GaussDB(openGauss)

User Guide

Issue 01

Date 2020-11-30

HUAWEI TECHNOLOGIES CO., LTD.

Trademarks and Permissions

Notice

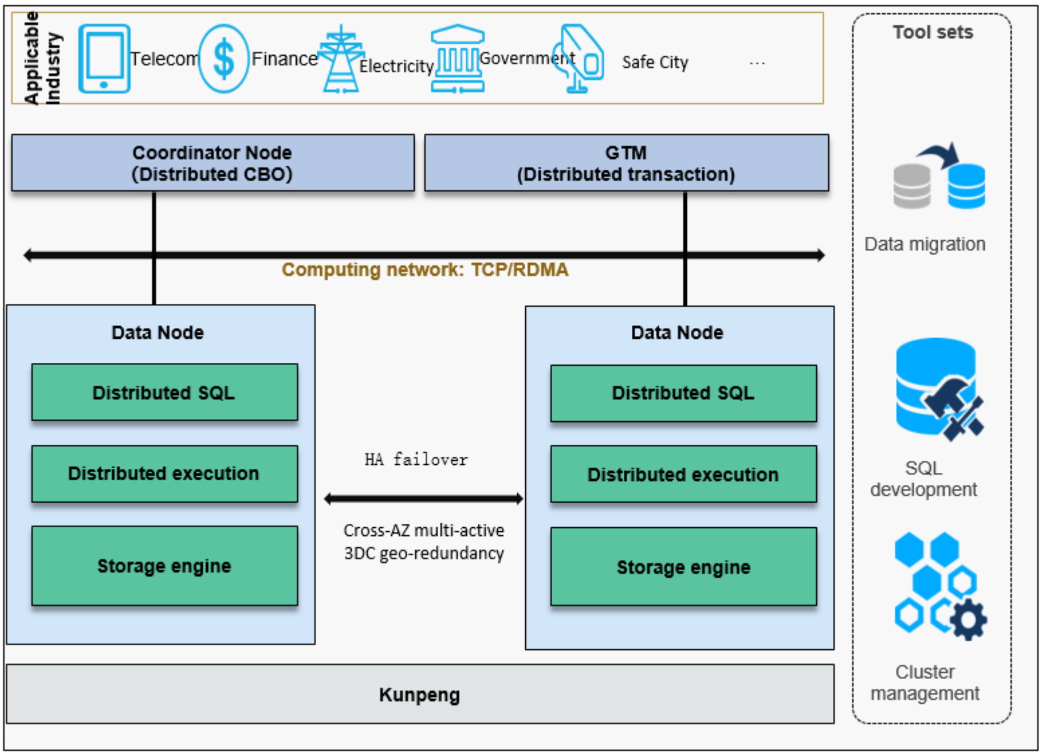
Contents

1 Introduction

1.1 What Is GaussDB(openGauss)?

GaussDB(openGauss) is a next-generation, enterprise-class relational database. It is designed based on the shared-nothing architecture and supports both x86 and Kunpeng CPU architectures. It features the following: high-throughput, strong-consistency transaction processing capabilities, financial-grade HA with 3DC geo-redundant DR, high scalability with a distributed architecture, and high-performance big data query capabilities. GaussDB(openGauss) is suitable for core systems used in a wide range of sectors, such as finance, telecom, and government.

The overall architecture of the distributed deployment model is as follows:



1.2 Basic Concepts

DB Instances

DB instances are the smallest management units used by GaussDB(openGauss). Each is an isolated database environment on the cloud. You can create and manage DB instances on the management console. For details about DB instance types, specifications, engines, versions, and statuses, see **DB Instance Description**.

Instance Versions

Currently, only 2020 Enterprise Edition is supported.

DB Instance Types

Distributed DB instances are supported. A distributed DB instance supports capability expansion through shards to cope with highly concurrent access to massive volumes of data.

DB Instance Classes

DB instance classes consist of vCPUs and memory (GB). For details, see **DB Instance Classes**.

Automated Backups

When you create a DB instance, the automated backup function is enabled by default. After the DB instance is created, you can modify the backup policy. GaussDB(openGauss) will automatically create backups for DB instances based on your settings.

Manual Backups

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

Regions and AZs

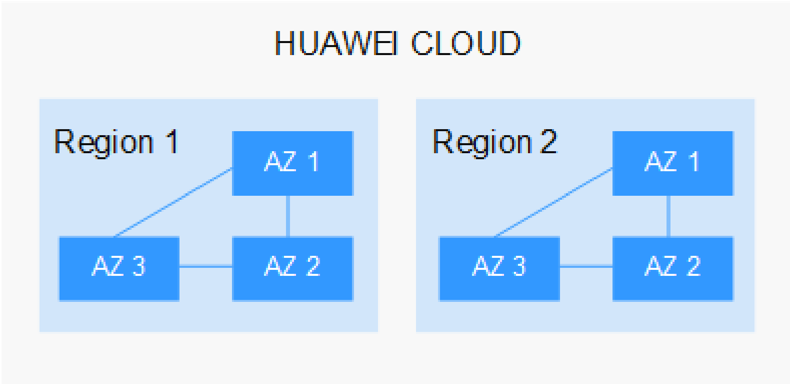
A region and availability zone (AZ) identify the location of a data center. You can create resources in a specific region and AZ.

- Regions are divided from the dimensions 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, and Image Management Service (IMS), are shared within the same cloud region. Regions are classified as Global region and specific regions. The Global region provides common cloud services for all tenants, and a specific region provides only services of the same type for specific tenants.
- An AZ contains one or multiple physical data centers. Each AZ has independent cooling, fire extinguishing, moisture-proof, and electricity

facilities. Within an AZ, computing, network, storage, and other resources are logically divided into multiple clusters. AZs within a region are interconnected using high-speed optical fibers to support cross-AZ high-availability systems.

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

Figure 1-1 Regions and AZs



HUAWEI CLOUD provides services in many regions around the world. You can select a region and AZ as needed. For more information, see **HUAWEI CLOUD Global Regions**.

Projects

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

1.3 Advantages

- **High Security**
  GaussDB(openGauss) provides a wide range of features to let you enjoy the security of top-level commercial databases at a low cost: dynamic data masking, transparent data encryption (TDE), row-level access control, and always encrypted.
- **Comprehensive Tools and Service-oriented Capabilities**
  GaussDB(openGauss) can be deployed in the HUAWEI CLOUD and hybrid cloud for commercial use and can work with ecosystem tools such as Data Admin Service (DAS), Database and Application Migration UGO (UGO), and Data Replication Service (DRS) to make development, O&M, tuning, monitoring, and migration easy to perform.
- **In-House, Full-Stack Development**
  Developed based on Huawei's Kunpeng ecosystem, GaussDB(openGauss) continuously optimizes its performance to meet ever-increasing demands in different scenarios.
- **Open-Source Ecosystem**
  GaussDB(openGauss) is an open-source database and the centralized version is available for your download from the openGauss community.

1.4 DB Instance Description

1.4.1 DB Instance Statuses

DB Instance Statuses

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

Table 1-1 DB instance statuses

Status	Description
Normal	The DB instance is available.
Abnormal	The DB instance is unavailable.
Creating	The DB instance or backup is being created.
Creation failed	The DB instance failed to be created.
Rebooting	The DB instance is rebooting because of a user request or a modification that requires a reboot for the changes to take effect.
Scaling up	The storage space of a DB instance is being scaled up.
Restoring	The DB instance is being restored from a backup.
Restore failed	The DB instance failed to be restored.
Frozen	The DB instance is frozen when the account balance is less than or equal to ¥0. Retained frozen DB instances are unfrozen only after your account is recharged and the overdue payments are cleared.
Storage full	The storage space of the DB instance is full. Data cannot be written to databases.
Deleted	The DB instance has been deleted. DB instances will not be displayed in the instance list.
Upgrading	The DB engine version is being upgraded.
Pending reboot	A modification to a database parameter is waiting for a DB instance reboot before it can take effect.

1.4.2 DB Instance Classes

Table 1-2 Instance classes

Instance Class	vCPUs	Memory (GB)
General-enhanced II **NOTE** This instance class is based on the x86 architecture.	8	64
	16	128
	32	256
	64	512

1.4.3 DB Instance Storage Types

The database system is generally an important system in the IT system and has high requirements on storage I/O performance. GaussDB(openGauss) supports **ultra-high I/O** storage type with a maximum throughput of 350 MB/s.

1.4.4 DB Instance Versions

Currently, only 2020 Enterprise Edition is supported.

1.5 Permissions Management

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

With IAM, you can use your account to create IAM users for your employees, and assign permissions to the users to control their access to specific resource types. For example, some software developers in your enterprise need to use GaussDB(openGauss) resources but must not delete them or perform any high-risk operations. To achieve this result, you can create IAM users for the software developers and grant them only the permissions required for using GaussDB(openGauss) resources.

If your account does not need individual IAM users for permissions management, you may skip this chapter.

IAM can be used for free. You pay only for the resources in your account. For more information about IAM, see the **IAM Service Overview**.

GaussDB(openGauss) Permissions

By default, new IAM users do not have permissions assigned. You need to add a user to one or more groups, and attach permissions policies or roles to these groups. Users inherit permissions from the groups to which they are added and can perform specified operations on cloud services. Currently, GaussDB(openGauss) shares the same permissions with RDS.

GaussDB(openGauss) is a project-level service deployed in specific physical regions. To assign GaussDB(openGauss) 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 take effect for the user group in all region-specific projects. When accessing GaussDB(openGauss), the users need to switch to a region where they have been authorized to use this service.

You can grant users permissions by using roles and policies.

- Roles: A type of coarse-grained authorization mechanism that defines permissions related to users responsibilities. Only a limited number of service-level roles for authorization are available. When using roles to grant permissions, you need to also assign other roles on which the permissions depend to take effect. Roles are not ideal for fine-grained authorization and secure access control.
- Policies: A fine-grained authorization mechanism that defines permissions required to perform operations on specific cloud resources under certain conditions. This mechanism allows for more flexible policy-based authorization and meets secure access control requirements. For example, you can grant IAM users only the permissions for managing a certain type of GaussDB(openGauss) resources. Most policies define permissions based on APIs. For the API actions supported by GaussDB(openGauss), see **Permissions Policies and Supported Actions**

Table 1-3 lists all the system permissions of GaussDB(openGauss).

Table 1-3 RDS system policies

Policy Name/ System Role	Description	Category	Dependencies
RDS FullAccess	Full permissions for RDS	System-defined policy	N/A
RDS ReadOnlyAccess	Read-only permissions for RDS	System-defined policy	N/A
RDS ManageAccess	Database administrator permissions for all operations except deleting RDS resources	System-defined policy	N/A
RDS Administrator	Administrator permissions for RDS	System role	The **Tenant Guest** and **Server Administrator** roles need to be assigned in the same project.

Table 1-4 lists the common operations supported by each system policy of GaussDB(openGauss). Choose proper system policies according to this table.

Table 1-4 Common operations and supported actions by the RDS system policies

Operation	RDS FullAccess	RDS ReadOnlyAccess	RDS ManageAccess	RDS Administrator
Creating a DB instance	√	x	√	√
Deleting a DB instance	√	x	x	√
Querying an instance list	√	√	√	√

Table 1-5 Common operations and supported actions

Operation	Action	Remarks
Creating a DB instance	rds:instance:create rds:param:list	To select a VPC, subnet, and security group, you need to configure the following actions: vpc:vpcs:list vpc:vpcs:get vpc:subnets:get vpc:securityGroups:get To create an encrypted DB instance, you need to configure the KMS Administrator permission for the project.
Scaling up storage space	rds:instance:extendSpace	N/A
Reboot a DB instance	rds:instance:restart	N/A
Delete a DB instance	rds:instance:delete	N/A
Querying a DB instance list	rds:instance:list	N/A

Operation	Action	Remarks
Querying DB instance details	rds:instance:list	If the VPC, subnet, and security group are displayed in the DB instance list, you need to configure vpc:*:get and vpc:*:list.
Changing DB instance passwords	rds:password:update	N/A
Changing a DB instance name	rds:instance:modify	N/A
Changing failover priorities	rds:instance:modifyStrategy	N/A
Binding or unbinding an EIP	rds:instance:modifyPublicAccess	To query public IP addresses, you need to configure the following actions: vpc:publicIps:get vpc:publicIps:list
Obtaining a parameter template list	rds:param:list	N/A
Creating a parameter template	rds:param:create	N/A
Modifying parameters in a parameter template	rds:param:modify	N/A
Applying a parameter template	rds:param:apply	N/A
Modifying parameters of a specified DB instance	rds:param:modify	N/A
Obtaining the parameter template of a specified DB instance	rds:param:list	N/A
Obtaining parameters of a specified parameter template	rds:param:list	N/A
Deleting a parameter template	rds:param:delete	N/A

Operation	Action	Remarks
Resetting a parameter template	rds:param:reset	N/A
Comparing parameter templates	rds:param:list	N/A
Saving parameters in a parameter template	rds:param:save	N/A
Querying a parameter template type	rds:param:list	N/A
Setting an automated backup policy	rds:instance:modifyBackupPolicy	N/A
Querying an automated backup policy	rds:instance:list	N/A
Creating a manual backup	rds:backup:create	N/A
Obtaining a backup list	rds:backup:list	N/A
Deleting a manual backup	rds:backup:delete	N/A
Querying restoration time ranges	rds:instance:list	N/A
Restoring data to a new DB instance	rds:instance:create	To select a VPC, subnet, and security group, configure the following actions: vpc:vpcs:list vpc:vpcs:get vpc:subnets:get vpc:securityGroups:get
Obtaining a database backup file list	rds:backup:list	N/A
Viewing a task list	rds:task:list	N/A
Deleting a task from the task center	rds:task:delete	N/A
Managing a tag	rds:instance:modify	N/A

Operation	Action	Remarks
Adding a node	rds:instance:expandCluster	N/A

Reference

- IAM Service Overview
- Permissions Policies and Supported Actions

1.6 Constraints

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

Table 1-6 Function constraints

Function Item	Constraints
Database access	• If remote access is not enabled, GaussDB(openGauss) DB instances must be in the same VPC subnet as the ECSs associated with these instances. • Security group rules must be added to allow the ECSs to access GaussDB(openGauss) DB instances. By default, a GaussDB(openGauss) DB instance cannot be accessed by an ECS in a different security group. To allow it, you must add an inbound rule to the GaussDB(openGauss) security group. • The default port is **8000**. You can change it only when creating the DB instance.
Deployment	ECSs in which GaussDB(openGauss) DB instances are deployed are not directly visible to users. You can access GaussDB(openGauss) DB instances only through an IP address and a port number.
Database root permissions	Only the **root** permissions are available on the instance creation page.
Database parameter modification	Some parameters can be modified on the console.
DB instance reboot	GaussDB(openGauss) DB instances cannot be rebooted through commands. They must be rebooted on the management console.
Backup files	GaussDB(openGauss) backup files are stored in OBS buckets and are not visible to users.

1.7 Billing

Currently, only the pay-per-use billing mode is supported.

Billing Items

HUAWEI CLOUD GaussDB(openGauss) charges you for your DB instances, database storage, and backup storage (optional).

Table 1-7 GaussDB(openGauss) billing items

Billing Item	Description
Instance class	The DB instance class (CPU and memory) is billed on the pay-per-use basis.
Database storage	The database storage is billed on the pay-per-use basis.
Backup storage (optional)	GaussDB(openGauss) provides backup storage up to 100% of your provisioned database storage at no additional charge. If the backup storage usage exceeds 100% of your provisioned database storage, tiered pricing starts.
Public network traffic	GaussDB(openGauss) DB instances are accessible from both private and public networks. Only the traffic from public networks is billed.

Billing Modes

Pay-per-use (hourly): You can pay only the resources you use. Partial hours are billed as full hours.

Specification Changes

Scaling up storage space: You can change the storage space as required. After scaling the storage space, you are charged based on the new storage space. Storage space can only be scaled up, not down. The storage space must be a multiple of (Number of shards x 40 GB).

Renewing a DB Instance

Currently, only the pay-per-use billing mode is supported. GaussDB(openGauss) allows you to tailor your computing resources and storage space to the needs of your business.

Pay-per-use: You are charged based on the actual usage by hour. Partial hours are billed as full hours. If your account balance is insufficient, it will be in arrears. Top up your account in a timely manner.

To renew a subscription, go to the **Repaying Arrears** page.

Expiration and Overdue Payment

- **Service Expiration**

  Service expiration is only for DB instances billed on a yearly/monthly basis.

- **Overdue Payment**

  A pay-per-use DB instance is billed by hour. If the account balance is not enough to cover the payment, the DB instance is in arrears. If the DB instance is renewed within the retention period, it will be available and charged from the original expiration date.

  If your purchased DB instance is in arrears, see **Repaying Arrears** in the *Billing Center User Guide*.

1.8 Related Services

Related Services shows the relationship between GaussDB(openGauss) and other services.

Table 1-8 Related services

Service Name	Description
Elastic Cloud Service (ECS)	Enables you to access DB instances through an ECS to reduce application response time and public network traffic fees.
Virtual Private Cloud (VPC)	Isolates your network and controls access to your DB instances.
Object Storage Service (OBS)	Stores automated and manual backups of your DB instances.
Cloud Eye	Acts as an open monitoring platform that monitors resources in real time. It reports alarms and issues warnings promptly to ensure that services are running properly.
Cloud Trace Service (CTS)	Provides records of operations on cloud service resources, enabling you to query, audit, and backtrack operations.
Enterprise Project Management Service (EPS)	Allows you to manage cloud resources and user groups by enterprise project.
Tag Management Service (TMS)	Provides visualized service for fast and unified cross-region tagging and categorization of cloud services.
Data Admin Service (DAS)	Provides a visualized GUI interface for you to connect and manage cloud databases.