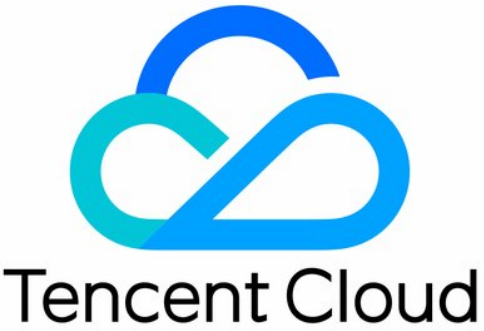
TencentDB for TcaplusDB Product Introduction



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Product Introduction Overview

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Background

With the explosive growth of game data, traditional relational databases are increasingly unable to meet the requirements for high concurrent read/write operations, efficient storage and access of massive data, high scalability, and high availability. NoSQL databases have seen rapid development due to their simple expansion and fast read/write capabilities. Tencent Cloud TcaplusDB leverages the design principles and technologies of non-relational databases, balancing performance and cost to create a specialized solution for gaming data storage, considering the unique characteristics of games.

Introduction

TcaplusDB is a NoSQL distributed data storage service designed specifically for games, supporting Protobuf interface access. Tcaplus combines cache and disk to achieve high performance while also saving costs. It effectively supports both global and regional server configuration and offers solutions like seamless scaling, backup disaster recovery, and fast rollbacks to accommodate the burst growth and long-tail operation characteristics of games, ensuring safety and reliability. Currently, it is used in hundreds of popular games including <King of Glory>, <CrossFire>, <Naruto>.

Product Features

Combination of Cache and Persistent Storage

Feature Introduction: Cache + Disk Storage, Automatic Hot and Cold Data Exchange.
User Value: Simplifies application architecture by not needing two types of databases.

Supports Global Server Coverage

Feature Introduction: Unlimited Storage Space, Single Table Supports up to 2PB, Non-stop Scaling, Supports Global Server Coverage and Partitioned Server Operations.
User Value: No need to worry about storage space expansion.

Supports PB Access

Feature Introduction: Combines with Protobuf to provide flexible data access, supports access and extraction of specified fields.
User Value: Bandwidth saving, cost reduction.

Rapid Rollback

Feature Introduction: Quickly fetch cold backups with parallel decompression, full process automation of rollback, supports precise time point rollback of data, each node has 300GB cold backup, completes rapid recovery of all nodes within 2 hours.
User Value: Rapid rollback, reduced failure losses.

Backup and Disaster Recovery

Feature Introduction: Overload protection; Dual-machine hot standby; Daily cold backup disaster recovery mechanism, data retention for 7 days, Binlog stream retention for 7 days.
User Value: Data security assurance, coping with operational failures.

Strengths

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Low costs

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.

Low learning curve

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.

Product Architecture

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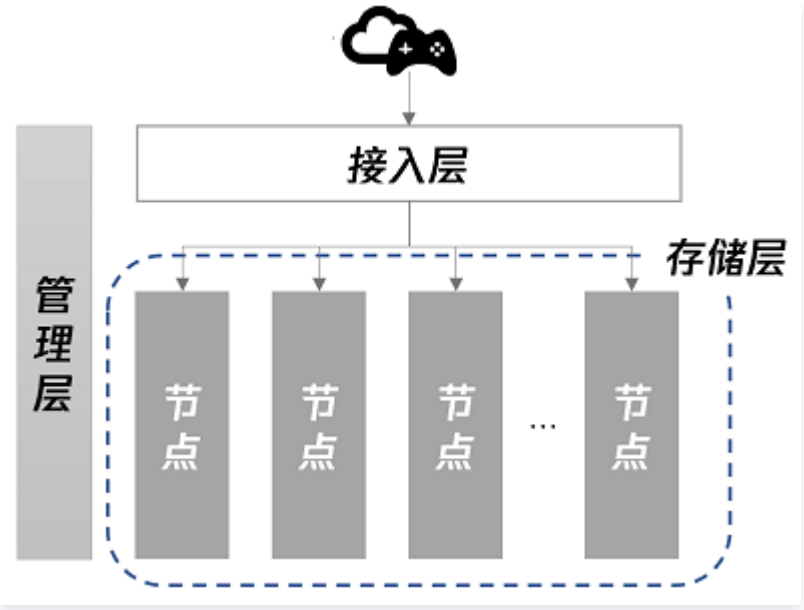
TcaplusDB is a fully hosted distributed NoSQL database service mainly composed of the management layer, access layer, and storage layer. The access and storage layers consist of multiple connection nodes and storage nodes and support horizontal node scaling. Each layer has its own role, and the overall 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

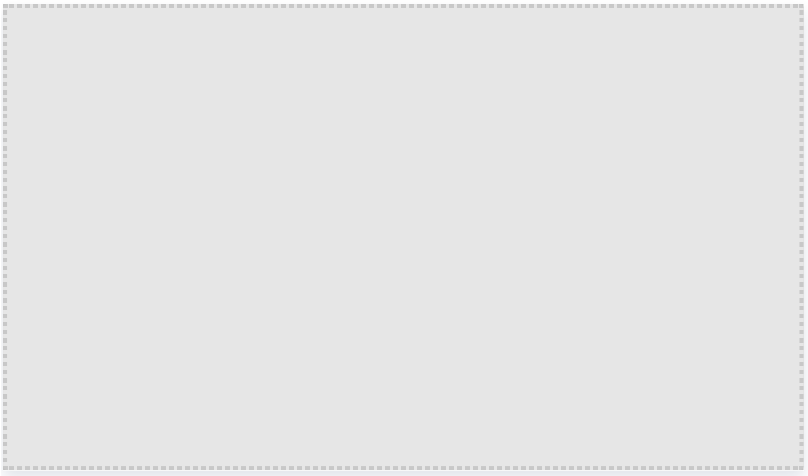
The TcaplusDB access layer is used to process user requests, interact with data nodes at the storage layer, and get data and return it to users.

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. The relationship diagram is shown below:



Region Overview

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Tencent Cloud databases are hosted in managed data centers at multiple locations worldwide. These locations are known as regions. Each region is an independent geographical area.
Region names reflect the coverage area of the data centers. For easier understanding, the naming convention is as follows:
Regions are named based on [coverage area + city of data center location], where the first part indicates coverage capability and the second part specifies the city of the data center's location or its proximity.

> **Note:**
> TcaplusDB does not distinguish availability zones.

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:

- Cloud resources in the same region (within the same account and VPC) can be interconnected through the private network, which can be accessed directly using Private IP address.
- The networks of different regions are fully isolated from each other, and Tencent Cloud services in different regions cannot communicate over private network by default.
- Cloud products located in different regions can communicate via the Internet using Public IP. Cloud products in different VPCs can communicate through CCN, which is a faster and more stable method of communication.

Region List

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

China

Region	Region Label

East China (Shanghai)	ap-shanghai
Hong Kong (China), Macao (China), and Taiwan (China)(Hong Kong, China)	ap-hongkong

Other countries and regions

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