

Cloud File Storage

Product Introduction

Product Documentation



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Product Introduction

Overview

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Cloud File Storage (CFS) provides a scalable shared file storage service that can be used with Tencent Cloud services such as CVM, TKE, and BatchCompute. CFS offers standard NFS and CIFS/SMB file system access protocols as well as shared data sources for multiple CVM instances or other computing services. It supports elastic capacity expansion and performance scaling. Your existing applications can be mounted for use without modification. As a highly available and reliable distributed file system, CFS is suitable for various scenarios such as big data analysis, media processing, and content management.

CFS is easy to integrate, eliminating your need to adjust your business structure or make complex configurations. To integrate and use CFS, simply complete three steps: creating a file system, launching a file system client on a server, and mounting the created file system.

Features

Integrated management

CFS supports NFS v3.0/v4.0 and CIFS/SMB2.0/SMB2.5/SMB3.0 protocols as well as POSIX access syntax (such as strong data consistency and file locking). You can mount a file system by running the standard mount command on the corresponding operating system.

Automatic expansion

CFS can automatically expand the storage capacity of a file system based on file size without interrupting requests and applications during the process, thereby ensuring exclusive use of storage resources while reducing management workload.

Security settings

CFS features extremely high availability and persistence. Each file stored in a CFS instance has 3 redundant copies. It supports access from VPC and classic network as well as access control.

Pay-as-you-go

CFS is billed by actual usage with no minimum fees or deployment or OPS fees. It allows multiple CVM instances to share the same storage capacity via the NFS and CIFS/SMB protocols, eliminating your need to purchase other storage services or care about cache.

Strengths

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Benefits

Integrated management

- CFS supports POSIX access syntax (such as strong data consistency and file locking). Tencent Cloud's computing resources can be mounted to CFS through the NFS v3.0/v4.0 protocol.
- CFS comes with a console where you can quickly create and configure a file system, reducing the time needed for deployment and the workload of file system maintenance.

Automatic scaling

CFS can automatically expand the storage capacity of a file system based on file size without interrupting requests and applications during the process, thereby ensuring exclusive use of storage resources while reducing the time cost and workload of management.

Security and reliability

- CFS employs a three-copy distributed mechanism that can securely store data across racks to ensure reliability up to 99.9999999%. The service won't return a success response to a write request until it confirms that the data has been written in all three copies. In case that any one of the copies fails, CFS will quickly copy a new one through data migration to ensure that there are always three copies ready for use.
- CFS can strictly control access to file systems, allowing you to implement access control by using the security groups in the basic network or VPCs together with permission groups.

Low costs

- CFS can dynamically adjust the capacity as needed, without early storage capacity scheduling required. You only need to pay for what you use with no minimum fees or deployment or OPS fees.
- CFS allows multiple compute nodes to share the same storage capacity via the NFS and CIFS/SMB protocols, eliminating your need to purchase other storage services or care about cache.

Model Selection

Application scenarios: CFS vs. CBS

Category	Single CFS File System	Single Cloud Disk
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Category	Single CFS File System	Single Cloud Disk
Throughput	Up to 40 GB/s for high-performance CFS Up to 300 MB/s for standard CFS	Up to 260 MB/s for SSD cloud disk Up to 150 MB/s for premium cloud disk
IOPS	Up to 60K IOPS for high-performance CFS Up to 4K IOPS for standard CFS	Up to 26K IOPS for SSD cloud disk Up to 6K IOPS for premium cloud disk
Sharing	Shared by tens of thousands of clients with strong data consistency	Shared by dozens of clients with no guarantee for consistency
Number of redundant copies	3	3
How to use	Usable directly after mount	File system installation required

Storage Types and Performance

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CFS provides file systems with scalable storage, which can work with other Tencent Cloud services such as CVM, TKE, and BatchCompute. CFS offers the following storage classes, and you can select one based on your business needs.

Storage Classes

Standard

Standard is a highly cost-effective file system that uses mixed media and accelerates data reads/writes through a data tiering mechanism. Three replicas on three independent physical servers on different racks are provided to guarantee strong consistency and successful storage of every data entry written to the file system. Its access server features hot data migration to ensure data reliability and high service availability, making it suitable for scenarios that require small-scale general data storage.

High-Performance

High-Performance is a low-latency file system that uses NVMe only and provides a high storage performance through a data tiering mechanism. Three replicas on three independent physical servers on different racks are provided to guarantee strong consistency and successful storage of every data entry written to the file system. Its access server features hot data migration to ensure data reliability and service high availability, making it suitable for small-scale core businesses that are latency-sensitive.

Standard Turbo

Standard Turbo is a parallel file system that uses mixed media and an asymmetric framework. The data nodes and metadata nodes are deployed independently. By allowing mounting over a private protocol, the performance of a single client can be like a storage cluster. In addition, underlying resources are isolated to ensure exclusive storage for the cluster. Three replicas on three independent physical servers on different racks are provided to guarantee strong consistency and successful storage of every data entry written to the file system. Its access server features hot data migration to ensure data reliability and service high availability, making it suitable for businesses that require high throughput and mixed loads.

High-Performance Turbo

High-Performance Turbo is a high-bandwidth, low-latency, parallel file system that uses NVMe only and an asymmetric framework. The data nodes and metadata nodes are deployed independently. By allowing mounting over a private protocol, the performance of a single client can be like a storage cluster. In addition, underlying resources

are isolated to ensure exclusive storage for the cluster. Three replicas on three independent physical servers on different racks are provided to guarantee strong consistency and successful storage of every data entry written to the file system. Its access server features hot data migration to ensure data reliability and high service availability, making it suitable for scenarios that use large numbers of small files.

High-Throughput

High-Throughput is a parallel file system that uses a layered framework. It provides more flexible bandwidth scaling and access over the SMB protocol, meeting the storage requirements for a small capacity and high bandwidth. Three replicas on three independent physical servers on different racks are provided to guarantee strong consistency and successful storage of every data entry written to the file system. Its access server features hot data migration to ensure data reliability and high service availability, making it suitable for read-intensive scenarios such as rendering, game battle server, and non-linear editing.

Performance and Specifications

General series

Product Name	Standard	High-Performance
Positioning	Cost-effective, suitable for small-scale general data storage	High performance and low latency, suitable for small-scale latency-sensitive core businesses
Scenario	Small-scale enterprise file sharing, data backup/archive, and log storage	Small-scale CI/CD development and testing environments, high-performance web services, OLTP databases, and high-performance file sharing
Storage capacity	0–160 TiB	0–32 TiB
Bandwidth (MiB/s)	$\text{Min}\{100 + 0.1 \times \text{Capacity in GiB}, 300\}$	$\text{Min}\{200 + 0.2 \times \text{Capacity in GiB}, 1,024\}$
Read IOPS	$\text{min}\{2000 + 8 \times \text{Size in GiB}, 15,000\}$	$\text{Min}\{2,500 + 30 \times \text{Size in GiB}, 30,000\}$
Write IOPS	$\text{min}\{2000 + 8 \times \text{Size in GiB}, 15,000\}$	$\text{Min}\{2,500 + 30 \times \text{Size in GiB}, 30,000\}$
OPS upper threshold	Read/Write: 10,000/1,000	Read/Write: 30,000/3,000
Latency	4K single-stream read: 3 ms 4K single-stream write: 7 ms	4K single-stream read: 1 ms 4K single-stream write: 1.5 ms

Cost	0.058 USD/GiB/month	0.23 USD/GiB/month
Supported protocol	NFS/SMB	NFS
Expansion	Auto	Auto
Supported OS	Linux/Windows	Linux/Windows

Turbo series

Product Name	Standard Turbo	High-Performance Turbo
Positioning	High-throughput and large storage, suitable for businesses that require high throughput and mixed loads	High-throughput and high IOPS, suitable for businesses that use large-scale small files
Scenario	Non-linear media asset editing, image rendering, AI inferencing, OLAP business, and high-performance computing	High-performance and large-scale computation, AI training, OLTP databases, big data analysis, and OLAP services
Storage capacity	40 TiB–100 PiB	20 TiB–100 PiB
Bandwidth (MiB/s)	$\text{Min}\{0.1 \times \text{Capacity in GiB}, 100,000\}$	$\text{Min}\{0.2 \times \text{Capacity in GiB}, 100,000\}$
Read IOPS	$\text{Min}\{2 \times \text{Capacity in GiB}, 2 \text{ million}\}$	$\text{Min}\{20 \times \text{Capacity in GiB}, 10 \text{ million}\}$
Write IOPS	$\text{Min}\{1 \times \text{Capacity in GiB}, 1 \text{ million}\}$	$\text{Min}\{5 \times \text{Capacity in GiB}, 3 \text{ million}\}$
OPS upper threshold	Read/Write: 300,000/20,000	Read/Write: 300,000/20,000
Latency	4K single-stream read: 0.2 ms 4K single-stream write: 3 ms	4K single-stream read: 0.2 ms 4K single-stream write: 1.5 ms
Cost	0.09 USD/GiB/month	0.15 USD/GiB/month
Supported protocol	POSIX/MPI	POSIX/MPI
Expansion	Manual	Manual
Supported OS	Linux	Linux

High-Throughput

Product Name	High-Throughput
Positioning	High throughput and large capacity, suitable for large-scale read-intensive businesses
Scenario	Read-intensive scenarios such as video rendering, game battle server, and non-linear editing
Storage capacity	0-1 PiB
Bandwidth (MiB/s)	0-200 GiB/s (dependent on the deployment workload)
Read IOPS	$\text{Min}\{2 \times \text{Capacity in GiB}, 2 \text{ million}\}$
Write IOPS	$\text{Min}\{1 \times \text{Capacity in GiB}, 1 \text{ million}\}$
OPS upper threshold	Read/Write: 300,000/20,000
Latency	4K single-stream read: 5 ms 4K single-stream write: 10 ms
Supported protocol	SMB
Expansion	Auto
Supported OS	Windows

Notes

- In the performance-related formulas, the capacities of Standard Turbo and High-Performance Turbo refer to the capacities purchased for the cluster. For Standard and High-Performance, the capacities refer to the storage that is actually used by the instances.
- The table above shows the capabilities of the file system. To reach the performance upper threshold, you usually need to perform multi-threaded reads/writes using multiple compute nodes.
- The performance benchmark is tested in interruption-free conditions. The results of mixed tests or other loads might vary.
- OPS suggests the file system's ability to process metadata per second, which is not the same as IOPS.
- Currently, High-Throughput CFS is not available for purchase in the console. If you need to purchase it, [submit a ticket](#) for application.

Use Cases

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Enterprise File Sharing

CFS provides storage services suitable for organizations with a large number of employees who need to access and share the same datasets. It allows the administrators of an organization to create file systems and set read/write permissions for internal clients.

High-performance Computing and Big Data Analysis

CFS provides the scale, performance, high throughput of computing nodes, read-after-write consistency, and low-latency file operations required by high-performance computing and big data applications, making it particularly suitable for such scenarios as machine learning, AI training, and centralized server log processing and analysis.

Streaming Media Processing

For media workflows such as video editing, video production, broadcast processing, sound design, and rendering, shared storage is generally used to work with large files. The strong data consistency model of CFS, coupled with high throughput and shared file access, helps reduce the time it takes to complete such tasks.

Content Management and Web Services

As a highly persistent, high-throughput file system, CFS can be used for various content management systems. It stores and provides data for various applications such as websites, online distribution, and archiving.

Dedicated Software Environment

CFS provides the foundation for the migration of traditional service architectures to the cloud for government, education, and healthcare sectors. Generally, a dedicated software program needs to share the same file storage system and only supports POSIX standard protocol operations.

Recommended Regions

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The following table describes regions where CFS is recommended:

Note :

If you need to use CFS in a region where resources are sold out for your CVM instances or services, you can choose a VPC in that region, create a subnet in a purchasable availability zone (AZ), and then create a CFS file system in that subnet. For more information, please see [FAQs](#).

This table recommends AZs for resource deployment based on the resource-adding capacity and resource adequacy of CFS, which doesn't mean CFS resources are always available for purchase in these AZs. If you purchase resources in recommended AZs, subsequent addition of resources can be guaranteed.

Note :

Whether you can purchase resources in an AZ is subject to the console. Although there are still resources in some legacy AZs, you are advised to deploy businesses in recommended AZs first.

Region	Recommended AZ
Beijing	Beijing Zone 6
	Beijing Zone 7
Shanghai	Shanghai Zone 4
	Shanghai Zone 5
Guangzhou	Guangzhou Zone 6
	Guangzhou Zone 7
Nanjing	Nanjing Zone 1
	Nanjing Zone 2
	Nanjing Zone 3
Chengdu	Chengdu Zone 1

	Chengdu Zone 2
Chongqing	Chongqing Zone 1
Hong Kong (China)	Hong Kong (China) Zone 1
	Hong Kong (China) Zone 2
Singapore	Singapore Zone 1
	Singapore Zone 2
Tokyo	Tokyo Zone 1
	Tokyo Zone 2
US West	Silicon Valley Zone 1
US East	Virginia Zone 1
Mumbai	Mumbai Zone 1
Thailand	Bangkok Zone 1
	Bangkok Zone 2
Seoul	Seoul Zone 1
Toronto	Toronto Zone 1
Russia	Moscow Zone 1

System Restrictions

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Limits and Notes

Specification limits

Product Type	Standard		High-Performance		Standard Turbo	
	Specification	Recommended Range	Specification	Recommended Range	Specification	Recommended Range
Maximum system capacity	160 TiB	140 TiB	32 TiB	24 TiB	100 PiB	40 PiB
Minimum system capacity	Unrestricted		Unrestricted		40 TiB	
Maximum system bandwidth	300 MiB/s	240 MiB/s	1GiB/s	800MiB/s	100 GiB/s	40 GiB/s
Maximum number of system files	Min[15000 * used capacity (GiB), 1 billion]	Min[10000 * used capacity (GiB), 0.8 billion]	Min[20000 * used capacity (GiB), 1.5 billion]	Min[15000 * used capacity (GiB), 1 billion]	Min[15000 * deployed capacity (GiB), 1 billion]	Min[15000 * deployed capacity (GiB), 1 billion]
Maximum number of system directories	10 million	8 million	15 million	10 million	10 million	10 million
Maximum length of filename	255 bytes	255 bytes	255 bytes	255 bytes	255 bytes	255 bytes
Maximum length of absolute path	4,096 bytes	4,096 bytes	4,096 bytes	4,096 bytes	4,096 bytes	4,096 bytes
Maximum number of directory levels	1000	16	1000	16	1000	1000
Maximum number of files/subdirectories per directory	1 million	0.8 million	1 million	0.8 million	1 million	1 million

Maximum number of concurrently opened files	65536	1000	65536	1000	65536	1
Maximum number of locks per file	512	512	512	512	512	5
Maximum number of clients	1000	100	1000	100	2000	1
Maximum number of mounted file systems per client	1000	16	1000	16	16	8
Billing	Billed by the actual usage (excluding prepaid)		Billed by the actual usage (excluding prepaid)		Billed by the purch	
Supported protocol	NFS/SMB		NFS		POSIX/MPI	
Supported OS	Linux/Windows				Linux	

Notes

Turbo series

- The Turbo series is mounted using a client. After you run the `mount` command on the client installed, you can use the file system the same way as a local file system.
- The Turbo series is billed according to the capacity purchased. For example, if you purchased a 40 TiB file system of the Standard Turbo storage class, you will be billed at the 40 TiB rates by hour, no matter how much you actually use. For example, if you use the file system for one hour, the fees will be calculated as follows: $40 \times 1024 \times 0.09 / 24 / 30 = 5.12$ USD. The file system can be terminated anytime.
- To ensure the cloud load balance of the file system after scaling up, we recommend that you scale up when around 80% of the capacity has been used. Online scale-up is supported and will be imperceptible during the whole process.
- The Turbo series cannot be scaled down. Alternatively, you can create a Turbo instance, migrate your data, and then delete the old instance.
- Because the self-deployed cluster needs to be set up again, the initial creation of the Turbo series will take about 20 minutes.
- The Turbo series can be mounted and used only by root accounts by default. If you need to use them with a general account, you can [submit a ticket](#) to contact us.
- If you need the Turbo series with higher specifications (supporting more files, directories, etc.), you can submit a ticket to contact us.

UID and GID

- When the NFS v3.0 protocol is used, if the UID or the GID of the file does not exist in the local account, then the UID and the GID will be displayed directly. Otherwise, the relevant user and group names will be displayed based on the mapping relationship of the local UID and GID.
- When the NFS v4.0 protocol is used, if the Linux version is above 3.0, the UID rules and the GID rules will be the same as those of the NFS v3.0 protocol. Otherwise, the UID and the GID of all files will be displayed as `nobody`.

Note :

When you mount a file system to a Linux version below 3.0 by using the NFS v4.0 protocol, we recommend that you refrain from performing "change owner" or "change group" on the file or directory. Otherwise, its UID and GID will become `nobody`.

Supported CIFS/SMB protocol

- Supported protocol versions: CIFS/SMB 1.0 and later are supported. However, we recommend that you refrain from mount file systems using SMB 1.0, because it is inferior in terms of performance and features to SMB 2.0 and later and because Windows has stopped its technical support service for Windows versions supporting SMB 1.0 or earlier.
- You cannot use NFS and SMB to access the same file system at the same time or directly access an SMB file system via WAN.
- Read/write ACL is provided only at the file system level. No ACL is provided at the file/directory level.
- IOCTL/FSCTL operations such as sparse files setting, file compression, ENI status query, and reparse point setting are not supported.
- Alternate Data Streams are not supported.
- Some protocol features in SMB 3.0 or above such as SMB Direct, SMB Multichannel, SMB Directory Leasing, and Persistent File Handle are not supported.