TencentDB for TcaplusDB

Product Introduction

Product Documentation

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Product Overview

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Overview

With the explosive growth of game data, it has become increasingly difficult for traditional relational databases to meet needs such as high concurrent read and write functions, efficient storage of and access to massive data, high scalability and high availability. In contrast, NoSQL databases have developed rapidly owing to their advantages like simple expansion and fast read and write functions.

TencentDB for TcaplusDB is specially built for game data storage based on the design concept and technology of non-relational databases. It can balance performance and cost according to the characteristics of games.

Introduction

TencentDB for TcaplusDB is a NoSQL distributed data storage service designed for games and it supports Protobuf API access. By combining cache with disks, TcaplusDB can deliver high performance while saving costs to support all-server/all-region and multi-server/multi-region structures. In addition, it provides safe, reliable and complete solutions covering capacity expansion/reduction with non-stop service, backup for disaster recovery, and quick rollback in response to the explosive data growth and long-tail OPS of games. It is now widely used in hundreds of popular games such as Arena of Valor, CrossFire and NARUTO.

Features

Cache combined with persistent storage

Description: Cache and disk storage are combined, and hot and cold data are automatically swapped in/out.
User value: There is no need to use two kinds of databases, and thus the application architecture is simplified.

All-server/all-region support

Description: Storage space is uncapped, with a single table limited to 50 TB. Capacity expansion/reduction with non-stop service, as well as all-server/all-region and multi-server/multi-region are supported.
User value: There is no need concern about storage space expansion.

PB access support

Description: Flexible data access is enabled by use of Protobuf, and access to and extraction of specified fields are supported.

User value: Bandwidth is greatly saved and cost is reduced.

Quick rollback

Description: Cold backup is pulled quickly and then parallel decompressed. The rollback process is entirely automated, and rollback to a precise time point is supported. With 300 GB cold data backup on each node, all nodes can be recovered within 2 hours.

User value: Quick rollback can reduce failure losses.

Backup for disaster recovery

Description: overload protection; primary/secondary hot backup; daily cold backup for disaster recovery with data retained for up to 7 days and binlog records for 7 days.

User value: Data security is ensured and operation failure is handled easily.

Benefits

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Low cost

The key-table NoSQL storage service, which employs memory storage supplemented by disk storage, provides the ability of switching in-process data between memory and disks, and the ability of dynamically expanding capacity across multiple processes to ensure that active data are stored in memory and inactive data on disks. This service saves about 70% in costs compared to memory-only storage, and about 40% in comparison to Redis+MySQL.

High performance

Features including exchange of hot and cold data between memory and disks based on the Least Recently Used (LRU) algorithm, data storage on SSD disk and multi-server distribution of data ensure a high performance of up to 100,000 QPS per server with a latency less than 10 milliseconds.

High availability

The master/slave hot backup mechanism ensures quick recovery in case of system failure.

Support for game-specific needs

Game-specific needs such as a multi-server/multi-region model, quick start-up of servers, cross-region access, cross-region data consolidation, data compression and more are met, and are optimized continuously according to game requirements.

Dynamic expansion

The storage space is uncapped, and the capacity can be dynamically expanded or reduced according to the actual needs of a game without affecting game operation. This feature makes it easier to address sudden changes in business scale.

Ease of learning

The service inherits the development technologies of the PC platform and benefits from the development experience of the PC game team. The service API provides easy synchronous and asynchronous operations.

Service-based operation

With a convenient resource application mode, there will no longer be any need to manually deploy the storage service environment.

Optimization of resource utilization to improve operational efficiency

Alarm and other basic systems are integrated to provide process-level monitoring capabilities. Service APIs provide easy access to server capacity expansion, load balancing, and disaster recovery.

Use Cases

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Mobile games

As mobile games are characterized by fragmented play time, high player interaction, support for both all-server/all-region and multi-server/multi-region modes, fast iteration rate, and multiple operational activities, data requirement is massive and thus low latency is very important for data storage. TcaplusDB can support and optimize mobile games accordingly by leveraging technologies such as batch operation, automatic server merging, capacity expansion/reduction with non-stop service, and cold and hot data exchange. In addition, TcaplusDB also provide targeted support and optimization with regard to frequent data rollbacks, high availability, data updates and other data-related features.

PC games

PC game players are often logged in for extended periods of time, and PC games have a long lifecycle. Most PC games run in the multi-server/multi-region mode, so there are large amounts of data records and thus high requirements for low latency. TcaplusDB can support and optimize PC games by using technologies such as automatic disaster recovery, data partitioning, automatic record packeting, and cache combined with SSD disk storage.

Browser games

Browser games feature frequent server launching/merging, and usually run 7x24 non-stop. As browsers have limited ability to cache data, high requirements are imposed on the backend data storage system. TcaplusDB can support and optimize browser games by means of automatic server merging, capacity expansion/reduction with non-stop service, and cache combined with high-speed disk storage.

Social apps

In social apps, data can be created freely by users, and comments are used frequently. Contents are aggregated by topic, and fields such as Text, Link, and Time are of fixed length. Data activity is determined by time, and more data is read and less data is written. TcaplusDB can support and optimize social apps by using technologies such as list storage, heterogeneous datatype support, hot and cold data exchange, and read/write separation.

Architecture

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TcaplusDB is a fully hosted distributed NoSQL database service and mainly consists of the management, access, and storage layers. The access and storage layers both consist of multiple connection nodes and storage nodes and support horizontal node scaling. Each layer has its own roles, and the overall architecture is as shown below:
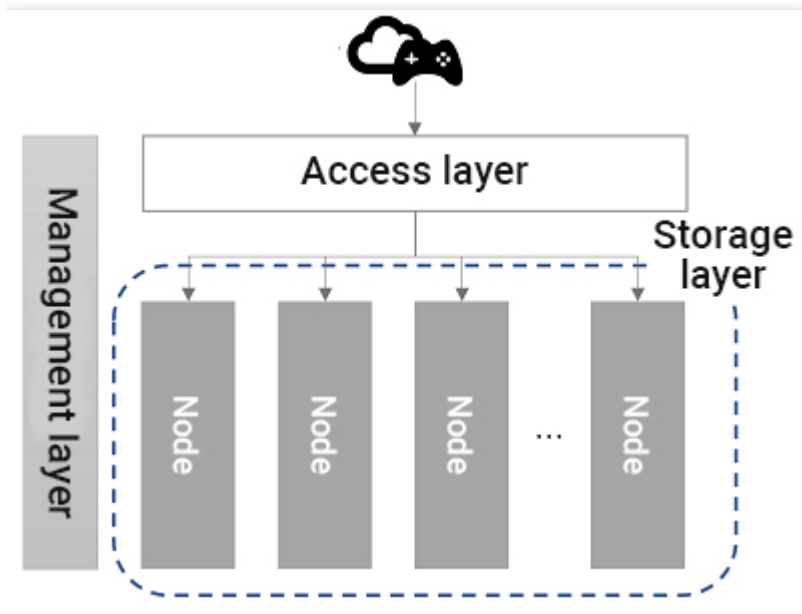
Management layer

The TcaplusDB management layer is used to store metadata and management information, schedule the TcaplusDB system, and manage TcaplusDB data.

Access layer

The TcaplusDB access layer is used to process user requests, interact with data nodes at the storage layer, and get data and return it to users.

Storage layer

The storage layer service is the core service of TcaplusDB used to store user data, respond to access-layer requests, and return data information.

TcaplusDB Logic Structure

The TcaplusDB logic structure consists of clusters, table groups, and tables as shown below:
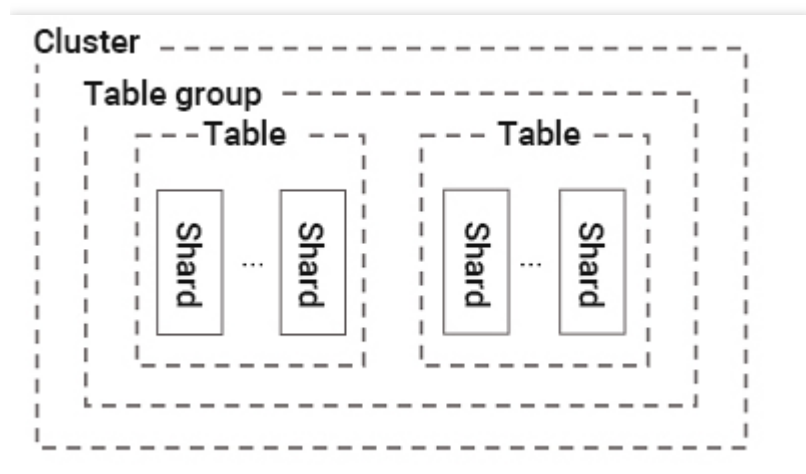
Regions

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TencentDB data centers are hosted in multiple locations worldwide. These locations are known as regions. Each region is an independent geographical area.

Region name can most directly embody the coverage of a data center. The following naming convention is used for your convenience:

A region name is composed of **region + city**. The `region` indicates the geographic area that the data center covers, while the `city` represents the city in or near which the data center is located.

> Note：
>
> TcaplusDB does not divide instances by AZ.

How to Select Region

Tencent Cloud regions are completely isolated. This guarantees the maximum cross-region stability and fault tolerance. When purchasing Tencent Cloud services, you are recommended to select the region closest to your end users to minimize access latency and improve download speed. Operations such as launching or viewing instances are performed at the region level.

Notes on private network communication:

- Tencent Cloud resources in the same region (under the same account and in the same VPC) can communicate with each other over private network. They can also be accessed via private IPs.
- The networks of different regions are fully isolated from each other, and Tencent Cloud services in different regions cannot communicate with each other over the private network by default.
- Tencent Cloud services in different regions can communicate with each other by accessing the internet through public IPs. Tencent Cloud services in different VPCs can communicate with each other through CCN, which is faster and more stable.

Region List

TcaplusDB divides instances only by region and is available in the following regions:

China

Region	Identifier
East China (Shanghai)	ap-shanghai
Hong Kong/Macao/Taiwan (Hong Kong, China)	ap-hongkong

Other countries/regions

Region	Identifier
Southeast Asia Pacific (Singapore)	ap-singapore
Northeast Asia Pacific (Seoul)	ap-seoul
Northeast Asia Pacific (Tokyo)	ap-tokyo
West US (Silicon Valley)	na-siliconvalley
East US (Virginia)	na-ashburn
Europe (Frankfurt)	eu-frankfurt