Document Database Service

Service Overview

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1 Infographics





HUAWEI CLOUD Document Database Service

01 What Is HUAWEI CLOUD DDS?

Document Database Service (DDS) is compatible with MongoDB and supports security audit, multi-account management, and point-in-time recovery (PITR). It provides DB instances in the cluster and replica set architectures.



DDS—Four Core Values 02



MongoDB Compatibility, Three Types of **Architecture Covering Various Scenarios**

Cluster: Powerful horizontal scaling, 100 times higher than self-built databases.

Replica set: Three-node architecture, providing high availability and up to 2 TB of storage, you can add up to either 5 or 7 nodes. Single node: Cost-effective option, suitable for the deployment of non-core businesses.

> Multi-AZ Deployment, **Ensuring Service Security**

A replica set consists of three nodes.

interrupted.

2 What Is DDS?

Document Database Service (DDS), compatible with MongoDB, is a secure, high availability (HA) database service that is reliable, scalable, and easy to use. It provides functions such as one-click deployment, elastic capacity expansion, disaster recovery, backup, restoration, monitoring, and alarm reporting.

Before using DDS, you need to be familiar with MongoDB and the MongoDB protocol. For details, see **official documents**.

Storage Structure

Figure 2-1 Storage structure



The basic management unit of DDS is an instance. A DDS instance consists of database, collection, and document.

DDS is fully compatible with the MongoDB protocol, so some terms, data structures, and basic syntax of DDS are the same as those of MongoDB. The following table lists the difference between common terms in MongoDB and relational databases to help you better understand and use DDS.

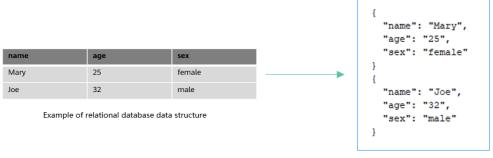
Table 2-1 Terms

MongoDB	Description	Relational Database
Database	A DDS instance contains multiple databases, and a database contains multiple collections.	Database
Collection	A collection is a group of MongoDB documents.	Table
Document	A document is a group of keyvalue pairs (BSONs) and is the most basic unit in MongoDB.	Row

Data Structure

MongoDB uses JSON-like documents when storing documents in collections. The following figure compares data structures between relational databases and MongoDB, helping you have a better understanding of MongoDB concepts.

Figure 2-2 Data structures



MongoDB data structure example

Why DDS?

For details, see **Advantages** and **Typical Application Scenarios**.

Product Pricing

For details, see **Pricing Details**.

Compatible DB Engines and Versions

For details about the compatible DB engines and versions, see **DB Engines and Versions**.

Deployment Suggestions

Before deploying DDS, consider the following factors:

- Region and Availability Zone: You should select a region and AZs based on the geographical locations of your users, product prices, DR capabilities, and network latency. Once DB instances are successfully created in specific AZs in a region, the region cannot be changed. For more information, see Region and AZ.
- Network planning: When creating a DDS DB instance, you are advised to use the Virtual Private Network (VPC) and subnet where the Elastic Cloud Server (ECS) is deployed.
- Data security: DDS provides comprehensive assurance for data security. You
 can deploy DB instances in multiple AZs and use audit logs, isolated networks,
 security groups, and data encryption to ensure data security.

3 Advantages

DDS provides several types of DB instances with high reliability and scalability. You can manage them using various O&M tools in a visual way.

Diverse Instance Types

There are many instance types to meet your requirements in different scenarios.

Table 3-1 Architecture

Instanc e Archite cture	Description	Application Scenario
Cluster	A DDS cluster consists of three types of nodes: mongos, shard, and config. You can select the number of mongos and shard nodes and the cluster configuration you need based on your performance requirements.	Cluster instances are recommended for service systems that require both high availability and scalability.
Replica set	A DDS replica set consists of three nodes: primary, secondary, and hidden. Data is automatically synchronized between nodes to ensure high data reliability. If a primary node goes down or becomes faulty, the replica set elects a secondary node as a new primary node and continues normal operations.	Replica set instance suits small- and medium-sized service systems that require high availability.

Instanc e Archite cture	Description	Application Scenario
Single node NOTE Huaw ei Cloud has discon tinued the sale of DDS single node instan ces since July 15, 2023.	While not as robust as replica sets, single node architecture can be a less expensive way to visualize O&M and provide elastic scaling.	Single node instances are useful for R&D, testing, and non-core data storage of enterprises.

Elastic Scaling

DDS allows you to change the storage space, node quantity, CPU, and memory of an instance.

Friendly UI

A web-based console provides comprehensive monitoring information, making your operations easy and visual.

Secure

- VPCs, subnets, security groups, storage encryption, SSL, and DDoS protection are provided to defend against various malicious attacks and ensure data security.
- DDS supports audit logs that record your operations on databases or collections, helping you audit database security and analyze root cause of faults
- Fine-grained permission management is supported.

Abundant O&M Tools

- Backup and restoration
 - DDS supports full backup, incremental backup, and point-in-time backup and restoration of replica sets. Backup data can be stored for up to 732 days.
- Monitoring and alarm reporting

DDS monitors instance metrics. You can customize the objects you want to monitor and configure notification policies to learn about the database service status in a timely manner.

Other advantages

DDS also boasts outstanding service availability, data durability, system security, and maintenance cost. For details, see Comparison Between DDS and On-Premises Databases.

4 Comparison Between DDS and On-Premises Databases

DDS provides high availability. It is more reliable, secure, and cost-effective than self-built databases.

Table 4-1 Comparison between DDS and on-premises databases

Item	DDS	On-Premises Database
Service availability	99.95%	Requires setting up the primary/standby relationship and HA environment for ensuring the availability.
Data durability	99.9999999%	Requires self-guarantee, primary/standby relationship setup, and RAID setup.
System security	 Anti-Distributed denial of service (DDoS) protection is provided, and system vulnerabilities are automatically addressed in a timely manner. Supports log auditing. 	 Requires procurement of expensive devices and software, as well as manual detection and fix of security vulnerabilities. Requires procurement of an audit system.

Item	DDS	On-Premises Database	
Database backup	 Automated backup is supported. You can configure backup policies based on service requirements. You can create manual or physical backups at any time. DDS helps increase backup efficiency by 3 times. Backup files are automatically uploaded to Object Storage Service (OBS) for storage. 	 Requires self-setup and maintenance. The open-source version supports only logical backup resulting in low backup efficiency. 	
Monitoring and alarm reporting	DDS interconnects with Cloud Eye, which provides a visualized platform for you to view monitoring metrics and set threshold alarms.	You have to purchase three servers and hosting fees can be expensive.	
Hosting	There are no hosting fees.	Requires purchase of three servers and payment of high hosting fees.	
Maintenan ce cost	There are no additional O&M costs, and second-by-second performance monitoring, threshold alarms, and event alarms can all be configured.	Requires a lot of workforce investment and professional database administrator (DBA) for maintenance.	
Deploymen t and scaling	Supports quick deployment, flexible application, elastic scaling, and one-click specification change.	Requires procurement, deployment, and coordination of hardware that matches original devices.	
Log transfer	Stores slow query logs and error logs for one month.	Requires you to transfer, exportant and query log information on your own.	
High availability	Provides high availability capabilities, supporting second-level switchover and failover.	Requires self-setup of HA monitoring. Data may be lost after a manual primary/ secondary switchover is performed using commands.	

5 Typical Application Scenarios

Games

Player information generated, like their equipment and bonus points, are stored in DDS databases. During peak hours, DDS cluster instances can handle large amounts of concurrent requests. DDS cluster and replica set provide high availability to ensure the games are stable in high-concurrency scenarios.

In addition, DDS is compatible with MongoDB and provides a non-schema mode, which frees you from having to change table structures when the play modes change. DDS can meet the flexible gaming requirements. You can store structured data with fixed schemas in Relational Database Service (RDS), store services with flexible schemas in DDS, and store hot data in GeminiDB Redis, improving data efficiency and reducing data storage costs.

Advantages:

- **Supports Embedded Documents**: Embedded documents eliminate the need for JOIN statements, which simplifies application development. Flexible schemas also facilitate rapid development and iteration.
- **Easy to Cope with Peak Pressure**: Sharded clusters provide enough capacity to store data into the TB range.

IoT

DDS is compatible with MongoDB and provides high-performance and asynchronous data writes. In certain scenarios, DDS can deliver performance comparable to an in-memory database. In addition, cluster instances can dynamically add mongos and shard nodes or upgrade specifications. The performance and storage space can be quickly expanded, making cluster instances suitable for IoT scenarios with high concurrent writes.

Intelligent IoT terminals need to collect various types of data, store device logs, and analyze various types of information. In recent years, IoT services have grown rapidly, generating huge volumes of data and increasing access traffic. IoT has created demand for horizontal storage scaling.

DDS provides a secondary index to meet dynamic query requirements and uses the MapReduce aggregation framework, which is compatible with MongoDB, to analyze data from multiple dimensions.

Advantages:

- **High Write Performance**: DDS sharded clusters provide the robust write performance needed to handle terabyte-scale databases.
- **High Performance and Scalability**: DDS supports applications with high QPS rates, and its sharding architecture can be scaled in or out to flexibly cope with application changes.

Internet

DDS replica sets use the three-node HA architecture. Three data nodes form an anti-affinity group and are deployed on different physical servers to automatically synchronize data. The primary and secondary nodes provide services. Each node has a private IP address and works with Driver to allocate read workloads.

Many organizations need to process and store data into the TB range, requiring data to be written to databases in real time and dynamic analysis capabilities in big data computing.

Advantages:

- **MapReduce:** With a complete data analysis utility, you can query statements or scripts, and distribute requests to DDS.
- **Excellent Scalability**: DDS DB instances can be scaled up to support growing services and data volumes in content management systems.

Others

- Social: DDS allows you to easily discover people or places nearby through geographical indexing. DDS provides a wide range of queries. It is suitable for storing chat content, and data can be read and written quickly.
- Big data: DDS can used as the cloud storage system of big data. Its flexible aggregation facilitates data extraction and analysis.
- Logistics: Order information is stored in arrays embedded in a DDS DB instance. Even if the order status is continuously updated during delivery, all order changes can be read through one query.

6 Functions and Features

This section describes the main functions and features of DDS.

Migrating Data

With **Data Replication Service (DRS)**, you can migrate self-built MongoDB databases or other cloud MongoDB databases to DDS in real time. DRS simplifies data transmission between databases and reduces data transmission costs.

Scaling up Storage

If the storage you purchased cannot meet your requirements, you can **scale up the instance**.

Changing Instance Class

If the CPU or memory of an instance cannot meet your service requirements, you can **change the instance class** on the console.

Backup and Restoration

- You can configure the automated backup policy and create backups. The
 maximum retention period for an automated backup is 732 days. A manual
 backup can be retained until you delete it.
- Data can be **restored using backup files**. Replica set instances support point-in-time recovery at the instance level, database level and table level.

Monitoring Metrics

DDS monitors key performance metrics of instances and DB engines in real time, including the CPU usage, memory usage, storage space usage, command execution frequency, delete statement execution frequency, insert statement execution frequency, and number of active connections.

Managing Logs

DDS allows you to query and download database error logs and slow query logs.

Configuring Parameters

DDS allows you to manage parameter templates and **modify parameter template settings** on the console.

Cross-AZ Disaster Recovery

If the region where your instance is located supports three or more AZs, you can deploy the instance across three AZs to achieve **cross-AZ disaster recovery**.

7 System Architecture

7.1 Cluster

A cluster consists of a config node, and multiple mongos and shard nodes.

Data read and write requests are forwarded by the mongos nodes, which read configuration settings from config, and then allocate the read and write requests to the shards, making it easy to cope with high concurrency scenarios. In addition, each config node, along with the shards in its cluster, is replicated in triplicate to ensure high availability.

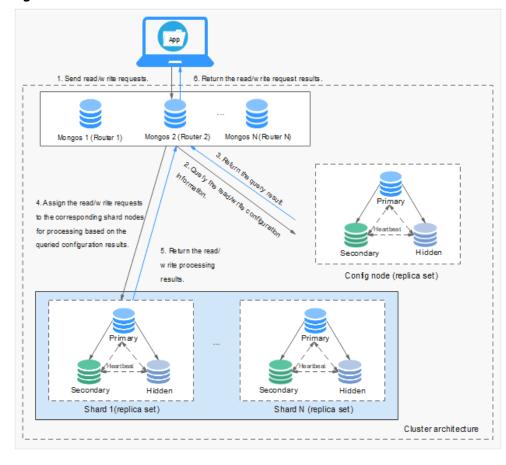


Figure 7-1 Cluster architecture

- Each mongos is a single node, but you can provision multiple mongos nodes for load balancing and failovers. A single cluster can contain 2 to 32 mongos nodes.
- Each shard is a three-node replica set. A single cluster supports 2 to 32 shards.
- A config node is a necessary part of a cluster instance, and is also deployed as a replica set. The config node stores instance configuration data.
- Cluster is suitable for handling large amounts of data and can meet the requirements for high availability and scalability.

7.2 Replica Set

A replica set consists of a set of mongod processes. It is a collection of nodes that help ensure data redundancy and reliability.

Ⅲ NOTE

For details about the mongod process, see the MongoDB official documentation.

A replica set consists of three nodes: primary, secondary, and hidden. The three-node architecture is set up automatically, and the three nodes automatically synchronize data with each other to ensure data reliability. Replica sets are recommended for small- and medium-sized service systems that require high availability.

- Primary node: Primary nodes are used to process both read and write requests.
- Secondary node: Secondary nodes are used to process read requests only.
- Hidden node: Hidden nodes are used to back up service data.

You can perform operations on the primary and secondary nodes. If the primary node is faulty, the system automatically selects a new primary node. The following figure shows the replica set architecture.

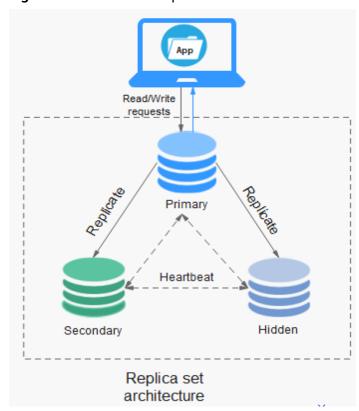


Figure 7-2 Three-node replica set architecture

After a replica set is created, you can add up to either 5 or 7 nodes. For details about how to add a replica set node, see **Adding Replica Set Instance Nodes**.



Figure 7-3 Replica set instance nodes

7.3 Single Node

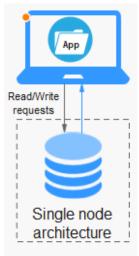
Ⅲ NOTE

Huawei Cloud has discontinued the sale of DDS single node instances since July 15, 2023.

A single node instance, as its name suggests, contains only one node and that node can be accessed directly.

As a supplement to the cluster and replica set architectures, the single-node architecture is useful for R&D, SQL commissioning, and lab project testing. While not as robust as replica sets, single node architecture can be a less expensive way to visualize O&M and provide elastic scaling.

Figure 7-4 Single node architecture



8 Instances

8.1 DB Engines and Versions

DDS supports versions 3.4, 4.0, 4.2, and 4.4, and you need to use a driver compatible with MongoDB 3.0 or later to access DDS. You can select the DB engine and version you need based on your service requirements.

Table 8-1 Supported DB engines and versions

Compatibility	CPU Type	DB Instance Type	Storage Engine
4.4	x86	Cluster	RocksDB
		Replica set	
4.2	x86	Cluster	RocksDB
		Replica set	
4.0	• x86	Cluster	WiredTiger
	Kunpeng	Replica set	
3.4	• x86	Cluster	WiredTiger
	Kunpeng	Replica set	

For details about the compatibility between DDS and MongoDB Community Editions, see **Versions**.

8.2 Instance Specifications

8.2.1 Cluster

Instances of the same type have different memory specifications. You can select instances of different specifications based on application scenarios.

This section describes cluster instance specifications. The instance specifications depend on the selected CPU model.

□ NOTE

The default maximum number of connections has been adjusted. Query the number of connections based on the instance creation time. For details about the number of connections for instances created before July 2021, see **Historical Node Specifications**.

Node Specifications

DDS cluster instances have two specification types: general-purpose and enhanced II. For details, see **Table 8-2**.

Table 8-2 Specification type

Specific ation Type	Description	Applicable Scenario
General - purpose	CPU resources are shared with other general-purpose DB instances on the same physical machine. CPU usage is maximized through resource overcommitment. This instance class is a cost-effective option and suitable for scenarios where performance stability is not critical.	Suitable for scenarios that have high requirements on cost-effectiveness.
Enhanc ed II	With a leading network acceleration engine and Data Plane Development Kit (DPDK) fast packet processing mechanism, this instance class provides higher network performance and computing power.	Suitable for websites and web applications that require high database computing and network performance.

Table 8-3 config specifications

CPU Type	Specif icatio ns	vCPUs	Memo ry (GB)	Flavor ID	Default Maximum Number of Connectio ns	Range of Connectio ns
x86	Enha nced	2	4	dds.mongodb.c6.l arge.2.config	2000	200-2000
	11	2	16	dds.mongodb.c6.l arge.8.config	2000	200-2000

CPU Type	Specif icatio ns	vCPUs	Memo ry (GB)	Flavor ID	Default Maximum Number of Connectio ns	Range of Connections
		4	32	dds.mongodb.c6.x large.8.config	4000	200-4000
		8	64	dds.mongodb.c6. 2xlarge.8.config	16000	200-16000
Kunpe ng	-	2	4	dds.mongodb.lar ge.arm2.config	2000	200-2000
		4	8	dds.mongodb.xlar ge.arm2.config	4000	200-4000
		8	16	dds.mongodb.2xl arge.arm2.config	16000	200-16000

Table 8-4 mongos and shard specifications

CPU Type	Specif icatio ns	Comp onent	vCPUs	Memor y (GB)	Flavor ID	Defau It Maxi mum Num ber of Conn ectio ns	Rang e of Conn ectio ns	
x86	Gene ral- purpo	mong os	1	4	dds.mongodb.s6. medium.4.mongo s	1000	200-1 000	
se	se	e	2	4	dds.mongodb.s6.l arge.2.mongos	2000	200-2 000	
				2	8	dds.mongodb.s6.l arge.4.mongos	2000	200-2 000
			4 8		8	dds.mongodb.s6.x large.2.mongos	4000	200-4 000
		4	16	dds.mongodb.s6.x large.4.mongos	4000	200-4 000		
			8	16	dds.mongodb.s6.2 xlarge.2.mongos	16000	200-1 6000	

CPU Type	Specif icatio ns	Comp onent	vCPUs	Memor y (GB)	Flavor ID	Defau It Maxi mum Num ber of Conn ectio ns	Rang e of Conn ectio ns
			8	32	dds.mongodb.s6.2 xlarge.4.mongos	16000	200-1 6000
		shard	1	4	dds.mongodb.s6. medium.4.shard	1000	200-1 000
			2	4	dds.mongodb.s6.l arge.2.shard	2000	200-2 000
			2	8	dds.mongodb.s6.l arge.4.shard	2000	200-2 000
			4	8	dds.mongodb.s6.x large.2.shard	4000	200-4 000
			4	16	dds.mongodb.s6.x large.4.shard	4000	200-4 000
			8	16	dds.mongodb.s6.2 xlarge.2.shard	16000	200-1 6000
			8	32	dds.mongodb.s6.2 xlarge.4.shard	16000	200-1 6000
	Enha nced II	mong os	1	8	dds.mongodb.c6. medium.8.mongo s	1000	200-1 000
			2	8	dds.mongodb.c6.l arge.4.mongos	2000	200-2 000
			2	16	dds.mongodb.c6.l arge.8.mongos	2000	200-2 000
			4	16	dds.mongodb.c6.x large.4.mongos	4000	200-4 000
		4	32	dds.mongodb.c6.x large.8.mongos	4000	200-4 000	
		8	32	dds.mongodb.c6. 2xlarge.4.mongos	16000	200-1 6000	
			8	64	dds.mongodb.c6. 2xlarge.8.mongos	16000	200-1 6000

CPU Type	Specif icatio ns	Comp onent	vCPUs	Memor y (GB)	Flavor ID	Defau lt Maxi mum Num ber of Conn ectio ns	Rang e of Conn ectio ns
			16	64	dds.mongodb.c6. 4xlarge.4.mongos	16000	200-1 6000
			16	128	dds.mongodb.c6. 4xlarge.8.mongos	16000	200-1 6000
			32	128	dds.mongodb.c6. 8xlarge.4.mongos	16000	200-1 6000
			32	256	dds.mongodb.c6. 8xlarge.8.mongos	16000	200-1 6000
			64	256	dds.mongodb.c6. 16xlarge.4.mongo s	16000	200-1 6000
			64	512	dds.mongodb.c6. 16xlarge.8.mongo s	16000	200-1 6000
		shard	1	8	dds.mongodb.c6. medium.8.shard	1000	200-1 000
			2	8	dds.mongodb.c6.l arge.4.shard	2000	200-2 000
			2	16	dds.mongodb.c6.l arge.8.shard	2000	200-2 000
			4	16	dds.mongodb.c6.x large.4.shard	4000	200-4 000
			4	32	dds.mongodb.c6.x large.8.shard	4000	200-4 000
		8	32	dds.mongodb.c6. 2xlarge.4.shard	16000	200-1 6000	
			8	64	dds.mongodb.c6. 2xlarge.8.shard	16000	200-1 6000
			16	64	dds.mongodb.c6. 4xlarge.4.shard	16000	200-1 6000
			16	128	dds.mongodb.c6. 4xlarge.8.shard	16000	200-1 6000

CPU Type	Specif icatio ns	Comp onent	vCPUs	Memor y (GB)	Flavor ID	Defau lt Maxi mum Num ber of Conn ectio ns	Rang e of Conn ectio ns
			32	128	dds.mongodb.c6. 8xlarge.4.shard	16000	200-1 6000
			32	256	dds.mongodb.c6. 8xlarge.8.shard	16000	200-1 6000
			64	256	dds.mongodb.c6. 16xlarge.4.shard	16000	200-1 6000
			64	512	dds.mongodb.c6. 16xlarge.8.shard	16000	200-1 6000
Kunp eng	-	mong os	2	4	dds.mongodb.larg e.arm2.mongos	2000	200-2 000
	-		2	8	dds.mongodb.larg e.arm4.mongos	2000	200-2 000
	-		4	8	dds.mongodb.xlar ge.arm2.mongos	4000	200-4 000
	-		4	16	dds.mongodb.xlar ge.arm4.mongos	4000	200-4 000
	-		8	16	dds.mongodb.2xl arge.arm2.mongo s	16000	200-1 6000
	-		8	32	dds.mongodb.2xl arge.arm4.mongo s	16000	200-1 6000
	-		16	32	dds.mongodb.4xl arge.arm2.mongo s	16000	200-1 6000
	-		16	64	dds.mongodb.4xl arge.arm4.mongo s	16000	200-1 6000
	-	shard	2	4	dds.mongodb.larg e.arm2.shard	2000	200-2 000
	-		2	8	dds.mongodb.larg e.arm4.shard	2000	200-2 000

CPU Type	Specif icatio ns	Comp onent	vCPUs	Memor y (GB)	Flavor ID	Defau It Maxi mum Num ber of Conn ectio ns	Rang e of Conn ectio ns
	1		4	8	dds.mongodb.xlar ge.arm2.shard	4000	200-4 000
	ı		4	16	dds.mongodb.xlar ge.arm4.shard	4000	200-4 000
	ı		8	16	dds.mongodb.2xl arge.arm2.shard	16000	200-1 6000
	-		8	32	dds.mongodb.2xl arge.arm4.shard	16000	200-1 6000
	-		16	32	dds.mongodb.4xl arge.arm2.shard	16000	200-1 6000
	-		16	64	dds.mongodb.4xl arge.arm4.shard	16000	200-1 6000

Historical Node Specifications

For details about the range of connections of instances created before July 2021, see the following table.

Table 8-5 config specifications

Inst anc e Typ e	CPU Type	Specifications	vCPUs	Mem ory (GB)	Flavor ID	Default Maximu m Number of Connecti ons	Range of Connecti ons
Clu ster	x86	Gene ral- purp ose	2	4	dds.mongodb.s6 .large.2.config	400	200-2000
		Enha nced	2	4	dds.mongodb.c3 .large.2.config		

Inst anc e Typ e	CPU Type	Specifications	vCPUs	Mem ory (GB)	Flavor ID	Default Maximu m Number of Connecti ons	Range of Connecti ons
		Enha nced II	2	4	dds.mongodb.c6 .large.2.config		
	Kunp eng	-	2	4	dds.mongodb.la rge.arm2.config		

Table 8-6 mongos and shard specifications

Inst anc e Typ e	CPU Type	Spec ifica tions	Comp onent	vCPUs	Memo ry (GB)	Flavor ID	Defa ult Maxi mum Num ber of Conn ectio ns	Range of Connec tions
Clu ster		ral- purp	mong os	1	4	dds.mongodb .s6.medium.4. mongos	400	200-10 00
		ose		2	4	dds.mongodb .s6.large.2.mo ngos	400	200-20 00
				2	8	dds.mongodb .s6.large.4.mo ngos	400	200-20 00
				4	8	dds.mongodb .s6.xlarge.2.m ongos	1000	200-40 00
				4	16	dds.mongodb .s6.xlarge.4.m ongos	1000	200-40 00
				8	16	dds.mongodb .s6.2xlarge.2. mongos	4000	200-16 000

Inst anc e Typ e	CPU Type	Spec ifica tions	Component	vCPUs	Memo ry (GB)	Flavor ID	Defa ult Maxi mum Num ber of Conn ectio ns	Range of Connec tions
				8	32	dds.mongodb .s6.2xlarge.4. mongos	4000	200-16 000
			shard	1	4	dds.mongodb .s6.medium.4. shard	400	200-10 00
				2	4	dds.mongodb .s6.large.2.sha rd	400	200-20 00
			2	8	dds.mongodb .s6.large.4.sha rd	400	200-20 00	
				4	8	dds.mongodb .s6.xlarge.2.sh ard	1000	200-40 00
				4	16	dds.mongodb .s6.xlarge.4.sh ard	1000	200-40 00
				8	16	dds.mongodb .s6.2xlarge.2.s hard	4000	200-16 000
	Enha nced			8	32	dds.mongodb .s6.2xlarge.4.s hard	4000	200-16 000
		mong os	2	8	dds.mongodb .c3.large.4.mo ngos	400	200-20 00	
				4	16	dds.mongodb .c3.xlarge.4.m ongos	1000	200-40 00
				8	32	dds.mongodb .c3.2xlarge.4. mongos	4000	200-16 000

Inst anc e Typ e	CPU Type	Spec ifica tions	Comp onent	vCPUs	Memo ry (GB)	Flavor ID	Defa ult Maxi mum Num ber of Conn ectio ns	Range of Connec tions
				16	64	dds.mongodb .c3.4xlarge.4. mongos	8000	200-16 000
				32	128	dds.mongodb .c3.8xlarge.4. mongos	8000	200-16 000
				60	256	dds.mongodb .c3.15xlarge.4 .mongos	8000	200-16 000
			shard	2	8	dds.mongodb .c3.large.4.sha rd	400	200-20 00
				4	16	dds.mongodb .c3.xlarge.4.sh ard	1000	200-40 00
				8	32	dds.mongodb .c3.2xlarge.4.s hard	4000	200-16 000
				16	64	dds.mongodb .c3.4xlarge.4.s hard	8000	200-16 000
				32	128	dds.mongodb .c3.8xlarge.4.s hard	8000	200-16 000
				60	256	dds.mongodb .c3.15xlarge.4 .shard	8000	200-16 000
		Enha nced II	mong os	2	8	dds.mongodb .c6.large.4.mo ngos	400	200-20 00
				4	16	dds.mongodb .c6.xlarge.4.m ongos	1000	200-40 00

Inst anc e Typ e	CPU Type	Spec ifica tions	Comp onent	vCPUs	Memo ry (GB)	Flavor ID	Defa ult Maxi mum Num ber of Conn ectio ns	Range of Connec tions
				8	32	dds.mongodb .c6.2xlarge.4. mongos	4000	200-16 000
				16	64	dds.mongodb .c6.4xlarge.4. mongos	8000	200-16 000
				32	128	dds.mongodb .c6.8xlarge.4. mongos	8000	200-16 000
				64	256	dds.mongodb .c6.16xlarge.4 .mongos	8000	200-16 000
			shard	2	8	dds.mongodb .c6.large.4.sha rd	400	200-20 00
				4	16	dds.mongodb .c6.xlarge.4.sh ard	1000	200-40 00
				8	32	dds.mongodb .c6.2xlarge.4.s hard	4000	200-16 000
				16	64	dds.mongodb .c6.4xlarge.4.s hard	8000	200-16 000
				32	128	dds.mongodb .c6.8xlarge.4.s hard	8000	200-16 000
				64	256	dds.mongodb .c6.16xlarge.4 .shard	8000	200-16 000
	Kunp eng	-	mong os	2	4	dds.mongodb .large.arm2.m ongos	400	200-20 00

Inst anc e Typ e	CPU Type	Spec ifica tions	Comp onent	vCPUs	Memo ry (GB)	Flavor ID	Defa ult Maxi mum Num ber of Conn ectio ns	Range of Connec tions
		-		2	8	dds.mongodb .large.arm4.m ongos	400	200-20 00
		-		4	8	dds.mongodb .xlarge.arm2. mongos	1000	200-40 00
		-		4	16	dds.mongodb .xlarge.arm4. mongos	1000	200-40 00
		-		8	16	dds.mongodb .2xlarge.arm2 .mongos	4000	200-16 000
		-		8	32	dds.mongodb .2xlarge.arm4 .mongos	4000	200-16 000
		-		16	32	dds.mongodb .4xlarge.arm2 .mongos	8000	200-16 000
		-		16	64	dds.mongodb .4xlarge.arm4 .mongos	8000	200-16 000
		-	shard	2	4	dds.mongodb .large.arm2.s hard	400	200-20 00
	-	-		2	8	dds.mongodb .large.arm4.s hard	400	200-20 00
		-		4	8	dds.mongodb .xlarge.arm2.s hard	1000	200-40 00
		-		4	16	dds.mongodb .xlarge.arm4.s hard	1000	200-40 00

Inst anc e Typ e	CPU Type	Spec ifica tions	Comp onent	vCPUs	Memo ry (GB)	Flavor ID	Defa ult Maxi mum Num ber of Conn ectio ns	Range of Connec tions
		-		8	16	dds.mongodb .2xlarge.arm2 .shard	4000	200-16 000
		-		8	32	dds.mongodb .2xlarge.arm4 .shard	4000	200-16 000
		-		16	32	dds.mongodb .4xlarge.arm2 .shard	8000	200-16 000
		-		16	64	dds.mongodb .4xlarge.arm4 .shard	8000	200-16 000

Helpful Links

- How do I change the maximum number of connections of a cluster instance?
 You can change the maximum number of connections to a DB instance by modifying the net.maxIncomingConnections parameter. For details about how to change parameter values, see Editing a Parameter Template.
- How do I purchase a cluster instance?For details, see Buying a Cluster Instance.
- 3. How do I change the CPU or memory of a cluster instance?

 You can change the CPU and memory of mongos and shards nodes. For details, see Changing the CPU and Memory of a Cluster Instance.
- How do I scale up the storage space of a cluster instance?
 You can scale up the storage of shards nodes. For details, see Scaling Up Storage.

8.2.2 Replica Set

Instances of the same type have different memory specifications. You can select instances of different specifications based on application scenarios.

This section describes replica set instance specifications. The instance specifications depend on the selected CPU model.

□ NOTE

The default maximum number of connections has been adjusted. Query the number of connections based on the instance creation time. For details about the number of connections for instances created before July 2021, see **Historical Instance Specifications**.

Instance Specifications

DDS replica set instances have two specification types: general-purpose and enhanced II. For details, see **Table 8-7**.

Table 8-7 Specification type

Specific ation Type	Description	Applicable Scenario
General - purpose	CPU resources are shared with other general-purpose DB instances on the same physical machine. CPU usage is maximized through resource overcommitment. This instance class is a cost-effective option and suitable for scenarios where performance stability is not critical.	Suitable for scenarios that have high requirements on cost-effectiveness.
Enhanc ed II	With a leading network acceleration engine and Data Plane Development Kit (DPDK) fast packet processing mechanism, this instance class provides higher network performance and computing power.	Suitable for websites and web applications that require high database computing and network performance.

Table 8-8 lists the specifications of replica set instances.

Table 8-8 Replica set instance specifications

CPU Type	Specific ations	vCPUs	Memo ry (GB)	Flavor ID	Defau lt Maxi mum Numb er of Conn ection s	Range of Connecti ons
x86	General -	2	4	dds.mongodb.s6.large .2.repset	1000	200-100 0
	purpose	2	8	dds.mongodb.s6.large .4.repset	1000	200-100 0
		4	8	dds.mongodb.s6.xlarg e.2.repset	3000	200-300 0
		4	16	dds.mongodb.s6.xlarg e.4.repset	3000	200-300 0
		8	16	dds.mongodb.s6.2xlar ge.2.repset	8000	200-800 0
		8	32	dds.mongodb.s6.2xlar ge.4.repset	8000	200-800 0
	Enhanc ed II	1	8	dds.mongodb.c6.medi um.8.repset	500	200-500
		2	8	dds.mongodb.c6.large .4.repset	1000	200-100 0
		2	16	dds.mongodb.c6.large .8.repset	1000	200-100 0
		4	16	dds.mongodb.c6.xlarg e.4.repset	3000	200-300 0
		4	32	dds.mongodb.c6.xlarg e.8.repset	3000	200-300 0
		8	32	dds.mongodb.c6.2xlar ge.4.repset	8000	200-800 0
		8	64	dds.mongodb.c6.2xlar ge.8.repset	8000	200-800 0
		16	64	dds.mongodb.c6.4xlar ge.4.repset	16000	200-160 00
		16	128	dds.mongodb.c6.4xlar ge.8.repset	16000	200-160 00

CPU Type	Specific ations	vCPUs	Memo ry (GB)	Flavor ID	Defau lt Maxi mum Numb er of Conn ection s	Range of Connecti ons
		32	128	dds.mongodb.c6.8xlar ge.4.repset	16000	200-160 00
		32	256	dds.mongodb.c6.8xlar ge.8.repset	16000	200-160 00
		64	256	dds.mongodb.c6.16xla rge.4.repset	16000	200-160 00
		64	512	dds.mongodb.c6.16xla rge.8.repset	16000	200-160 00
Kunp eng	-	2	4	dds.mongodb.large.ar m2.repset	1000	200-100 0
	-	2	8	dds.mongodb.large.ar m4.repset	1000	200-100 0
	-	4	8	dds.mongodb.xlarge.a rm2.repset	3000	200-300 0
	-	4	16	dds.mongodb.xlarge.a rm4.repset	3000	200-300 0
	-	8	16	dds.mongodb.2xlarge. arm2.repset	8000	200-800 0
	-	8	32	dds.mongodb.2xlarge. arm4.repset	8000	200-800 0
	-	16	32	dds.mongodb.4xlarge. arm2.repset	16000	200-160 00
	-	16	64	dds.mongodb.4xlarge. arm4.repset	16000	200-160 00

Historical Instance Specifications

For details about the range of connections of instances created before July 2021, see the following table.

Table 8-9 Replica set instance specifications

CPU Type	Specific ations	vCPUs	Memo ry (GB)	Flavor ID	Defau lt Maxi mum Numb er of Conn ection s	Range of Connecti ons
x86	General -	2	4	dds.mongodb.s6.large .2.repset	400	200-100 0
	purpose	2	8	dds.mongodb.s6.large .4.repset	400	200-100 0
		4	8	dds.mongodb.s6.xlarg e.2.repset	1000	200-300 0
		4	16	dds.mongodb.s6.xlarg e.4.repset	1000	200-300 0
		8	16	dds.mongodb.s6.2xlar ge.2.repset	4000	200-800 0
		8	32	dds.mongodb.s6.2xlar ge.4.repset	4000	200-800 0
	Enhanc ed	2	8	dds.mongodb.c3.large .4.repset	400	200-100 0
		4	16	dds.mongodb.c3.xlarg e.4.repset	1000	200-300 0
		8	32	dds.mongodb.c3.2xlar ge.4.repset	4000	200-800 0
		16	64	dds.mongodb.c3.4xlar ge.4.repset	8000	200-160 00
		32	128	dds.mongodb.c3.8xlar ge.4.repset	8000	200-160 00
		60	256	dds.mongodb.c3.15xla rge.4.repset	8000	200-160 00
	Enhanc ed II	2	8	dds.mongodb.c6.large .4.repset	400	200-100 0
		4	16	dds.mongodb.c6.xlarg e.4.repset	1000	200-300 0
		8	32	dds.mongodb.c6.2xlar ge.4.repset	4000	200-800 0

CPU Type	Specific ations	vCPUs	Memo ry (GB)	Flavor ID	Defau lt Maxi mum Numb er of Conn ection s	Range of Connecti ons
		16	64	dds.mongodb.c6.4xlar ge.4.repset	8000	200-160 00
		32	128	dds.mongodb.c6.8xlar ge.4.repset	8000	200-160 00
		64	256	dds.mongodb.c6.16xla rge.4.repset	8000	200-160 00
Kunp eng	-	2	4	dds.mongodb.large.ar m2.repset	400	200-100 0
	-	2	8	dds.mongodb.large.ar m4.repset	400	200-100 0
	-	4	8	dds.mongodb.xlarge.a rm2.repset	1000	200-300 0
	-	4	16	dds.mongodb.xlarge.a rm4.repset	1000	200-300 0
	-	8	16	dds.mongodb.2xlarge. arm2.repset	4000	200-800 0
	-	8	32	dds.mongodb.2xlarge. arm4.repset	4000	200-800 0
	-	16	32	dds.mongodb.4xlarge. arm2.repset	8000	200-160 00
	-	16	64	dds.mongodb.4xlarge. arm4.repset	8000	200-160 00

Helpful Links

1. How do I change the maximum number of connections of a replica set instance?

You can change the maximum number of connections to an instance by modifying the **net.maxIncomingConnections** parameter. For details about how to change parameter values, see **Editing a Parameter Template**.

- How do I buy a replica set instance?
 For details, see Buying a Replica Set Instance.
- 3. How do I change the CPU and memory of a replica set instance?

For details, see Changing the CPU or Memory of a Replica Set Instance.

4. How do I scale up the storage space of a replica set instance? For details, see **Scaling Up Storage**.

8.2.3 Single Node

□ NOTE

Huawei Cloud has discontinued the sale of DDS single node instances since July 15, 2023.

Instances of the same type have different memory specifications. You can select instances of different specifications based on application scenarios.

This section describes single node instance specifications. The instance specifications depend on the selected CPU model.

Ⅲ NOTE

The default maximum number of connections has been adjusted. Query the number of connections based on the instance creation time. For details about the number of connections for instances created before July 2021, see **Historical Instance Specifications**.

Instance Specifications

DDS single node instances have two specification types: general-purpose and enhanced II. For details, see **Table 8-10**.

Table 8-10 Specification type

Specific ation Type	Description	Applicable Scenario
General - purpose	CPU resources are shared with other general-purpose DB instances on the same physical machine. CPU usage is maximized through resource overcommitment. This instance class is a cost-effective option and suitable for scenarios where performance stability is not critical.	Suitable for scenarios that have high requirements on cost-effectiveness.
Enhanc ed II	With a leading network acceleration engine and Data Plane Development Kit (DPDK) fast packet processing mechanism, this instance class provides higher network performance and computing power.	Suitable for websites and web applications that require high database computing and network performance.

Table 8-11 Single Node

CPU Type	Specific ations	vCPUs	Memo ry (GB)	Flavor ID	Defau lt Maxi mum Numb er of Conne ctions	Rang e of Conn ectio ns
x86	General -	1	4	dds.mongodb.s6.mediu m.4.single	500	200-5 00
	purpose	2	4	dds.mongodb.s6.large.2. single	1000	200-1 000
		2	8	dds.mongodb.s6.large.4. single	1000	200-1 000
		4	8	dds.mongodb.s6.xlarge. 2.single	8000	200-8 000
		4	16	dds.mongodb.s6.xlarge. 4.single	8000	200-8 000
		8	16	dds.mongodb.s6.2xlarge .2.single	10000	200-1 0000
		8	32	dds.mongodb.s6.2xlarge .4.single	10000	200-1 0000
	Enhanc ed II	1	8	dds.mongodb.c6.mediu m.8.single	500	200-5 00
		2	8	dds.mongodb.c6.large.4. single	1000	200-1 000
		2	16	dds.mongodb.c6.large.8. single	1000	200-1 000
		4	16	dds.mongodb.c6.xlarge. 4.single	8000	200-8 000
		4	32	dds.mongodb.c6.xlarge. 8.single	8000	200-8 000
		8	32	dds.mongodb.c6.2xlarg e.4.single	10000	200-1 0000
		8	64	dds.mongodb.c6.2xlarg e.8.single	10000	200-1 0000
		16	64	dds.mongodb.c6.4xlarg e.4.single	16000	200-1 6000
		16	128	dds.mongodb.c6.4xlarg e.8.single	16000	200-1 6000

CPU Type	Specific ations	vCPUs	Memo ry (GB)	Flavor ID	Defau lt Maxi mum Numb er of Conne ctions	Rang e of Conn ectio ns
		32	128	dds.mongodb.c6.8xlarg e.4.single	16000	200-1 6000
		64	256	dds.mongodb.c6.16xlar ge.4.single	16000	200-1 6000
Kunpe ng	-	2	4	dds.mongodb.large.arm 2.single	1000	200-1 000
	-	2	8	dds.mongodb.large.arm 4.single	1000	200-1 000
	-	4	8	dds.mongodb.xlarge.ar m2.single	8000	200-8 000
	-	4	16	dds.mongodb.xlarge.ar m4.single	8000	200-8 000
	-	8	16	dds.mongodb.2xlarge.ar m2.single	10000	200-1 0000
	-	8	32	dds.mongodb.2xlarge.ar m4.single	10000	200-1 0000
	-	16	32	dds.mongodb.4xlarge.ar m2.single	16000	200-1 6000
	-	16	64	dds.mongodb.4xlarge.ar m4.single	16000	200-1 6000

Historical Instance Specifications

For details about the range of connections of instances created before July 2021, see the following table.

Table 8-12 Single Node

CPU Type	Specific ations	vCPUs	Memo ry (GB)	Flavor ID	Defa ult Maxi mum Num ber of Conn ectio ns	Range of Connec tions
x86	General	1	4	dds.mongodb.s6.mediu m.4.single	400	200-50 0
	purpose	2	4	dds.mongodb.s6.large. 2.single	400	200-10 00
		2	8	dds.mongodb.s6.large. 4.single	400	200-10 00
		4	8	dds.mongodb.s6.xlarge. 2.single	1000	200-80 00
		4	16	dds.mongodb.s6.xlarge. 4.single	1000	200-80 00
		8	16	dds.mongodb.s6.2xlarg e.2.single	4000	200-10 000
		8	32	dds.mongodb.s6.2xlarg e.4.single	4000	200-10 000
	Enhanc ed	2	8	dds.mongodb.c3.large. 4.single	400	200-10 00
		4	16	dds.mongodb.c3.xlarge .4.single	1000	200-80 00
		8	32	dds.mongodb.c3.2xlarg e.4.single	4000	200-10 000
		16	64	dds.mongodb.c3.4xlarg e.4.single	8000	200-16 000
		32	128	dds.mongodb.c3.8xlarg e.4.single	8000	200-16 000
		60	256	dds.mongodb.c3.15xlar ge.4.single	8000	200-16 000
	Enhanc ed II	2	8	dds.mongodb.c6.large. 4.single	400	200-50 0
		4	16	dds.mongodb.c6.xlarge .4.single	1000	200-10 00

CPU Type	Specific ations	vCPUs	Memo ry (GB)	Flavor ID	Defa ult Maxi mum Num ber of Conn ectio ns	Range of Connec tions
		8	32	dds.mongodb.c6.2xlarg e.4.single	4000	200-40 00
		16	64	dds.mongodb.c6.4xlarg e.4.single	8000	200-80 00
		32	128	dds.mongodb.c6.8xlarg e.4.single	8000	200-16 000
		64	256	dds.mongodb.c6.16xlar ge.4.single	8000	200-16 000
Kunpe ng	-	2	4	dds.mongodb.large.ar m2.single	400	200-10 00
	-	2	8	dds.mongodb.large.ar m4.single	400	200-10 00
	-	4	8	dds.mongodb.xlarge.ar m2.single	1000	200-80 00
	-	4	16	dds.mongodb.xlarge.ar m4.single	1000	200-80 00
	-	8	16	dds.mongodb.2xlarge.a rm2.single	4000	200-10 000
	-	8	32	dds.mongodb.2xlarge.a rm4.single	4000	200-10 000
	-	16	32	dds.mongodb.4xlarge.a rm2.single	8000	200-16 000
	-	16	64	dds.mongodb.4xlarge.a rm4.single	8000	200-16 000

Helpful Links

1. How do I change the maximum number of connections of a single node instance?

You can change the maximum number of connections to an instance by modifying the **net.maxIncomingConnections** parameter. For details about how to change parameter values, see **Editing a Parameter Template**.

- How do I change the CPU and memory of a single node instance?
 For details, see Changing the CPU or Memory of a Single Node Instance.
- 3. How do I scale up the storage of a single node instance? For details, see **Scaling Up Storage**.

8.3 Read Replica

To improve the read capability of the primary node, DDS provides read replicas that can be accessed independently, which is good for handling read-intensive workloads and reducing memory pressure on the primary node. You can also create one or more read replicas to process a large number of read requests and improve throughput.

Differences Between Read Replica and Secondary Node

Nod e	Description	Application Scenario
Seco ndar y node s	The secondary node of a replica set instance ensures high availability. If a primary node is faulty, the system automatically switches traffic to the secondary node. If the primary node is faulty, each secondary node may be elected as a new primary node to execute data write requests.	DDS provides an HA connection address to connect to both the primary and secondary nodes and separate read and write operations. In this way, a DDS instance can handle heavy read workloads with ease. In addition, the impact of node faults on services is wakened while the performance is improved.
Read replic as	A read replica in a replica set instance synchronizes data only from the primary node. It does not ensure high availability and will not be elected as the primary node. Read replicas can be connected independently and do not interfere with primary nodes.	Read replicas are useful when applications need to read large amounts of data from existing instances.

Constraints

- Only replica set instances can have read replicas.
- Instances that only have read replicas cannot be created.
- DDS instance version must be 3.4, 4.0, and 4.2.
- Read replicas are used only for processing read requests and do not participate in primary/secondary node election.
- A maximum of five read replicas can be added to a replica set instance. For details, see Adding Read Replicas to a Replica Set Instance.

• Data is asynchronously replicated between the primary node and the read replica, and this process will delay by a few seconds.

Functions

- You can change the number of read replicas to meet fluctuating service demands and reduce service costs.
- The specifications of a read replica are the same as those of the primary node. Data is automatically synchronized to the read replica.
- Resources on the primary node are not occupied. Adding or deleting read replicas does not affect services on the primary node.
- Read replicas can be connected independently and do not interfere with existing primary and secondary nodes. For details, see Connecting to Read Replicas Using Mongo Shell.
- You can monitor the performance of read replicas.

Billing

- After a read replica is added to the current instance, you will be billed for using the VM and disks of the read replica.
- The price of a read replica is equal to that of a single node in a replica set instance or a shard node in a cluster instance. For example, if the price of a three-node replica set instance is USD \$3,000, the price of a read replica is USD \$1,000.

9 Constraints

Before using DDS, you must familiarize yourself with the constraints of different types of DDS DB instances to help you select the instance architectures that best suit your business scenarios.

Table 9-1 Constraints on cluster instances

Function	Constraints				
Instance Deployment	Cluster DB instances cannot be deployed in all regions and AZs.				
Database Minor Version Upgrade	 The instance version must be 3.4, 4.0, or 4.2. If the instance status is abnormal or the instance is being operated, the upgrade cannot be performed. The upgrade cannot be performed if there are abnormal instance nodes. 				

Function	Constraints				
Instance Modifications	Scaling Up Storage Space NOTE				
	 Only shard nodes can be scaled up, and mongos and config nodes cannot be scaled up. 				
	Storage space can only be scaled up. It cannot be scaled down.				
	 If the storage space is about to be used up, the database is set to read-only, and data cannot be modified. 				
	The maximum storage space of a single shard is 2000 GB. If the storage space exceeds 2000 GB, scale-out will fail.				
	Adding and Reverting Instance Nodes NOTE				
	You can add nodes for a DB instance only when the DB instance is normal.				
	 You can roll back a node only when the node fails to be added. 				
	Changing a DB Instance Class NOTE				
	When the instance class is being changed, a primary/ secondary switchover may occur once or twice and the database connection will be interrupted each time for up to 30s. You are advised to change the class during off-peak hours to reduce impacts and ensure that the service system of your client can reconnect to the database if the connection is interrupted.				
Data Backups	Physical and snapshot backup methods are supported.				
Data Restorations	Backup data can be restored to a new DB instance.				
	Backup data can be restored to the original DB instance.				
	Backup data can be restored to a specified point in time.				
	Backup data can be restored to an on-premises database.				
Data Security	SSL encryption can be set. NOTE Enabling or disabling SSL will cause instances to restart. Exercise caution when performing this operation.				
Data Migration	DDS provides multiple migration schemes to migrate MongoDB databases in different service scenarios. For details, see Migration Scheme Overview.				
	Migrating data using the export and import tools				
	Migrating data from other cloud MongoDB to DDS				
	Migrating data from on-premises MongoDB to DDS				
	Migrating data from ECS-hosted MongoDB to DDS				
	Migrating data from DDS to MongoDB				

Function	Constraints				
Logs	Error logs, slow query logs, and audit logs are supported.				
Billing	DDS allows you to pay only for what you use. There is no minimum fee requirement. For more information, see Pricing Details .				
Connections	You can enable shard and config IP addresses.				
	You can change a private IP address of a DB instance.				
	You can change a database port.				
	NOTE The shard node port is 8637, and the config node port is 8636, which cannot be changed.				
	You can apply for and modify a private domain name for database connections.				
Recycle Bin	Instances in the recycle bin are retained for 7 days by default.				
	Up to 100 instances can be moved to the recycle bin. Once the recycle bin is full, you can still delete instances, but they cannot be placed in the recycle bin.				

Table 9-2 Constraints on replica set instances

Function	Constraints				
Instance Deployment	Replica set DB instances cannot be deployed in all regions and AZs.				
Database Minor Version Upgrade	 The instance version must be 3.4, 4.0, or 4.2. If the instance status is abnormal or the instance is being operated, the upgrade cannot be performed. The upgrade cannot be performed if there are abnormal instance nodes. Read replicas do not support minor version upgrade. 				

Function	Constraints				
Instance Modifications	Scaling Up Storage Space NOTE				
	Storage space can only be scaled up. It cannot be scaled down.				
	 If the storage space is about to be used up, the database is set to read-only, and data cannot be modified. 				
	Adding and Reverting Instance Nodes				
	NOTE				
	 You can add nodes for a DB instance only when the DB instance is normal. 				
	 You can roll back a node only when the node fails to be added. 				
	Deleting Instance Nodes or Read Replicas				
	NOTE				
	 Nodes cannot be deleted from instances that have abnormal nodes. 				
	Changing a DB Instance Class NOTE				
	 When the instance class is being changed, a primary/ secondary switchover may occur once or twice and the database connection will be interrupted each time for up to 30s. You are advised to change the class during off-peak hours to reduce impacts and ensure that the service system of your client can reconnect to the database if the connection is interrupted. 				
Data Backups	Physical and snapshot backup methods are supported.				
Data Restorations	Backup data can be restored to a new DB instance.				
	Backup data can be restored to the original DB instance.				
	Backup data can be restored to a specified point in time.				
	Backup data can be restored to an on-premises database.				
Data Security	SSL encryption can be set.				
	NOTE Enabling or disabling SSL will cause instances to restart. Exercise caution when performing this operation.				

Function	Constraints				
Data Migration	DDS provides multiple migration schemes to migrate MongoDB databases in different service scenarios. For details, see Migration Scheme Overview .				
	Migrating data using the export and import tools				
	Migrating data from other cloud MongoDB to DDS				
	Migrating data from on-premises MongoDB to DDS				
	Migrating data from ECS-hosted MongoDB to DDS				
	Migrating data from DDS to MongoDB				
Logs	Error logs, slow query logs, and audit logs are supported.				
	Read replicas do not support slow query logs and error logs.				
Billing	DDS allows you to pay only for what you use. There is no minimum fee requirement. For more information, see Pricing Details .				
Connections	You can configure access across CIDR blocks.				
	You can change a private IP address of a DB instance.				
	You can change a database port.				
	NOTE The default port is 8635. You can change the port after the instance is created.				
	You can apply for and modify a private domain name for database connections.				
Recycle Bin	Instances in the recycle bin are retained for 7 days by default.				
	Up to 100 instances can be moved to the recycle bin. Once the recycle bin is full, you can still delete instances, but they cannot be placed in the recycle bin.				

Table 9-3 Constraints on single node instances

Function	Constraints		
Instance Deployment	Single node DB instances cannot be deployed in all regions and AZs.		
Database Minor Version Upgrade	Not supported.		

Function	Constraints				
Instance Modifications	 Scaling Up Storage Space NOTE Storage space can only be scaled up. It cannot be scaled down. If the storage space is about to be used up, the database is set to read-only, and data cannot be modified. Changing a DB Instance Class NOTE When the instance class is being changed, the database connection will be interrupted for 5 to 10 minutes. You are advised to change the class during off-peak hours to reduce impacts and ensure that the service system of your client can reconnect to the database if the connection is interrupted. 				
Data Backups	Logical and snapshot backup methods are supported.				
Data Restorations	 Backup data can be restored to a new DB instance. Backup data can be restored to the original DB instance. Backup data can be restored to an on-premises database. 				
Data Security	SSL encryption can be set. NOTE Enabling or disabling SSL will cause instances to restart. Exercise caution when performing this operation.				
Data Migration	DDS provides multiple migration schemes to migrate MongoDB databases in different service scenarios. For details, see Migration Scheme Overview. • Migrating data using the export and import tools • Migrating data from other cloud MongoDB to DDS • Migrating data from on-premises MongoDB to DDS • Migrating data from ECS-hosted MongoDB to DDS • Migrating data from DDS to MongoDB				
Logs	Error logs, slow query logs, and audit logs are supported.				
Billing	DDS allows you to pay only for what you use. There is no minimum fee requirement. For more information, see Pricing Details .				
Connections	 You can change a private IP address of a DB instance. You can change a database port. NOTE The default port is 8635. You can change the port after the instance is created. You can apply for and modify a private domain name for database connections. 				

Function	Constraints	
Recycle Bin	 Instances in the recycle bin are retained for 7 days by default. 	
	 Up to 100 instances can be moved to the recycle bin. Once the recycle bin is full, you can still delete instances, but they cannot be placed in the recycle bin. 	

10 Pricing Details

Huawei Cloud Document Database Service (DDS) provides different DB instance types, including replica set and cluster. These instances are billed on a pay-per-use basis and there are no minimum usage requirements.

Pricing

Table 10-1 Description

Item	Description	Billing Standards
Instance specifications	The instance specifications that you select. For a cluster instance, the	For details, see Product Pricing Details . You can use the DDS price
	mongos, shard, and config nodes are billed based on their specifications.	calculator to quickly obtain an estimate price of a DB instance with the specifications you select.
Storage	Storage space is billed based on the capacity you select.	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
	For cluster instances, the storage fees include the storage fees of shard and config nodes.	
Backup storage (optional)	DDS backup files are stored in OBS and do not occupy the storage of DDS instances.	
	DDS provides backup storage up to 100% of your provisioned database storage at no additional fees. If the backup storage usage exceeds 100% of your provisioned database storage, you will be charged for resource usage.	

Item	Description	Billing Standards		
Audit log space (optional)	An audit log records operations performed on your databases and collections. The generated log files are stored in OBS.	Enabling audit log incurs certain fees. For details, see Pricing Details .		
(Optional) Public network traffic	 DDS instances can be accessed from the Internet, and traffic fees are generated accordingly. You are not charged for the traffic generated in the cloud. 	For details, see EIP Pricing Details.		

Billing Mode

DDS provides two billing modes: pay-per-use and yearly/monthly. Pay-per-use is recommended if you are unsure of your future service needs and want to avoid paying for unused resources. However, if you are sure of your needs, yearly/monthly will be less expensive.

- Yearly/Monthly is a prepaid billing mode, which provides a larger discount than pay-per-use billing and is recommended for long-term use of resources.
- Pay-per-use (hourly): This billing mode is flexible. You pay only for what you use. Pricing is listed on a per-hour basis, but bills are calculated based on the actual usage duration. When you create a pay-per-use DB instance, Huawei Cloud will freeze a prepaid balance. A frozen deposit will be returned when one of the following conditions is met. Before a deposit is unfrozen, if a resource is in arrears, the deposit is preferentially used to deduct the outstanding amount of the resource.
 - a. Customer resources are released.
 - b. Customer resources fail to be created.
 - c. Customer resources are not released 24 hours after a prepaid balance is
- You can change the billing mode from pay-per-use to yearly/monthly or vice versa.

For operation details, see Changing the Billing Mode from Pay-per-Use to Yearly/Monthly and Changing the Billing Mode from Yearly/Monthly to Pay-per-Use.

Configuration Changes

You can change the specifications of an existing DB instance based on your service requirements. After the change, the instance is billed based on the new specifications.

Adding instances or nodes: You can add instances to handle growing services.
 After the instances are added, you will be charged based on the new number of instances. The number of cluster instance nodes can only be increased. The

- number of mongos nodes ranges from 2 to 32, the number of shard nodes ranges from 2 to 32, and the number of config nodes is 1 by default.
- Scaling up storage space: You can change the storage space based on service requirements. After scaling the storage space, you will be charged based on the new storage space. Note that storage space cannot be scaled down.

Renewal

DDS supports both yearly/monthly and pay-per-use billing modes.

- Pay-per-use: You are charged for a full hour regardless of whether you use the full or partial hour. You can use the service as long as your account balance is sufficient. If your account balance is insufficient, the service cannot be used normally. Top up your account in a timely manner.
- Yearly/monthly: An upfront payment is required when you purchase the service. No additional fees are incurred during your usage.

1 1 Basic Concepts

11.1 Instance

- An instance is a basic management unit of DDS. One or more databases can be created in a single DDS instance, and one or more collections can be created in each database.
- You can create and manage DB instances of various types and versions on the management console. For details about DB instance types, versions, and specifications, see <u>Instances</u>.
- Resources, such as the CPU, memory, and I/O, of each DDS DB instance are isolated from each other.

11.2 Cluster

Each DDS cluster consists of a config node, and multiple mongos and shard nodes. The following diagram shows the node relationships.

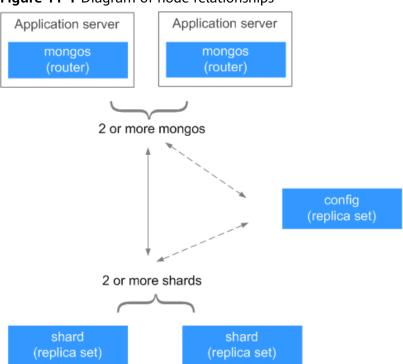


Figure 11-1 Diagram of node relationships

mongos

A mongos is a router for reading and writing data, providing a unified interface for accessing DB instances.

- Each DB instance has 2 to 16 mongos nodes. You can specify the quantity.
- A mongos reads configuration settings from configs and allocates read and write requests to shards. You can connect to a mongos directly.

config

A config stores configuration settings for DB instances and consists of one replica set.

You cannot connect to a config node directly.

shard

Shards are used to store user data.

- Each Community Edition instance has 2 to 16 shard nodes. You can specify the quantity.
- Each shard node is deployed as a replica set to ensure data redundancy and high reliability.
- You cannot connect to a shard node directly.

11.3 Database Parameter Template

A database parameter template is a collection of configuration parameters and values and can be applied to multiple DB instances.

11.4 Region and AZ

Concept

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

- Regions are defined by their geographical location and network latency.
 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. There are universal regions and dedicated regions. A universal region provides universal cloud services for common tenants. A dedicated region only provides services of a specific type and only or for specific tenants.
- An AZ contains one or multiple physical data centers. Each AZ has independent cooling, fire extinguishing, moisture-proof, and electrical 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 allow you to build cross-AZ high-availability systems.

Figure 11-2 shows the relationship between regions and AZs.

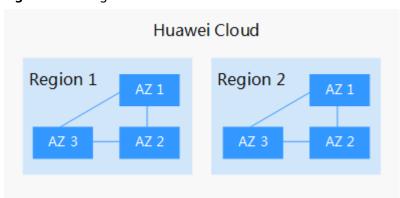


Figure 11-2 Region and AZ

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

Selecting a Region

When selecting a region, consider the following factors:

Location

You are advised to select a region close to you or your target users. This reduces network latency and improves the access rate. However, since all Chinese mainland regions provide basically the same infrastructure, BGP network quality, as well as operations and resource configurations, any of them will work well if your users are located there.

Resource price
 Resource prices may vary in different regions. For details, see Product Pricing Details.

Selecting an AZ

When determining whether to deploy resources in the same AZ, consider your applications' requirements for disaster recovery (DR) and network latency.

- For better DR resilience, deploy resources in different AZs in the same region.
- For lower network latency, deploy resources in the same AZ.

Regions and Endpoints

Before using an API to call resources, specify its region and endpoint. For more details, see **Regions and Endpoints**.

11.5 DB Connections

The number of connections is the number of databases that can be simultaneously connected to an application. The number of connections is irrelevant to the maximum number of users allowed by your applications or websites.

- For a cluster instance, the number of connections is the number of connections between the client and the mongos nodes.
- For a replica set instance, the number of connections is the number of connections between the client and the primary and secondary nodes.
- For a single-node instance, the number of connections is the number of connections between the client and the node.

11.6 Memory

The maximum available memory that can be used by a DDS DB instance.

11.7 Storage Space

The storage space in GB specified when you purchase a DDS DB instance.

- Both your collection data and the data required for the operation of your DB instance such as system database data and indexes occupy the storage space on your purchased DB instance.
- Ensure that your DDS DB instance has sufficient storage space, or your DB instance may be read-only. If your DB instance is read-only due to insufficient storage space, you can scale up the storage space.

12 Compatibility

12.1 Versions

DDS supports versions 3.4, 4.0, 4.2, and 4.4. This section describes the compatibility between DDS and MongoDB Community Editions.

- DDS 3.4
 DDS 3.4 is fully compatible with MongoDB 3.4 Community Edition.
- DDS 4.0
 DDS 4.0 is fully compatible with MongoDB 4.0 Community Edition and

partially compatible with MongoDB 4.4 Community Edition.

- DDS 4.2
 DDS 4.2 is fully compatible with MongoDB 4.2 Community Edition and partially compatible with MongoDB 4.4 Community Edition.
- DDS 4.4
 DDS 4.4 is fully compatible with MongoDB 4.4 Community Edition.

12.2 Details

This section describes the features and compatibility of DDS and MongoDB.

DDS Features

Table 12-1 Feature list

Categ	Featur	Со	DDS 4.0	DDS 4.2	DDS 4.4	Remarks
ory	e	ns				
		tr				
		ai				
		nt				

			Si ng le N od e	R e pl ic a S et	Cl us te r	Si ng le N od e	R e pl ic a S et	Cl u st er	Sin gle No de	Rep lica Set	Cl ust er	
Instan ce Manag ement	Creati ng an instan ce	-	√	√	√	√	√	√	√	√	√	-
	Deleti ng an instan ce	-	√	√	√	√	√	√	√	√	√	-
	Restar ting an instan ce	-	√	√	√	√	√	√	√	√	√	-
	Resetti ng a passw ord	-	√	√	√	√	√	√	√	√	√	-
	Changi ng an instan ce name	-	√	√	√	√	√	√	√	√	√	-
	Changi ng an instan ce port	-	√	√	√	√	√	√	√	√	√	-
	Perfor ming a switch over	-	√	√	√	√	√	√	×	√	×	-
	Exporti ng the instan ce list	-	√	√	√	√	√	√	√	√	√	-
	Comp ute scale- up	-	√	√	√	√	√	√	√	√	√	-

	Comp ute scale- down	-	√	√	√	√	√	√	√	√	√	-
	Addin g nodes	-	-	√	√	-	√	√	√	√	√	-
	Deleti ng nodes	-	-	×	×	-	×	×	×	×	×	-
	Storag e scale- up	-	√	√	√	√	√	√	√	√	√	-
	Storag e scale- down	-	×	×	×	×	×	×	×	×	×	-
	Restar ting a node	-	√	√	√	√	√	√	√	√	√	-
	OpenA Pl	-	√	√	√	√	√	√	√	√	√	-
	SDK	-	√	√	√	√	√	√	√	√	√	-
	Task center	-	√	√	√	√	√	√	√	√	√	-
	Tags	-	√	√	√	√	√	√	√	√	√	-
	Quota s	-	√	√	√	√	√	√	√	√	√	-
Netwo rk Manag ement	EIP- based public netwo rk access	-	√	√	√	√	√	√	√	√	√	-
	Changi ng a private IP addres s	-	√	√	√	√	√	√	√	√	√	-

	Cross- CIDR access	-	√	✓	✓	×	×	×	✓	✓	✓	In DDS 4.2 and 4.4, the client and an instance can communica te only when they are in the same VPC and subnet. If the client is a container, the client can
												communica te with an instance using an IP address in the default CIDR block 192.168.0.0/ 16, 172.16.0.0/2 4, or 10.0.0.0/8.
	Changi ng an AZ		√	√	√	×	×	×	√	√	√	In DDS 4.2 and 4.4, deploying an instance across multiple AZs is recommend ed.
	Domai n name access	1	√	√	√	×	×	×	×	×	×	In DDS 4.2 and 4.4, you are advised to use the IP address to access an instance.
Securit y	Securit y group	-	√	√	√	√	√	√	√	√	√	-
	SSL	-	√	√	√	√	√	√	√	√	√	-

	Instan ce recycle bin	-	√	√	√	√	√	√	√	√	√	-
	Storag e encryp tion	-	√	√	√	×	×	×	×	×	×	-
Billing	Conver ting a single node to a replica set	-	×	-	-	×	-	-	×	-	-	-
	Pay- per- use	-	√	√	√	√	√	√	√	√	√	-
	Yearly/ Month ly	-	√	√	√	√	√	√	×	×	×	In open beta testing (OBT), DDS 4.4 does not support the yearly/ monthly billing.
	Changi ng pay- per- use to yearly/ month ly	-	√	√	√	√	√	√	×	×	×	In open beta testing (OBT), DDS 4.4 does not support the yearly/ monthly billing.
	Changi ng yearly/ month ly to pay- per- use	-	√	√	√	√	√	√	×	×	×	In open beta testing (OBT), DDS 4.4 does not support the yearly/ monthly billing.

Versio ns	Minor versio n upgra de (manu al)	-	√	√	√	√	√	√	√	√	√	-
	Minor versio n upgra de (auto matic)	-	×	×	×	×	×	×	×	×	×	-
	Major versio n upgra de (manu al)	-	×	×	×	×	×	×	×	×	×	-
Logs	Viewin g slow query logs	-	√	√	√	√	√	√	√	√	√	-
	Downl oading slow query logs	-	√	√	√	√	✓	√	√	√	√	-
	Maski ng slow query logs	-	√	√	√	√	√	√	√	√	√	-
	Queryi ng error logs	-	√	√	√	√	√	√	√	√	√	-
	Downl oading error logs	-	√	√	√	√	√	√	√	√	√	-

	Config uring the audit log policy	-	√	√	√	√	√	√	√	√	√	-
	Queryi ng audit logs	-	√	√	√	√	√	√	√	√	√	-
	Downl oading audit logs	-	√	√	√	√	√	√	√	√	√	-
Param eters	Changi ng a param eter templ ate	-	√	√	√	√	√	√	√	√	√	-
	Creati ng a param eter templ ate	-	√	√	√	√	√	√	√	√	√	-
	Deleti ng a param eter templ ate	-	√	√	√	√	√	√	√	√	√	-
	Modify ing a param eter templ ate	-	√	√	√	√	√	√	√	√	√	-
	Comp aring param eter templ ates	-	√	√	√	√	√	√	√	√	√	-

Backu p and	Autom	-	√	√	√	√	√	√	√	√	√	-
restora tion	backu p											
	Manu al backu p	-	√	√	√	√	√	√	√	√	√	-
	Deleti ng a backu p	-	√	√	√	√	√	√	√	√	√	-
	Restori ng to a new DB instan ce	-	√	√	√	√	√	√	√	→	√	-
	Restori ng data to the origina l DB instan ce	-	√	√	√	√	√	√	√	√	✓	-
	Restori ng to an existin g DB instan ce	-	×	×	×	×	×	×	×	×	×	-
	Config uring an autom ated backu p	-	√	√	√	√	√	√	√	√	√	-
	Increm ental backu p	-	√	√	√	×	×	×	×	×	×	-
	PITR	-	×	√	×	×	×	×	×	×	×	-

	Downl oading a full backu p file	-	√	√	√	√	√	√	√	√	√	-
	Downl oading an increm ental backu p file	-	-	-	-	-	-	-	-	-	-	-
	Cross- region backu p	-	√	√	√	√	√	√	√	√	√	-
	Cross- region restora tion	-	√	√	√	√	√	√	√	√	√	-
O&M	Creati ng a databa se role	Th is op er ati on can only be performed by caling a specified A.P.	✓	✓	✓	✓	√	√	√	√	✓	

Creati	Th	√	√	√	√	√	√	√	√	√	_
ng a	is	•	•	•	•	·	·		,	•	
databa	ор										
se	er										
accou	ati										
nt	on										
	ca										
	n										
	on										
	ly										
	be										
	pe										
	rf										
	or										
	m										
	ed										
	by										
	ca lli										
	ng										
	a										
	sp										
	ec										
	ifi										
	ed										
	Α										
	PI.										

Deleti	Th	√	√	√	√	√	√	√	√	√	-
ng a	is	•	•	•	•	•	'	'	'	•	
databa	ор										
se role	er										
	ati										
	on										
	ca										
	n										
	on										
	ly										
	be										
	pe										
	rf										
	or										
	m _.										
	ed										
	by										
	ca lli										
	ng										
	a sp										
	ec										
	ifi										
	ed										
	A										
	PI.										

Droppi ng a databa se user	This operation can only be performed by calling a specified API.	✓	✓	✓	✓	√	√	√	✓	✓	
Monit oring by second s	Mi ni m u m int er va l: 5s	√	√	√	√	√	√	√	√	√	-

MOTE

 $\sqrt{}$ indicates that an item is supported, and \times indicates that an item is not supported.

MongoDB Compatibility

Table 12-2 Compatible features

Categor y	Details	DDS 4.0	DDS 4.2	DDS 4.4	Commu nity Edition Mongo DB 4.2	Commu nity Edition Mongo DB 4.4
Databas e comma nds	The find command supports the allowDiskUse field, which allows MongoDB to use temporary files on disk to store data exceeding the system memory limit while processing a nonindex sort operation.	×	×	√	×	√
	 New syntax and usage of projection. In projection, syntax of aggregation functions is supported, for example, using aggregation operators. In projection, data is encoded in JSON format and nested to map specified fields. In projection, the \$ character can be used to specify a specific index subelement for a mapped array element. 	×	×	√	×	×

Categor y	Details	DDS 4.0	DDS 4.2	DDS 4.4	Commu nity Edition Mongo DB 4.2	Commu nity Edition Mongo DB 4.4
Distribu ted transac tions	Distributed transactions are supported. Distributed transactions refer to multi-document transactions on sharded clusters and replica sets. Multi-document transactions (whether on sharded clusters or replica sets) are also known as distributed transactions starting in MongoDB 4.2.	×	√	√	✓	✓
	The 16 MB total size limit for a transaction was removed.	×	×	√	√	√
	The MongoDB drivers must be updated for MongoDB 4.2.	×	√	√	√	√

Categor y	Details	DDS 4.0	DDS 4.2	DDS 4.4	Commu nity Edition Mongo DB 4.2	Commu nity Edition Mongo DB 4.4
Aggregation	 The aggregation capability is improved. Data can be updated in the aggregation pipeline. Added \$merge. Added \$accumulator and \$function. Supported union All. Added \$unionWith. For details about aggregation operations, see Table 12-3. 					✓
Wildcar d indexes	Wildcard indexes are supported.	√	√	√	√	√
Sharde d cluster	A document's shard key field value can be changed.	×	×	√	√	✓
	The fields associated with the shard key can be adjusted.	√	√	√	×	√
	Collections can be sharded using a composite shard key that consists of a single hash field.	×	×	√	×	√
	The 512-byte size limit on a shard key was removed.	×	√	√	×	√

Categor y	Details	DDS 4.0	DDS 4.2	DDS 4.4	Commu nity Edition Mongo DB 4.2	Commu nity Edition Mongo DB 4.4
	Multi-document transactions allow the creation of indexes and collections (non-distributed transactions).	×	×	x	×	✓
Indexes	The size limit on indexes was removed.	√	√	√	√	√
	The length limit on index names was removed.	√	√	√	√	√
	Composite indexes can contain hash indexes.	×	×	√	×	√
	Hidden indexes are supported for commissioning.	√	√	√	×	√
	The size limit on collection namespaces is changed. The length of <database>.<collection> is increased from 120 bytes to 255 bytes.</collection></database>	√	✓	√	√	√
Other optimiz ed features	Default Read and Write Concern Global default read/ write concerns, involving connection and command read/ write contexts.	×	×	√	×	×
	Jumbo chunks can be migrated.	×	×	√	×	×
	Hedge query is supported.	×	×	√	×	×

Categor y	Details	DDS 4.0	DDS 4.2	DDS 4.4	Commu nity Edition Mongo DB 4.2	Commu nity Edition Mongo DB 4.4
	The mongos node supports JavaScripts to support some special aggregation operators.	×	×	√	×	×

- √ indicates that an item is supported, and × indicates that an item is not supported.
- For details about how to evaluate the compatibility when migrating MongoDB from a later version to an earlier version, see How Do I Evaluate the Compatibility When Migrating MongoDB from a Later Version to an Earlier Version?

Aggregation Operations

Table 12-3 Aggregation operations

Operator	DDS 4.0	DDS 4.2	DDS 4.4	MongoDB 4.2 Community Edition	MongoDB 4.4 Community Edition
\$sin	√	√	√	√	√
\$cos	√	√	√	√	√
\$tan	√	√	√	√	√
\$asin	√	√	√	√	√
\$acos	√	√	√	√	√
\$atan	√	√	√	√	√
\$atan2	√	√	√	√	√
\$asinh	√	√	√	√	√
\$acosh	√	√	√	√	√
\$atanh	√	√	√	√	√
\$degreesToR adians	√	√	√	√	√
\$radiansToD egrees	√	√	√	√	√

Operator	DDS 4.0	DDS 4.2	DDS 4.4	MongoDB 4.2 Community Edition	MongoDB 4.4 Community Edition
\$round	√	√	√	√	√
\$trunc	√	√	√	√	√
\$regexFind	√	√	√	√	√
\$regexFindAl	√	√	√	√	√
\$regexMatch	√	√	√	√	√
\$merge	√	√	√	√	√
\$planCacheS tats	×	×	×	√	√
\$replaceWit	√	√	√	√	√
\$set	√	√	√	√	√
\$unset	√	√	√	√	√
NOW	√	√	√	√	√
CLUSTER_TI ME	√	√	√	√	√
findAndModi fy	√	√	√	×	√
update	√	√	√	√	√
\$accumulato	√	√	√	×	✓
\$binarySize	√	√	√	×	√
\$bsonSize	√	√	√	×	√
\$first	√	√	√	×	√
\$function	√	√	√	×	√
\$last	√	√	√	×	√
\$isNumber	√	√	√	×	√
\$replaceOne	√	√	√	×	√
\$unionWith	√	√	√	×	√

■ NOTE

- $\sqrt{}$ indicates that an item is supported, and \times indicates that an item is not supported.
- For details about how to evaluate the compatibility when migrating MongoDB from a later version to an earlier version, see How Do I Evaluate the Compatibility When Migrating MongoDB from a Later Version to an Earlier Version?

12.3 Browsers

For details about the compatibility between DDS and browsers, see Which Browsers Are Supported?

13 Security

13.1 Shared Responsibilities

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

The shared responsibility model for Huawei Cloud and the tenants who use Huawei Cloud services is illustrated in **Figure 13-1**. 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 more widely speaking, the security 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.

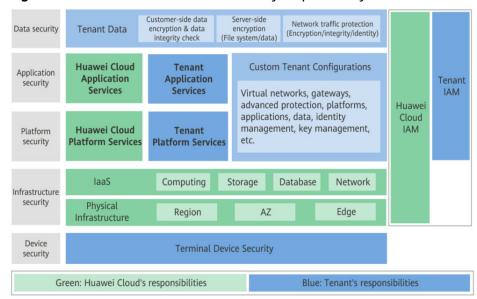


Figure 13-1 Huawei Cloud shared security responsibility model

13.2 Identity Authentication and Access Control

Identity Authentication

When you access DDS, 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 over DDS permissions. IAM provides identity authentication, permissions management, and access control, helping you efficiently manage access to your Huawei Cloud resources. IAM users can use DDS 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**.

VPCs and subnets

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 ranges, and bandwidth for a VPC. This makes it easy for you to manage and configure private networks and improves network security.

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

For details, see Creating a VPC.

Security groups

A security group is a logical group that provides access control policies for the ECSs and DDS 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 your DDS instances.

For details, see Configuring Security Group Rules.

13.3 Data Protection

DDS provides a series of methods and features to ensure data security and reliability.

Table 13-1 Methods for data security

Method	Description	Reference
Transmission encryption (HTTPS)	HTTP and HTTPS are both supported, but HTTPS is recommended for enhanced security.	Making an API Request
Data backup	You can back up and restore databases to ensure data reliability.	Backup Principles and Solutions
Critical operation protection	With this function enabled, the system authenticates your identify when you perform critical operations like deleting an instance, to further secure your data and configurations.	Critical Operation Protection
SSL	You can use SSL to encrypt the connection between DDS and the client. It provides privacy, authentication, and integrity to Internet communications.	Enabling or Disabling SSL

13.4 Audit and Logs

Audit

Cloud Trace Service (CTS) records operations on 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 DDS for future query, audit, and backtracking. For details, see **Key Operations Recorded by CTS**.

Logs

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

- Error Logs
 - DDS allows you to view database-level logs, including error logs and slow SQL query logs. For details, see **Error Logs**.
- Slow Query Logs
 - Slow query logs record statements that exceed **operationProfiling.slowOpThresholdMs** (500 ms by default). You can view log details and statistics to identify slow statements, so you can optimize them. For details, see **Slow Query Logs**.
- Audit Logs

An audit log records operations performed on your databases and collections. The generated log files are stored in OBS. Auditing logs can enhance your database security and help you analyze the cause of failed operations. For details, see **Audit Logs**.

13.5 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 monitors resources and operations, such as CPU usage and network throughput using Cloud Eye. For details about supported monitoring metrics and how to create alarm rules, see **DDS Metrics**.

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

13.6 Fault Rectification

Automated backups are created during the backup time window of your DB instances. DDS saves automated backups based on the retention period (1 to 732 days) you specified. For details, see **Configuring an Automated Backup Policy**.

Based on your service requirements, you can:

- Restoring a Cluster Backup to a New Instance
- Restoring a Cluster Backup to the Original Instance
- Restoring a Cluster Instance to a Point in Time
- Restoring a Cluster Backup to an On-premises Database

Cross-Region Backup

DDS can store backup files in the storage space that is in a different region from the DB instance for disaster recovery. If a DB instance in a region is faulty, you can

use the backup files in another region to restore data to a new DB instance. After you enable cross-region backup, the backup files are automatically stored in the region you specify.

Cross-AZ Disaster Recovery

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

Failover

If a primary node becomes unavailable, DDS automatically fails over to a standby node.

MOTE

Only cluster and replica set instances support this function.

13.7 Certificates

Compliance Certificates

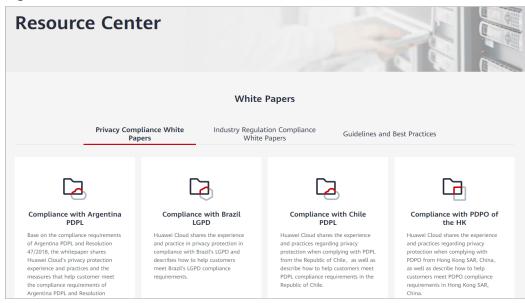
Huawei Cloud services and platforms have obtained various security and compliance certifications from authoritative organizations, such as International Organization for Standardization (ISO), system and organization controls (SOC), and Payment card industry (PCI) compliance standards. These certifications are available for download.

Figure 13-2 Downloading compliance certificates

Resource Center

Huawei Cloud also provides the following resources to help users meet compliance requirements. For details, see **Resource Center**.

Figure 13-3 Resource center



14 Permissions

If you need to assign different permissions to personnel in your enterprise to access your DDS resources, Identity and Access Management (IAM) is a good choice for fine-grained permissions management. IAM provides identity authentication, permissions management, and access control, helping you to securely access your Huawei Cloud resources.

With IAM, you can create IAM users and assign permissions to control their access to specific resources. For example, if you want some software developers in your enterprise to use DDS resources but do not want them to delete DDS instances or perform any other high-risk operations, you can create IAM users and grant permission to use DDS instances but not permission to delete them.

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

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

DDS 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.

DDS is a project-level service deployed for specific regions. When you set **Scope** to **Region-specific projects** and select the specified projects in the specified regions, the users only have permissions for DDS instances in the selected projects. If you set **Scope** to **All resources**, the users have permissions for DDS instances in all region-specific projects. When accessing DDS, the users need to switch to the authorized region.

You can grant users permissions by using roles and policies.

Roles: A coarse-grained authorization strategy provided by IAM to assign
permissions based on users' job responsibilities. Only a limited number of
service-level roles are available for authorization. Huawei Cloud services
depend on each other. When you grant permissions using roles, you also need
to attach any existing role dependencies. Roles are not ideal for fine-grained
authorization and least privilege access.

 Policies: A fine-grained authorization strategy that defines permissions required to perform operations on specific cloud resources under certain conditions. This type of authorization is more flexible and is ideal for least privilege access. For example, you can grant users only permission to manage DDS instances of a certain type.

Table 14-1 lists all the system-defined permissions for DDS.

Table 14-1 System-defined permissions for DDS

Role/Policy Name	Description	Туре	Dependencies
DDS FullAccess	Full permissions for Document Database Service.	System-defined policy	To create yearly/monthly instances, configure the CBC actions: • bss:balance: view • bss:balance: update • bss:order:vie w • bss:order:up date • bss:renewal: view • bss:renewal: update To unsubscribe from a yearly/monthly instance, you need to configure the following CBC action: • bss:unsubscribe:update
DDS ReadOnlyAcces s	Read-only permissions for Document Database Service. Users with these permissions can only view DDS data.	System- defined policy	None

Table 14-2 lists the common operations supported by system-defined permissions for DDS.

Table 14-2 Common operations supported by system-defined permissions

Operation	DDS FullAccess	DDS ReadOnlyAccess
Creating an instance	√	х
Querying instances	√	√
Deleting an instance	√	x
Restarting an instance	√	x
Performing a primary/ secondary switchover	√	х
Changing a database port	√	х
Resetting a password	√	х
Modifying an SSL policy	√	х
Changing a security group	√	х
Binding or unbinding an EIP	√	х
Scaling up storage space	√	х
Changing instance specifications	√	х
Adding nodes	√	х
Deleting the node that fails to be added	√	х
Modifying an automated backup policy	✓	х
Renaming an instance	√	х
Changing a private IP address	√	х
Changing the parameter template associated with the node in a DB instance	√	х
Showing original slow logs	√	х
Enabling or disabling local log auditing	√	х
Downloading audit logs	√	х
Deleting audit logs	√	х

Operation	DDS FullAccess	DDS ReadOnlyAccess
Downloading a backup	√	x
Creating a manual backup	✓	х
Querying the backup list	√	√
Restoring data to a new DB instance	√	х
Restoring data to an existing instance	√	х
Deleting a backup	√	х
Creating a parameter template	✓	х
Viewing parameter templates	√	√
Modifying a parameter template	√	х
Deleting a parameter template	√	х
Viewing a task center list	√	х
Stopping a backup	√	Х

Table 14-3 lists common DDS operations and corresponding actions. You can refer to this table to customize permission policies.

Table 14-3 Common operations and supported actions

Operation	Actions	Authorization Scope	Description
Instance creation page	vpc:vpcs:listvpc:subnets: getvpc:security Groups:get	Supported: IAM projects Enterprise projects	The VPC, subnet, and security group are displayed on the instance creation page.

Operation	Actions	Authorization Scope	Description
Creating an instance	 dds:instance: create vpc:vpcs:list vpc:vpcs:get vpc:subnets: get vpc:security Groups:get vpc:ports:get 	Supported: IAM projects Enterprise projects	If the default VPC, subnet, and security group are used, the vpc:*:create permission must be configured. To create an encrypted instance, configure the KMS Administrator permission for the project.
Querying DB instances	dds:instance:list	Supported:IAM projectsEnterprise projects	-
Querying details of a DB instance	dds:instance:list	Supported: • IAM projects • Enterprise projects	If the VPC, subnet, and security group need to be displayed on the instance details page, add the vpc:*:get and vpc:*:list actions.
Exporting DB instance lists	dds:instance:list	Supported: IAM projects Enterprise projects	If the VPC, subnet, and security group are required, add the vpc:*:get and vpc:*:list actions.
Deleting a DB instance	dds:instance:del eteInstance	Supported:IAM projectsEnterprise projects	When deleting a DB instance, delete the IP address on the data side.
Restarting a DB instance	dds:instance:reb oot	Supported:IAM projectsEnterprise projects	-
Performing a primary/ secondary switchover	dds:instance:swi tchover	Supported: IAM projects Enterprise projects	-
Changing a port	dds:instance:mo difyPort	Supported:IAM projectsEnterprise projects	-

Operation	Actions	Authorization Scope	Description
Resetting a password	dds:instance:res etPasswd	Supported: IAM projects Enterprise projects	-
Modified SSL	dds:instance:mo difySSL	Supported:IAM projectsEnterprise projects	-
Modifying a security group	dds:instance:mo difySecurityGro up	Supported:IAM projectsEnterprise projects	-
Binding an EIP	dds:instance:bin dPublicIp	Supported: • IAM projects	 When binding an EIP, you need to query the created EIP. Enterprise projects are not supported. Fine-grained authentication is not supported. For details, see Floating IP Address.
Unbinding an EIP	dds:instance:un bindPublicIp	Supported: • IAM projects	 Enterprise projects are not supported. Fine-grained authentication is not supported. For details, see Floating IP Address.
Scaling up storage space	dds:instance:ext endVolume	Supported: IAM projects Enterprise projects	-
Changing DB instance classes	dds:instance:mo difySpec	Supported:IAM projectsEnterprise projects	-

Operation	Actions	Authorization Scope	Description
Adding nodes	 dds:instance: extendNode vpc:vpcs:list vpc:vpcs:get vpc:subnets: get vpc:security Groups:get vpc:ports:get 	Supported: IAM projects Enterprise projects	-
Deleting the node that fails to be added	dds:instance:ext endNode	Supported:IAM projectsEnterprise projects	If the IP address has been created but the subsequent procedure fails, delete the IP address on the data side.
Modifying an automated backup policy	dds:instance:mo difyBackupPolic y	Supported: IAM projects Enterprise projects	-
Renaming a DB instance	dds:instance:mo dify	Supported: IAM projects Enterprise projects	-
Changing a private IP address	dds:instance: modifyVIPvpc:subnets: getvpc:ports:get	Supported:IAM projectsEnterprise projects	Before changing the private IP address, query available IP addresses.
Changing the parameter template associated with the node in a DB instance	dds:instance:mo difyParameter	Supported: IAM projects Enterprise projects	-
Showing original slow logs	dds:instance:mo difySlowLogPlai ntextSwitch	Supported: IAM projects Enterprise projects	-

Operation	Actions	Authorization Scope	Description
Enabling or disabling local log auditing	dds:instances:m odifyAuditLogS witch	Supported:IAM projectsEnterprise projects	-
Downloadi ng audit logs	dds:instances:d ownloadAuditL og	Supported:IAM projectsEnterprise projects	-
Deleting audit logs	dds:instance:del eteAuditLog	Supported: IAM projects Enterprise projects	-
Downloadi ng a backup file	dds:backup:dow nload	Supported:IAM projectsEnterprise projects	-
Changing the billing mode from pay-per-use to yearly/ monthly	dds:instances:re new	Supported:IAM projectsEnterprise projects	-
Creating a Manual Backup	dds:instance:cre ateManualBack up	Supported:IAM projectsEnterprise projects	-
Querying the backup list	dds:backup:list	Supported: IAM projects Enterprise projects	-

Operation	Actions	Authorization Scope	Description
Restoring data to a new DB instance	 dds:backup:c reateInstanc eFromBacku p vpc:vpcs:list vpc:vpcs:get vpc:subnets: get vpc:security Groups:get vpc:ports:get 	Supported: IAM projects Enterprise projects	The KMS Administrator permission needs to be configured for the encrypted instance in the project.
Restoring to an existing DB instance	dds:backup:refr eshInstanceFro mBackup	Supported: IAM projects Enterprise projects	-
Deleting a backup	dds:backup:dele te	Supported:IAM projectsEnterprise projects	-
Creating a parameter template	dds:param:creat e	Supported:IAM projectsEnterprise projects	-
Viewing parameter templates	dds:param:list	Supported:IAM projectsEnterprise projects	-
Modifying a parameter template	dds:param:modi fy	Supported: IAM projects Enterprise projects	-
Deleting a parameter template	dds:param:delet e	Supported: IAM projects Enterprise projects	-
Task Center list	dds:task:list	Supported:IAM projectsEnterprise projects	-

Operation	Actions	Authorization Scope	Description
Stopping a backup	dds:backup:stop	Supported:IAM projectsEnterprise projects	-
Querying a log group	lts:groups:get	Supported: IAM projects Enterprise projects	-
Querying a log stream	lts:topics:get	Supported: IAM projects Enterprise projects	-

Helpful Links

- What Is IAM?
- Creating a User Group, a User, and Granting DDS Permissions
- Permissions Policies and Supported Actions

15 Related Services

The following figure shows the relationship between DDS and other services.

Figure 15-1 Related services

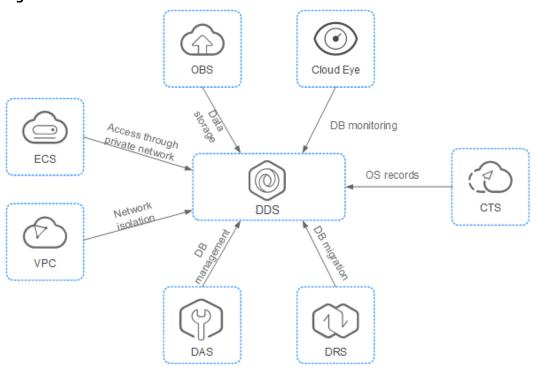


Table 15-1 Related services

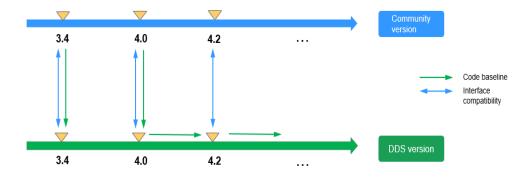
Service Name	Function
Elastic Cloud Service (ECS)	ECS provides DDS with elastic computing resources and a running environment for DB instances.
Virtual Private Cloud (VPC)	VPC provides DDS with elastic network resources and implements network isolation and access control for your DB instances.

Service Name	Function
Object Storage Service (OBS)	OBS stores your DDS instance backup files.
Cloud Eye	Cloud Eye serves as a monitoring platform, monitoring DDS resources for you in real time. It reports alarms and issues warnings promptly to ensure that services are running properly.
Cloud Trace Service (CTS)	CTS records operations related to DDS, facilitating your further queries, audits, and retrievals.
Data Replication Service (DRS)	DRS smoothly migrates databases to the cloud. Source databases remain operational during migration, minimizing downtime and impact.

16 Mapping Between DDS Versions and Community Versions

Document Database Service (DDS) is a cloud database service compatible with MongoDB. DDS major versions select community versions that have not reached EOL and have new major functions as candidate versions for compatibility. The DDS version does not correspond to the community version. To help you understand the mapping between DDS versions and community versions, DDS uses compatible community versions. For details, see Figure 16-1.

Figure 16-1 Mapping between DDS versions and community versions



- DDS 3.4 and 4.0 are developed based on the corresponding community versions. The implementation of the same interface is consistent with that in the community. Compared with a community version, DDS has higher security and more O&M functions. DDS can better meet commercial application requirements.
- After October 16, 2018, DDS 4.0 uses the community version 4.0.3 as the baseline version. New features are independently developed and evolved.
- DDS 4.2 and later versions use the community version 4.0.3 as the baseline version. New features are independently developed and evolved. The storage engine is switched to RocksDB to provide better user experience.
- DDS source code has been opened in the GitHub community. For details, see https://github.com/hwCloudDBSDDS/dds.

A Change History

Released On	Description
2021-12-30	This issue is the seventeenth official release, which incorporates the following changes:
	Added Read Replica.
	Added the pricing description of audit log storage.
2021-10-30	This issue is the sixteenth official release, which incorporates the following changes: Added Compatibility.
2021-05-30	This issue is the fifteenth official release, which incorporates the following changes:
	Supported RocksDB and instances compatible with MongoDB 4.2.
2021-04-30	This issue is the fourteenth official release, which incorporates the following change:
	Changed parameter group to parameter template.
2021-03-30	This issue is the thirteenth official release, which incorporates the following changes:
	Terminated the sale of DDS Enhanced/Enhanced II instances that offer vCPU-to-memory ratio of 1:2.
2020-09-30	This issue is the twelfth official release, which incorporates the following changes:
	Supported Kunpeng-based instances of Community Edition 4.0.
2020-08-30	This issue is the eleventh official release, which incorporates the following changes:
	Supported up to 32 mongos nodes and 32 shard nodes in each Community Edition cluster instance.
	Supported up to 3,000 GB of the replica set storage space.

Released On	Description
2020-02-14	This issue is the tenth official release, which incorporates the following change:
	Modified the description of the replica set instance architecture.
2019-10-18	This issue is the ninth official release, which incorporates the following changes: • Added section Comparison Between DDS and On-Premises
	Databases.
	 Updated sections Functions and Features and Typical Application Scenarios.
2019-09-11	This issue is the eighth official release, which incorporates the following changes:
	Supported a maximum of 16 mongos nodes and 16 shards for a Community Edition cluster instance.
2019-08-13	This issue is the seventh official release, which incorporates the following change:
	Modified DB instance statuses.
2019-04-19	This issue is the sixth official release, which incorporates the following changes:
	Modified the description of the Community Edition cluster instance architecture.
	Modified DB instance statuses.
2019-02-15	This issue is the fifth official release, which incorporates the following change:
	Modified DB instance statuses.
2018-09-06	This issue is the fourth official release, which incorporates the following change:
	Modified DB instance statuses.
2018-07-02	This issue is the third official release, which incorporates the following change:
	Supported multiple specifications.
2018-06-01	This issue is the second official release, which incorporates the following change:
	Supported DB instances that are compatible with MongoDB 3.4 Community Edition.
2018-05-04	This issue is the first official release.