Scalable File Service

User Guide (ME-Abu Dhabi Region)

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HUAWEI TECHNOLOGIES CO., LTD.

Contents

1 Introduction

1.1 SFS

Overview

Scalable File Service (SFS) provides scalable, high-performance 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
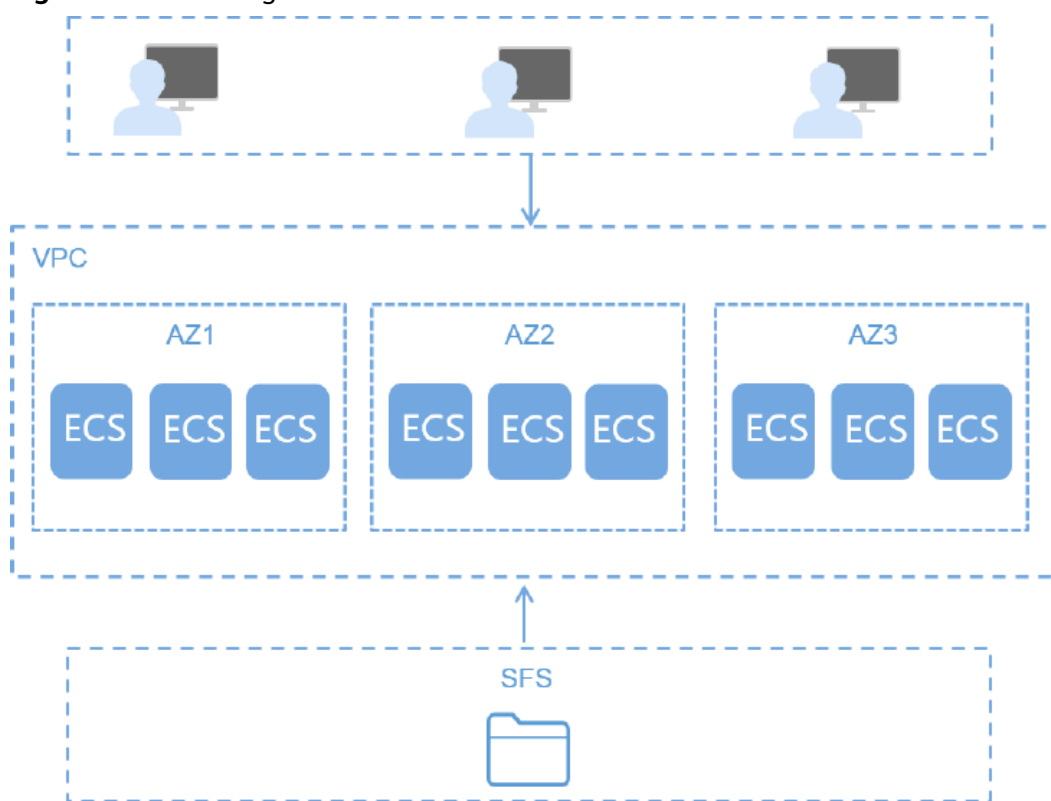
Compared with traditional file sharing storage, SFS has the following advantages:

- File sharing

  ECSs 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

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

- 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.

1.2 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.

- A region is a physical data center, which is completely isolated to improve fault tolerance and stability. The region that is selected during resource creation cannot be changed after the resource is created.
- An AZ is a physical location where resources use independent power supplies and networks. A region contains one or more AZs that are physically isolated but interconnected through internal networks. Because AZs are isolated from each other, any fault that occurs in an AZ will not affect other AZs.

Figure 1-2 shows the relationship between regions and AZs.

Figure 1-2 Regions and AZs
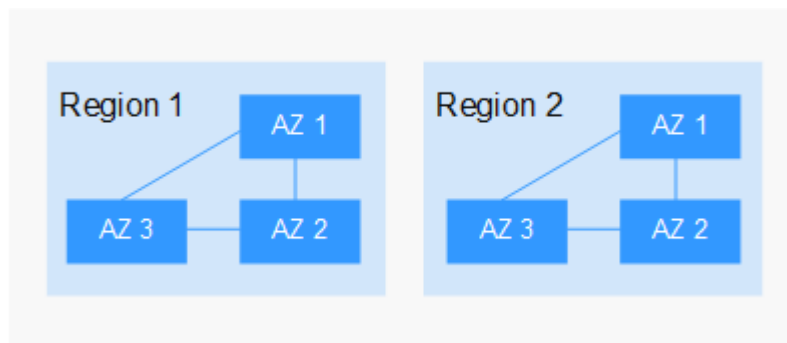
Selecting a Region

Select a region closest to your target users for low network latency and quick access.

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 low network latency, deploy resources in the same AZ.

Regions and Endpoints

Before you use an API to call resources, specify its region and endpoint. For more details, see **Regions and Endpoints**.

1.3 Application Scenarios

SFS Turbo

Expandable to 320 TB, SFS Turbo provides a 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.

1.4 File System Types

SFS Turbo provides two types of file systems: SFS Turbo Standard and SFS Turbo Performance.

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

Table 1-1 Comparison of file system types

File System Type	Storage Class	Feature	Advantage	Application Scenario
SFS Turbo	SFS Turbo Standard	• Maximum bandwidth: 150 MB/s; maximum IOPS: 5,000 • Latency: 2 to 5 ms; maximum capacity: 32 TB • It is suitable for services with massive small files and services that require low latency.	Low latency and tenant exclusive	Services with massive small files, such as code storage, log storage, web services, and virtual desktop
	SFS Turbo Performance	• Maximum bandwidth: 350 MB/s; maximum IOPS: 20,000 • Latency: 1 to 2 ms; maximum capacity: 32 TB • With optimized features, it is suitable for services with massive small files and services that require low latency and high IOPS.	Low latency, high IOPS, and tenant exclusive	Services with massive small files, random I/O-intensive and latency-sensitive services, such as high-performance websites, file sharing, and content management

1.5 Related Services

Table 1-2 lists the relationship between SFS and other cloud services.

Table 1-2 Related services

Function	Related Service	Reference
A file system and the associated 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) Mounting an NFS File System to ECSs (Windows)
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, assign the file system and the associated ECSs 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)	**User Permission**

Function	Related Service	Reference
Once you have subscribed to SFS, you can monitor its performance, such as the read bandwidth, write bandwidth, and read write bandwidth on Cloud Eye, which does not require any plug-ins.	Cloud Eye	**Monitoring**

1.6 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 mount point on the management console, the file system can be mounted to multiple ECSs 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.

- 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. More than one project can be created for an account.

1.7 Restrictions and Limitations

Constraints:

- To obtain better performance, you are advised to use the operating systems listed in **1.9 Supported Operating Systems**, which have passed the compatibility test.
- Currently, SFS does not support replication.
- Currently, SFS does not support cross-region access.

Restrictions on specifications of SFS Turbo file systems:

- You are not advised to mount SFS Turbo file systems to ECSs running Windows.
- Only the NFSv3 protocol is supported (NFSv4 is not supported).
- A maximum of 500 compute nodes can be mounted to and access a single file system at the same time.
- The maximum capacity of a single file system is 32 TB, and the maximum capacity of a single file is 16 TB.
- A maximum of 100 million files are supported in a single file system.
- By default, a single directory contains a maximum of 2 million files.
- The maximum full path is 1024 bytes, and the maximum file name length is 255 bytes.
- The maximum soft link length is 1024 bytes.
- The maximum number of hard links is 255.
- The maximum directory depth is 100 layers.

1.8 User Permissions

The system provides two types of user permissions by default: user management and resource management. User management refers to the management of users, user groups, and user group rights. Resource management refers to the control operations that can be performed by users on cloud service resources.

For details, see the *Permission Description*.

1.9 Supported Operating Systems

Table 1-3 lists the operating systems that have passed the compatibility test.

Table 1-3 Supported operating systems

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

Type	Version
Ubuntu	Ubuntu 10, 11, 12, 13, 14, and 15 LTS for x86
Euler	Euler OS 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 You are not advised to mount SFS Turbo file systems to ECSs running Windows.

2 Getting Started

2.1 Step 1: Create a File System

You can create a file system and mount it to multiple ECSs. Then the ECSs can share the file system.

Prerequisites

1. Before creating a file system, ensure that a VPC is available.

    If no VPC is available, create a VPC by referring to section "Creating a VPC" in the *VPC User Guide*.

2. Before creating a file system, ensure that an ECS is available and the ECS belongs to the created VPC.

    If no ECS is available, create an ECS by referring to "Creating an ECS" in the *Elastic Cloud Server User Guide*.

2.2 Step 2: Mount a File System

2.2.1 Mounting an NFS File System to ECSs

After creating a file system, you need to mount the file system to ECSs so that ECSs can share the file system.

Prerequisites

- You have checked the type of the operating system on each ECS. Different operating systems use different commands to install the NFS client.

- You have created a file system and have obtained the mount point of the file system.

- At least one ECS that belongs to the same VPC as the file system exists.

Procedure

Step 1 Log in to the management console using a cloud account.

1. Log in to the management console and select a region and a project.

2. Under **Computing**, click **Elastic Cloud Server** to switch to the ECS console.

Step 2 Log in to the ECS as user **root**.

> 📖 **NOTE**
>
> If you log in to the ECS as a non-root user, see **7.1 Mounting a File System to an ECS Running Linux as a Non-root User**.

Step 3 Install the NFS client.

1. Run the following command to check whether the NFS software package is installed.

   - On CentOS, Red Hat, Oracle Enterprise Linux, SUSE, EulerOS, Fedora, or OpenSUSE:

     rpm -qa|grep nfs

   - On Debian or Ubuntu:

     dpkg -l nfs-common

   If nothing is displayed, go to **Step 3.2**.

   - On CentOS, Red Hat, EulerOS, Fedora, or Oracle Enterprise Linux:
     ```
     libnfsidmap
     nfs-utils
     ```

   - On SUSE or OpenSUSE:
     ```
     nfsidmap
     nfs-client
     ```

   - On Debian or Ubuntu:
     ```
     nfs-common
     ```

2. Run the following command to install the NFS software package.

   > 📖 **NOTE**
   >
   > The following commands require that ECSs be connected to the Internet. Otherwise, the installation will fail.

   - On CentOS, Red Hat, EulerOS, Fedora, or Oracle Enterprise Linux:

     sudo yum -y install nfs-utils

   - On Debian or Ubuntu:

     sudo apt-get install nfs-common

   - On SUSE or OpenSUSE:

     zypper install nfs-client

Step 4 Run the following command to create a local path for mounting the file system:

mkdir *Local path*

Step 5 Run the following command to mount the file system to the ECS that belongs to the same VPC as the file system. Currently, the file system can be mounted to the ECS running Linux using NFS v3 only.

Table 2-1 describes the variables.

mount -t nfs -o vers=3,timeo=600,noresvport,nolock *Mount point Local path*

NOTICE

After an ECS where file systems have been mounted restarts, it loses the file system mount information. You can configure automatic mount in the **fstab** file to ensure that an ECS automatically mounts file systems when it restarts. For details, see **2.2.3 Mounting a File System Automatically**.

Table 2-1 Parameter description

Parameter	Description
vers	File system version. Currently, only NFSv3 is supported, so the value is fixed to **3**.
timeo	Waiting time before the NFS client retransmits a request. The unit is 0.1 second. The recommended value is **600**.
resvport/ noresvport	Whether the confidential source port is used for server connection. By default, **resvport** indicates that the confidential port is used, and **noresvport** indicates that the confidential port is not used. The kernel version is 2.6.28 or later.
	You are advised to set this parameter to **noresvport** so that a new TCP port can be used when the network is reconnected. This ensures that the connection is not interrupted when the network recovers from a fault.
lock/nolock	Whether to lock files on the server using the NLM protocol. If **nolock** is selected, the lock is valid for applications on one host. For applications on another host, the lock is invalid. The recommended value is **nolock**. If this parameter is not specified, **lock** is selected by default. In this case, other servers cannot write data to the file system.
Mount point	The format for an SFS Turbo file system is *File system IP address*:/, for example, **192.168.0.0:/**. See **Figure 2-1**.
Local path	Local path on the ECS, used to mount the file system, for example, **/local_path**.

Figure 2-1 Mount point

For more mounting parameters for performance optimization during file system mounting, see **Table 2-2**. Use commas (,) to separate parameters. The following command is an example:

mount -t nfs -o vers=3,timeo=600,nolock,rsize=1048576,wsize=1048576,hard,retrans=3,noresv port,async,noatime,nodiratime *Mount point Local path*

Table 2-2 Parameters for file system mounting

Parameter	Description
rsize	Maximum number of bytes that can be read from the server each time. The actual data is less than or equal to the value of this parameter. The value of **rsize** must be a positive integer that is a multiple of **1024**. If the entered value is smaller than **1024**, the value is automatically set to **4096**. If the entered value is greater than **1048576**, the value is automatically set to **1048576**. By default, the setting is performed after the negotiation between the server and the client. You are advised to set this parameter to the maximum value **1048576**.
wsize	Maximum number of bytes that can be written to the server each time. The actual data is less than or equal to the value of this parameter. The value of **wsize** must be a positive integer that is a multiple of **1024**. If the entered value is smaller than **1024**, the value is automatically set to **4096**. If the entered value is greater than **1048576**, the value is automatically set to **1048576**. By default, the setting is performed after the negotiation between the server and the client. You are advised to set this parameter to the maximum value **1048576**.
soft/hard	**soft** indicates that a file system is mounted in soft mount mode. In this mode, if an NFS request times out, the client returns an error to the invoking program. **hard** indicates that a file system is mounted in hard mount mode. In this mode, if the NFS request times out, the client continues to request until the request is successful. The default value is **hard**.
retrans	Number of retransmission times before the client returns an error. The default value is **3**.

Parameter	Description
resvport/ noresvport	Whether the confidential source port is used for server connection. By default, **resvport** indicates that the confidential port is used, and **noresvport** indicates that the confidential port is not used. The kernel version is 2.6.28 or later.
	You are advised to set this parameter to **noresvport** so that a new TCP port can be used when the network is reconnected. This ensures that the connection is not interrupted when the network recovers from a fault.
sync/async	**sync** indicates that data is written to the server immediately. **async** indicates that data is first written to the cache before being written to the server.
	Synchronous write requires that an NFS server returns a success message only after all data is written to the server, which brings long latency. The recommended value is **async**.
noatime	If you do not need to record the file access time, set this parameter. This prevents overheads caused by access time modification during frequent access.
nodiratime	If you do not need to record the directory access time, set this parameter. This prevents overheads caused by access time modification during frequent access.

NOTE

You are advised to use the default values for the parameters without use recommendations.

Step 6 Run the following command to view the mounted file system:

mount -l

If the command output contains the following information, the file system is mounted successfully.

Mount point on */local_path* type nfs (rw,vers=3,timeo=600,nolock,addr=)

Step 7 After the file system is mounted successfully, access the file system on the ECSs to read or write data.

If the mounting fails or times out, rectify the fault by referring to **Troubleshooting**.

NOTE

The supported maximum size of a file to be written is 16 TB.

----End

2.2.2 Mounting an NFS File System to ECSs (Windows)

After creating a file system, you need to mount the file system to ECSs so that ECSs can share the file system.

This section uses Windows Server 2012 as an example to describe how to mount an NFS file system. For other versions, perform the steps based on the actual situation.

Prerequisites

- You have created a file system and have obtained the mount point of the file system.
- At least one ECS that belongs to the same VPC as the file system exists.

Limitations and Constraints

You are not advised to mount SFS Turbo file systems to ECSs running Windows because some Windows applications (such as 3DMAX) have compatibility issues.

Procedure

Step 1 Log in to the management console using a cloud account.

1. Log in to the management console and select a region and a project.
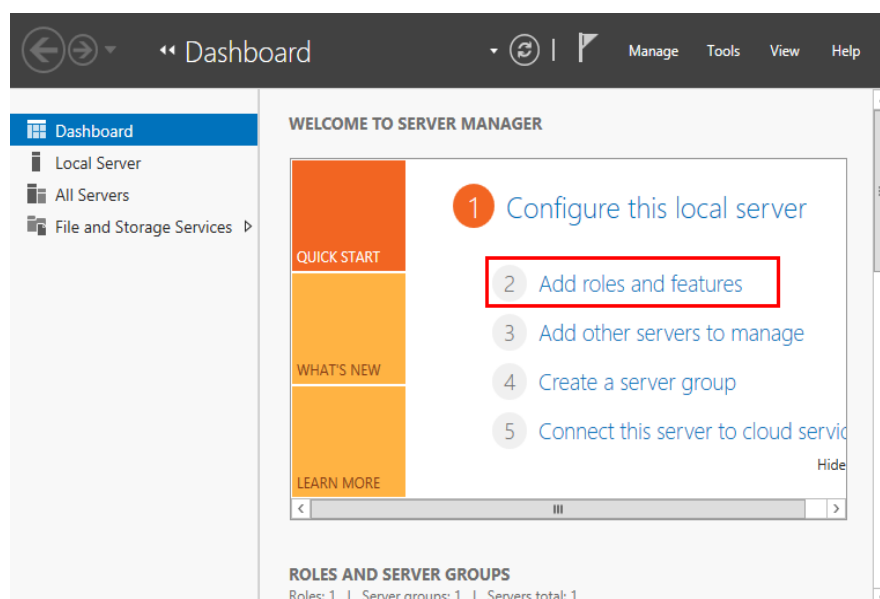2. Under **Computing**, click **Elastic Cloud Server** to switch to the ECS console.

Step 2 Go to the ECS console and log in to the ECS running Windows Server 2012.

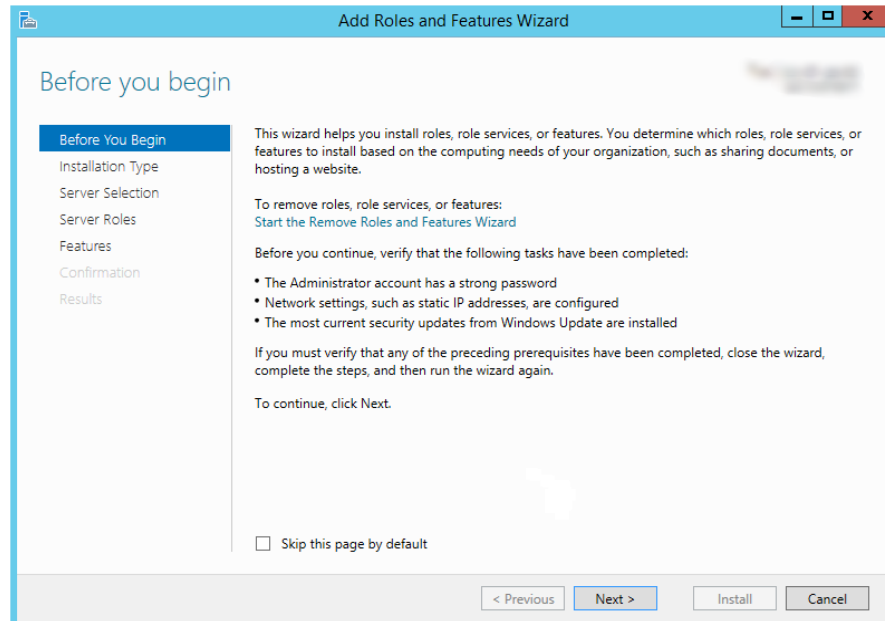**Step 3** Install the NFS client.

1. Click **Server Manager** in the lower left corner. The **Server Manager** window is displayed, as shown in **Figure 2-2**.

Figure 2-2 Server Manager

2. Click **Add Roles and Features**. See **Figure 2-3**.

Figure 2-3 Wizard for adding roles and features

3. Click **Next** as prompted. On the **Server Roles** page, select **Server for NFS**, as shown in **Figure 2-4**.

Figure 2-4 Selecting the server for NFS
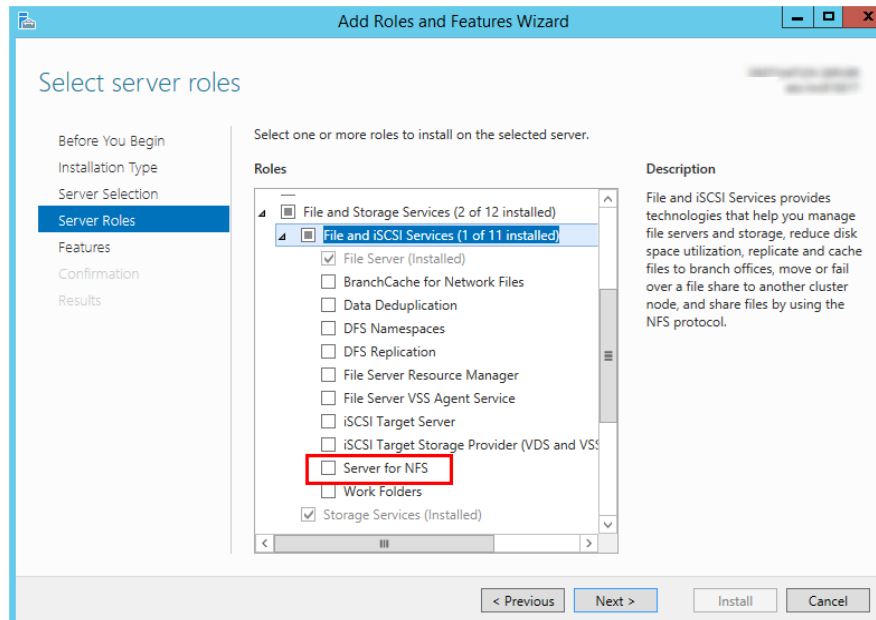
4. Click **Next**. In the **Features** page, select **Client for NFS** and click **Next**, as shown in **Figure 2-5**. Confirm the settings and then click **Install**. If you install the NFS client for the first time, after the installation is complete, restart the client and log in to the ECS again as prompted.

Figure 2-5 Selecting the NFS client
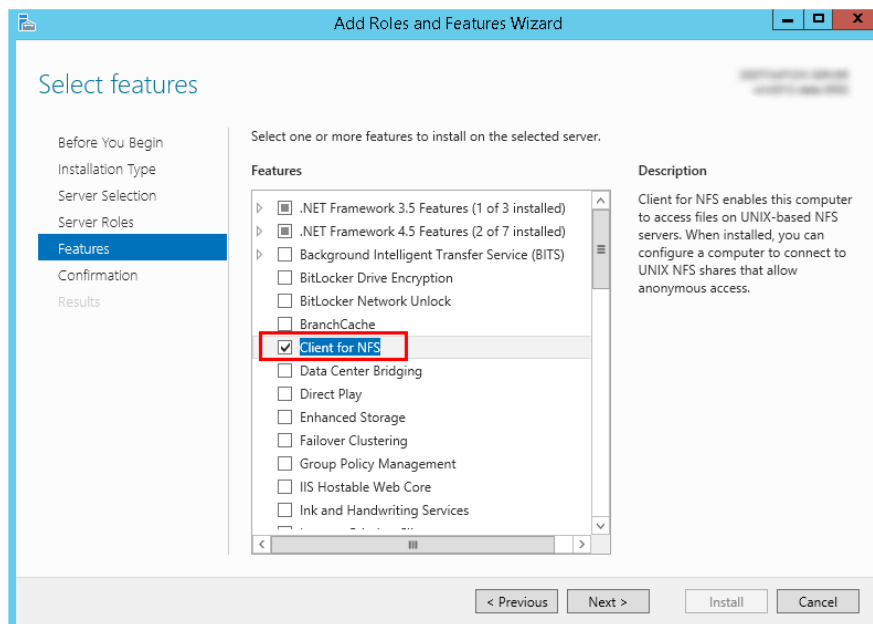
Step 4 Modify the NFS transfer protocol.

1. Choose **Control Panel > System and Security > Administrative Tools > Services for Network File System (NFS)**, as shown in **Figure 2-6**.

Figure 2-6 Administrative tools
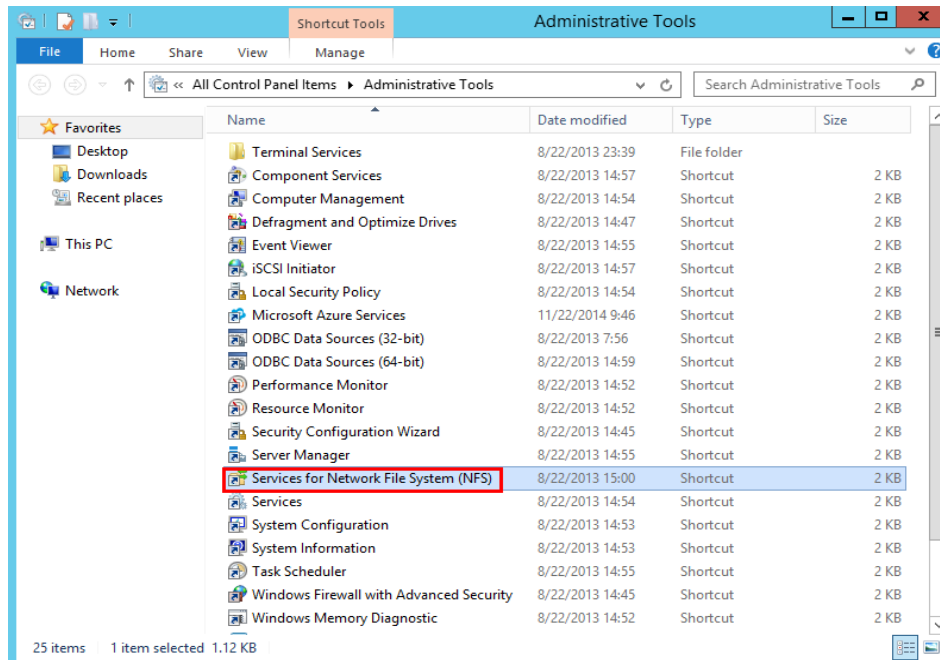
2. Right-click **Client for NFS**, choose **Properties**, change the transport protocol to **TCP**, and select **Use hard mounts**, as shown in **Figure 2-7** and **Figure 2-8**.

Figure 2-7 Services for NFS
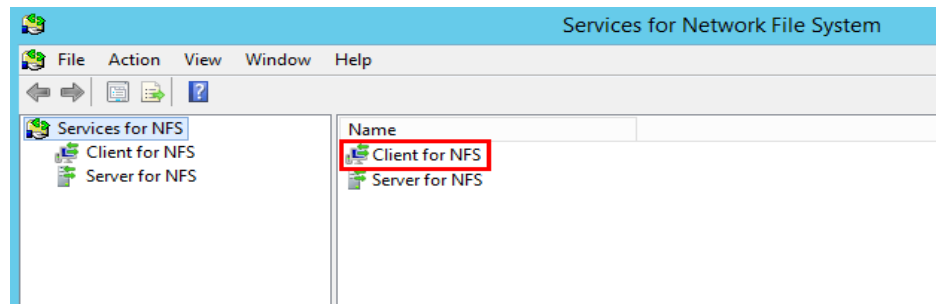
Figure 2-8 Client for NFS properties

Step 5 Run the following command in the Command Prompt of the Windows Server 2012 (**X** is the drive letter of the free disk). Select the ECS that belongs to the same VPC as the file system to mount the file system.

For SFS Turbo file systems: **mount -o nolock,casesensitive=yes** *mount point* **! X:**

📖 **NOTE**

- Drive letter of the free disk: A disk that is not in use, such as disk E or X.
- The mount point of an SFS Turbo file system is the root directory. Ensure that an English exclamation mark (!) is added to the mount point, for example, **127.0.0.1:/!**.
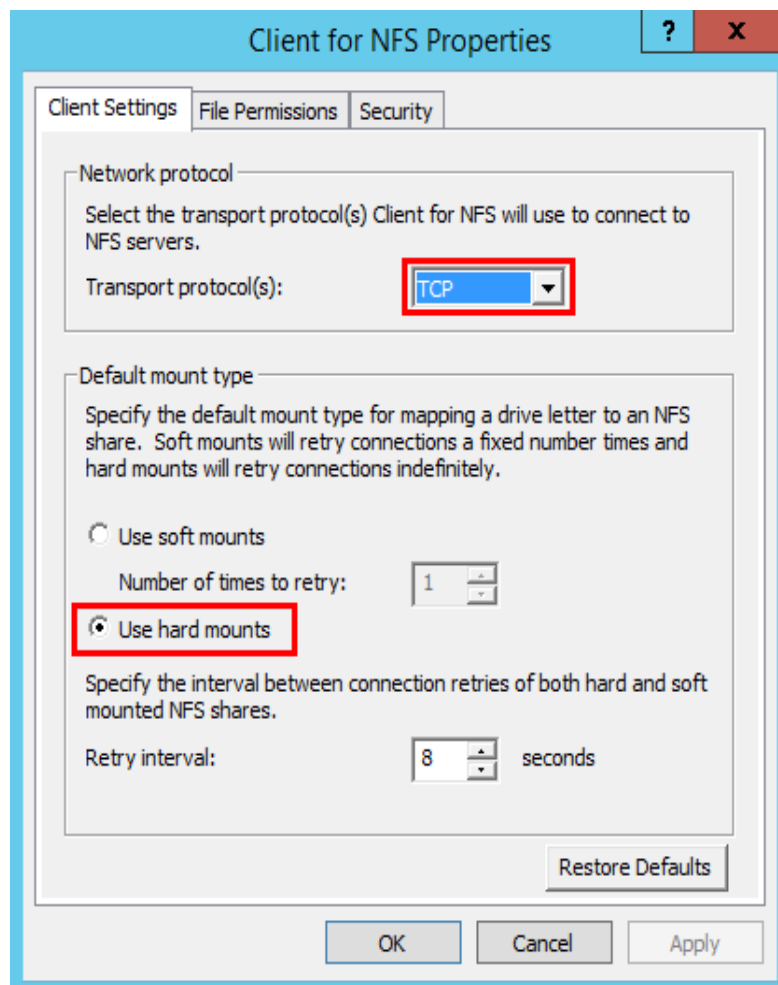- **casesensitive=yes** indicates that file names are case sensitive during file search. If this parameter is not added, the performance of creating files in a large directory will deteriorate.

You can move the cursor to the mount point and click 🔲 next to the mount point to copy the mount point. If the information shown in **Figure 2-10** is displayed, the mounting is successful.

Figure 2-9 Mount point

Name	AZ	Status ⇕	Type ⇕	Used Capacity (GB) ⇕	Mount Address	Operation
sfs-turbo-39f3	AZ1	✅ Available	SFS Turbo Standard	0.00	192.168.0.■■■r:/	Expand Capacity Delete
sfs-turbo-d384	AZ1	✅ Available	SFS Turbo Standard	0.00	192.168.0.■■■:/	Expand Capacity Delete

Figure 2-10 Running the command
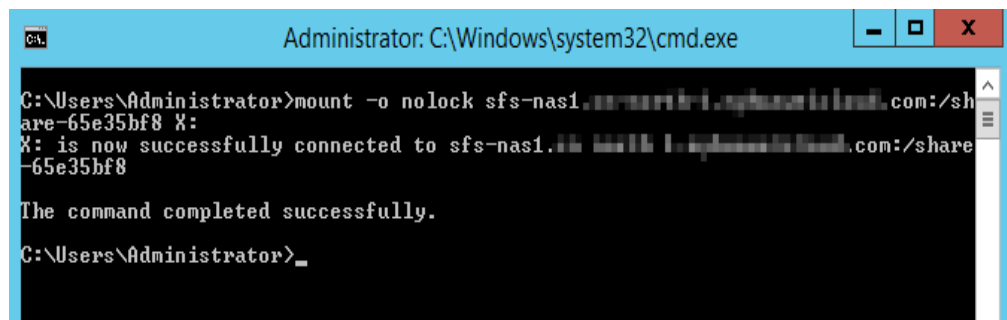
Step 6 After the file system is mounted successfully, you can view the mounted file system on the **This PC** page, as shown in **Figure 2-11**.

If the mounting fails or times out, rectify the fault by referring to **Troubleshooting**.

Figure 2-11 Successful mounting
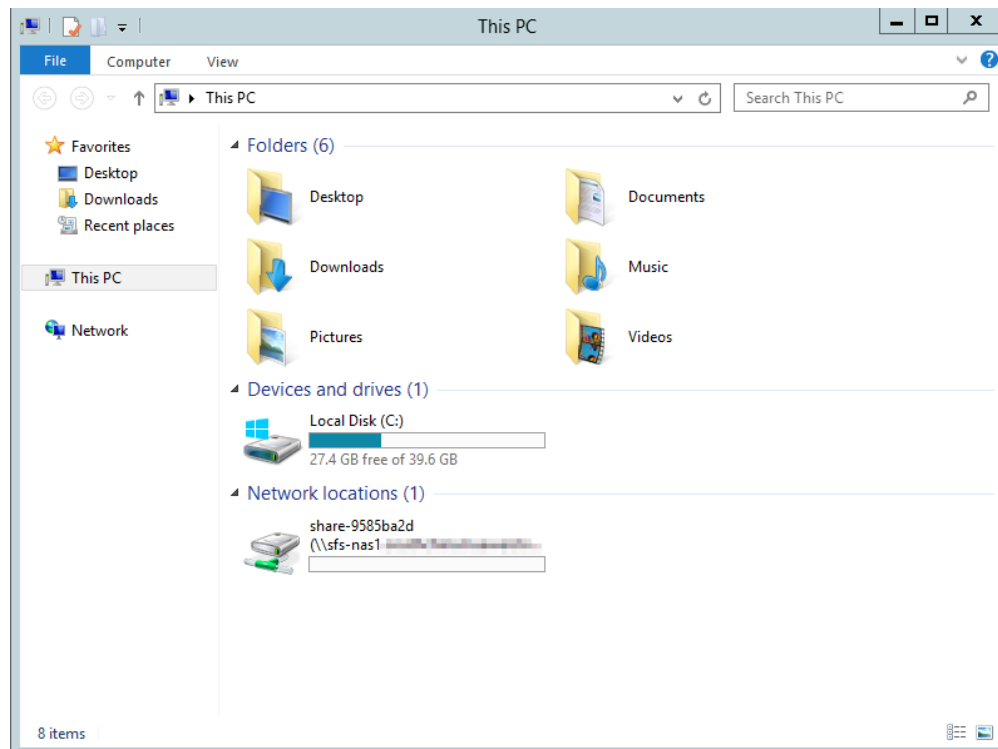
----**End**

2.2.3 Mounting a File System Automatically

To prevent mounting information loss after a restart of the ECS where a file system is mounted, you can configure the ECS and make the file system be mounted automatically after the ECS restarts.

Restrictions

Due to different mechanisms for managing startup items (service startup sequence), some ECSs running CentOS may not support the following automatic mounting schemes. In this case, manually mount the file system.

Procedure (Linux)

Step 1 Log in to the management console using a cloud account.

1. Log in to the management console and select a region and a project.

2. Under **Computing**, click **Elastic Cloud Server** to switch to the ECS console.

Step 2 Log in to the ECS as user **root**.

Step 3 Run the **vi /etc/fstab** command to edit the **/etc/fstab** file.

At the end of the file, add the file system information, for example:

Mount point /local_path nfs vers=3,timeo=600,nolock 0 0

Replace *Mount point* and */local_path* with actual values. You can obtain the mount point from the **Mount Address** column of the file system. Each record in

the **/etc/fstab** file corresponds to a mount. Each record has six fields, as described in **Field Description**.

NOTICE

For optimal system performance, configure file system information based on the previous example configuration. If needed, you can customize part of mount parameters. However, the customization may affect system performance.

Step 4 Press **Esc**, input **:wq**, and press **Enter** to save and exit.

After the preceding configurations are complete, the system reads mounting information from the **/etc/fstab** file to automatically mount the file system when the ECS restarts.

Step 5 (Optional) Run the following command to view the updated content of the **/etc/fstab** file:

cat /etc/fstab

----End

Field Description

Table 1 describes the mount fields.

Table 2-3 Field description

Field	Description
Mount point	Mount object, that is, the mount point of the file system to be mounted. Set this parameter to the mount point in the **mount** command that is used in **2.2.1 Mounting an NFS File System to ECSs**.
/local_path	Mount point, that is, the directory created on the ECS for mounting the file system. Set this parameter to the local path in the **mount** command that is used in **2.2.1 Mounting an NFS File System to ECSs**.
nfs	Mount type, that is, file system or partition type. Set it to **nfs**.
vers=3,timeo=600,nolock	Mount options, used to set mount parameters. Use commas (,) to separate between multiple options. ● **vers**: file system version. The value **3** indicates NFSv3. ● **timeo**: waiting time before the NFS client retransmits a request. The unit is 0.1 second. The recommended value is **600**. ● **nolock**: specifies whether to lock files on the server using the NLM protocol.

Field	Description
0	Choose whether to back up file systems using the dump command. • **0**: not to back up file systems • An integer larger than 0: to back up file systems. A file system with a smaller integer is checked earlier than that with a larger integer.
0	Choose whether to check file systems using the fsck command when the ECS is starting and specify the sequence for checking file systems. • **0**: to check file systems • By default, this field is set to **1** for the root directory partition. Other partitions start from **2**, and a partition with a smaller integer is checked earlier than that with a larger integer.

Procedure (Windows)

Ensure that an NFS client has been installed on the target server before mounting. This section uses Windows Server 2012 as an example to describe how to mount a file system.

Step 1 Log in to the management console using a cloud account.

1. Log in to the management console and select a region and a project.

2. Under **Computing**, click **Elastic Cloud Server** to switch to the ECS console.

Step 2 Log in to the ECS.

Step 3 Before mounting the file system, create a script named **auto_mount.bat**, save the script to a local host, and record the save path. The script contains the following content:

```
mount -o nolock mount point corresponding drive letter
```

For example, content of a file system's **auto_mount.bat** script can be **mount -o nolock sfs.nas1.xxx.com/share-xxx X:**

📖 **NOTE**

After the script is created, you are advised to manually run the script in the Command Prompt interface to ensure that the script can be executed successfully.

The **.bat** script cannot be stored in the same path as the **.vbs** file in **Step 2**.

Step 4 Create a .txt file whose name is *XXX*.**vbs** and **Save Type** is **All Files**, and save the file to the directory **C:\Users\Administrator\AppData\Roaming\Microsoft \Windows\Start Menu\Programs\Startup**. The file contains the following content:

```
set ws=WScript.CreateObject("WScript.Shell")
ws.Run "Local path of the auto_mount.bat script /start", 0
```

Step 5 After the task is created, you can restart the ECS and check whether the configuration is successful.

----End

2.3 Step 3: Unmount a File System

If a file system is no longer used and needs to be deleted, you are advised to unmount the file system and then delete it.

Linux OS

Step 1 Log in to the management console using a cloud account.

1. Log in to the management console and select a region and a project.
2. Under **Computing**, click **Elastic Cloud Server** to switch to the ECS console.

Step 2 Log in to the ECS.

Step 3 Run the following command:

umount *Local path*

Local path: Local path used to mount the file system on the ECS, for example, **/local_path**.

☐ NOTE

Before running the **umount** command, stop all read and write operations related to the file system and exit from the local path. Otherwise, the unmounting will fail.

----End

Windows OS

Step 1 Log in to the management console using a cloud account.

1. Log in to the management console and select a region and a project.
2. Under **Computing**, click **Elastic Cloud Server** to switch to the ECS console.

Step 2 Log in to the ECS.

Step 3 Right-click the file system to be unmounted and choose **Disconnect**.

Figure 2-12 Unmounting
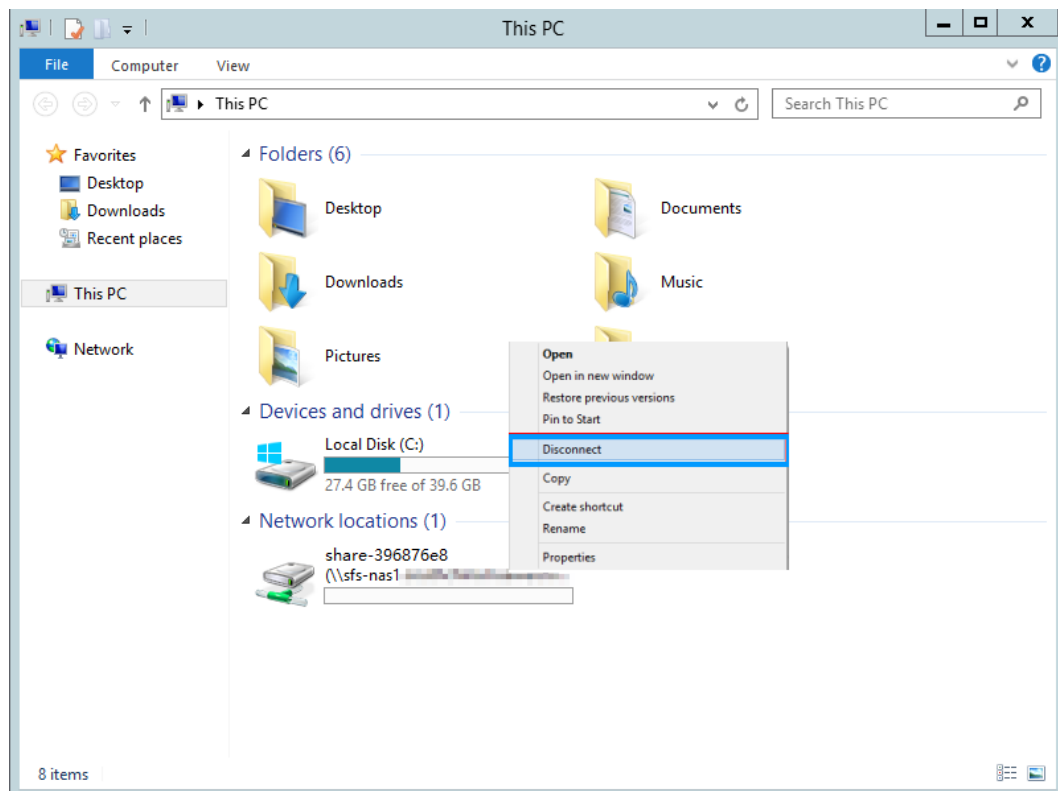
Step 4 If the mounted file system does not exist in the network location anymore, the file system is successfully unmounted.

----End

3 Management

3.1 File System Management

Viewing a File System

You can search for file systems by file system name keyword or file system status, and view their basic information.

Procedure

Step 1 Log in to SFS Console.

Step 2 In the file system list, view all file systems. **Table 3-1** describes the parameters of each file system.

Table 3-1 Parameter description

Parameter	Description
Name	Name of the file system, for example, **sfs-name-001**
Status	The value can be **Available**, **Unavailable**, **Frozen**, **Creating**, **Deleting**.
Type	File system type.
Protocol Type	The NFS protocol is supported.

Parameter	Description
Used Capacity (GB)	Used space of the file system for storing data **NOTE** The space information is refreshed every 15 minutes.
Maximum Capacity (GB)	Maximum capacity of the file system
Mount Address	File system mount point. The format is *File system IP address*:/.
Operation	Valid operations include capacity expansion, monitoring indicator viewing, and deletion.

Step 3 (Optional) Search for and view file systems by file system name keyword or file system status.

----End

Deleting a File System

After a file system is deleted, data in it cannot be restored. To prevent data loss, before deleting a file system, ensure that files in it have been backed up locally.

Prerequisites

You have unmounted the file system to be deleted. For details about how to unmount the file system, see .
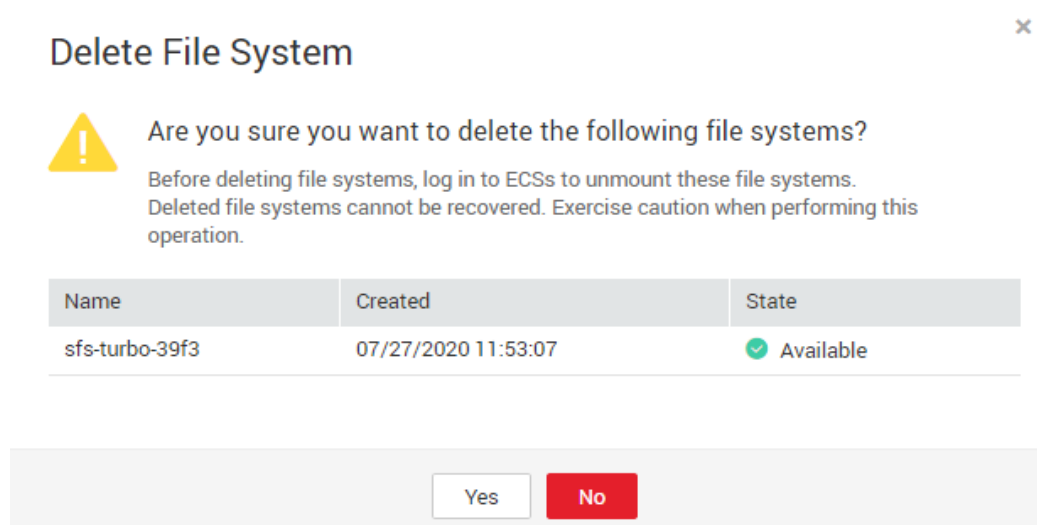
Procedure

Step 1 In the file system list, click **Delete** in the row of the file system you want to delete.

Step 2 In the displayed dialog box, confirm the information, and then click **Yes**.

📖 **NOTE**

Only **Available** and **Unavailable** file systems can be deleted.

Figure 3-1 Deleting a file system

Step 3 Check the file system list to confirm that the file system is deleted successfully.

----End

3.2 Capacity Expansion

You can expand the capacity of a file system when needed.

The capacity of an SFS Turbo file system can be expanded but cannot be shrunk.

Procedure

Step 1 Log in to SFS Console.

Step 2 In the file system list, click **Expand Capacity** in the row of the desired file system. The following dialog box is displayed. See **Figure 3-2Figure 3-3**.

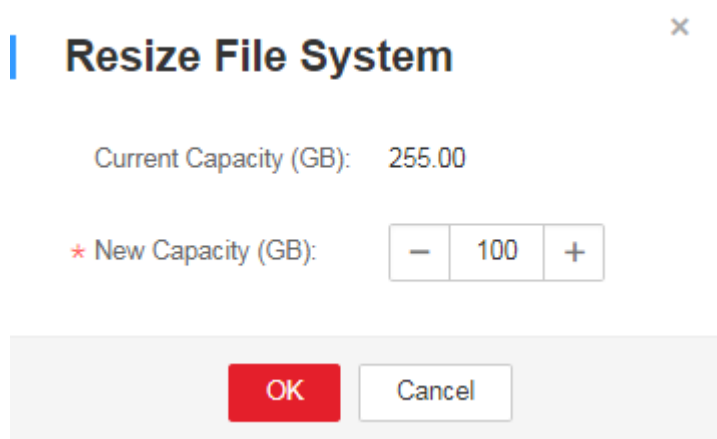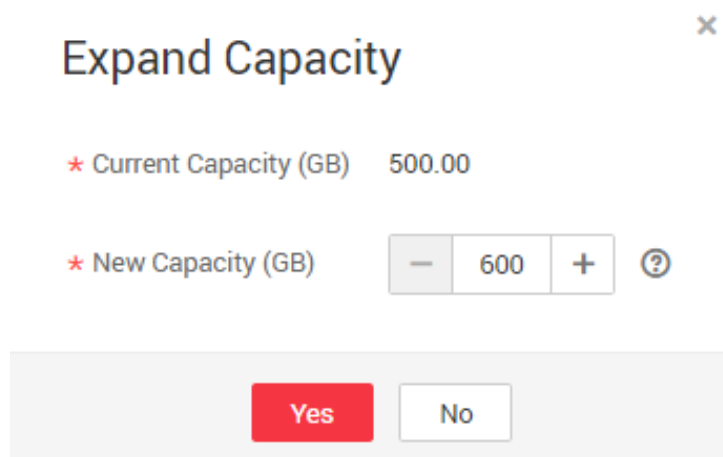**Figure 3-2** Resizing a file system

Figure 3-3 Expanding the capacity of a file system

Step 3 Enter a new maximum capacity of the file system based on service requirements, and click **OK**. Table 3-2 describes the parameters.

Table 3-2 Parameter description

Parameter	Description
Used Capacity (GB)	Used capacity of the current file system
Maximum Capacity (GB)	Maximum capacity of the current file system
New Maximum Capacity (GB)	Target maximum capacity of the file system after expanding. The value ranges from **1 GB** to **512,000 GB**.

Step 4 In the dialog box that is displayed, confirm the information and click **OK**.

Step 5 In the file system list, check the capacity information after resizing.

----End

3.3 Quotas

What Is Quota?

Quotas are enforced for service resources on the platform to prevent unforeseen spikes in resource usage. Quotas can limit the number or amount of resources available to users, such as the maximum number of ECSs or EVS disks that can be created.

If the existing resource quota cannot meet your service requirements, you can apply for a higher quota.

How Do I View My Quotas?

1. Log in to the management console.

2. Click   in the upper left corner and select the desired region and project.

3. In the upper right corner of the page, click   .

   The **Service Quota** page is displayed.

4. View the used and total quota of each type of resources on the displayed page.

   If a quota cannot meet service requirements, apply for a higher quota.

How Do I Apply for a Higher Quota?

The system does not support online quota adjustment. If you need to adjust a quota, call the hotline or send an email to the customer service mailbox. Customer service personnel will timely process your request for quota adjustment and inform you of the real-time progress by making a call or sending an email.

Before dialing the hotline number or sending an email, make sure that the following information has been obtained:

- Account name, project name, and project ID, which can be obtained by performing the following operations:

  Log in to the management console using the cloud account, click the username in the upper right corner, select **My Credentials** from the drop-down list, and obtain the account name, project name, and project ID on the **My Credentials** page.

- Quota information, which includes:
  - Service name
  - Quota type
  - Required quota

If you need to adjust a quota, contact the administrator.

3.4 Monitoring

3.4.1 SFS Turbo Metrics

Function

This topic describes metrics reported by Elastic File Service (EFS) to Cloud Eye as well as their namespaces and dimensions. You can use the console or APIs provided by Cloud Eye to query the metrics generated for EFS.

Namespace

SYS.EFS

Metrics

Metric	Metric Name	Description	Value Range	Monitored Object
client_connections	Client Connections	Number of client connections	≥ 0	SFS Turbo file system
data_read_io_bytes	Read Bandwidth	Data read I/O load Unit: byte/s	≥ 0 bytes/s	SFS Turbo file system
data_write_io_bytes	Write Bandwidth	Data write I/O load Unit: byte/s	≥ 0 bytes/s	SFS Turbo file system
metadata_io_bytes	Metadata Read and Write Bandwidth	Metadata read and write I/O load Unit: byte/s	≥ 0 bytes/s	SFS Turbo file system
total_io_bytes	Total Bandwidth	Total I/O load Unit: byte/s	≥ 0 bytes/s	SFS Turbo file system
iops	IOPS	I/O operations per unit time	≥ 0	SFS Turbo file system
used_capacity	Used Capacity	Used capacity of a file system Unit: byte	≥ 0 bytes	SFS Turbo file system
used_capacity_percent	Capacity Usage	Percentage of used capacity in the total capacity Unit: Percent	0% to 100%	SFS Turbo file system

Dimension

Key	Value
efs_instance_id	Instance

Viewing Monitoring Statistics

Step 1 Log in to the management console.

Step 2 View the monitoring graphs using either of the following methods.

- Method 1: Choose **Service List** > **Storage** > **Scalable File Service**. In the file system list, click **View Metric** in the **Operation** column of the target file system.

- Method 2: Choose **Management & Deployment** > **Cloud Eye** > **Cloud Service Monitoring** > **Elastic File Service**. In the file system list, click **View Metric** in the **Operation** column of the target file system.

Step 3 View the SFS Turbo file system monitoring data by metric or monitored duration.

For more information about Cloud Eye, see the *Cloud Eye User Guide*.

----End

3.5 Auditing

Scenarios

Cloud Trace Service (CTS) records operations of SFS resources, facilitating query, audit, and backtracking.

Prerequisites

Operations

Table 3-3 SFS operations traced by CTS

Operation	Resource Type	Trace
Creating a shared file system	sfs	createShare
Modifying a shared file system	sfs	updateShareInfo
Deleting a shared file system	sfs	deleteShare
Adding a share access rule	sfs	addShareACL
Deleting a share access rule	sfs	deleteShareACL

Querying Traces

Step 1 Log in to the management console.

Step 2 Click in the upper left corner and select a region and project.

Step 3 Choose **Management & Deployment** > **Cloud Trace Service**. The **Cloud Trace Service** page is displayed.

Step 4 In the navigation pane on the left, choose **Trace List**.

Step 5 On the trace list page, set **Trace Source**, **Resource Type**, and **Search By**, and click **Query** to query the specified traces.

For details about other operations, see section "Querying Real-Time Traces" in the *Cloud Trace Service User Guide*.

----End

Disabling or Enabling a Tracker

This section describes how to disable an existing tracker on the CTS console. After the tracker is disabled, the system will stop recording operations, but you can still view existing operation records.

Step 1 Log in to the management console.

Step 2 Choose **Management & Deployment** > **Cloud Trace Service**. The **Cloud Trace Service** page is displayed.

Step 3 Click **Trackers** in the left pane.

Step 4 Click **Disable** on the right of the tracker information.

Step 5 Click **Yes**.

Step 6 After the tracker is disabled, the available operation changes from **Disable** to **Enable**. To enable the tracker again, click **Enable** and then click **Yes**. The system will start recording operations again.

----End

4 Typical Applications

4.1 Enterprise Website/App Background

Context

For I/O-intensive website services, SFS Turbo can provide shared website source code directories and storage for multiple web servers, enabling low-latency and high-IOPS concurrent share access. Features of such services are as follows:

- A large number of small files: Static website files need to be stored, including HTML files, JSON files, and static images.

- Read I/O intensive: Scope of data reading is large, and data writing is relatively small.

- Multiple web servers access an SFS Turbo background to achieve high availability of website services.

Configuration Process

1. Sort out the website files.

2. Log in to SFS Console. Create an SFS Turbo file system to store the website files.

3. Log in to the ECS that functions as the compute node and mount the file system.

4. On the head node, upload the files to the file system.

5. Start the web server.

Prerequisites

- A VPC has been created.

- ECSs that function as head nodes and compute nodes have been created, and have been assigned to the VPC.

- SFS has been enabled.

Example Configuration

Step 1 Log in to SFS Console.

Step 2 On the **Create File System** page, set parameters as instructed.

Step 3 For details about how to mount a file system to an ECS running Linux, see **2.2.1 Mounting an NFS File System to ECSs**. For details about how to mount a file system running Windows, see **2.2.2 Mounting an NFS File System to ECSs (Windows)**.

Step 4 Log in to the head node, and upload the files to the file system.

Step 5 Start the web server.

----End

4.2 Log Printing

Context

SFS Turbo can provide multiple service nodes for shared log output directories, facilitating log collection and management of distributed applications. Features of such services are as follows:

- A shared file system is mounted to multiple service hosts and logs are printed concurrently.
- Large file size and small I/O: The size of a single log file is large, but the I/O of each log writing is small.
- Write I/O intensive: Write I/O of small blocks is the major service.

Configuration Process

1. Log in to SFS Console. Create an SFS Turbo file system to store the log files.
2. Log in to the ECS that functions as the compute node and mount the file system.
3. Configure the log directory to the shared file system. It is recommended that each host use different log files.
4. Start applications.

Prerequisites

- A VPC has been created.
- ECSs that function as head nodes and compute nodes have been created, and have been assigned to the VPC.
- SFS has been enabled.

Example Configuration

Step 1 Log in to SFS Console.

Step 2 On the **Create File System** page, set parameters as instructed.

Step 3 For details about how to mount a file system to an ECS running Linux, see **2.2.1 Mounting an NFS File System to ECSs**. For details about how to mount a file system running Windows, see **2.2.2 Mounting an NFS File System to ECSs (Windows)**.

Step 4 Configure the log directory to the shared file system. It is recommended that each host use different log files.

Step 5 Start applications.

----End

5 Troubleshooting

5.1 Mounting a File System Times Out

Symptom

When the **mount** command is executed to mount a file system to ECSs, the message **timed out** is displayed.

Possible Causes

- Cause 1: The network status is not stable.
- Cause 2: The network connection is abnormal.
- Cause 3: The operating system of the ECS where the file system is to be mounted is Ubuntu18 or a later version.

Fault Diagnosis

After the network fault is excluded, run the **mount** command again.

Solution

- Cause 1 and Cause 2: The network status is not stable or the network connection is abnormal.

  Re-mount the file system after the network issue is addressed.

  - If the patch is uninstalled successfully, no further action is required.
  - If the problem persists, see the solution for cause 3.

- Cause 3: The operating system of the ECS where the file system is to be mounted is Ubuntu18 or a later version.

a. Check whether the target ECS running Ubuntu18 or a later version is a private image.

- If yes, go to **c**.

- If no, go to **b**.

b. Convert the public image ECS to a private image.

i. To create a private image based on an existing ECS, see section "Creating an Image" in the *Elastic Cloud Server User Guide*

ii. Use the private image created in **b.i** to create an ECS or switch the ECS to the private image created in **b.i**. For details, see section "Changing the OS" in the *Elastic Cloud Server User Guide*.

c. Log in to the ECS and mount the file system again.

5.2 Mounting a File System Fails

Symptom

When running the **mount** command to mount the file system to the ECSs, the message **access denied** is displayed.

Possible Causes

- Cause 1: The file system has been deleted.
- Cause 2: The ECS on which the **mount** command is executed and the mounted file system are not in the same VPC.
- Cause 3: The mount point in the **mount** command is incorrect.
- Cause 4: The IP address used for accessing SFS is a virtual IP address.

Fault Diagnosis

Take troubleshooting measures based on possible causes.

Solution

- Cause 1: The file system has been deleted.

  Log in to the management console and check whether the file system has been deleted.

  – If yes, create a file system or select an existing file system to mount. The ECS to which the file system is to be mounted must reside in the same VPC as the mounted file system.

  – If no, go to Cause 2.

- Cause 2: The ECS on which the **mount** command is executed and the mounted file system are not in the same VPC.

  Log in to the management console and check whether the ECS and the file system belong to the same VPC.
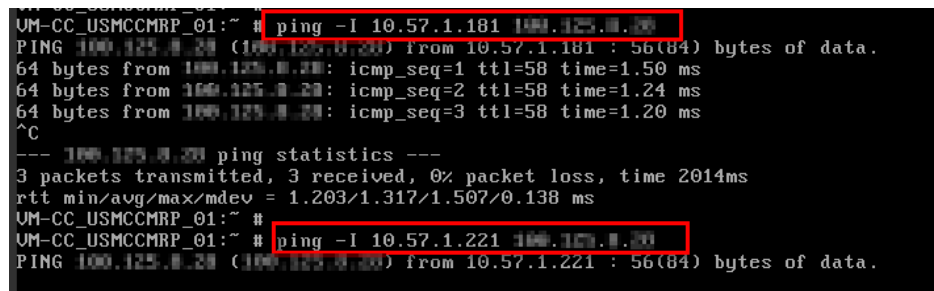
  – If yes, go to Cause 3.

  – If no, re-select the file system of the same VPC as the ECS.

- Cause 3: The mount point in the **mount** command is incorrect.

  a. Log in to the management console and check whether the mount point is the same as the one in the **mount** command.

  b. If the mount point in the **mount** command is incorrectly entered, correct it and run the command again.

- Cause 4: The IP address used for accessing SFS is a virtual IP address.

  Log in to the ECS, run the **ping** command and use the IP address of the ECS to access SFS. Check whether the service is reachable. See **Figure 5-1**.

  – If yes, the network problem has been resolved. Check other possible causes.

  – If no, the ECS virtual IP address is unable to access SFS due to the network problem. Use the private IP address and run the **ping** command to access SFS and check whether the service is reachable.

Figure 5-1 Running the ping command to access SFS

5.3 An ECS Fails to Access a File System

Symptom

An ECS fails to access a file system. The system displays a message indicating that the access request is denied. All services on the ECS are abnormal.

Possible Causes

- Cause 1: The file system is abnormal.
- Cause 2: After a forcible unmount operation on the ECS, mount fails.

Fault Diagnosis

Take troubleshooting measures based on possible causes.

Solution

- Cause 1: The file system is abnormal.

  Log in to the management console. On the **Scalable File System** page, check whether the file system is in the **Available** state.

  – If yes, go to Cause 2.

  – If no, see **5.4 The File System Is Abnormal** to restore the file system to the available state, and then access the file system again.

- Cause 2: After a forcible unmount operation on the ECS, mount fails.

    a. This problem is caused by an inherent defect of ECSs. Restart the ECS to resolve this problem.

    b. Check whether the file system can be properly mounted and accessed.

        ▪ If yes, no further action is required.

        ▪ If no, contact technical support.

5.4 The File System Is Abnormal

Currently, the file system exceptions include deletion error, expansion error, reduction error, and reduction failure. When the file system is in these statuses, refer to the following handling suggestions.

Table 5-1 Measures for handling file system abnormalities

Exception	Suggestion
Deletion error	When the file system is in the deletion error status, it can automatically recover to the available state. If the status cannot be restored to available, contact the administrator.
Expansion error	When the file system is in the expansion error status, it can automatically recover to the available state. If the status cannot be restored to available, contact the administrator.
Reduction error	When the file system is in the reduction error status, it takes approximately five minutes for the file system to restore to the available state.
Reduction failure	When the file system is in the reduction failure status, it takes approximately five minutes for the file system to restore to the available state.

6 FAQs

6.1 Concepts

6.1.1 What Is SFS?

Scalable File Service (SFS) provides high-performance file storage that can be expanded and shrunk on demand. With SFS, you can enjoy shared file access spanning multiple ECSs. SFS supports the Network File System (NFS) protocol. You can seamlessly integrate existing applications and tools with the service.

SFS provides an easy-to-use graphical user interface (GUI). On the GUI, users can create and configure file systems, saving effort in deploying, resizing, and optimizing file systems.

In addition, SFS features high availability. It can be elastically expanded, and it performs better as its capacity grows. The service is suitable for a wide range of scenarios, including enterprise office, high-performance websites, and software development.

6.2 Specifications

6.2.1 What Is the Maximum Size of a File That Can Be Stored in a File System?

For SFS Turbo file systems, the supported maximum size of a file is 16 TB.

6.2.2 What Access Protocols Are Supported by SFS?

SFS supports the standard network file protocol NFSv3.

6.2.3 How Many File Systems Can Be Created by Each Account?

Currently, a maximum of 10 SFS Turbo file systems can be created by each cloud account.

6.2.4 How Many ECSs Can a File System Be Mounted To?

You can mount an SFS Turbo file system to a maximum of 500 ECSs.

6.3 Restrictions

6.3.1 Can the Capacity of a File System Be Expanded?

SFS Turbo file systems: support online capacity expansion. During the capacity expansion, the file system will be unavailable for two to three minutes.

6.4 Networks

6.4.1 Can a File System Be Accessed Across VPCs?

Yes. An SFS Turbo file system allows two or more VPCs in the same region to interconnect with each other through VPC peering connection. In this case, different VPCs are in the same network, and ECSs under these VPCs can share the same file system. For more information about VPC peering connection, see "VPC Peering Connection" in *Virtual Private Cloud User Guide*.

6.4.2 Does the Security Group of a VPC Affect SFS?

A security group is a collection of access control rules for ECSs that have the same security protection requirements and are mutually trusted in a VPC. After a security group is created, you can create different access rules for the security group to protect the ECSs that are added to this security group. The default security group rule allows all outgoing data packets. ECSs in a security group can access each other without the need to add rules. The system creates a security group for each cloud account by default. Users can also create custom security groups by themselves.

When creating the security group, you need to add the inbound and outbound access rule, and enable the ports needed by the NFS protocol and DNS server of SFS to ensure that the file system can be successfully mounted. The port numbers required by the NFS protocol are **111**, **2049**, **2050**, **2051**, **20048**, and **2052**. The port number required by the DNS server is **53**.

Example Value

- Inbound rule

Directio n	Protocol	Port Range	Source IP Address		Description
Inbound	TCP and UDP	111	IP Addr ess	0.0.0 .0/0 (conf igur able)	One port corresponds to one access rule. You need to add information to the ports one by one.

- Outbound rule

Direction	Protocol	Port Range	Source IP Address		Description
Outbound	TCP and UDP	111	IP Addr ess	0.0. 0.0/ 0 (co nfig ura ble)	One port corresponds to one access rule. You need to add information to the ports one by one.

◫ **NOTE**

The bidirectional access rule must be configured for port **111**. The inbound rule can be set to the front-end service IP range of SFS. You can obtain it by running the following command: **ping** *File system domain name or IP address* or **dig** *File system domain name or IP address*.

For ports **2049**, **2050**, **2051**, and **2052**, only the outbound rule needs to be added, which is the same as the outbound rule of port **111**.

6.5 Others

6.5.1 How Do I Access a File System from an ECS?

To access your file system, install the NFS client on an ECS running Linux and then mount the file system using the **mount** command. For an ECS running Windows, install the NFS client on the ECS, modify the NFS transfer protocol, and then mount the file system by running the **mount** command. Then, you can share the files and directories of the file system.

6.5.2 How Do I Check Whether a File System on an ECS Running Linux Is Available?

Log in to the ECS as the **root** user. Run the following command, and the command output displays all available file systems with the same domain name or IP address.

showmount -e *File system domain name or IP address*

6.5.3 What Resources Does SFS Occupy?

To ensure that file systems can be used properly, the service occupies the following resources:

- For SFS Turbo file systems:
  - When an SFS Turbo file system is created, two private IP addresses and one virtual IP address are created in the subnet entered by the user.
  - When an SFS Turbo file system is created, the inbound rules of ports 111, 445, 2049, 2051, 2052, and 20048 are enabled in the security group entered by the user. The default source IP address is 0.0.0.0/0. You can change the IP address as required.

When data is written to the folders of a file system, the running memory of the server is occupied, but the storage space of the server disk is not occupied. The file system uses independent space.

7 Other Operations

7.1 Mounting a File System to an ECS Running Linux as a Non-root User

Description

By default, a Linux ECS allows only the **root** user to run the **mount** command for mounting a file system. However, if the permissions of user **root** are assigned to other common users, such users can also run the **mount** command for file system mounting. The following describes how to mount a file system to a Linux ECS as a common user. The EulerOS is used as an example.

Prerequisites

- A non-**root** user has been created on the ECS.
- A file system has been created and can be mounted to the ECS by the **root** user.
- You have obtained the mount point of the file system.

Procedure

Step 1 Log in to the ECS as user **root**.

Step 2 Assign the permissions of user **root** to the non-**root** user.

1. Run the **chmod 777 /etc/sudoers** command to change the **sudoers** file to be editable.

2. Run the **vi /etc/resolv.conf** command to edit the **sudoers** file.

3. Add a common user under the **root** account. In the following figure, user **Mike** is added.

Figure 7-1 Adding a user

4. Press **Esc**, input **:wq**, and press **Enter** to save and exit.

5. Run the **chmod 440 /etc/sudoers** command to change the **sudoers** file to be read-only.

Step 3 Log in to the ECS as user **Mike**.

Step 4 Run the following command to mount the file system. For details about the mounting parameters, see **Table 7-1**.

mount -t nfs -o vers=3,timeo=600,noresvport,nolock *Mount point Local path*

Table 7-1 Parameter description

Parameter	Description

Mount point	**NOTE**
	  x is a digit or letter.
	  If the mount point is too long to display completely, expand the column to view the full mount point.

Local path	Local path on the ECS, used to mount the file system, for example, **/local_path**.

Step 5 Run the following command to view the mounted file system.

mount -l

If the command output contains the following information, the file system is mounted successfully.

example.com:/share-xxx on /local_path type nfs (rw,vers=3,timeo=600,nolock,addr=)

----End

A Change History

Release Date	What's New
2020-11-06	This issue is the first official release.