Key-Value Storage Service

Service Overview

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HUAWEI

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Contents

1 What Is KVS?

Overview

Key-Value Storage Service (KVS) provides fully managed key-value (KV) data storage and indexing for sectors such as gaming, big data, and Internet. It is mainly used to store KV data (including metadata, description data, management parameters, and state data) of applications. It provides predictable performance and seamless scalability. You do not need to manage shards, pre-provision hardware, or manually expand clusters.

To use KVS to store data, you first need to create a store and a table.

NOTICE

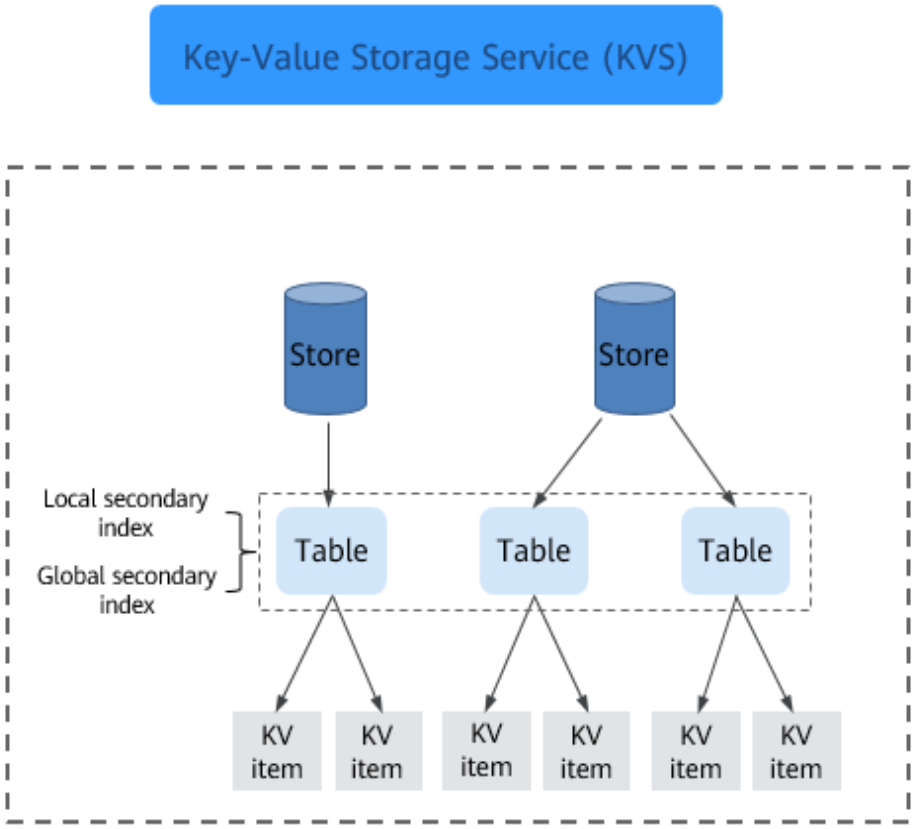
KVS provides storage but is unaware of the data you stored. If you need to transfer data across borders, ensure that your use of KVS complies with relevant laws and regulations.

Architecture

Figure 1-1 shows the architecture of KVS. You can use KVS with other cloud services to do the following things:

- Monitor your KVS resources in real time and be alerted in a timely manner through Cloud Eye.
- Create stores and tables in a region to store KV data.
- Create local or global secondary indexes to enjoy more flexibility when retrieving KV data.

Figure 1-1 KVS architecture



Access

You can access KVS using a web-based console, HTTPS APIs, and SDKs.

- APIs

  You can call APIs to use KVS from a third-party system. For details, see the *Key-Value Storage Service API Reference*.

- Console

  You can also use the console to access KVS directly.

  If you have already signed up with Huawei Cloud, sign in to the console and click **Key-Value Storage Service**. If you have not signed up, refer to **Signing Up for a HUAWEI ID and Enabling Huawei Cloud Services** and complete **real-name authentication**. (real-name authentication is required only when you purchase or use resources in the Chinese mainland region).

- SDKs

  KVS provides SDKs in various languages (including Java and C++) for secondary development. For details, see the *Key-Value Storage Service SDK Reference*.

2 KVS Advantages

- **Serverless**

  KVS is fully managed. You do not need to pre-provision resources or take care of maintenance. Just with a cloud account, you can instantly get started with KVS.

- **Flexible**

  KVS supports the BSON format, meaning that raw data does not need to be converted into strings, which accelerates data processing. In addition, fields of different data types can be flexibly combined.

- **Efficient**
  - KVS supports local and global secondary indexes, helping you retrieve data fast.
  - Prefix-based traversal is supported for higher efficiency.

- **High availability (HA)**
  - Data can be written to multiple availability zones (AZs) in sync within the same region, so you can be reassured that your services are not affected if any AZ is down.
  - Cross-AZ HA clusters deliver 99.99% availability and 99.9999999999% durability.

- **Secure and reliable**

  KVS supports HTTPS transmission encryption. Cipher suites in TLS preferentially use strong encryption algorithms.

- **Scalable**

  A single table has unlimited capacity and can scale elastically to help you handle traffic peaks and troughs with ease.

- **Controllable**
  - KVS authenticates the signature of each request from whether both public and private networks.
  - KVS checks the operational permissions of each user before processing any request.

3 KVS Scenarios

Advertising Tracking

You can store a wide range of marketing data in KVS, such as user data, user events, clickstream, and browsing data. This data is used for real-time bidding, ad positioning, and more.

Gaming

You can use KVS to store gaming data, including the game states, player data, session histories, and leaderboards.

Media and Entertainment

You can use KVS to store media metadata, user data, and digital rights data, and more.

Software and Internet

You can use KVS to store user content and metadata, vehicle and driver data, glossaries, and more.

Developer Platform

Developers can store various types of application data, description data, intermediate data, and transparent data blocks.

Management Plane Services

You can use KVS to store device or process configuration files in JSON or BSON, as well as service management data that is modifiable at the byte level.

4 KVS Features

Table 4-1 lists the main features of KVS.

Table 4-1 KVS features

Feature	Description
Store management	A store is a collection of tables. You can create different stores based on the division of your business for efficient queries.
Table management	A table is a collection of KV items and belongs to a store. You can create one or more tables in a store to store KV data. You can also query the tables you created.
KV item management	A KV item consists of mappings of keys and values, which represent the finest level of granularity. KV items are stored in tables. KV items can be added, updated, deleted, and scanned.
Index management	An index lets you query the data in the table using a different primary key from the base table, enabling faster and more accurate retrieval. KVS supports local and global secondary indexes. Indexes can be created, queried, and deleted.

5 Security

5.1 Shared Responsibilities

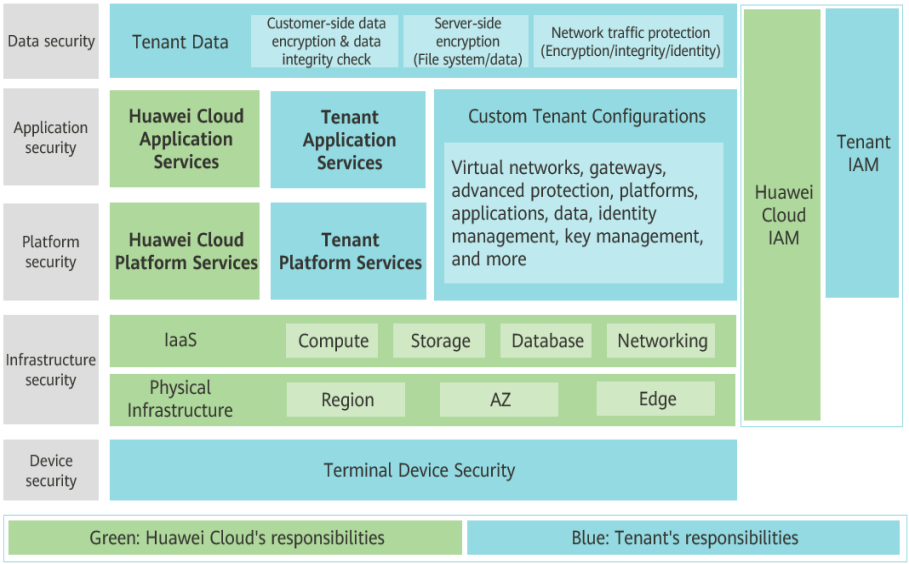
Huawei guarantees that its commitment to cyber security will never be outweighed by the consideration of commercial interests. To cope with emerging cloud security challenges and pervasive cloud security threats and attacks, Huawei Cloud builds a comprehensive cloud service security assurance system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

Figure 5-1 illustrates the responsibilities shared by Huawei Cloud and users.

- **Huawei Cloud**: Ensure the security of cloud services and provide secure clouds. Huawei Cloud's security responsibilities include ensuring the security of our IaaS, PaaS, and SaaS services, as well as the physical environments of the Huawei Cloud data centers where our IaaS, PaaS, and SaaS services operate. Huawei Cloud is responsible for not only the security functions and performance of our infrastructure, cloud services, and technologies, but also for the overall cloud O&M security and, in the broader sense, the security and compliance of our infrastructure and services.
- **Tenant**: Use the cloud securely. Tenants of Huawei Cloud are responsible for the secure and effective management of the tenant-customized configurations of cloud services including IaaS, PaaS, and SaaS. This includes but is not limited to virtual networks, the OS 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 and measures for building 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 5-1 Huawei Cloud shared security responsibility model



5.2 Identity Authentication and Access Control

IAM Identity Authentication

You can work with KVS using the KVS console, APIs, or SDKs. Whichever access method you use, requests are essentially sent through the REST APIs provided by KVS.

KVS APIs support request authentication. To authenticate, a request must contain a signature calculated based on the request sender's access keys (AK/SK) as the encryption factor and the specific information carried in the request body. AK/SK authentication uses AK/SK-based encryption. For details about access keys and how to obtain them, see **Access Keys (AK/SK)**.

Access Control

KVS resources are isolated by default. Resources created by an IAM user under an account can be accessed only by this IAM user and the account administrator.

5.3 Data Protection

KVS uses various measures to keep your data stored in KVS secure and reliable.

Table 5-1 KVS data protection

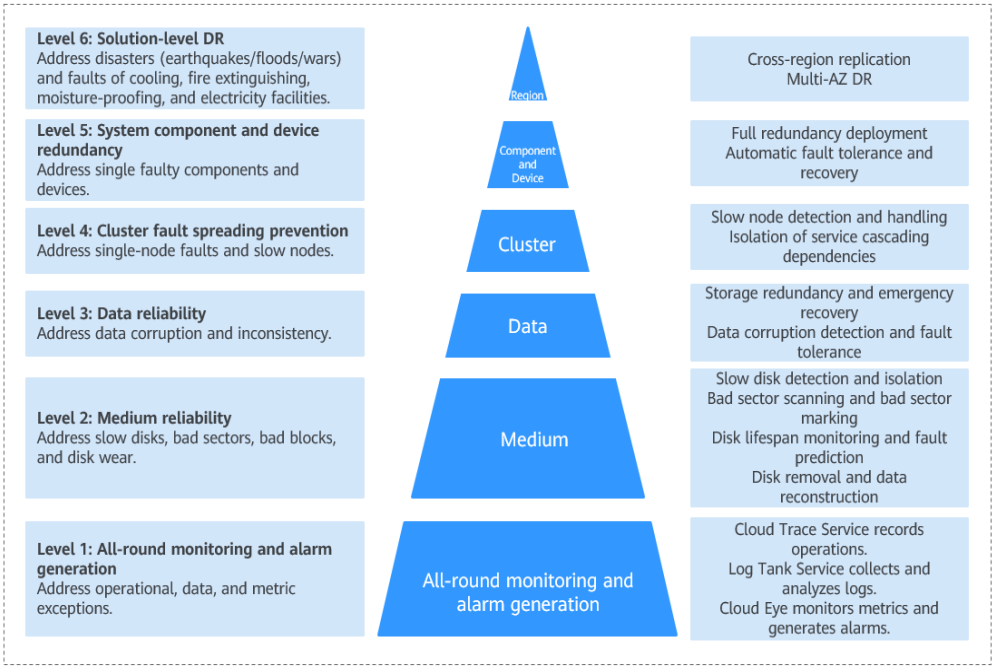
Measure	Description
HTTPS transmission encryption	KVS supports HTTPS transmission encryption. Cipher suites in TLS preferentially use strong encryption algorithms.

Measure	Description
Authentication	KVS APIs require identity authentication for all operations.

5.4 Resilience

KVS provides a multi-level architecture that uses cross-region replication, multi-AZ disaster recovery (DR), full redundancy, slow node detection, and other technologies to ensure data durability and reliability.

Figure 5-2 The reliability architecture of KVS



5.5 Monitoring Security Risks

You can use Cloud Eye to monitor your KVS resources and operations under the account and be alerted to any exceptions in real time. With Cloud Eye, you can get an overview of requests, traffic, error responses, and other state details about KVS.

For details about KVS metrics and how to create alarm rules, see **Viewing Monitoring Metrics and Creating Alarm Rules**.

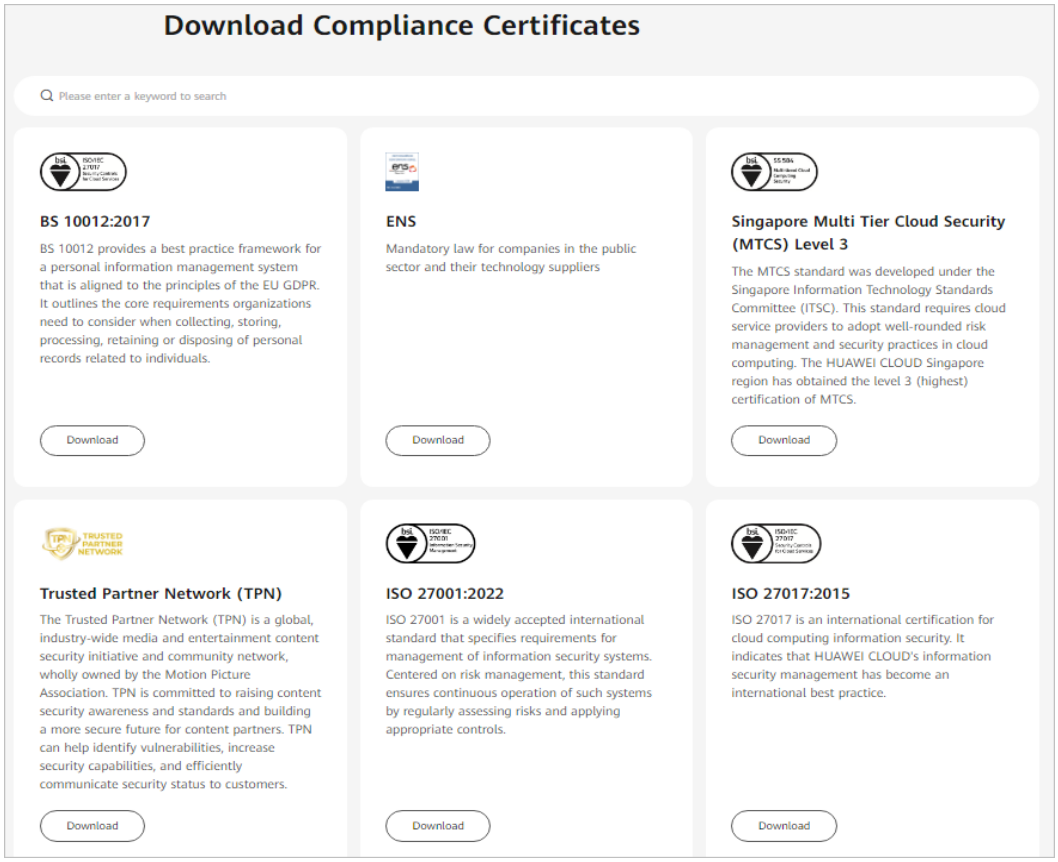
5.6 Certificates

Compliance Certificates

Huawei Cloud services and platforms have obtained various security and compliance certifications from authoritative organizations, such as International

Organization for Standardization (ISO). You can **download** them from the console.

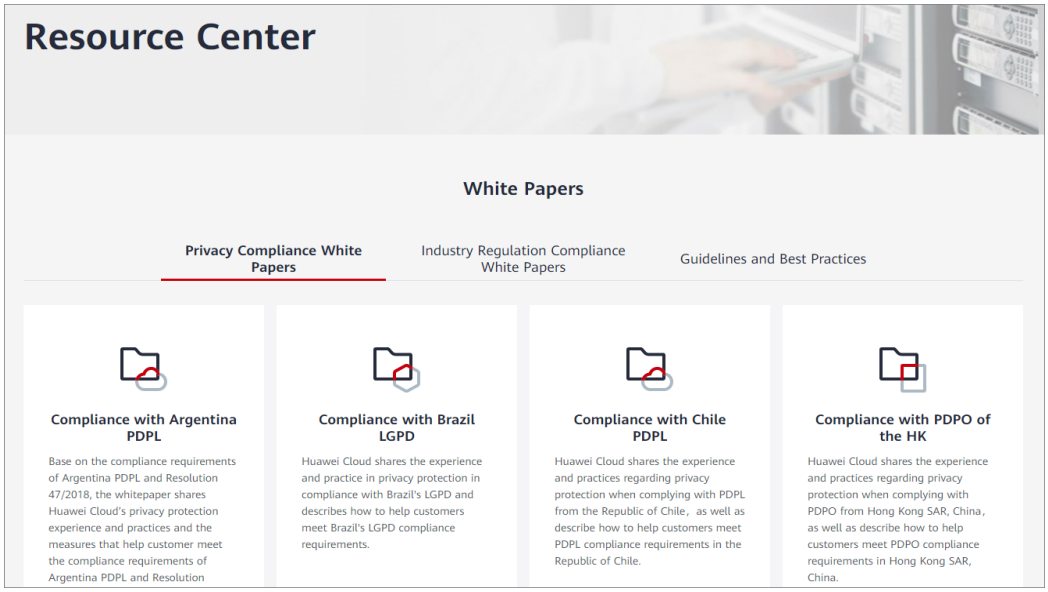
Figure 5-3 Downloading compliance certificates



Resource Center

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

Figure 5-4 Resource center



6 Notes and Constraints

Stores

- A store name must be 16 to 52 characters long. It is case-insensitive and cannot contain periods (.). A store name must be globally unique.
- Each account can create up to 25 stores.
- Point-In-Time Recovery (PITR) cannot be enabled for both a store and its tables.
- A store belongs to a region.
- Stores cannot be deleted.

Tables

- A table name can be 3 to 52 characters long. It is case-sensitive and must be unique within the store where it is.
- Up to 100 tables can be created in a store.
- You can only define one shard key and one sort key for a single table.
- A table must belong to a store.
- Tables cannot be deleted.

KV Items

- The KV data type can be a string, Boolean value, null value, floating-point number, array, mapping, date, or ObjectId. The total size of keys and values in a KV item cannot exceed 512 KB, including the primary key and local secondary indexes.
- A field name can be 1 byte to 63 bytes long. It is case sensitive and cannot contain periods (.) or dollar signs ($). A field name prefixed with **X** is a reserved name. The existing reserved field names are **Xattr** and **Xblob**. You are advised not to use them as field names.
- A primary key must be unique and cannot exceed 1,200 bytes.
- KV items accessed through APIs must be in the same store.
- A KV item must belong to a table.
- A KV item is uniquely identified by its store, table, and primary key combined.

Indexes

- A local secondary index must be prefixed with the shard key of its base table.
- A newly written KV item takes about one second to be synchronized to the global secondary index.
- An index item cannot be longer than 1,200 bytes.
- Indexes can only be created during table creation.
- Duplicate composite primary keys (shard key and sort key) are not allowed for multiple global secondary indexes of a table.
- Duplicate keys are not allowed in a single global secondary index.
- A global secondary index cannot have the same shard key as its base table.
- Duplicate sort keys are not allowed for multiple local secondary indexes of a table.
- Duplicate keys are not allowed in a single local secondary index.
- A local secondary index cannot have the same shard key as its base table.
- A local secondary index cannot have the same sort key as its base table.

7 Related Services

Figure 7-1 illustrates the relationships between KVS and other services. For related features, see Table 7-1.

Figure 7-1 KVS-related services

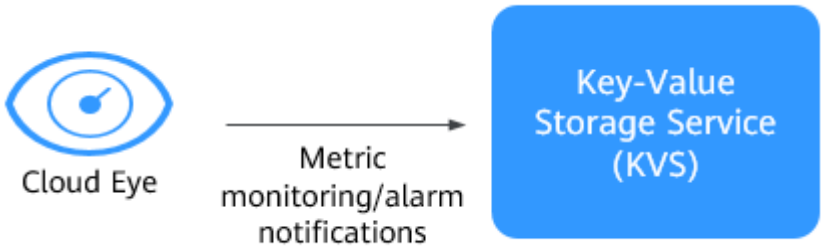


Table 7-1 KVS-related services

Related Service	Relationship with KVS	Related Feature
Cloud Eye	Monitors your KVS resources and notifies you of any alarms in real time.	Viewing Monitoring Metrics and Creating Alarm Rules

8 Concepts

8.1 Basic Concepts

- **Store**

  A store is a collection of tables. You can create different stores based on the division of your business.

- **Table**

  A table is a collection of KV items and belongs to a store. You can create tables in a store to store KV data and use the local and global secondary indexes to retrieve data from tables quickly and accurately.

- **Key-Value (KV) Item**

  A KV item is a document that is uniquely identified by its primary key. KV data is stored in tables.

- **Shard Key & Sort Key**

  Shard key: As a table field, it determines in which shard a KV item is stored. In a user table, for example, you can specify the *username* field as the shard key. KVS then stores KV items with the same username in the same shard.

  Sort key: As a table field, it is used to sort KV items before storing them in the table. When querying data, you can specify the sort key to specify the order in which the data is returned.

  When creating a table, you must specify a primary key. A primary key uniquely identifies a KV item in the table. The primary keys of any two KV items are different. KVS supports two types of primary keys:

  Simple primary key: It is a shard key.

  Composite primary key: It consists of a shard key and a sort key.

- **Index**

  An index lets you query the data in the table using a different primary key from the base table, enabling faster and more accurate retrieval. KVS supports local and global secondary indexes.

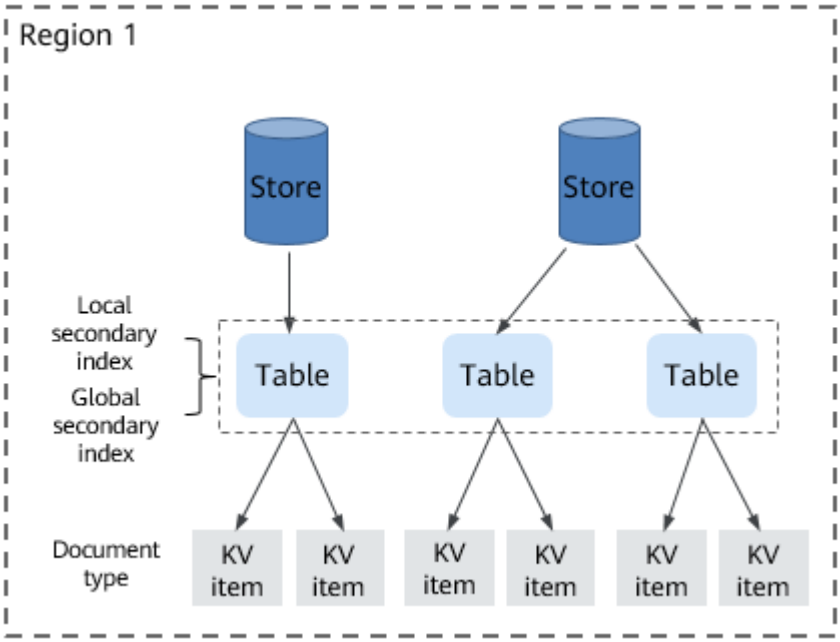
  Local secondary index: An index with the same shard key as its base table, but a different sort key. It is supported for tables with a composite primary key (shard key and sort key) and helps accelerate queries through the

specified sort key. When a KV item is written, a local secondary index item is automatically generated and stored with strong consistency.

Global secondary index: An index with a different shard key from the base table. Each index item stores only the index data. Other data in the corresponding KV item is not included. When a KV item is written, an index item is automatically generated and then asynchronously written to the global secondary index with eventual consistency.

For details about the relationships between stores, tables, KV items, and indexes, see **Figure 8-1**.

Figure 8-1 Relationships between basic KVS concepts



8.2 Region and AZ

Definitions

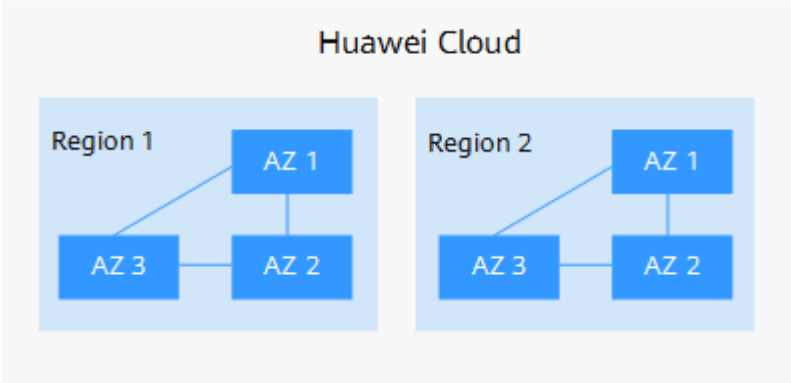
A region and an availability zone (AZ) refer to where a data center is. You can create resources in a specific region and AZ.

- Regions are defined based on the geographical location and network latency. Public services, such as Elastic Cloud Server (ECS), Elastic Volume Service (EVS), Object Storage Service (OBS), Virtual Private Cloud (VPC), Elastic IP (EIP), and Image Management Service (IMS), are shared within the same region. Regions are classified into universal regions and dedicated regions. A universal region provides universal cloud services for common tenants. A dedicated region provides services of a specific type or provides services for only specific tenants.
- An AZ contains one or more physical data centers. Each AZ has independent cooling, fire extinguishing, moisture-proofing, and electricity facilities. Within an AZ, compute, network, storage, and other resources are logically divided

into multiple clusters. AZs within a region are interconnected using high-speed optical fibers to support cross-AZ HA.

Figure 8-2 shows the relationship between regions and AZs.

Figure 8-2 Region and AZ



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

Selecting a Region

Take the following into account when selecting a region:

- Geographical location

  Select a region close to you or your target users. This ensures low access latency.

  - If you provide services in the Chinese mainland, select **CN North-Ulanqab1** or **CN North-Beijing4**.
  - Currently, no regions are available for services outside the Chinese mainland.

Selecting an AZ

When determining whether to deploy resources in the same AZ, consider your application's requirements for DR and network latency.

- Deploy resources in different AZs within the same region to ensure strong DR.
- Deploy resources within the same AZ to ensure low latency.

Regions and Endpoints

You need to specify the region and endpoint before you can call an API to use resources. For details about Huawei Cloud regions and endpoints, see **Regions and Endpoints**.

