

Scalable File Service Turbo

Service Overview

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Huawei Cloud Computing Technologies Co., Ltd.

Address: Huawei Cloud Data Center Jiaoxinggong Road
Qianzhong Avenue
Gui'an New District
Gui Zhou 550029
People's Republic of China

Website: <https://www.huaweicloud.com/intl/en-us/>

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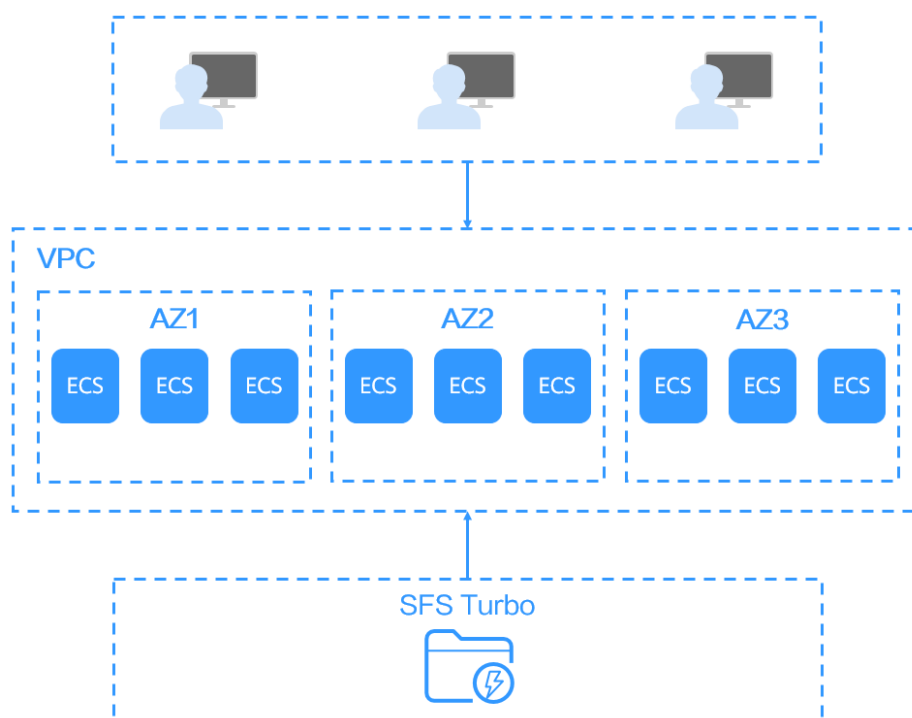
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1 What Is SFS Turbo?

Overview

Scalable File Service Turbo (SFS Turbo) provides scalable, high-performance (NAS) file storage. With SFS Turbo, you can enjoy shared file access spanning multiple Elastic Cloud Server (ECSs), Bare Metal Servers (BMSs), and containers created on Cloud Container Engine (CCE), as shown in [Figure 1-1](#).

Figure 1-1 Accessing SFS Turbo



Compared with traditional file storage, SFS Turbo has the following advantages:

- File sharing
Cloud servers in multiple availability zones (AZs) of the same region can access the same file system concurrently and share files.
- Elastic scaling

The file system storage can be scaled up on demand to dynamically adapt to service changes without interrupting applications. You can complete resizing with a few clicks.

- Superior performance and reliability

File system performance increases as capacity grows, and file systems deliver a high data durability to support rapid service growth.

The background system supports both HDD and SSD storage media. It adopts a distributed architecture and uses full redundant design for modules, which eliminate single-node faults.

- Seamless integration

SFS Turbo supports Network File System (NFS), through which a broad range of applications can read data from and write data into file systems.

- Easy operation

On an intuitive graphical user interface (GUI), you can create and manage file systems with ease.

Accessing SFS Turbo

You can access SFS Turbo on the console or through HTTPS-based API calls.

- APIs

Use APIs if you need to integrate SFS Turbo into a third-party system for secondary development. For detailed operations, see *Scalable File Service Turbo API Reference*.

- Console

Use the console if you prefer a web-based UI to perform operations.

2 Application Scenarios

Expandable to 320 TB, SFS Turbo provides fully hosted shared file storage. It features high availability and durability to support massive small files and applications requiring low latency and high IOPS. SFS Turbo is recommended for various scenarios, including high-performance websites, log storage, compression and decompression, DevOps, enterprise OA, and containerized applications.

- High-performance websites
For I/O-intensive website services, SFS Turbo can provide shared website source code directories for multiple web servers, enabling low-latency and high-IOPS concurrent share access.
- Log storage
SFS Turbo can provide multiple service nodes for shared log output directories, facilitating log collection and management of distributed applications.
- DevOps
The development directory can be shared to multiple VMs or containers, simplifying the configuration process and improving R&D experience.
- Enterprise OA
Office documents of enterprises or organizations can be saved in an SFS Turbo file system for high-performance shared access.

3 File System Types

This section describes the features, highlights, and application scenarios of different types of SFS Turbo file systems.

Table 3-1 SFS Turbo file systems

Parameter	20 MB/s/TiB	40 MB/s/TiB	125 MB/s/TiB	250 MB/s/TiB	500 MB/s/TiB	1,000 MB/s/TiB
Max. bandwidth	8 GB/s	8 GB/s	20 GB/s	20 GB/s	80 GB/s	80 GB/s
Max. IOPS	250,000	250,000	1 million	1 million	1 million	1 million
Single-queue, 4 KiB latency	2-5 ms	2-5 ms	1-3 ms	1-3 ms	1-3 ms	1-3 ms
Capacity	3.6 TB to 1 PB	1.2 TB to 1 PB	1.2 TB to 1 PB	1.2 TB to 1 PB	1.2 TB to 1 PB	1.2 TB to 1 PB
Medium Type	HDD	HDD	SSD	SSD	ESSD	ESSD
Highlights	Large capacity and low cost	Large capacity and low cost	Low latency and cost effectiveness	Low latency and cost effectiveness	High IOPS and high-density performance	High IOPS and high-density performance

Typical scenarios	Log storage, file sharing, content management, and websites	Log storage, file sharing, content management, and websites	AI training, autonomous driving, EDA simulation, rendering, enterprise NAS, and HPC web applications	AI training, autonomous driving, EDA simulation, rendering, enterprise NAS, and HPC web applications	Large-scale AI training, AI models, and AI generated content	Large-scale AI training, AI models, and AI generated content
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Table 3-2 Previous-generation SFS Turbo file systems

Parameter	Standard	Standard-Enhanced (Discontinued)	Performance	Performance-Enhanced (Discontinued)
Max. bandwidth	150 MB/s	1 GB/s	350 MB/s	2 GB/s
Max. IOPS	5,000	15,000	20,000	100,000
Single-queue, 4 KiB latency	2–5 ms	2–5 ms	1–3 ms	1–3 ms
Capacity	500 GB to 32 TB	10 TB to 320 TB	500 GB to 32 TB	10 TB to 320 TB
Medium Type	HDD	HDD	SSD	SSD
Highlights	Large capacity and low cost		Low latency and high IOPS	
Typical scenarios	Code storage, log storage, file sharing, and enterprise OA		High-performance website, file sharing, content management, image rendering, AI training, and enterprise OA	

 **NOTE**

- In the table, the maximum IOPS and maximum bandwidth all include both the read and write operations. So, maximum IOPS = read IOPS + write IOPS.
- The expansion increment of SFS Turbo Standard-Enhanced (discontinued), Standard, Performance-Enhanced (discontinued), and Performance file systems is 100 GB. The expansion increment of 20 MB/s/TiB, 40 MB/s/TiB, 125 MB/s/TiB, 250 MB/s/TiB, 500 MB/s/TiB, or 1,000 MB/s/TiB file systems is 1.2 TB.

4 File System Encryption

You can encrypt data on the newly created file systems if needed.

Keys used by encrypted file systems are provided by the Key Management Service (KMS), which is secure and convenient. You do not need to establish and maintain the key management infrastructure. If you want to use your own key material, use the key import function on the KMS console to create a custom key whose key material is empty and import the key material to the custom key. For details, see [Importing Key Materials](#) in the *Key Management Service User Guide*.

You can directly use the encryption function when creating SFS Turbo file systems. No authorization is required.

Encryption Key

An SFS Turbo file system does not have a default key. You can use your existing key or create a new key. For details, see section "Creating a Custom Key" in the *Data Encryption Workshop User Guide*.

5 SFS Turbo and Other Services

Relationships Between SFS Turbo and Other Services

Table 5-1 Related services

Function	Related Service	Reference
A file system and the ECSs must belong to the same project. File systems are mounted to shared paths for data sharing.	Elastic Cloud Server (ECS)	Mounting an NFS File System to ECSs (Linux)
VPC provisions an isolated virtual network environment defined and managed by yourself, improving the security of cloud resources and simplifying network deployment. An ECS cannot access file systems in a different VPC. Before using SFS Turbo, ensure that the file system and ECSs are in the same VPC.	Virtual Private Cloud (VPC)	Creating a File System
IAM is an enterprise-level self-service cloud resource management system. It provides user identity management and access control functions. When employees in your enterprise need to use SFS Turbo, the enterprise administrator can use IAM to create users and control these users' permissions on enterprise resources.	Identity and Access Management (IAM)	Permissions
File system encryption depends on KMS. You can use the keys provided by KMS to encrypt file systems to improve data security.	Key Management Service (KMS) of Data Encryption Workshop (DEW)	Encryption

Function	Related Service	Reference
<p>Once you have subscribed to SFS Turbo, you can monitor its performance without installing any plug-ins and view monitored metrics, such as the read bandwidth, write bandwidth, and read and write bandwidth on Cloud Eye.</p>	<p>Cloud Eye</p>	<p>Monitoring</p>
<p>CTS allows you to collect, store, and query cloud resource operation records and use these records for security analysis, compliance auditing, resource tracking, and fault locating. With CTS, you can record operations associated with SFS Turbo for later query, audit, and backtrack operations.</p>	<p>Cloud Trace Service (CTS)</p>	<p>Auditing</p>
<p>You can use tags to classify and identify file systems.</p>	<p>Tag Management Service (TMS)</p>	<p>Tag</p>

6 Basic Concepts

6.1 SFS Turbo Basic Concepts

Before you start, understand the following concepts.

File System

A file system provides users with shared file storage through NFS. It is used for accessing network files remotely. After you create a file system on the console, you can mount the file system on multiple servers and access the file system from the servers through the standard POSIX.

POSIX

Portable Operating System Interface (POSIX) is a set of interrelated standards specified by Institute of Electrical and Electronics Engineers (IEEE) to define the application programming interface (API) for software compatible with the UNIX operating system (OS). POSIX is intended to achieve software portability at the source code level so that a program written for a POSIX compatible OS can be compiled and executed on any other POSIX OS.

NFS

Network File System (NFS) is a distributed file system protocol that allows different computers and OSs to share data over a network.

6.2 Project and Enterprise Project

Project

A project is used to group and isolate OpenStack resources, such as compute, storage, and network resources. A project can be a department or a project team. Multiple projects can be created for one account.

Enterprise Project

An enterprise project manages multiple resource instances by category. Resources and projects in different cloud service regions can be classified into one enterprise project. An enterprise can classify resources based on departments or project groups and put relevant resources into one enterprise project for management. Resources can be migrated between enterprise projects.

6.3 Region and AZ

What Are Region and AZ?

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

- Regions are divided based on 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 either universal or dedicated. A universal region provides universal cloud services for common tenants, while a dedicated region provides services of the same type only or for specific tenants.
- An AZ contains one or more physical data centers. Each AZ has independent cooling, fire extinguishing, moisture-proof, and electricity facilities. Within an AZ, compute, network, storage, and other resources are logically divided into multiple clusters. to support high-availability systems.

Selecting a Region

If your target users are in Europe, select the **EU-Dublin** region.

Selecting an AZ

When deploying resources, consider your applications' requirements on network latency.

For lower network latency, deploy resources in the same AZ.

7 Notes and Constraints

Table 7-1 SFS Turbo restrictions

Item	Standard, Standard-Enhanced (Discontinued), Performance, and Performance-Enhanced (Discontinued)	20 MB/s/TiB, 40 MB/s/TiB, 125 MB/s/TiB, 250 MB/s/TiB, 500 MB/s/TiB, and 1,000 MB/s/TiB
Access method	VPN, Direct Connect, and Cloud Connect	VPN, Direct Connect, and Cloud Connect
Max. bandwidth	Standard: 150 MB/s Standard-Enhanced (Discontinued): 1 GB/s Performance: 350 MB/s Performance-Enhanced (Discontinued): 2 GB/s	20 MB/s/TiB and 40 MB/s/TiB: 8 GB/s (If you need a higher throughput, submit a service ticket . The maximum throughput is 20 GB/s.) 125 MB/s/TiB and 250 MB/s/TiB: 20 GB/s (If you need a higher throughput, submit a service ticket . The maximum throughput is 100 GB/s.) 500 MB/s/TiB and 1,000 MB/s/TiB: 80 GB/s (If you need a higher throughput, submit a service ticket . The maximum throughput is 200 GB/s.)

Item	Standard, Standard-Enhanced (Discontinued), Performance, and Performance-Enhanced (Discontinued)	20 MB/s/TiB, 40 MB/s/TiB, 125 MB/s/TiB, 250 MB/s/TiB, 500 MB/s/TiB, and 1,000 MB/s/TiB
Max. IOPS	Standard: 5,000 Standard-Enhanced (Discontinued): 15,000 Performance: 20,000 Performance-Enhanced (Discontinued): 100,000	20 MB/s/TiB and 40 MB/s/TiB: 250,000 125 MB/s/TiB and 250 MB/s/TiB: 1 million 500 MB/s/TiB and 1,000 MB/s/TiB: 4 million (If you need a higher IOPS, submit a service ticket . The maximum IOPS is 10 million.)
Min. latency	1–2 ms	1–2 ms
Max. capacity of a file system	320 TB	1 PB
Supported protocol	NFSv3	NFSv3
Max. number of clients that a file system allows	500	3,000
Max. number of authorized VPCs per file system	20	20
Max. size of a single file	16 TB	320 TB
Max. number of files or subdirectories per file system	1 billion NOTE The number of files or subdirectories allowed in a single file system is calculated by dividing the total capacity (KB) by 16. If the calculated value is greater than 1 billion, the number of files or subdirectories allowed is 1 billion.	2 billion NOTE The number of files or subdirectories allowed in a single file system is calculated by dividing the total capacity (GB) by 25,000. If the calculated value is greater than 2 billion, the number of files or subdirectories allowed is 2 billion.

Item	Standard, Standard-Enhanced (Discontinued), Performance, and Performance-Enhanced (Discontinued)	20 MB/s/TiB, 40 MB/s/TiB, 125 MB/s/TiB, 250 MB/s/TiB, 500 MB/s/TiB, and 1,000 MB/s/TiB
Max. number of files or subdirectories in a single directory	20 million NOTE If you need to execute the ls , du , cp , chmod , or chown command on a directory, you are advised to place no more than 500,000 files or subdirectories in that directory. Otherwise, requests may queue for a long time as the NFS protocol needs to send a large number of requests to traverse files in the directory.	20 million NOTE If you need to execute the ls , du , cp , chmod , or chown command on a directory, you are advised to place no more than 500,000 files or subdirectories in that directory. Otherwise, requests may queue for a long time as the NFS protocol needs to send a large number of requests to traverse files in the directory.
Max. directory depth (unit: level)	100	100
Max. path length (unit: byte)	1,024	4,096
Max. soft link length (unit: byte)	1,024	1,024
Max. hard link length (unit: byte)	255	255
Max. number of file systems	32 by default. You can submit a service ticket to increase the quota.	32 by default. You can submit a service ticket to increase the quota.
Backup	Supported	Supported
File locking with Flock	Not supported	Not supported
Cache acceleration	Not supported	Supported. (Eventual consistency only. To disable cache acceleration, submit a service ticket .) NOTE When multiple clients access the same file system, access requests of a client may be routed to different backends. If a request hits a backend's local cache, it will fail to obtain the modifications made by other clients. Cache is normally valid for 3 to 30 seconds.

Item	Standard, Standard-Enhanced (Discontinued), Performance, and Performance-Enhanced (Discontinued)	20 MB/s/TiB, 40 MB/s/TiB, 125 MB/s/TiB, 250 MB/s/TiB, 500 MB/s/TiB, and 1,000 MB/s/TiB
Tag	<ul style="list-style-type: none">• You can add a maximum of 10 tags to a file system.• Tag keys of a file system must be unique.	

8 Billing

Billing Items

Pay-per-use billing is preset by default. You are billed based on the storage capacity that you select (instead of the used capacity) and the amount of time that you use the file system. Usage period is calculated at the top of every hour. Any usage period of less than an hour is rounded up to an hour. For details, see [Table 8-1](#).

Table 8-1 SFS Turbo billing model

Billing Item	Billing Factor
Standard, Standard-Enhanced (Discontinued), Performance, Performance-Enhanced (Discontinued), 20 MB/s/TiB, 40 MB/s/TiB, 125 MB/s/TiB, 250 MB/s/TiB, 500 MB/s/TiB, and 1,000 MB/s/TiB	Storage space

Billing Modes

SFS Turbo supports the following billing modes: pay-per-use and yearly/monthly.

Changing Billing Mode

- Yearly/monthly is a prepaid billing mode. You will be billed based on the subscription duration you specify. This mode provides a favorable price and is ideal when the resource use duration is predictable.
- Pay-per-use is a postpaid billing mode. You will be billed based on the billing items of specific file systems and can purchase or delete file systems at any time. Expenditures are deducted from the account balance.

In some regions, you can change your pay-per-use SFS Turbo file systems to yearly/monthly billing. Changing from yearly/monthly billing to pay-per-use is currently not supported.

Expiration

After a yearly/monthly SFS Turbo file system expires, the system will not automatically change it to pay-per-use billing, but processes it based on the rules specified in [Resource Suspension and Release](#). If the file system is not renewed before the retention period expires, it will be deleted.

Overdue Payment

Possible causes of overdue payment:

You have created a pay-per-use SFS Turbo file system and your account balance is not enough to pay for the generated pay-per-use charges.

Service status and operation restrictions when an account is in arrears:

Your SFS Turbo file systems are retained after your account is in arrears and the file systems enter the retention period, but you cannot use the file systems. If the outstanding payment is not cleared before the retention period ends, data stored in the file systems will be deleted and cannot be recovered.

For details about the retention period, see [Service Suspension and Resource Release](#).

9 Permissions

If you need to assign different permissions to employees in your enterprise to access your SFS Turbo resources on Huawei Cloud, 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 use your Huawei Cloud account to create IAM users, and assign permissions to the users to control their access to specific resources. For example, some software developers in your enterprise need to use SFS Turbo resources but should not be allowed to delete the resources or perform any other high-risk operations. In this scenario, you can create IAM users for the software developers and grant them only the permissions required for using SFS Turbo resources.

If your Huawei Cloud account does not require individual IAM users for permissions management, 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](#).

SFS Turbo Permissions

New IAM users do not have any permissions assigned by default. You need to first add them to one or more groups and then 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.

You can grant permissions by using roles and policies.

- **Roles:** A coarse-grained authorization strategy that defines permissions by job responsibility. Only a limited number of service-level roles are available for authorization. When using roles to grant permissions, you need to also assign other roles on which the permissions depend to take effect. However, 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 a certain type of ECSs. Most policies define permissions based on APIs. For the API actions supported by SFS Turbo, see section "Permissions Policies and Supported Actions" in the *Scalable File Service API Reference*.

Table 9-1 lists all the system-defined permissions for SFS Turbo.

Table 9-1 System-defined permissions for SFS Turbo

Policy/Role Name	Description	Type	Dependencies
SFS Turbo FullAccess	Administrator permissions for SFS Turbo. Users with these permissions can perform any operation on all SFS Turbo resources under the account.	System-defined policy	None
SFS Turbo ReadOnlyAccess	Read-only permissions for SFS Turbo. Users with these permissions can only view SFS Turbo data.	System-defined policy	None

Table 9-2 lists the common operations supported by system-defined policies for SFS Turbo.

Table 9-2 Common operations supported by each system-defined policy of SFS Turbo

Operation	SFS Turbo FullAccess	SFS Turbo ReadOnlyAccess
Grants permission to query SFS Turbo file systems.	√	√
Grants permission to query tags of an SFS Turbo file system.	√	√
Grants permission to query SFS Turbo quotas.	√	√
Grants permission to list SFS Turbo file systems.	√	√
Grants permission to query the SFS Turbo file system types.	√	√

Operation	SFS Turbo FullAccess	SFS Turbo ReadOnlyAccess
Grants permission to query the AZ information of the current region.	√	√
Grants permission to check SFS Turbo file system names.	√	×
Grants permission to delete tags from an SFS Turbo file system.	√	×
Grants permission to expand capacities of SFS Turbo file systems.	√	×
Grants permission to create SFS Turbo file systems.	√	×
Grants permission to add a tag to an SFS Turbo file system.	√	×
Grants permission to delete SFS Turbo file systems.	√	×
Grants permission to batch add tags to an SFS Turbo file system.	√	×

Role/Policy Dependencies of the SFS Turbo Console

Table 9-3 Role/Policy dependencies of the SFS Turbo console

Console Function	Dependent Services	Role/Policy Required
Creating a file system	VPC Billing Center DSS ECS	<ul style="list-style-type: none"> The permissions of the SFS Turbo FullAccess policy already include the permissions of VPC FullAccess, which are required for creating file systems. An IAM user assigned the SFS Turbo Full Access policy does not need to have the VPC FullAccess policy assigned explicitly. To create yearly/monthly file systems, the BSS Administrator policy is required. To create file systems in dedicated projects, the DSS FullAccess and ECS FullAccess policies are required.
Querying file system details	VPC	<ul style="list-style-type: none"> The permissions of the SFS Turbo ReadOnlyAccess policy already include the permissions of VPC ReadOnlyAccess, which are required for querying file system details. An IAM user assigned the SFS Turbo ReadOnlyAccess policy does not need to have the VPC ReadOnlyAccess policy assigned explicitly.

Helpful Links

- [IAM Service Overview](#)
- https://support.huaweicloud.com/eu/usermanual-sfsturbo/sfsturbo_01_0032.html Creating a User and Granting SFS Turbo Permissions

10 Supported OSs

Table 10-1 lists the OSs that have passed the compatibility test.

Table 10-1 Supported OSs

Type	Version
CentOS	CentOS 5, 6, and 7 for x86
Debian	Debian GNU/Linux 6, 7, 8, and 9 for x86
Oracle	Oracle Enterprise Linux 5, 6, and 7 for x86
Red Hat	Red Hat Enterprise Linux 5, 6, and 7 for x86
SUSE	SUSE Linux Enterprise Server 10, 11, and 12 for x86
Ubuntu	Ubuntu 14.04 and later
EulerOS	EulerOS 2
Fedora	Fedora 24 and 25
OpenSUSE	OpenSUSE 42