

Scalable File Service

Service Overview

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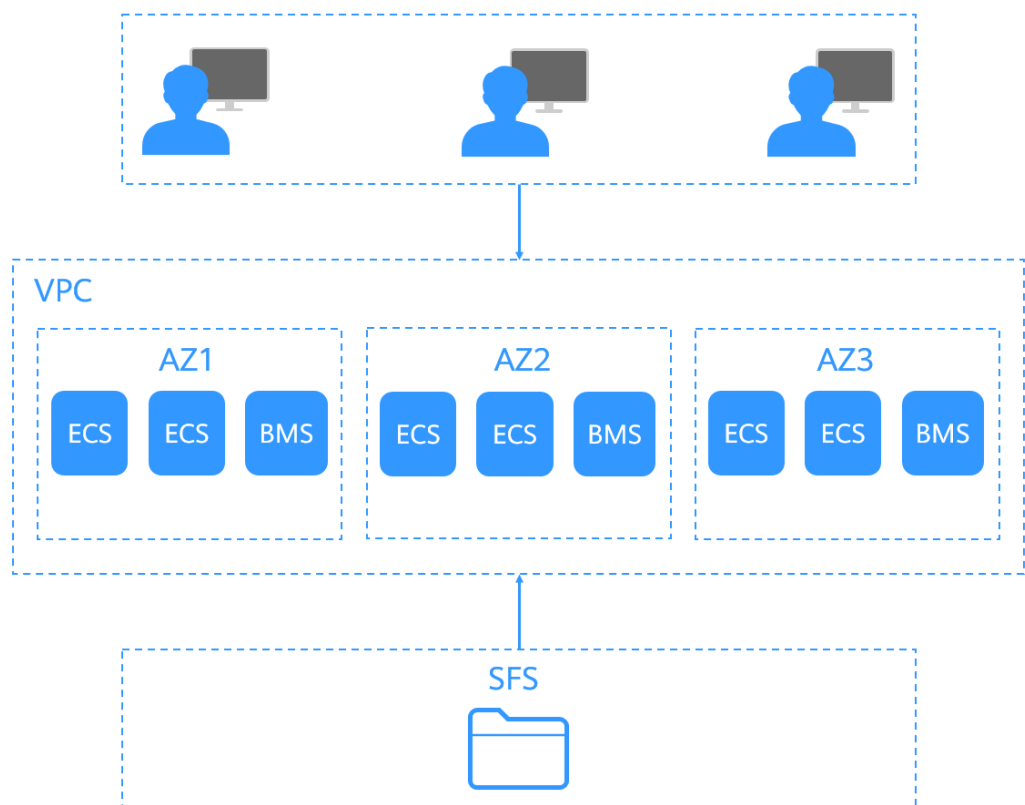
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1 What Is SFS?

Overview

Scalable File Service (SFS) provides scalable, high-performance (NAS) file storage. With SFS, you can enjoy shared file access spanning multiple Elastic Cloud Servers (ECSs), Bare Metal Servers (BMSs). See [Figure 1-1](#).

Figure 1-1 Accessing SFS



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

- File sharing

Servers in multiple availability zones (AZs) of a same region can access the same file system concurrently and share files.

- Elastic scaling

Storage can be scaled up or down on demand to dynamically adapt to service changes without interrupting applications. You can complete resizing with a few clicks.

- Superior performance and reliability

SFS enables file system performance to increase as capacity grows, and it delivers a high data durability to support rapid service growth.

The backend storage 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 supports Network File System (NFS). With this standard protocol, a broad range of mainstream applications can read and write data in the file system.

- Easy operation

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

Accessing SFS

You can access SFS on the management console or via APIs by sending HTTPS requests.

- APIs

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

- Management console

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

2 Application Scenarios

SFS Turbo

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 perfect to scenarios such as high-performance websites, log storage, compression and decompression, DevOps, enterprise offices, and container 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 offices
Office documents of enterprises or organizations can be saved in an SFS Turbo file system for high-performance shared access.

3 File System Types

SFS provides SFS Turbo file systems, which are further classified into Standard, Standard-Enhanced, Performance, and Performance-Enhanced.

The following table describes the features, advantages, and application scenarios of these file system types.

Table 3-1 SFS Turbo file system types

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 use cases	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 high-performance web applications	AI training, autonomous driving, EDA simulation, rendering, enterprise NAS, and high-performance web applications	Large-scale AI training, AI models, and AI generated content	Large-scale AI training, AI models, and AI generated content

Table 3-2 Previous-generation SFS Turbo file system types

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 use cases	Code storage, log storage, file sharing, and enterprise OA		High-performance website, file sharing, content management, image rendering, AI training, and enterprise OA	

4 File System Encryption

SFS provides you with the encryption function. You can encrypt data on the new file systems if needed.

Keys for encrypting file systems are provided by Key Management Service (KMS), which is secure and convenient. You do not need to establish and maintain 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 section "Importing Key Materials" in *Key Management Service User Guide*.

To use the file system encryption function, you can directly select the encryption function when creating an SFS Turbo file system without authorization.

Encryption Key

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

5 SFS and Other Services

Relationships Between SFS and Other Services

Table 5-1 Related services

Function	Related Service	Reference
A file system and the servers must belong to the same project so that they can mount the same file system for data sharing.	Elastic Cloud Server (ECS)	Mounting an NFS File System to ECSs (Linux)
VPC allows you to provision isolated virtual networks defined and managed by yourself. This improves the security of cloud resources and simplifies network deployment. A server cannot access file systems in a different VPC. Before using SFS, assign the file system and the servers to the same VPC.	Virtual Private Cloud (VPC)	Creating a File System
IAM is an enterprise-level self-help cloud resource management system. It provides user identity management and access control functions. When an enterprise needs to provide SFS for multiple users within the enterprise, the enterprise administrator can use IAM to create users and control these users' permissions on enterprise resources.	Identity and Access Management (IAM)	9 Permissions
The encryption feature relies on KMS, which improves the data security of your file systems.	Data Encryption Workshop: Key Management Service (KMS)	Encryption

Function	Related Service	Reference
Once you have subscribed to SFS, you can monitor its performance, such as the read bandwidth, write bandwidth, and read and write bandwidth on Cloud Eye, which does not require any plug-ins.	Cloud Eye	Monitoring
Cloud Trace Service (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 for later query, audit, and backtrack operations.	Cloud Trace Service (CTS)	Auditing

6 Basic Concepts

[6.1 SFS Basic Concepts](#)

[6.2 Project and Enterprise Project](#)

[6.3 Region and AZ](#)

6.1 SFS Basic Concepts

Before you start, understand the following concepts.

NFS

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

File System

A file system provides users with shared file storage service through NFS. It is used for accessing network files remotely. After a user creates a file system on the console, the file system can be mounted to multiple servers and is accessible 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 variants of the UNIX operating system. POSIX is intended to achieve software portability at the source code level. That is, a program written for a POSIX compatible operating system may be compiled and executed on any other POSIX operating system.

DHCP

Dynamic Host Configuration Protocol (DHCP) is a LAN network protocol. The server controls an IP address range, and a client can automatically obtain the IP address and subnet mask allocated by the server when logging in to the server. By

default, DHCP is not automatically installed as a service component of Windows Server. Manual installation and configuration are required.

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

Concept

A region and 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 classified into universal regions and dedicated regions. A universal region provides universal cloud services for common tenants. A dedicated region provides specific services 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, computing, network, storage, and other resources are logically divided into multiple clusters.

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 disaster recovery (DR) and network latency.

- For high DR capability, deploy resources in different AZs within the same region.

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

7

Notes and Constraints

General

- To obtain better performance, you are advised to use the operating systems listed in [10 Supported Operating Systems](#), which have passed the compatibility test.
- Currently, SFS does not support replication.
- Currently, SFS does not support cross-region access.

SFS Turbo

Table 7-1 SFS Turbo restrictions

Item	General
Access method	VPN, Direct Connect, and Cloud Connect
Max. bandwidth	2 GB/s
Max. IOPS	100,000
Min. latency	1 to 2 ms
Max. capacity per file system	320 TB
Supported protocol	NFSv3
Max. number of clients per file system	500
Max. number of authorized VPCs per file system	20
Max. size of a single file	16 TB
Max. number of files or subdirectories per file system	1 billion

Item	General
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 take long times as the NFS protocol sends a large number of requests to traverse directory files and requests are queuing up.
Max. directory depth (unit: layer)	100
Max. path length (unit: byte)	1,024
Max. soft link length (unit: byte)	1,024
Max. hard link length (unit: byte)	255
Max. number of file systems	32 by default. You can submit a service ticket to increase the quota.
File system backup	Supported
Backup data restoring to the original file system	Not supported NOTE SFS Turbo uses single-AZ deployment. SFS Turbo file systems will fail if their AZ fails.
File locking with Flock	Not supported
Cross-region mounting via domain name	Not supported NOTE <ul style="list-style-type: none"> When you mount a file system using its domain name, cross-region mounting is not supported. To mount a file system across regions, use the file system IP address for mounting. The file system domain name randomly resolves to a corresponding domain name server IP address, so some domain name servers may have lots of mounts while others have only a few. It is recommended that you use the domain name servers to the maximum extent as uneven mounts may affect the file system performance.
Cache acceleration	Not supported
File system tagging	<ul style="list-style-type: none"> A maximum of 10 tags can be added to a file system. Tag keys of a file system must be unique.

8 Billing

Billing Items of SFS Turbo

The default billing mode is pay-per-use. With this billing mode, 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 capacity. Usage duration is calculated at the top of every hour. A duration of less than one hour is rounded up to an hour. For details about SFS billing, see [Table 8-1](#).

Table 8-1 SFS Turbo billing

Category	Billing Item
SFS Turbo	Storage space

Billing Modes

SFS supports the following billing modes: pay-per-use and yearly/monthly package. For details about how to purchase SFS, see [How Do I Purchase SFS?](#)

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. Fees are deducted from the account balance.

In some regions, you can change the billing mode of an SFS Turbo file system from pay-per-use to yearly/monthly. For details, see [Yearly/Monthly Subscription](#). Currently, the billing mode cannot be changed from yearly/monthly to pay-per-use.

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 purchased an SFS Capacity-Oriented resource package, but your SFS file systems have used up the package capacity. In addition, your account balance is not enough to pay for the pay-per-use charges generated afterward.
- You have purchased an SFS Capacity-Oriented resource package but created a pay-per-use SFS Turbo file system. Your account balance is not enough to pay for the generated pay-per-use charges.
- You have created a yearly/monthly SFS Turbo file system and a pay-per-use SFS Capacity-Oriented file system. Your account balance is insufficient to pay for the generated pay-per-use charges.
- You do not have any SFS Capacity-Oriented resource package and your account balance is not enough after you create such a pay-per-use file system.
- 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 file systems are retained after your account is in arrears and 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 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 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 resources.

If your Huawei Cloud account does not require individual IAM users for permissions management, skip this section.

IAM can be used free of charge. You pay only for the resources in your account. For more information about IAM, see *Identity and Access Management User Guide*.

SFS Permissions

By default, new IAM users do not have permissions assigned. You need to add a user to one or more groups, and attach permissions policies or roles to these groups. Users inherit permissions from the groups to which they are added and can perform specified operations on cloud services based on the permissions.

SFS is a project-level service deployed and accessed in specific physical regions. To assign SFS permissions to a user group, specify the scope as region-specific projects and select projects for the permissions to take effect. If **All projects** is selected, the permissions will take effect for the user group in all region-specific projects. When accessing SFS, the users need to switch to a region where they have been authorized to use this service.

You can grant users permissions by using roles and policies.

- **Roles:** A type of coarse-grained authorization mechanism that defines permissions related to user responsibilities. This mechanism provides only a limited number of service-level roles 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 an ideal choice for fine-grained authorization and secure access control.

- Policies: A type of fine-grained authorization mechanism that defines permissions required to perform operations on specific cloud resources under certain conditions. This mechanism allows for more flexible policy-based authorization, meeting requirements for secure access control. For example, you can grant ECS users only the permissions for managing a certain type of ECSs. Most policies define permissions based on APIs. For the API actions supported by SFS, see [Permissions Policies and Supported Actions](#).

Table 9-1 lists all the system-defined roles and policies supported by SFS Turbo.

Table 9-1 System-defined roles and policies supported by SFS Turbo

Role/Policy Name	Description	Type	Dependency
SFS Turbo FullAccess	Administrator permissions for SFS Turbo. Users granted these permissions can perform all operations on SFS Turbo file systems.	System-defined policy	None
SFS Turbo ReadOnlyAccess	Read-only permissions for SFS Turbo. Users granted these permissions can only view SFS Turbo file system data.	System-defined policy	None

10 Supported Operating Systems

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

Table 10-1 Supported operating systems

Type	Version	SFS Capacity-Oriented	SFS Turbo
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	√	√
Windows	Windows Server 2008, 2008 r2, 2012, 2012 r2, and 2016 for x64 Windows 7, 8, and 10	√	√