GaussDB(for MySQL)

Service Overview

Issue   02

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1 What Is GaussDB(for MySQL)?

GaussDB(for MySQL) is an enterprise-grade distributed 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**.

2 Product Architecture

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.
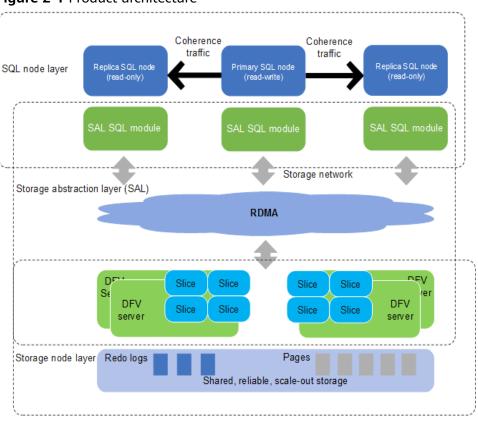
Figure 2-1 Product architecture

3 Basic Concepts

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

- 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.

4 Product Benefits

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 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.

Middleware-free architecture

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

5 Instance Description

5.1 Instance Specifications

Table 5-1 x86 instance specifications

Instance Specifications	vCPUs	Memory (GB)	Maximum Connections
Dedicated	4	16	5,000
	4	32	10,000
	8	32	10,000
	8	64	10,000
	16	64	18,000
	16	128	18,000
	32	128	30,000
	32	256	30,000
	60	256	60,000
	64	512	60,000

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 5-2 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.
Creating	The backup is being created.
Changing certificate settings	The certificate settings of the instance are being changed.
Deleted	The instance has been deleted and will not be displayed in the instance list.

5.3 DB Engines and Versions

Table 5-3 lists the DB engines and versions supported by GaussDB(for MySQL).

Table 5-3 DB engines and versions

DB Engine	Version
GaussDB(for MySQL)	MySQL 8.0

6 Constraints

To ensure the stability and security of GaussDB(for MySQL), certain constraints are put in place for access or permission control. **Table 6-1** and **Table 6-2** describe such constraints.

Table 6-1 Function constraints

Function	Constraint
GaussDB(for MySQL) access	- 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. - 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. - Default database port of GaussDB(for MySQL): For primary/standby instances, the default port is **3306**. You can change it if you want to access GaussDB(for MySQL) through another port over a private or public network.
Database root permissions	Only the **root** 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	The mysqldump tool can be used to migrate data to GaussDB(for MySQL).
GaussDB(for MySQL) instance reboot	GaussDB(for MySQL) instances can only be rebooted on the GaussDB(for MySQL) console.

Function	Constraint
GaussDB(for MySQL) backup files	GaussDB(for MySQL) backup files are stored in OBS buckets and are not visible to you.

Table 6-2 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.

7 Billing

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

Billing Item

Table 1 shows GaussDB(for MySQL) billing items.

Table 7-1 Billing items

Item	Billing Method
DB instance	Yearly/monthly or pay-per-use
Storage space	Yearly/monthly or pay-per-use
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.

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.

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.

8 Related Services

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

Table 8-1 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 Trace Service (CTS)	Records operations on cloud service resources.
Data Replication Service (DRS)	Smoothly migrates databases to the cloud.
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.

9 Differences Between GaussDB(for MySQL) and RDS for MySQL

GaussDB(for MySQL) has good performance, scalability, and usability. For details, see **Table 9-1**.

Table 9-1 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, delivering seven times the performance of the open-source MySQL. 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	- 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. - The storage can grow as needed, with up to 4 TB for an instance.	- 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. - The storage grows as needed with up to 128 TB for an instance.
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
2023-04-03	This issue is the second official release, which incorporates the following change: Added instance specifications. For details, see **Instance Specifications**.
2023-02-28	This issue is the first official release.