you can record operations associated with GaussDB(for MySQL) for later query, audit, and backtrack operations.

## Logs

GaussDB(for MySQL) provides a variety of log types and functions for database analysis or audit. You can view logs on the management console.

- Error logs  
GaussDB(for MySQL) allows you to view database-level logs, including error logs and slow SQL query logs.
- Slow query logs  
Slow query logs record statements that exceed **long\_query\_time** (10 seconds by default). You can view log details and statistics to identify slow statements, so you can optimize them.
- SQL Explorer  
Enabling SQL Explorer will allow GaussDB(for MySQL) to store all SQL statement logs for analysis.  
SQL Explorer is disabled by default.  
If SQL Explorer is enabled, you can use DAS to view average execution duration, total execution duration, average lock wait time, average rows scanned, and the like.

## 6.5 Risk Monitoring

Cloud Eye is a comprehensive monitoring platform for resources like cloud databases and cloud servers. It enables you to monitor resources, configure alarm rules, identify resource exceptions, and quickly respond to resource changes.

### Monitoring Metrics

You can monitor resources and operations, such as CPU usage and network throughput using Cloud Eye.

The monitoring interval can be 1 minute, 1 second, or 5 seconds. The default monitoring interval is 1 minute. To improve the accuracy of monitoring metrics, you can enable Monitoring by Seconds.

### Event Monitoring

Event monitoring provides reporting, query, and alarm functions for event data. You can create alarm rules for both system events and custom events. When specific events occur, Cloud Eye generates alarms for you.

## 6.6 Fault Rectification

Automated backups are created during the backup window of your DB instances. GaussDB(for MySQL) saves automated backups based on the retention period (1 to 732 days) you specified.

## Cross-Region Backups

GaussDB(for MySQL) can store backups in a different region from the instance for disaster recovery. If an instance in a region is faulty, you can use backups in another region to restore data to a new instance.

After you enable cross-region backup, the backup files are automatically stored in the region you specify.

## Multiple-AZ Deployment

An AZ is a physical region where resources have their own independent power supply and networks. AZs are physically isolated but interconnected through an internal network. GaussDB(for MySQL) supports multiple-AZ deployment for cross-region DR.

## Failover

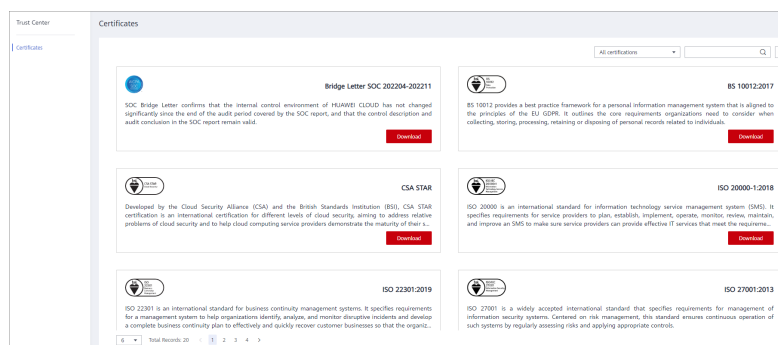
A GaussDB(for MySQL) instance contains a primary node and multiple read replicas. If a primary node becomes unavailable, GaussDB(for MySQL) automatically fails over to a read replica.

# 6.7 Certificates

## Compliance Certificate

Huawei Cloud services and platforms have obtained various security and compliance certifications from authoritative organizations, such as International Organization for Standardization (ISO), System and Organization Controls (SOC), and Payment Card Industry (PCI) compliance standards. You can [download](#) them.

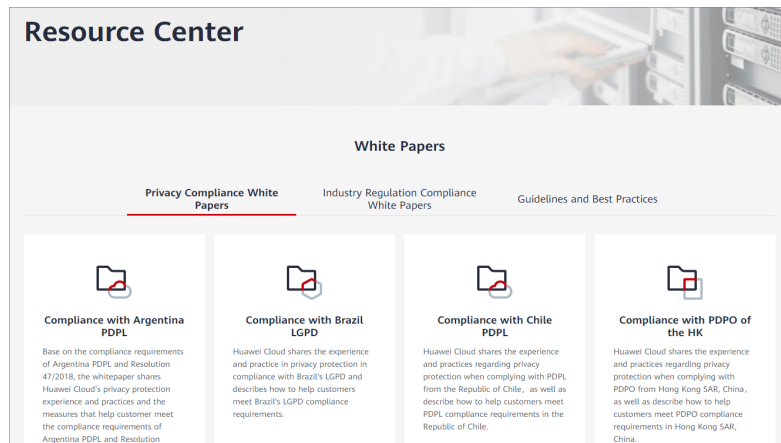
Figure 6-2 Downloading compliance certificates



## Resource Center

Huawei Cloud also provides the following resources to help users meet compliance requirements. For details, see [Resource Center](#).

Figure 6-3 Resource center



# 7 Permissions Management

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If your account does not need individual IAM users for permissions management, you can skip over this section.

If you need to assign different permissions to employees in your enterprise to access your GaussDB(for MySQL) resources, **IAM** is a good choice for fine-grained permissions management. IAM provides identity authentication, permissions management, and access control, helping you secure access to your resources.

With IAM, you can use your account to create IAM users for your employees, and assign specific permissions to different users to control their access to specific resource types. For example, you can grant software developers in your enterprise permissions to use GaussDB(for MySQL) resources but not permissions needed to delete them or perform any high-risk operations.

IAM is a free service. You pay only for the resources in your account. For more information about IAM, see [IAM Service Overview](#).

## GaussDB(for MySQL) Permissions

New IAM users do not have any permissions assigned by default. You need to first add them to one or more groups and attach policies or roles to these groups. The users then inherit permissions from the groups and can perform specified operations on cloud services based on the permissions they have been assigned.

GaussDB(for MySQL) is a project-level service deployed in specific physical regions. To assign GaussDB(for MySQL) permissions to a user group, specify the scope as region-specific projects and select projects for the permissions to take effect. If **All projects** is selected, the permissions will be granted to the user group in all region-specific projects. When accessing GaussDB(for MySQL), the users need to switch to a region where they have been authorized to use this service.

- **Policies:** A fine-grained authorization strategy that defines permissions required to perform operations on specific cloud resources under certain conditions. They allow for more flexible permission management and meet requirements for secure access control. For example, you can grant GaussDB(for MySQL) users only the permissions needed to manage a certain type of database resources.

**Table 7-1** lists all the system-defined roles and policies supported by GaussDB(for MySQL).

**Table 7-1** System-defined roles and policies supported by GaussDB(for MySQL)

Policy	Description	Type
GaussDB FullAccess	Full permissions for GaussDB(for MySQL)	System-defined policy
GaussDB ReadOnlyAccess	Read-only permissions for GaussDB(for MySQL)	System-defined policy

**Table 7-2** lists the common operations supported by each system-defined policy or role of GaussDB(for MySQL). Choose appropriate system policies based on this table.

**Table 7-2** Common operations supported by each system-defined policy or role of GaussDB(for MySQL)

Operation	GaussDB FullAccess	GaussDB ReadOnlyAccess
Creating an instance	Supported	Not supported
Deleting an instance	Supported	Not supported
Querying an instance list	Supported	Supported

**Table 7-3** Common operations and supported actions

Operation	Action	Description
Modifying parameters in a parameter template	gaussdb:param:modify	-
Changing DB instance specifications	gaussdb:instance:modify Spec	-



Operation	Action	Description
Creating a DB instance	gaussdb:instance:create	<p>To select a VPC, subnet, and security group, configure the following actions:</p> <p>vpc:vpcs:list vpc:vpcs:get vpc:subnets:get vpc:securityGroups:get</p> <p>To create an encrypted instance, configure the KMS Administrator permission for the project.</p> <p>To create yearly/monthly instances, configure the following CBC actions:</p> <p>bss:renewal:view bss:renewal:update bss:balance:view bss:order:view bss:order:update bss:order:pay</p> <p>To configure TDE during instance creation, configure the following action:</p> <p>iam:agencies:createServiceLinkedAgencyV5</p>
Creating a manual backup	gaussdb:backup:create	-
Querying backups	gaussdb:backup:list	-
Querying error logs	gaussdb:log:list	-
Rebooting a DB instance	gaussdb:instance:restart	-
Querying DB instances	gaussdb:instance:list	-
Creating a parameter template	gaussdb:param:create	-
Deleting a parameter template	gaussdb:param:delete	-
Modifying a backup policy	gaussdb:instance:modifyBackupPolicy	-

Operation	Action	Description
Viewing parameter templates	gaussdb:param:list	-
Deleting a DB instance	gaussdb:instance:delete	To unsubscribe from a yearly/monthly instance, configure the following action: bss:unsubscribe:update
Deleting a manual backup	gaussdb:backup:delete	-
Querying project tags	gaussdb:tag:list	-
Applying a parameter template	gaussdb:param:apply	-
Adding or deleting project tags in batches	gaussdb:instance:dealTag	-
Changing quotas	gaussdb:quota:modify	-
Upgrading a DB instance version	gaussdb:instance:upgrade	-
Promoting a read replica to the primary node	gaussdb:instance:switchover	-
Changing a database port	gaussdb:instance:modifyPort	-
Changing a security group	gaussdb:instance:modifySecurityGroup	-
Changing the private IP address	gaussdb:instance:modifyIp	To select an IP address, configure the following actions: vpc:vpcs:list vpc:vpcs:get
Enabling or disabling SSL	gaussdb:instance:modifySSL	-
Changing an instance name	gaussdb:instance:rename	-
Adding read replicas	gaussdb:instance:addNodes	-
Deleting read replicas	gaussdb:instance:deleteNodes	-
Scaling storage space	gaussdb:instance:modifyStorageSize	-

Operation	Action	Description
Changing a DB instance password	gaussdb:instance:modify Password	-
Binding an EIP to a DB instance	gaussdb:instance:bindPublicIp	To display EIPs on the console, configure: vpc:publicIps:get vpc:publicIps:list
Unbinding an EIP from a DB instance	gaussdb:instance:unbind PublicIp	-
Modifying a monitoring policy	gaussdb:instance:modify MonitorPolicy	-
Changing a failover priority	gaussdb:instance:modify SwitchoverPriority	-
Changing the maintenance window	gaussdb:instance:modify MaintenanceWindow	-
Isolating nodes	gaussdb:instance:isolate Nodes	-
Enabling or disabling SQL Explorer	gaussdb:instance:modify TraceSQLPolicy	-
Querying HTAP instances	gaussdb:htapInstance:list	-
Creating an HTAP instance	gaussdb:htapInstance:create	-
Modifying a GaussDB HTAP instance.	gaussdb:htapInstance:modify	-
Deleting an HTAP instance	gaussdb:htapInstance:delete	-
Changing an HTAP instance name	gaussdb:htapInstance:rename	-
Rebooting an HTAP instance	gaussdb:htapInstance:restart	-
Upgrading an HTAP instance version	gaussdb:htapInstance:upgrade	-
Promoting a read replica of an HTAP instance to primary	gaussdb:htapInstance:switchover	-
Changing the specifications of an HTAP Instance	gaussdb:htapInstance:modifySpec	-

Operation	Action	Description
Scaling up storage of an HTAP instance	gaussdb:htaplInstance:modifyStorageSize	-
Binding an EIP for an HTAP instance	gaussdb:htaplInstance:bindPublicIp	-
Unbinding an EIP from an HTAP instance	gaussdb:htaplInstance:unbindPublicIp	-
Changing the port of an HTAP instance	gaussdb:htaplInstance:modifyPort	-
Changing the HTAP instance password	gaussdb:htaplInstance:modifyPassword	-
Creating an HTAP Data Synchronization Task	gaussdb:htaplInstance:createDataSync	-
Modifying an HTAP Data Synchronization Task	gaussdb:htaplInstance:modifyDataSync	-
Deleting an HTAP Data Synchronization Task	gaussdb:htaplInstance:deleteDataSync	-
Creating a database proxy instance	gaussdb:proxy:create	-
Changing the read/write splitting address	gaussdb:proxy:modifyIp	-
Modifying the read weights of a proxy instance	gaussdb:proxy:modifyWeight	-
Changing the database proxy port	gaussdb:proxy:modifyPort	-
Modifying database proxy access control	gaussdb:proxy:modifyAccess	-
Deleting a proxy instance	gaussdb:proxy:delete	-
Querying proxy Instances	gaussdb:proxy:list	-
Upgrading a proxy instance version	gaussdb:proxy:upgrade	-
Changing a proxy instance name	gaussdb:proxy:rename	-
Adding database proxy nodes	gaussdb:proxy:addNodes	-
Deleting database proxy nodes	gaussdb:proxy:deleteNodes	-

Operation	Action	Description
Changing specifications of a proxy instance	gaussdb:proxy:modifySpec	-
Applying for a private domain name for a database proxy instance	gaussdb:proxy:createDns	-
Changing the domain name of proxy instance	gaussdb:proxy:modifyDns	-
Deleting the domain name of a proxy instance	gaussdb:proxy:deleteDns	-
Changing the routing policy of a proxy instance	gaussdb:proxy:modifyRouteMode	-
Enabling or disabling SSL for a proxy instance	gaussdb:proxy:modifySSL	-
Creating database users	gaussdb:user:create	-
Deleting database users	gaussdb:user:delete	-
Changing the password of a database user	gaussdb:user:modify	-
Querying database users	gaussdb:user:list	-
Authorizing database permissions to users	gaussdb:user:grantPrivilege	-
Revoking database permissions from users	gaussdb:user:revokePrivilege	-
Creating databases	gaussdb:database:create	-
Deleting databases	gaussdb:database:delete	-
Querying databases	gaussdb:database:list	-
Querying predefined tags	-	To query predefined tags, configure the following action: tms:resourceTags:list
Querying configured log groups	-	To query configured log groups, configure the following action: lts:groups:get
Querying configured log streams	-	To query configured log streams, configure the following action: lts:topics:get

Operation	Action	Description
Modifying auto scaling policies	gaussdb:autoscaling:createPolicy	To modify auto scaling policies, configure the following action: iam:agencies:listAgencies

# 8 Constraints

To ensure the stability and security of GaussDB(for MySQL), certain constraints are put in place for access or permission control. [Table 8-1](#) and [Table 8-2](#) describe such constraints.

**Table 8-1** Function constraints

Function	Constraint
GaussDB(for MySQL) access	<ul style="list-style-type: none"><li>• If GaussDB(for MySQL) instances do not have EIPs bound, the instances must be in the same VPC subnet as the ECSs associated with these instances.</li><li>• Security group rules must be added to allow ECSs to access GaussDB(for MySQL) instances. By default, a GaussDB(for MySQL) instance cannot be accessed by an ECS in a different security group. To enable access, you must add an inbound rule to the GaussDB(for MySQL) security group. When adding the rule, set the protocol and port, respectively, to TCP and to the default database port of the instance.</li><li>• Default database port of GaussDB(for MySQL): For primary/standby instances, the default port is <b>3306</b>. You can change it if you want to access GaussDB(for MySQL) through another port over a private or public network.</li></ul>
Database root permissions	Only the <b>root</b> permissions for primary/standby instances are available on the instance creation page.
Database parameter modification	Most parameters can be modified on the GaussDB(for MySQL) console.
Data migration	DRS or mysqldump can be used to migrate data to GaussDB(for MySQL).
MySQL storage engine	Only InnoDB storage engine is supported.

Function	Constraint
GaussDB(for MySQL) instance reboot	GaussDB(for MySQL) instances can only be rebooted on the GaussDB(for MySQL) console.
GaussDB(for MySQL) backup files	GaussDB(for MySQL) backup files are stored in OBS buckets and are not visible to you.
Binlog function	Binlog cannot be enabled for read replicas.
Partitioned tables	GaussDB(for MySQL) is compatible with MySQL Community Server 8.0.22. For a list-partitioned table, there are up to 256 values in a partition, or an error is reported. (Workaround: Redistribute the contents of one table partition into multiple partitions.)

**Table 8-2** Naming constraints

Parameter	Constraint
DB instance name	The name can contain 4 to 64 characters and must start with a letter. Only letters, digits, hyphens (-), and underscores (_) are allowed.
Database name	The name can contain 1 to 64 characters. Only letters, digits, hyphens (-), and underscores (_) are allowed. The total number of hyphens (-) cannot exceed 10.
Non-administrator account	The account can contain 1 to 32 characters. Only letters, digits, and underscores (_) are allowed.
Password	The password can contain 8 to 32 characters and must consist of at least three types of the following characters: uppercase letters, lowercase letters, digits, and special characters (~!@#\$%^*_+=+?,()&).
Parameter template name	The template name can contain 1 to 64 characters. Only letters (case-sensitive), digits, hyphens (-), underscores (_), and periods (.) are allowed.
Backup name	The backup name can consist of 4 to 64 characters and must start with a letter. Only letters (case-sensitive), digits, hyphens (-), and underscores (_) are allowed.



# 9 Billing

You only pay for what you use. There is no minimum charge.

## Billing Item

**Table 1** shows GaussDB(for MySQL) billing items.

**Table 9-1** Billing items

Item	Billing Method
DB instance	Yearly/monthly or pay-per-use
Storage space	Yearly/monthly or pay-per-use <ul style="list-style-type: none"><li>When you buy a yearly/monthly instance, you need to specify its storage. However, if the actual usage exceeds your purchased storage, you will be billed for additional storage on a pay-per-use basis.</li><li>When you buy a pay-per-use instance, you do not need to specify its storage, which will be scaled up dynamically based on the amount of data that needs to be stored, and is billed hourly on a pay-per-use basis.</li></ul>
Backup storage	GaussDB(for MySQL) provides storage space for backing up all of your provisioned database storage at no additional charge. If the backup storage usage exceeds 100% of your provisioned database storage, the additional part will be billed based on the backup storage pricing.
Public network traffic	GaussDB(for MySQL) instances are accessible from both private and public networks, but only the traffic from public networks is billed.
Monitoring by seconds	Pricing is listed on a per-hour basis, but bills are calculated based on the actual usage duration. GaussDB(for MySQL) provides monitoring every 60 seconds for free.

For details, see [Product Pricing Details](#). You can use the price calculator to estimate the cost for your GaussDB(for MySQL) usage.

## Billing Modes

GaussDB(for MySQL) provides the following two billing modes:

- **Yearly/Monthly:** Provides a larger discount than pay-per-use billing and is recommended for long-term use. If the storage space of a yearly/monthly instance is full, the additional space will be billed on a pay-per-use basis.
- **Pay-per-Use (hourly):** allows you to pay for only the resources you actually use. Pricing is listed on a per-hour basis, but bills are calculated down to the second.
- **Serverless:** The resources of serverless DB instances automatically change based on application requirements. You can start using the DB instance first and then pay as you go.

## Configuration Changes

- **Modifying instance specifications:** You can change vCPUs and memory of instances based on service requirements. After the modification, you are billed based on the new specifications.
- **Changing storage:** You can only change the storage of your yearly/monthly instances based on the amount of data that needs to be stored. After the change, you will be billed based on the new storage space. The storage can be scaled up or down only by a multiple of 10 GB.
- **Changing the compute configurations of a serverless instance:** Serverless compute configurations scale up or down when CPU usage, memory usage, or buffer pool hit ratio met the following conditions.

**Table 9-2** Changing serverless compute resources

Change Type	Trigger Condition
Scale up	One of the following conditions is met: <ul style="list-style-type: none"><li>• The CPU usage is greater than 90% for 5 seconds and the interval between two scale-up operations is at least 5 seconds.</li><li>• The memory usage is greater than 90% for 5 seconds and the interval between two scale-up operations is at least 5 seconds.</li></ul>
Scale down	One of the following conditions is met: <ul style="list-style-type: none"><li>• The CPU usage is less than 30% for 15 seconds and the interval between two scale-down operations is at least 15 seconds.</li><li>• The memory usage is less than 30% for 15 seconds, the CPU usage is less than 70% for 15 seconds, and the interval between two scale-down operations is at least 15 seconds.</li></ul>

# 10 Related Services

The following figure shows the relationship between GaussDB(for MySQL) and other services.

**Table 10-1** Related services

Service	Description
Elastic Cloud Service (ECS)	Enables you to access GaussDB(for MySQL) through an internal network. You can then access applications faster and you do not need to pay for public network traffic.
Virtual Private Cloud (VPC)	Isolates your networks and controls access to your GaussDB(for MySQL) instances.
Object Storage Service (OBS)	Stores automated and manual backups of your GaussDB(for MySQL) instances.
Cloud Eye	Monitors GaussDB(for MySQL) resources in real time and reports alarms and warnings promptly if any.
Cloud Trace Service (CTS)	Records operations on cloud service resources for future query, audit, and backtrack.
Data Replication Service (DRS)	Smoothly migrates databases to the cloud.
Enterprise Project Management Service (EPS)	Allows you to manage cloud resources and user groups by enterprise project.
Tag Management Service (TMS)	Makes it simple for users to implement, manage, and maintain tags on cloud resources.
Distributed Database Middleware (DDM)	Connects to multiple GaussDB(for MySQL) instances and allows you to access distributed databases.

# 11 Differences Between GaussDB(for MySQL) and RDS for MySQL

GaussDB(for MySQL) has good performance, scalability, and usability. For details, see [Table 11-1](#).

**Table 11-1** Differences between GaussDB(for MySQL) and RDS for MySQL

Item	RDS for MySQL	GaussDB(for MySQL)
Architecture	Traditional primary/standby architecture. Data is synchronized between the primary and standby nodes using binlog.	Decoupled storage and compute architecture. Compute nodes share the same data and data does not need to be synchronized using binlog.
Performance	Hundreds of thousands of QPS, delivering three times the performance of the open-source MySQL in high concurrency.	Millions of QPS, seven times the performance of open-source MySQL for certain service loads. In complex queries, operations, such as column extraction, conditional filtering, and aggregation calculation, can be pushed down to the storage layer, improving the performance by dozens of times compared with traditional databases.

Item	RDS for MySQL	GaussDB(for MySQL)
Scalability	<ul style="list-style-type: none"> <li>Up to five read replicas can be added for an instance. The time required for adding read replicas depends on the data volume. Adding read replicas require additional storage.</li> <li>The storage can grow as needed, with up to 4 TB for an instance.</li> </ul>	<ul style="list-style-type: none"> <li>Up to 15 read replicas can be added for an instance. Thanks to the shared storage, the time required for adding read replicas is not affected by the data volume. In addition, no additional storage is needed for read replica creation.</li> <li>The storage grows as needed with up to 128 TB for an instance.</li> </ul>
Availability	If the primary instance fails, the standby instance can be automatically promoted to the primary, with an RTO of less than 30s.	If the primary node is faulty, a read replica can be automatically promoted to the primary, with an RTO of less than 10s. It has lower latency because no data synchronization is required between the primary node and read replicas using binlog.
Backup restoration	Data can be restored to a specific point in time using full backups and binlog playback.	Data can be restored to a specific point in time using full backup (snapshots) and redo playback. Its restoration speed is faster.
DB engine version	MySQL 5.6, 5.7, and 8.0.	MySQL 8.0

# A Change History

Released On	Description
2023-07-24	This issue is the sixteenth official release, which incorporates the following change: Added <a href="#">naming constraints</a> .
2023-07-19	This issue is the fifteenth official release, which incorporates the following change: Optimized the conditions for changing the serverless compute in <a href="#">Configuration Changes</a> .
2023-05-22	This issue is the fourteenth official release, which incorporates the following change: Added single instances.
2023-04-20	This issue is the thirteenth official release, which incorporates the following change: Added general-purpose instance specifications. For details, see <a href="#">Instance Specifications</a> .
2023-03-20	This issue is the twelfth official release, which incorporates the following change: Added the fine-grained permission "Applying for a private domain name for a database proxy instance". For details, see <a href="#">Permissions Management</a> .
2023-03-14	This issue is the eleventh official release, which incorporates the following change: Optimized the content in <a href="#">Differences Between GaussDB(for MySQL) and RDS for MySQL</a> .
2023-01-11	This issue is the tenth official release, which incorporates the following change: Optimized <a href="#">DB Engines and Versions</a> .

Released On	Description
2022-12-07	This issue is the ninth official release, which incorporates the following change: <ul style="list-style-type: none"><li>• Added <a href="#">Differences Between GaussDB(for MySQL) and RDS for MySQL</a>.</li><li>• Optimized the content in <a href="#">Product Benefits</a>.</li></ul>
2022-11-10	This issue is the eighth official release, which incorporates the following changes: <ul style="list-style-type: none"><li>• Added <a href="#">Shared Responsibilities</a>.</li><li>• Added <a href="#">Identity Authentication and Access Control</a>.</li><li>• Added <a href="#">Data Protection</a>.</li><li>• Added <a href="#">Audit and Logs</a>.</li><li>• Added <a href="#">Risk Monitoring</a>.</li><li>• Added <a href="#">Fault Rectification</a>.</li><li>• Added <a href="#">Certificates</a>.</li></ul>
2022-11-04	This issue is the seventh official release, which incorporates the following change: Optimized the content in <a href="#">Permissions Management</a> .
2022-10-26	This issue is the sixth official release, which incorporates the following changes: <ul style="list-style-type: none"><li>• Optimized the description of storage layer in <a href="#">Product Architecture</a>.</li><li>• Added the specification codes in <a href="#">Instance Specifications</a>.</li></ul>
2022-01-28	This issue is the fifth official release, which incorporates the following change: Added DDM description in <a href="#">Related Services</a> .
2021-11-08	This issue is the fourth official release, which incorporates the following change: Added <a href="#">Permissions Management</a> .
2021-03-17	This issue is the third official release, which incorporates the following changes: <ul style="list-style-type: none"><li>• Optimized the architecture flowchart.</li><li>• Optimized instance specifications.</li></ul>
2021-02-27	This issue is the second official release, which incorporates the following change: Optimized instance specifications.
2020-10-27	This issue is the first official release.