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Operation Guide

Operation Overview

This document describes common cloud disk operations, including monitoring, alarms, managing cloud disks and snapshots.

Cloud Disk

- Creating cloud disks
- Mounting cloud disks
- Initializing cloud disks
  - Initialization Scenarios
  - Initializing cloud disks (less than 2 TB)
  - Initializing cloud disks (greater than or equal to 2 TB)
- Expanding cloud disks
  - Cloud disk expansion scenarios
  - Expanding cloud disks
  - Expanding partitions and file systems (Windows)
  - Expanding partitions and file systems (Linux)
- Unmounting cloud disks
- Terminating cloud disks

Snapshots

- Creating Snapshots
- Rolling back data from snapshots
- Creating cloud disks from snapshots
- Cross-region snapshot replication
- Deleting Snapshots

Monitoring and alarms

Monitoring and alarms
Use Limits

Use Limits on Cloud Disk

<table>
<thead>
<tr>
<th>Limit Type</th>
<th>Description</th>
</tr>
</thead>
</table>
| Enhanced SSD usage      | 1. Currently, Enhanced SSD is only available in Guangzhou Zone 3, Guangzhou Zone 4, Shanghai Zone 2, Shanghai Zone 3, Shanghai Zone 5, Beijing Zone 3, Beijing Zone 4, Chengdu Zone 1, Chongqing Zone 1, Nanjing Zone 1, and Nanjing Zone 2. It will be supported in more availability zones.  
  2. The performance of Enhanced SSD is only guaranteed when it's mounted to S5, M5, SA2, IT3, and D3 models created after August 1, 2020, and all later generation models.  
  3. Enhanced SSD cannot be used as the system disk.  
  4. Enhanced SSD cannot be encrypted.  
  5. Enhanced SSD cannot be upgraded from other disk types.                                                                                                                                                 |
| Elastic cloud disk capability | Starting from May 2018, all data disks purchased with CVMs are elastic cloud disks, which support unmounting from and remounting to CVMs. This feature is supported in all availability zones.                                       |
| Cloud disk performances  | I/O specification applies to both input and output performance at the same time. For example, if a 1-TB SSD has a maximum random IOPS of 26,000, its means that both its read and write performance can reach this value. Due to performance limits, if the block size in this example is 4 KB or 8 KB, the maximum IOPS can be reached. If the block size is 16 KB, the maximum IOPS cannot be reached (throughput has already reached the limit of 260 MB/s). |
| Max mountable elastic cloud disks per CVM | One CVM can have a maximum of 20 cloud disks mounted.                                                                                                                                                     |
| Mounting                | A cloud disk can only be mounted to a CVM in the same availability zone.                                                                                                                                                                   |
| Repossession of cloud disks in arrears | When a monthly-subscribed cloud disk expires and you do not renew it within 7 days after the expiry, it will be forcibly unmounted from the CVM (if any), and moved to the recycle bin. For details about the repossession mechanism, see Arrears.  
  Currently, when you mount a monthly-subscribed cloud disk to monthly-subscribed CVM, the following renewal method are available:  
  • Renew the cloud disk when the associated CVM expires  
  • Renew the cloud disk automatically on a monthly basis after it expires.  
  • Mount directly without a renewal policy.                                                                                                                                                     |

Use Limits on Snapshot

<table>
<thead>
<tr>
<th>Limit Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supported disk type</td>
<td>You can only use the data disk snapshot to create elastic cloud disks, while using the system disk snapshot to create a custom image.</td>
</tr>
<tr>
<td>Capacity of Created Cloud Disk</td>
<td>The capacity of the cloud disk created using a snapshot should be greater than or equal to that of the snapshot.</td>
</tr>
<tr>
<td>Snapshot rollback</td>
<td>Snapshot data can only be rolled back to the source cloud disk where the snapshot was created. If you want to create a cloud disk with data in an existing snapshot, see Creating Cloud Disks Using Snapshots.</td>
</tr>
<tr>
<td>Total snapshot size</td>
<td>No limit.</td>
</tr>
<tr>
<td>Snapshot quota in one region</td>
<td>64 + the number of cloud disks in the region * 64.</td>
</tr>
</tbody>
</table>

Use Limits on Scheduled Snapshot Policy

<table>
<thead>
<tr>
<th>Limit Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scheduled snapshot policy quota in one region</td>
<td>A single Tencent Cloud account can set a maximum of 30 scheduled snapshot policies in each region.</td>
</tr>
<tr>
<td>Description</td>
<td>Details</td>
</tr>
<tr>
<td>----------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Number of scheduled snapshot policies being associated with one cloud disk</td>
<td>A cloud disk can associate with a maximum of 10 scheduled snapshot policies in the same region.</td>
</tr>
<tr>
<td>Number of cloud disks associated with one scheduled snapshot policy</td>
<td>A scheduled snapshot policy can be associated with a maximum of 200 cloud disks in the same region.</td>
</tr>
</tbody>
</table>

Managing Cloud Disks
Creating Cloud Disks
Overview

CBS allows you to create a cloud disk and attach it to any CVM in the same availability zone. The cloud disk is identified and used by the CVM through block storage device mapping. Once created, the cloud disk can reach its maximum performance without prefetch.

You can create different types of CBS cloud disks based on business needs. For more information about CBS disk types, see CBS Types.

Prerequisites

- Before creating a cloud disk, you need to [sign up for Tencent Cloud](#) and complete [identity verification](#).

Directions

**Creating a cloud disk through the Console**

1. Log in to the [CBS Console](#).
2. Select a region and click + New.
3. In the Purchase Data Disk dialog box, configure the following parameters:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Availability Zone</td>
<td>Required. The availability zone where your cloud disk resides. It cannot be modified after the cloud disk was created.</td>
</tr>
</tbody>
</table>
| Cloud Disk Type    | Required. CBS offers 2 cloud disk types:  
  - Premium cloud storage  
  - SSD  
  - Enhanced SSD |
| Quick Disk Creation| Optional. To create a cloud disk using a snapshot, you need to tick **Create a cloud disk with a snapshot** and select the snapshot you want to use.  
  - The capacity of a cloud disk created using a snapshot is equal to that of the snapshot by default. You can adjust the disk capacity.  
  - When you create a cloud disk using a snapshot, the disk type is the same as that of the snapshot’s source disk. You can adjust the disk type. |
| Capacity           | Required. CBS provides the following cloud disk capacity and specifications:  
  - Premium Cloud Storage: 10 GB - 16000 GB  
  - SSD: 100 GB - 16000 GB  
  - Enhanced SSD: 100 GB-16,000 GB  
  When you create a cloud disk using a snapshot, the disk capacity cannot be smaller than that of the snapshot. If you do not specify this parameter, the disk capacity is equal to that of the snapshot by default. |
| Scheduled Snapshot | Optional. You can associate scheduled snapshot policies when creating a cloud disk to regularly manage your cloud disk snapshots. Currently, Tencent Cloud provides a 50 GB free tier for each region in mainland China. For more information, see Billing Overview. |
| Disk Name          | Optional. A maximum of 20 characters start with a letter or Chinese character, and can be a combination of upper- and lower-case letters, Chinese characters, numbers, and special characters ` `, ` `, ` `, ` `, ` `, ` `, ` `, ` `, ` `, ` `, ` `. This parameter can be modified after the cloud disk was created.  
  - Creating a single cloud disk: disk name is the name of the cloud disk you create.  
  - Batch creating cloud disks: when you create multiple cloud disks at one time, disk name is the prefix of your cloud disk names, which are **disk name_number** ranging from "disk name_0" to "disk name_49". |
| Project            | Required. When creating a cloud disk, you can configure the project to which the cloud disk belongs. Default value: **DEFAULT PROJECT**. |
| Tag                | Optional. When creating a cloud disk, you can bind a tag to it. Tag is used for identification, helping you easily categorize and search for |

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cloud resources. For more information about tags, see [Tag](#).

<table>
<thead>
<tr>
<th>Billing Mode</th>
<th>Required. CBS is pay-as-you-go.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quantity</td>
<td>Optional. Default value is <strong>1</strong>, meaning only one cloud disk is created. Currently, up to 50 cloud disks can be created at one time.</td>
</tr>
<tr>
<td>Period</td>
<td>The <strong>Pay-as-you-go</strong> billing mode does not involve this parameter.</td>
</tr>
</tbody>
</table>

4. Click OK.
   - If **Billing Mode** is **Pay-as-you-go**, the creation is completed.
     - i. Once you confirm your configuration, select whether to use the voucher based on actual needs, and then click **Confirm**.
     - ii. Complete the payment.

- You can view the cloud disk(s) you created in the Cloud Block Storage list page. The newly added elastic cloud disk has a **To be mounted** status. To mount it to a CVM in the same availability zone, see Mounting Cloud Disks.

**Creating a cloud disk using a snapshot**

If you want to create a cloud disk that contains all data upon creation, you can create cloud disks using snapshots.

**Creating a cloud disk using API**

You can use the [CreateDisks](#) API to create a cloud disk. For more information, see CreateDisks.
Mounting Cloud Disks

You can mount an elastic cloud disk (used as a data disk for the CVM) to any CVM in the same availability zone. Each CVM can have up to 20 data disks mounted to it. You can use the following methods to mount a cloud disk.

- When launching a new CVM, specify the corresponding custom image and data disk snapshot.
  After automatic mounting, reads and writes on the data disk can be directly performed without disk initialization operations such as partitioning and formatting.

- For an independently purchased cloud disk, the elastic cloud disk can be manually mounted to an existing CVM instance in the same availability zone through the console or API.
  - Directly created cloud disks
    After manual mounting, you need to perform initialization operations on the disk such as partitioning and formatting. For more information, see Initializing cloud disks (smaller than 2TB) or Initializing cloud disks (larger than or equal to 2TB).
  - Creating a cloud disk from a snapshot
    If the capacity of the cloud disk is equal to the capacity of the snapshot, reads and writes on the data disk can be directly performed without disk initialization operations such as partitioning and formatting.
    If the capacity of the cloud disk is larger than the snapshot capacity, you need to extend the file system or convert the partition format.

Some Linux CVMs may not recognize elastic cloud disks. You can first enable the disk hot swapping function on the CVM. For details, see Enable disk hot swapping function.

Automatic Mounting

Mounting data disks (Windows)

If you need to automatically mount a cloud disk created from a corresponding data disk snapshot when starting a Windows CVM instance, the specified custom image and data disk snapshot must meet the following requirements:

- The data disk must be formatted as ntfs or fat32 before you create a snapshot.
- The SAN policy in the custom image is onlineAll.

Public images for Windows that are currently provided by Tencent Cloud have been configured by default, but we still recommend that you check the configuration before creating any custom images by following the steps below:
Mounting data disks (Linux)

If you need to automatically mount a cloud disk created from a corresponding data disk snapshot when starting a Linux CVM instance, the specified custom image and data disk snapshot must meet the following requirements:

- The data disk must be formatted before the snapshot is created. That is, the data disk has been successfully mounted to the original CVM.
- For the system disk to create a custom image, you need to add the following commands to the file `/etc/rc.local` to write the data disk mounting point to the file.

```
mkdir -p <mount-point>
mount <device-id> <mount-point>
```

The parameter descriptions for these commands are as follows:
- `<mount-point>` must be set to the mounting point of the file system, such as `/mydata`.
- `<device-id>` must be set to the actual file partition location. For example, enter `/dev/vdb` when there is no partition in the file system, and `/dev/vdb1` when there is a partition in the file system.

Mounting Manually

Using the console to mount cloud disks

1. Log in to the CBS Console.
2. On the cloud disk list page, you can mount cloud disks using the following methods:
   a. Click More > Mount in the row of the cloud disk with the status To Be Mounted.
   b. Select the cloud disks with the status To Be Mounted, and click Mount at the top of the cloud disk list to perform batch mounting.
3. In the pop-up box, click OK.
4. Refresh the cloud disk list.
   If the status of the cloud disk changes to Mounted, this indicates that mounting is successful.
5. Depending on the cloud disks, you need to choose to perform the corresponding subsequent operations to make the cloud disk available.

<table>
<thead>
<tr>
<th>Creation Mode</th>
<th>Cloud disk capacity</th>
<th>Subsequent Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Create directly</td>
<td>Cloud disk capacity&lt; 2TB</td>
<td>Initializing cloud disks (smaller than 2TB)</td>
</tr>
</tbody>
</table>
Cloud disk capacity ≥ 2TB

<table>
<thead>
<tr>
<th>Create from a snapshot</th>
<th>Initializing cloud disks (larger than or equal to 2TB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cloud disk capacity = snapshot capacity</td>
<td>No subsequent operations needed, use directly after mounting.</td>
</tr>
</tbody>
</table>
| Snapshot capacity < cloud disk capacity ≤ 2TB or 2TB < snapshot capacity < cloud disk capacity | - Mounting to a Windows CVM: Expanding partitions and file systems (Windows)  
- Mounting to a Linux CVM: Expanding partitions and file systems (Linux) |
| Snapshot capacity ≤ 2TB < cloud disk capacity | - If MBR partition format is used in the snapshot: Refer to Initializing cloud disks (larger than or equal to 2TB)  
- Using GPT to re-partition  
- Mounting to a Windows CVM: Expanding partitions and file systems (Windows)  
- Mounting to a Linux CVM: Expanding partitions and file systems (Linux) |

**Using the API to mount cloud disks**

You can use the AttachDisks API to mount a cloud disk. For more information, see [Mounting cloud disks](#).

**Enabling the disk hot swapping function**

All images that are currently provided already support the mounting and unmounting operations of elastic cloud disks. **To unmount a cloud disk, you must first execute the `umount` (Linux) or offline (Windows) operations. Otherwise, the CVM may not recognize the elastic cloud disk next time it is mounted.**

However, if you have previously purchased a CVM with one of the following operating systems and plan to mount it with elastic cloud disks, we recommend that you first add the related driver to the CVM to get the hot swapping function:

<table>
<thead>
<tr>
<th>CVM operating system types</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>CentOS</td>
<td>5.11 64-bit</td>
</tr>
<tr>
<td></td>
<td>5.11 32-bit</td>
</tr>
<tr>
<td></td>
<td>5.8 64-bit</td>
</tr>
<tr>
<td></td>
<td>5.8 32-bit</td>
</tr>
<tr>
<td>Debian</td>
<td>6.0.3 32-bit</td>
</tr>
<tr>
<td>Ubuntu</td>
<td>10.04 64-bit</td>
</tr>
<tr>
<td></td>
<td>10.04 32-bit</td>
</tr>
<tr>
<td>openSUSE</td>
<td>12.3 64-bit</td>
</tr>
<tr>
<td></td>
<td>12.3 32-bit</td>
</tr>
</tbody>
</table>

1. As the root user, [Log In to the Linux CVM](#).
2. Execute the following command to add the driver.

```bash
modprobe acpiphp
```

If you need to load the `acpiphp` module when shutting down or re-starting the CVM, we recommend you execute Step 3 to set the `acpiphp` module to load automatically when starting up.

3. (Optional) According to the different operating systems, select the related operation method to set the `acpiphp` module to load automatically when starting up:

   - **CentOS 5 Series**
     a. Execute the following command to create and open an `acpiphp.modules` file.

     ```bash
     vi /etc/sysconfig/modules/acpiphp.modules
     ```

     b. Add the following content to the file, and save.

     ```bash
     #!/bin/bash
     modprobe acpiphp > /dev/null
     ```

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c. Execute the following command to add execution permissions.

```bash
chmod a+x /etc/sysconfig/modules/acpihp.modules
```

### Debian 6 Series, Ubuntu 10.04 Series

a. Execute the following command to modify the file.

```bash
vi /etc/modules
```

b. Add the following content to the file, and save.

```bash
acpihp
```

### openSUSE 12.3 Series

a. Execute the following command to modify the file.

```bash
vi /etc/sysconfig/kernel
```

b. Add the following content to the file, and save.

```bash
MODULES_LOADED_ON_BOOT="acpihp"
```
The cloud disks created through the console are manually mounted to your CVM and used as data disks in Online status by default. To use the disks, you need to initialize them first, including formatting, partitioning, and creating file systems. The initialization method varies by actual use scenario as shown below:

- If the entire disk is presented as one independent partition (that is, there are not multiple logical disks such as D disk/vdb1 and E disk/vdb2), we strongly recommend you not use partitions, and directly create the file system on bare devices.
- If the entire disk needs to be presented as multiple logical partitions (that is, there are multiple logical disks), you need to perform the partitioning first, then create the file system on a partition.

Common disk partition styles are Main Boot Record (MBR) and Guid Partition Table (GPT). If the disk partition format is changed after the disk is put into use, original data on the disk will be erased. Therefore, select an appropriate partition style according to actual needs.

Basics of the two partition styles are shown in the following table:

<table>
<thead>
<tr>
<th>Partition style</th>
<th>Maximum supported disk capacity</th>
<th>Number of partitions supported</th>
<th>Partition tool</th>
</tr>
</thead>
<tbody>
<tr>
<td>MBR</td>
<td>2TB</td>
<td>• 4 primary partitions</td>
<td>Window operating system: Disk management</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 3 primary partitions and 1 extended partition</td>
<td>Linux operating system: f disk tool</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Linux operating system: parted tool</td>
</tr>
<tr>
<td>GPT</td>
<td>18EB Currently, cloud disk supports a maximum capacity of 32TB</td>
<td>No limit on number of partitions</td>
<td>Windows operating system: Disk management</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Linux operating system: parted tool</td>
</tr>
</tbody>
</table>

Select the appropriate operations guide according to disk capacity and the CVM’s operating system type:

- For disk capacity less than 2TB:
  - Initializing cloud disks (Windows)
  - Initializing cloud disks (Linux)
- For disk capacity larger than or equal to 2TB:
  - Initializing cloud disks (Windows)
  - Initializing cloud disks (Linux)
Initializing Cloud Disks (Smaller than 2TB)

Overview

This document takes cloud disks with a capacity less than 2 TB as an example to provide guidance on disk initialization. For more information, see Initialization Scenarios.

Prerequisites

You have mounted a cloud disk to your CVM.

Notes

- To protect important data, please see Usage FAQs before operating on your cloud disks.
- Formatting a data disk will erase all data. Make sure that the disk does not contain data, or important data has been backed up.
- To avoid exceptions, make sure before formatting that the CVM has stopped external services.

Directions

Initializing cloud disks (Windows)

This article uses the Windows Server 2012 R2 operating system as an example. The formatting operation varies by operating system. Below is for reference only.

1. Log in to the Windows Cloud Virtual Machine.

2. On the CVM desktop, right click the lower-right icon.

3. Select Disk Management in the pop-up menu to open the Disk Management window.

If the newly added disk is in offline status (as shown in the figure above), execute Step 4 before Step 5 to perform initialization. Otherwise, you can directly execute Step 5[initialize].

4. Disks are listed on the right-side pane. Right click disk 1 area, and select Online to bring it online. The status of disk 1 changes from Offline to Not Initialized.

5. Right click disk 1 area, and select Initialize Disk in the menu.

6. In the Initialize Disk dialog box, the disk you need to initialize is displayed. Select MBR or GPT and click OK.

If the disk partition format is changed after the disk is put into use, the original data on the disk will be erased. Please select an appropriate partition format based on actual needs.

7. Right click the unallocated space of the disk, and select New Simple Volume.

8. In the pop-up New Simple Volume Wizard dialog box, follow instructions on the interface and click Next.

9. Specify the volume size as needed, which is the maximum value by default. Click Next.
0. Assign a drive letter, and click **Next**.

1. Select **Format this volume with the following settings**, configure parameters as needed, format the partition, and click **Next** to complete the partition creation.

2. Click **Complete** to complete the wizard. Wait for the system to complete the initialization operation. When the volume status becomes **Healthy**, disk initialization is successful.

   After successfully completing the initialization, enter the **Computer** interface to view the new disk.

### Initializing cloud disks (Linux)

Select the initialization method according to your actual use cases:

- If the entire disk is presented as one independent partition (there is no logical disk such as vdb1 and vdb2), we strongly recommend that you not use partition, and directly **create the file system on bare devices**.
- If the entire disk needs to be presented as multiple logical partitions (there are multiple logical disks), you need to perform the partition operation first, and then **create the file system on a partition**.

### Creating file systems on bare devices

1. **Log in to the Linux Cloud Virtual Machine**.

2. Execute the following command as the root user to view the disk name.

   ```bash
   fdisk -l
   ```

   If information similar to what is shown below is returned, the current CVM has two disks, where "/dev/vda" is the system disk and "/dev/vdb" is the newly added data disk.

3. Execute the following command to create a file system on the "/dev/vdb" bare device.

   ```bash
   mkfs -t <File system format> /dev/vdb
   ```

   The partition size supported by different file systems varies. Select an appropriate file system as needed. The following example takes **EXT4** as the file system:

   ```bash
   mkfs -t ext4 /dev/vdb
   ```

   The formatting takes a while. Please pay attention to the system’s running status and do not exit.

4. Execute the following command to create a new mount point.

   ```bash
   mkdir <mount point>
   ```

   Take creating a new mount point `/data` as an example:

   ```bash
   mkdir /data
   ```

5. Execute the following command to mount the newly created partition to the newly created mount point.

   ```bash
   mount /dev/vdb <mount point>
   ```
Take creating a new mount point `/data` as an example:

```
mount /dev/vdb /data
```

6. Execute the following command to view the mount result.

```
df -TH
```

If you do not need to configure automatic disk mounting at startup, skip the following steps.

7. Confirm the mount method and obtain the corresponding information.

   Based on business needs, you can use an elastic cloud disk’s soft link, file system’s UUID (universally unique identifier), or device name to automatically mount a disk. The descriptions and information acquisition methods are as follows:

<table>
<thead>
<tr>
<th>Mount method</th>
<th>Pros and cons</th>
<th>Information acquisition method</th>
</tr>
</thead>
</table>
| Use the soft link of the elastic cloud disk (Recommended) | **Pros:** The soft link of an elastic cloud disk is fixed and unique. It does not change with operations such as mounting, unmounting, and formatting partitions. **Cons:** Only an elastic cloud disk can use the soft link, which operates imperceptibly for the partition formatting operation. | Execute the following command to view the soft link of the elastic cloud disk:
   ```
   ls -l /dev/disk/by-id
   ``` |
| Use the UUID of the file system   | Automatic mounting configuration may fail due to changes in a file system’s UUID. For example, reformatting a file system will change its UUID. | Execute the following command to view the UUID of the file system:
   ```
   blkid /dev/vdb
   ``` |
| Use device name                   | Automatic mounting configuration may fail due to changes in device name. For example, if an elastic | Execute the following command to view the device name:
   ```
   fdisk -l
   ``` |
8. Execute the following command to back up the `/etc/fstab` file to the `/home` directory, for example:

   ```
   cp -r /etc/fstab /home
   ```

9. Execute the following command to use VI editor to open the `/etc/fstab` file.

   ```
   vi /etc/fstab
   ```

0. Press `i` to enter the edit mode.

1. Move the cursor to the end of the file, press **Enter**, and add the following content.

   ```
   <Device information> <Mount point> <File system format> <File system installation option> <File system dump frequency> <File system check sequence at launch>
   ```

   ① (Recommended) Take automatic mounting using the soft link of an elastic cloud disk as an example. Add the following to the previous example:

   ```
   /dev/disk/by-id/virtio-disk-drkhklpe /data ext4 defaults 0 0
   ```

   ② Take automatic mounting using the UUID of the disk partition as an example. Add the following to the previous example:

   ```
   UUID=d489ca1c-5057-4536-81cb-ceb2847f9954 /data ext4 defaults 0 0
   ```

   ③ Take automatic mounting using the device name as an example. Add the following to the previous example:

   ```
   /dev/vdb /data ext4 defaults 0 0
   ```

2. Press **Esc**, enter `:wq`, and press **Enter**.

   Save the configuration and exit the editor.

3. Execute the following command to check whether the `/etc/fstab` file has been written successfully.

   ```
   mount -a
   ```

   If the command runs successfully, the file has been written. The newly created file system will automatically mount when the operating system is launched.

---

**Creating a file system on a partition**

This example uses the fdisk partition tool in the CentOS 7.5 operating system to configure data disk `/dev/vdc` as the primary partition. MBR is used as the default partition format, EXT4 format as the file system, `/data/newpart` as the mount point, and automatic mounting at startup is configured. The formatting operation varies by operating system. Below is for reference only.

1. **Log in to the Linux Cloud Virtual Machine.**
2. Execute the following command as the root user to view the disk name.

   ```
   fdisk -l
   ```

   If information similar to what is shown below is returned, the current CVM has two disks, where `/dev/vda` is the system disk and `/dev/vdb` is the newly added data disk.
3. Execute the following command to enter the fdisk partition tool and execute partitioning operations on the newly added data disk.

   ```
   fdisk <Newly added data disk>
   ```

   Take the newly mounted data disk `/dev/vdb` as an example:

   ```
   fdisk /dev/vdb
   ```

   The returned information is similar to what is shown below:

   ![fdisk output example]

4. Enter `n` and press Enter to start creating the new partition.

   The returned information is similar to what is shown below:

   ![fdisk output example]

   This indicates that the disk has two partition types:
   - `p` indicates the primary partition.
   - `e` indicates the extended partition.

5. Take creating a primary partition as an example. Enter `p` and press Enter to start creating a new primary partition.

   The returned information is similar to what is shown below:

   ![fdisk output example]

   **Partition number** indicates the number of the primary partition. You can choose from 1-4.

6. Take selecting partition number 1 as an example. Enter `1` and press Enter.

   The returned information is similar to what is shown below:

   ![fdisk output example]

   **First sector** indicates the start sector. You can choose from 2048 - 20971519. The default value is 2048.

7. Take selecting default start sector number 2048 as an example. Press Enter.

   The returned information is similar to what is shown below:

   ![fdisk output example]

   **Last sector** indicates the end sector. You can choose from 2048 - 20971519. The default value is 20971519.
8. Take selecting the default end sector number 20971519 as an example. Press Enter.
   The returned information is similar to what is shown below:

   
   ![Partitioning Information]

   This indicates that partitioning is completed. A new partition has been created on the 60 GB data disk.

9. Enter `p` and press Enter to view information about the newly created partition.
   The returned information is similar to what is shown below:

   ![Partition Information]

   This indicates the detailed information of the newly created partition /dev/vdb1.

   If the partitioning operation above has an error, enter `q` to exit the fdisk partition tool, and the prior partition result will not be retained.

0. Enter `w` and press Enter to write the partition result into the partition table.
   If the returned information is similar to what is shown below, the partition has been created.

   ![Partition Table Confirmation]

1. Execute the following command to sync the partition table to the operating system.

   ```bash
   partprobe
   ```

2. Execute the following command to configure the file system of the newly created partition to that required by the system.

   ```bash
   mkfs -t <File system format> /dev/vdb1
   ```

   The partition size supported by different file systems varies. Select an appropriate file system as needed. The following example takes EXT4 as the file system:

   ```bash
   mkfs -t ext4 /dev/vdb1
   ```
The returned information is similar to what is shown below:

```
[root@UM 16.14_centos ~]# mkfs -t ext4 /dev/vdb1
mke2fs 1.42.9 (28-Dec-2013)
_filesystem_label=
 OS type: Linux
 Block size: 4096 (log=2)
 Fragment size: 4096 (log=2)
 Stripes@blocks, Stripe width@blocks
3932160 inodes, 1572800 blocks
763419 blocks (8.0%) reserved for the super user
 First data block:
 Maximum filesystem blocks:216426864
 4096 blocks
32768 blocks per group, 32768 fragments per group
64K inodes per group,
Superblock backups stored on blocks:
32768, 98344, 163840, 229376, 294912, 360448, 425984, 491520, 557056, 622592
All allocated group tables: done
Writing inode tables: done
Creating journal (5120 blocks): done
Writing superblocks and filesystem accounting information: done
```

The formatting takes a while. Please pay attention to the system’s running status and do not exit.

3. Execute the following command to create a new mount point.

```bash
mkdir <mount point>
```

Take creating a new mount point `/data/newpart` as an example:

```bash
mkdir /data/newpart
```

4. Execute the following command to mount the newly created partition to the newly created mount point.

```bash
mount /dev/vdb1 <Mount point>
```

Take creating a new mount point `/data/newpart` as an example:

```bash
mount /dev/vdb1 /data/newpart
```

5. Execute the following command to view the mount result.

```bash
df -TH
```

The returned information is similar to what is shown below:

```
Filesystem  Type  Size  Used  Avail  Use% Mounted on
/dev/vdb1   ext4  51G   1.6G   49G   4% /data/newpart
```

This indicates that the newly created partition `/dev/vdb1` has been mounted to `/data/newpart`.

If you do not need to configure automatic disk mounting at startup, skip the following steps.

6. Confirm the mount method and obtain the corresponding information.

Based on business needs, you can use an elastic cloud disk’s soft link, file system’s UUID (universally unique identifier), or device name to automatically mount a disk. The descriptions and information acquisition methods are as follows:

<table>
<thead>
<tr>
<th>Mount method</th>
<th>Pros and cons</th>
<th>Information acquisition method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use the soft link of the elastic cloud disk (Recommended)</td>
<td>Pros: The soft link of an</td>
<td>Execute the following command to view the soft link of the elastic c</td>
</tr>
</tbody>
</table>
### elastic cloud disk

- **Pros:**
  - Fixed and unique.
  - Does not change with operations such as mounting, unmounting, and formatting partitions.

- **Cons:**
  - Only an elastic cloud disk can use the soft link, which operates imperceptibly for the partition formatting operation.

---

#### Use the UUID of the file system

- Automatic mounting configuration may fail due to changes in a file system’s UUID.
  - For example, reformatting a file system will change its UUID.

- Execute the following command to view the UUID of the file system:
  
  ```bash
  blkid /dev/vdb1
  ```

#### Use device name

- Automatic mounting configuration may fail due to changes in device name.
  - For example, if an elastic cloud disk on the CVM is unmounted and then remounted, the device name may change when the operating system recognizes the file system again.

- Execute the following command to view the device name:
  
  ```bash
  fdisk -l
  ```

---

7. Run the following command to back up the `/etc/fstab` file to the `/home` directory, for example:

   ```bash
   cp -r /etc/fstab /home
   ```

8. Execute the following command to use VI editor to open the `/etc/fstab` file.
9. Press `i` to enter editing mode.

0. Move the cursor to the end of the file, press `Enter`, and add the following content:

```
DEVICE INFORMATION  MOUNT POINT  FILE SYSTEM FORMAT  FILE SYSTEM INSTALLATION OPTION  FILE SYSTEM DUMP FREQUENCY  FILE SYSTEM CHECK SEQUENCE AT LAUNCH
```

- **(Recommended)** Take automatic mounting using the soft link of an elastic cloud disk as an example. Add the following to the previous example:
  ```
  /dev/disk/by-id/virtio-disk-drkhklpe-part1 /data/newpart ext4 defaults 0 2
  ```

- Take automatic mounting using the UUID of the disk partition as an example. Add the following to the previous example:
  ```
  UUID=d489ca1c-5057-4536-81cb-ceb284719954 /data/newpart ext4 defaults 0 2
  ```

- Take automatic mounting using the device name as an example. Add the following to the previous example:
  ```
  /dev/vdb1 /data/newpart ext4 defaults 0 2
  ```

1. Press `Esc`, enter `:wq` and press `Enter`.
   
   Save the configuration and exit the editor.

2. Execute the following command to check whether the `/etc/fstab` file has been written successfully:
   ```
   mount -a
   ```

   If the command runs successfully, the file has been written. The newly created file system will automatically mount when the operating system is launched.

**Related Operations**

*Initializing cloud disks (larger than or equal to 2 TB)*.
Scenario

This document takes cloud disks with a capacity greater than or equal to 2TB as an example to provide guidance on disk initialization. For more information, see Initialization Scenarios. MBR supports disk with a maximum capacity of 2TB. When you partition disk with a capacity greater than 2TB, we recommend that you use the GPT partition format. When GPT is used on Linux operating system, fdisk can no longer be used and the parted tool must be used.

Prerequisites

You have mounted a cloud disk to your CVM.

Notes

- To protect important data, please see Usage FAQs before operating on your cloud disks.
- Formatting a data disk will erase all data. Make sure that the disk does not contain data, or important data has been backed up.
- To avoid exceptions, make sure before formatting that the CVM has stopped external services.

Directions

Initializing cloud disks (Windows)

1. Log in to the Windows Cloud Virtual Machine.
2. In the CVM desktop, click to enter the Server Manager page.
3. In the left navigation tree, click File and Storage Services.
4. In the left navigation tree, select Volumes>Disks.

   If the newly added disk is in offline status (as shown in the figure above), execute Step 5 before Step 6 to perform initialization. Otherwise, you can directly execute Step 6.

5. Disks are listed on the right-side pane. Right click the row where 1 is located, and select Online to bring it online. The status of 1 changes from Offline to Online.
6. Right click the row where 1 is located, and select Initialize in the menu.
7. Follow instructions on the interface, and click Yes.
8. After initialization, the partition of 1 changes from Unknown to GPT. Right click the row where 1 is located and select New Simple Volume in the menu.
9. In the pop-up New Volume Wizard dialog box, follow instructions on the interface and click Next.
10. Select the server and disk, and click Next.
11. Specify the volume size as needed, which is the maximum value by default. Click Next.
12. Assign a drive letter, and click Next.
13. Select Format this volume with the following settings, configure parameters as needed, format the partition, and click Next to complete the partition creation.
14. Confirm the information and click Create.
15. Wait for the system to complete the creation of the new volume, and then click Finish.
After completing initialization, enter the My Computer interface to view the new disk.

### Initializing cloud disks (Linux)

Select the initialization method according to your actual use scenario:

- If the entire disk is presented as one independent partition (i.e., no logical disks such as vdb1 and vdb2), we strongly recommend that you not use partition, and directly create the file system on bare devices.
- If the entire disk is presented as multiple logical partitions (i.e., there are multiple logical disks), you need to perform the partition operation first, and then create the file system on a partition.

#### Creating file systems on bare devices

1. Log in to the Linux Cloud Virtual Machine.
2. Execute the following command as the root user to view the disk name.

   ```
   fdisk -l
   ```

   If information similar to what is shown below is returned, the current CVM has two disks, where “/dev/vda” is the system disk and “/dev/vdb” is the newly added data disk.

   ![Disk Information](image)

3. Execute the following command to create a file system on the “/dev/vdb” bare device.

   ```
   mkfs -t <File system format> /dev/vdb
   ```

   The partition size supported by different file systems varies. Select an appropriate file system as needed. The following example takes EXT4 as the file system:

   ```
   mkfs -t ext4 /dev/vdb
   ```

   The formatting takes a while. Please pay attention to the system’s running status and do not exit.

4. Execute the following command to create a new mount point.

   ```
   mkdir <Mount point>
   ```

   Take creating a new mount point /data as an example:

   ```
   mkdir /data
   ```

5. Execute the following command to mount the newly created partition to the newly created mount point.

   ```
   mount /dev/vdb <Mount point>
   ```

   Take the newly created mount point /data as an example:

   ```
   mount /dev/vdb /data
   ```

6. Execute the following command to view the mount result.

   ```
   df -TH
   ```
If you do not need to configure automatic disk mounting at startup, skip the following steps.

7. Confirm the mount method and obtain the corresponding information.

Based on business needs, you can use an elastic cloud disk’s soft link, file system’s UUID (universally unique identifier), or device name to automatically mount a disk. The descriptions and information acquisition methods are as follows:

<table>
<thead>
<tr>
<th>Mount method</th>
<th>Pros and cons</th>
<th>Information acquisition method</th>
</tr>
</thead>
</table>
| Use the soft link of the elastic cloud disk *(recommended)* | **Pros:** The soft link of an elastic cloud disk is fixed and unique. It does not change with operations such as mounting, unmounting, and formatting partitions. **Cons:** Only an elastic cloud disk can use the soft link, which operates transparently for the partition formatting operation. | Execute the following command to view the soft link of the elastic cloud disk: 

```bash
ls -l /dev/disk/by-id
```

| Use the UUID of the file system | Automatic mounting configuration may fail due to changes in a file system’s UUID. For example, reformatting a file system will change its UUID. | Execute the following command to view the UUID of the file system: 

```bash
blkid /dev/vdb
```

| Use device name                 | Automatic mounting configuration may fail due to changes in device name. For example, if an elastic cloud disk on the CVM is unmounted and then remounted, the device | Execute the following command to view the device name: 

```bash
fdisk -l
```
8. Run the following command to back up the `/etc/fstab` file to the `/home` directory, for example:

```bash
cp -r /etc/fstab /home
```

9. Execute the following command to use VI editor to open the `/etc/fstab` file.

```bash
vi /etc/fstab
```

0. Press `I` to enter the edit mode.

1. Move the cursor to the end of the file, press **Enter**, and add the following content.

```bash
<Device information> <Mount point> <File system format> <File system installation option> <File system dump frequency> <File system check sequence at launch>
```

- **(Recommended)** Take automatic mounting using the soft link of an elastic cloud disk as an example. Add the following to the previous example:

```bash
/dev/disk/by-id/virtio-disk-drkhklpe /data ext4 defaults 0 0
```

- Take automatic mounting using the UUID of the disk partition as an example. Add the following to the previous example:

```bash
UUID=d489ca1c-5057-4536-81cb-ceb2847f9954 /data ext4 defaults 0 0
```

- Take automatic mounting using the device name as an example. Add the following to the previous example:

```bash
/dev/vdb /data ext4 defaults 0 0
```

2. Press **Esc**, enter `:wq`, and press **Enter**.

   Save the configuration and exit the editor.

3. Execute the following command to check whether the `/etc/fstab` file has been written successfully.

```bash
mount -a
```

If the command runs successfully, the file has been written. The newly created file system will automatically mount when the operating system is launched.

### Creating a file system on a partition

This example uses the parted partition tool in the CentOS 7.5 operating system to configure data disk `/dev/vdc` as the primary partition. GPT is used as the default partition format, EXT4 format as the file system, `/data/newpart2` as the mount point, and automatic mounting at startup is configured. The formatting operation varies by operating system. Below is for reference only.

1. **Log in to the Linux Cloud Virtual Machine.**
2. Execute the following command as the root user to view the disk name.

   ```bash
   lsblk
   ```

   If information similar to what is shown below is returned, the current CVM has two disks, where “/dev/vda” is the system disk and “/dev/vdc” is the newly added data disk.

3. Execute the following command to enter the parted partition tool, and execute the partition operation on the newly added data disk.
parted < Newly added data disk>

Take the newly mounted data disk /dev/vdc as an example:

parted /dev/vdc

The returned information is similar to what is shown below:

4. Enter `p` and press Enter to view the current disk partition format.
   The returned information is similar to what is shown below:

5. Execute the following command to configure the disk partition format.

   mklabel <Disk partition format>

   If the disk capacity is larger than or equal to 2TB, only GPT partition format can be used:

   mklabel gpt

6. Enter `p` and press Enter to check whether the disk partition format has been configured successfully.
   The returned information is similar to what is shown below:

   Partition Table: gpt indicates that the disk partition format is GPT.

7. Enter `unit s` and press Enter to configure the measurement unit of the disk as sector.

8. Take creating one partition for the entire disk as an example, enter `mkpart opt 2048s 100%` and press Enter.
   2048s indicates the initial disk capacity and 100% indicates the final disk capacity. This is for reference only. You can choose the number of disk partitions and their capacities based on business needs.

9. Enter `p` and press Enter to view information about the newly created partition.
   The returned information is similar to what is shown below:
This indicates the detailed information of the newly created partition `/dev/vdc1`.

1. Execute the following command to view the disk name.

```bash
lsblk
```

The returned information is similar to what is shown below. You can now see the new partition `/dev/vdc1`.

```
NAME      MAJ:MIN RM  SIZE RO TYPE MOUNTPOINT
sdb        11:8    1   50M  0  disk           
Ldc1        253:1  0  586  0  part /         
Ldc1        253:3  0  37  0  part /         
```

2. Execute the following command to configure the file system of the newly created partition to that required by the system.

```bash
mkfs -t <File system format> /dev/vdc1
```

The partition size supported by different file systems varies. Select an appropriate file system as needed. The following example takes `EXT4` as the file system:

```bash
mkfs -t ext4 /dev/vdc1
```

The returned information is similar to what is shown below:

```
Filesystem label= 
OS type: Linux
Block size=4096 (log=2)
Fragment size=4096 (log=2)
Stride=4 blocks, Stripe width=0 blocks
3282475 blocks (4.08GiB) reserved for the super user
First data block=2048
Maximum filesystem blocks=2933195584
30720 blocks per group, 30720 fragments per group
6144 inodes per group
Superblock backups stored on blocks:
1295, 1353, 2469, 32768, 65536, 98304, 163840, 2199023, 4294967296, 8589934592, 17179869184, 34359738368, 67792516144, 135585032288
Allocating group tables: done
Creating journal (32768 blocks): done
Writing superblocks and filesystem accounting information: done
```

The formatting takes a while. Please pay attention to the system's running status and do not exit.

3. Execute the following command to create a new mount point.

```bash
mkdir <Mount point>
```

Take creating a new mount point `/data/newpart2` as an example:

```bash
mkdir /data/newpart2
```

4. Execute the following command to mount the newly created partition to the newly created mount point.
mount /dev/vdc1 <Mount point>

Take the newly created mount point /data/newpart2 as an example:

```
mount /dev/vdc1 /data/newpart2
```

5. Execute the following command to view the mount result.

```
df -TH
```

The returned information is similar to what is shown below:

```
/dev/vdc1  ext4  536 1.6G  496  42 /
/dev/vdc1  ext4  536 1.6G  496  42 /
/dev/vdc1  ext4  536 1.6G  496  42 /
```

This indicates that the newly created partition /dev/vdc1 has been mounted to /data/newpart2.

If you do not need to configure automatic disk mounting at startup, skip the following steps.

6. Confirm the mount method and obtain the corresponding information.

   Based on business needs, you can use an elastic cloud disk’s soft link, file system’s UUID (universally unique identifier), or device name to automatically mount a disk. The descriptions and information acquisition methods are as follows:

<table>
<thead>
<tr>
<th>Mount method</th>
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</tr>
</thead>
</table>
| Use the soft link of the elastic cloud disk (recommended) | Pros: The soft link of an elastic cloud disk is fixed and unique. It does not change with operations such as mounting, unmounting, and formatting partitions. Cons: Only an elastic cloud disk can use the soft link, which operates transparently for the partition formatting operation. | Execute the following command to view the soft link of the elastic cloud disk: 
```
ls -l /dev/disk/by-id
```

| Use the UUID of the file system | Automatic mounting configuration may fail due to changes in | Execute the following command to view the UUID of the file system: 
```
blkid /dev/vdc1
```
### Related Operations

Use device name

<table>
<thead>
<tr>
<th>Automatic mounting configuration may fail due to changes in device name. For example, if an elastic cloud disk on the CVM is unmounted and then remounted, the device name may change when the operating system recognizes the file system again.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Execute the following command to view the device name.</td>
</tr>
<tr>
<td><code>fdisk -l</code></td>
</tr>
</tbody>
</table>

7. Run the following command to back up the `/etc/fstab` file to the `/home` directory, for example:

   ```bash
cp -r /etc/fstab /home
   ```

8. Execute the following command to use VI editor to open the `/etc/fstab` file.

   ```bash
   vi /etc/fstab
   ```

9. Press I to enter the edit mode.

10. Move the cursor to the end of the file, press Enter, and add the following content.

    ```bash
    (Recommended) Take automatic mounting using the soft link of an elastic cloud disk as an example. Add the following to the previous example:
    
    ```bash
    /dev/disk/by-id/virtio-disk-bm42ztm-part1 /data/newpart2 ext4 defaults 0 2
    ```

    - Take automatic mounting using the UUID of the disk partition as an example. Add the following to the previous example:

      ```bash
      UUID=fc3f42cc-2093-40c7-b4fd-c616ba6165f4 /data/newpart2 ext4 defaults 0 2
      ```

    - Take automatic mounting using the device name as an example. Add the following to the previous example:

      ```bash
      /dev/vdc1 /data/newpart2 ext4 defaults 0 2
      ```

1. Press Esc, enter :wq, and press Enter.

   Save the configuration and exit the editor.

2. Execute the following command to check whether the `/etc/fstab` file has been written successfully.

   ```bash
   mount -a
   ```

   If the command runs successfully, the file has been written. The newly created file system will automatically mount when the operating system is launched.
Initializing cloud disks (smaller than 2TB).

Expanding Cloud Disk Capacity
Cloud Disk Expansion Scenarios

Expanding the capacity of cloud system disks
For data security, CVM cloud disks cannot be expanded directly in the console. You must reinstall the system to expand the capacity of the system disks.

When reinstalling the system to adjust the system disk capacity, you can only maintain or increase the capacity, not reduce it.

**Expanding the capacity of cloud data disks**

Cloud disks that serve as data disks can be expanded directly in the console or via an API. Note that you can only maintain or increase the capacity, not reduce it.

Based on the mounting status of CBS data disks, you can expand their capacity by different means.

- If the current CBS data disk can be unmounted, you can expand its capacity in CBS console or via the ResizeDisk API.
- If the current CBS data disk cannot be unmounted, you can expand its capacity in CVM instance console or via the ResizeDisk API.

If the maximum capacity of the cloud disk cannot meet your business needs, you can try building up RAID groups or building up LVM logic volumes.

Once the data disk capacity is expanded, you must perform the following operations for the instance to recognize and use the data disk:

<table>
<thead>
<tr>
<th>Before Expansion</th>
<th>After Expansion</th>
<th>Subsequent Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>No file system is created.</td>
<td>Disk capacity is less than 2 TB.</td>
<td>Initialize cloud disks (less than 2 TB)</td>
</tr>
<tr>
<td></td>
<td>Disk capacity is greater than or equal to 2 TB.</td>
<td>Initialize cloud disks (greater than or equal to 2 TB)</td>
</tr>
</tbody>
</table>
| File system has already been created. | Disk capacity is less than 2 TB. | • The expanded disk is a Windows CVM cloud disk: Expand partitions and file systems (Windows).  
• The expanded disk is a Linux CVM cloud disk: Expand partitions and file systems (Linux). |
| | Disk capacity is greater than or equal to 2 TB. | • GPT partition format: Expand partitions and file systems (Windows) or Expand partitions and file systems (Linux)  
• MBR partition format: Not supported.  
MBR partition format supports a maximum disk capacity of 2TB. If your disk partition is in MBR format and its capacity needs to be expanded beyond 2TB, we recommend you create and mount a new data disk, and use GPT partition format to copy the data to the new disk. |
Expanding Cloud Disk Capacity

Overview

A cloud disk is an expandable storage device on cloud. After a cloud disk is created, you can expand its capacity at any time to increase its storage capacity without losing any data in it. After a cloud disk is expanded, you need to either assign its expanded capacity to an existing partition, or format it into an independent new partition. For more information, see Extending Partitions and File Systems (Windows) or Extending Partitions and File Systems (Linux).

⚠️ Note:

MBR partition supports disk with a maximum capacity of 2 TB. When you partition disk with a capacity greater than 2 TB, we recommend that you create and mount a new data disk and use the GPT partition format to copy data.

Expanding Data Disks

Expanding data disks via the CBS console

1. Log in to the CBS console.
2. Locate the cloud disk to be expanded, and select More > Expand in the Operation column.
3. Select a new capacity. It must be greater than or equal to the current capacity.
4. Complete the payment.
5. Assign its expanded capacity to an existing partition, or format it into an independent new partition. Depending on the operating system of the CVM, see Extending Partitions and File Systems (Windows) or Extending Partitions and File Systems (Linux).

Expanding data disk via the CVM Console

1. Log in to the CVM console.
2. Locate the CVM on which you want to expand the data disk, and select More -> Resource Adjustment -> Expand Data Disk in the Operation column.
3. Select a new capacity. It must be greater than or equal to the current capacity.
4. Complete the payment.
5. Assign its expanded capacity to an existing partition, or format it into an independent new partition. Depending on the operating system of the CVM, see Extending Partitions and File Systems (Windows) or Extending Partitions and File Systems (Linux).

Expanding data disk via API

You can use the ResizeCbsStorage API to expand the specified cloud disks. For more information, see ResizeDisk.

Expanding System Disks

If a system disk is a cloud disk, its capacity can be expanded. However, you have to reinstall the operating system of the CVM to implement the expansion.
Extending Partitions and File Systems (Windows)

Introduction

After expanding a cloud disk, you need to either assign its expanded capacity to an existing partition, or format it into an independent new partition.

- If you expand a cloud disk that is mounted to a running CVM, you need to Rescan Disk to recognize the disk capacity after expansion.
- If you expand a cloud disk that is unmounted or mounted to an inactive CVM, the disk capacity after expansion will be automatically recognized.

Prerequisites

- You have expanded the cloud disk capacity.
- You have mounted the cloud disk to a Windows CVM and created a file system.
- You have logged in to the Windows CVM on which you want to extend partitions and the file system.

This document describes how to expand a disk mounted to a CVM on Windows Server 2012 R2. The expansion may slightly vary with operating systems, so this document is for reference only.

Directions

- If you expand a cloud disk that is mounted to a running CVM, you must rescan disk to recognize the expanded cloud disk capacity before extending volumes.
- If you expand a cloud disk that is unmounted or mounted to an inactive CVM, you can proceed directly to extending the volume.

Rescan the disk

1. Right click and select Computer Management.
2. In the left sidebar of the Computer Management window, select Storage -> Disk Management.
3. Right click Disk Management, and select Rescan Disks, as shown below:
4. After the scan is complete, check whether the data disk has the size after the expansion. (In this example, the scan shows that the cloud disk is expanded from 10GB to 50GB).

Extend volumes

1. Right click any white area of the disk space. Select Extend Volume.
2. Follow the Extend Volume Wizard to extend the volume.
   The new data disk capacity will be added to the original volume.

Related Actions

Extending Linux file systems
Extending Partitions and File Systems (Linux)

Introduction

Cloud disks are expandable storage devices on the cloud. After creating a cloud disk, you can expand its capacity at any time to increase its storage space without losing any original data. After expanding a cloud disk, you need to either assign its expanded capacity to an existing partition, or format it into an independent new partition.

Prerequisites

- You have expanded the cloud disk capacity.
- You have mounted the cloud disk to a Linux CVM and created a file system.
- You have logged in to the Linux CVM on which you want to expand partitions and the file system.

Directions

Confirming the expansion method

1. Run the following command as the root user to view the partition format of the cloud disk.

   ```
   fdisk -l
   ```

   - If the result indicates that the device has no partition (for example, it only shows /dev/vdb), see extending the file system.
   - If the result similar to the following two figures (which may vary according to the operating system) is returned, GPT partition format is used.

   ![GPT partition format example](image1.png)

   ![MBR partition format example](image2.png)

   - If the result similar to the following two figures (which may vary according to the operating system) is returned, MBR partition format is used.

   ![MBR partition format example](image3.png)

   **Note:**
   
   The maximum disk capacity supported by MBR partition format is 2 TB. If your disk partition is in MBR format, and you need to expand its capacity to more than 2 TB, we recommend that you create and mount a new data disk, and copy the data to the new disk using GPT partition format. For Linux operating system, if the disk partition format is GPT, the fdisk partition tool can no longer be used, and parted tool must be used.
2. Follow Step 1 to view the cloud disk partition format, and select the corresponding operations guide.

<table>
<thead>
<tr>
<th>Partition format</th>
<th>Operations guide</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>-</td>
<td>Extend the file system</td>
<td>Applicable to scenarios where a file system is created directly on a bare device and no partition is created.</td>
</tr>
<tr>
<td>GPT</td>
<td>Assign the expanded capacity to an existing partition (GPT)</td>
<td>Also applicable to scenarios of direct formatting when no partition is created.</td>
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<tr>
<td></td>
<td>Format the expanded capacity into an independent new partition (GPT)</td>
<td>The original partition can be retained without changes.</td>
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<tr>
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<td>Assign the expanded capacity to an existing partition (MBR)</td>
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</tr>
<tr>
<td></td>
<td>Format the expanded capacity into an independent new partition (MBR)</td>
<td>The original partition can be retained without changes.</td>
</tr>
</tbody>
</table>

**Extending the file system**

1. Use different commands to extend the file system, depending on the file system type:
   - For an EXT file system, run the `resize2fs` command to extend the file system.
   - For an XFS file system, run the `xfs_growfs` command to extend the file system.

   Taking `/dev/vdb` as an example, run the following command to extend an EXT file system:

   ```bash
   resize2fs /dev/vdb
   ```

   Taking `/dev/vdb` as an example, run the following command to extend an XFS file system:

   ```bash
   xfs_growfs /dev/vdb
   ```

2. Run the following command to view the new partition:

   ```bash
   df -h
   ```

**Assigning the expanded capacity to an existing partition (GPT)**

1. Run the following command as the root user to confirm changes in cloud disk capacity:

   ```bash
   parted /Disk path print
   ```

   Taking the disk path `/dev/vdb` as an example, run the following command:
parted /dev/vdb print

If a message as shown in the following figure appears in the process, enter Fix.

```
Error: The backup GPT table is not at the end of the disk, as it should be. This might mean that another operating system believes the disk is smaller. Fix, by moving the backup to the end (and removing the old backup)?
Fix/Ignore/Cancel? Fix
Warning: Not all of the space available to /dev/vdb appears to be used, you can fix the GPT to use all of the space (an extra 188743696 blocks) or continue with the current setting?
Fix/Ignore? Fix
```

As shown in the following figure, the cloud disk capacity is 107 GB after expansion and the existing partition capacity is 10.7 GB.

2. Run the following command to check whether the cloud disk has partitions mounted:

```
mount | grep '<Disk path>'
```

Taking the disk path /dev/vdb as an example, run the following command:

```
mount | grep '/dev/vdb'
```

As shown in the following figure, the cloud disk has one partition (vdb1) mounted to /data.

3. Run the following command to unmount the data disk:

```
umount <mount point>
```

Taking the mount point /data mount point as an example, run the following command:

```
umount /data
```

**Note:**
Unmount the file systems from all partitions on the cloud disk, and execute the operations in Step 4 again. You can run the following command again to confirm that the unmounting is successful.

```
mount | grep '/dev/vdb'
```
The file systems are unmounted from all partitions on the cloud disk, as shown in the following figure.

```
[root@VM_164_30_centos ~]# mount | grep '/dev/vdb'
[root@VM_164_30_centos ~]#
```

4. Run the following command to access the parted tool.

```bash
parted '<Disk path>'
```

Taking the disk path `/dev/vdb` as an example, run the following command:

```bash
parted '/dev/vdb'
```

5. Run the following command to change the unit from the default “GB” to “sector” for display and operation:

```bash
unit s
```

6. Run the following command to view partitions and record their `Start` values:

```bash
print
```

Take the `Start` value `2048s` as an example:

```
(parted) unit s
(parted) print
Model: Virtio Block Device (virtblk)
Disk /dev/vdb: 209715200s
Sector size (logical/physical): 512B/512B
Partition Table: gpt

Number  Start  End    Size   File system  Name   Flags
1       2048s  20969471s 20967424s  ext3    primary
```

7. Run the following command to delete the existing partition:

```bash
rm <Partition Number>
```

For example, run the following command to delete the partition “1” from the CVM:

```bash
rm 1
```
The following figure shows the command output.

8. Run the following command to create a new primary partition:

```bash
mkpart primary <Start sector of the original partition> 100%
```

The 100% in the command indicates this partition goes to the end of the disk.
Assume that the primary partition starts from sector 2048 (it must be the same as that of the previously deleted partition, that is, the Start value must be 2048s), run the following command:

```bash
mkpart primary 2048s 100%
```

If a status as shown in the following figure appears, enter Ignore.

9. Run the following command to check whether the new partition has been created successfully:

```bash
print
```

If the result as shown in the following figure is returned, the new partition has been created successfully.

10. Run the following command to exit the parted tool:

```bash
quit
```

1. Run the following command to check the extended partition:

```bash
e2fsck -f <Partition path>
```

Taking the newly created partition “1” (that is, the partition path is /dev/vdb1) as an example, run the following command:

```bash
e2fsck -f /dev/vdb1
```
The following figure shows the command output.

```
[root@VM_164_30_centos ~]# e2fsck -f /dev/vdb1
 e2fsck 1.41.12 (17-May-2018)
 Pass 1: Checking inodes, blocks, and sizes
 Pass 2: Checking directory structure
 Pass 3: Checking directory connectivity
 Pass 4: Checking reference counts
 Pass 5: Checking group summary information
/dev/vdb1: 11/655360 files (0.0% non-contiguous), 79696/26288928 blocks
```

Extend your file system depending on the type:

- **For an EXT file system:**
  - a. Run the following command to extend the EXT file system in the new partition:
    
    ```
    resize2fs <Partition path>
    
    Taking the partition path /dev/vdb1 as an example, run the following command:
    
    ```
    
    ```
    resize2fs /dev/vdb1
    
    If the result as shown in the following figure is returned, the expansion is successful.
    
    ```
    
    ```
    [root@VM_164_30_centos ~]# resize2fs /dev/vdb1
    resize2fs 1.41.12 (17-May-2018)
    Resizing the filesystem on /dev/vdb1 to 26213888 (4k) blocks.
    The filesystem on /dev/vdb1 is now 26213888 blocks long.
    
    b. Run the following command to manually mount the new partition:
    
    ```
    mount <Partition path> <Mount point>
    
    Taking the partition path /dev/vdb1 and the mount point /data as an example, run the following command:
    
    ```
    
    ```
    mount /dev/vdb1 /data
    ```
    
- **For an XFS file system:**
  - a. Run the following command to manually mount the partition:
    
    ```
    mount <Partition path> <Mount point>
    
    Taking the partition path /dev/vdb1 and the mount point /data as an example, run the following command:
    
    ```
    
    ```
    mount /dev/vdb1 /data
    
  - b. Run the following command to extend the XFS file system in the new partition:
    
    ```
    xfs_growfs <Partition path>
    
    Taking the partition path /dev/vdb1 as an example, run the following command:
    
    ```
    
    ```
    xfs_growfs /dev/vdb1
    ```
    
  - 2. Run the following command to view the new partition:
    
    ```
    df -h
    ```
If the result as shown in the following figure is returned, the mount is successful and you can see the data disk.

![Image of data disk result](image)

**Formatting the expanded capacity into an independent new partition (GPT)**

1. Run the following command as the root user to confirm changes in cloud disk capacity:

   ```bash
   parted <Disk path> print
   ```

   Taking the partition path `/dev/vdb` as an example, run the following command:

   ```bash
   parted /dev/vdb print
   ```

   If a message as shown in the following figure appears in the process, enter `Fix`.

   ![Fix message](image)

   As shown in the following figure, the cloud disk capacity is 107 GB after expansion and the existing partition capacity is 10.7 GB.

   ![Cloud disk capacity](image)

2. Run the following command to check whether the cloud disk has partitions mounted:

   ```bash
   mount | grep '<Disk path>'
   ```

   Taking the disk path `/dev/vdb` as an example, run the following command:

   ```bash
   mount | grep '/dev/vdb'
   ```

   As shown in the following figure, the cloud disk has one partition (vdb1) mounted to `/data`.

   ![Partition mounted](image)

3. Run the following command to unmount the data disk:

   ```bash
   umount <mount point>
   ```

   Taking the mount point `/data` as an example, run the following command:

   ```bash
   umount /data
   ```

   **Note:**
Unmount the file systems from all partitions on the cloud disk, and execute the operations in Step 4 again. You can run the following command again to confirm that the unmounting is successful.

```
mount | grep '/dev/vdb'
```

The file systems are unmounted from all partitions on the cloud disk, as shown in the following figure.

```
[root@VM_164_30_centos ~]# mount | grep '/dev/vdb'
[root@VM_164_30_centos ~]#
```

4. Run the following command to access the parted partition tool:

```
parted '<Disk path>'
```

Taking the disk path `/dev/vdb` as an example, run the following command:

```
parted '/dev/vdb'
```

5. Run the following command to view partitions and record their End values, which will be used as the start offset of the next partition:

```
print
```

6. Run the following command to create a new primary partition. This partition starts from the end of the existing partition, and covers all the newly added space on the disk.

```
mkpart primary start end
```

Taking the End value “10.7 GB” as an example, run the following command:

```
mkpart primary 10.7G 100%
```

7. Run the following command to check whether the new partition has been created successfully:

```
print
```

8. Run the following command to exit the parted tool:

```
quit
```

9. Run the following command to format the newly created partition:

```
mkfs.<fstype> <Partition path>
```

Select a file system format such as EXT2 or EXT3 as needed.
Taking the EXT3 file system as an example, run the following command:

```
mkfs.ext3 /dev/vdb2
```
Assigning the expanded capacity to an existing partition (MBR)

You can use the fdisk/e2fsck/resize2fs automatic expansion tools to add the newly expanded disk space to the existing file system on a Linux CVM. For a successful expansion, the following four requirements must be met:

- The file system is EXT2, EXT3, EXT4, or XFS.
- The current file system does not have any error.
- The disk size after expansion does not exceed 2 TB.
- The current tools only support Python version 2, not Python version 3.

1. Run the following command as the root user to unmount the partition:

   ```bash
   umount <Mount point>
   ```

   Taking the mount point `/data` as an example, run the following command:

   ```bash
   umount /data
   ```

2. Run the following command to download a tool:

   ```bash
   ```

3. Run the following command to use the expansion tool for expansion:

   ```bash
   python /tmp/devresize.py <Disk path>
   ```

   Taking the disk path `/dev/vdb` and the file system `vdb1` as an example, run the following command:

   ```bash
   python /tmp/devresize.py /dev/vdb
   ```

   If "The filesystem on /dev/vdb1 is now XXXX blocks long." is returned, the expansion is successful. Execute Step 4.

   If "[ERROR] - e2fsck failed!!" is returned, execute the following steps:
   a. Run the following command to fix the partition where the file system resides:

      ```bash
      fsck -a <Partition path>
      ```

      Taking the disk path `/dev/vdb` and the file system `vdb1` as an example, run the following command:

      ```bash
      fsck -a /dev/vdb1
      ```

   b. Run the following command again after the fix to use the expansion tool for expansion:

      ```bash
      python /tmp/devresize.py /dev/vdb
      ```

4. Run the following command to manually mount the extended partition:

   ```bash
   mount <Partition path> <Mount point>
   ```

   Take the mount point `/data` as an example.
If there is a partition before expansion and the partition path is `/dev/vdb1`, run the following command:

```
mount /dev/vdb1 /data
```

If there is no partition before expansion, run the following command:

```
mount /dev/vdb /data
```

5. Run the following command to view the partition capacity after expansion:

```
df -h
```

The result similar to what is shown below is returned, the mount is successful, and you can see the data disk.

![Command output](image)

6. Run the following command to view the data of the original partition after expansion and check whether the new storage space has been added to the file system.

```
ll /data
```

**Formatting the expanded capacity into an independent new partition (MBR)**

1. Run the following command as the root user to view the partitions of the mounted data disk:

```
df -h
```

![Command output](image)

2. Run the following command to view the data disk after expansion without partitions:

```
fdisk -l
```
3. Run the following command to unmount all mounted partitions:

```
umount <mount point>
```

Taking the mount point `/data` as an example, run the following command:

```
umount /data
```

**Note:**

Unmount the file systems from all partitions on the cloud disk, and execute the operations in Step 4 again. You can run the following command again to confirm that unmounting is successful.

```
mount | grep '<Disk path>'
```

If it returns null, all file systems have been unmounted from partitions on the cloud disk.

4. Run the following command to create a partition.

```
fdisk <Disk path>
```

Taking the disk path `/dev/xvdc` as an example, run the following command:

```
fdisk /dev/xvdc
```

When prompted, sequentially enter `p` (check existing partitions), `n` (create a partition), `p` (create a primary partition), `2` (create a second primary partition), press **Enter** twice (keep default configurations), enter `w` (save the partition table), and start the partition, as shown in the
5. Run the following command to view the new partition:

```bash
fdisk -l
```

As shown in the following figure, the new partition “xvdc2” has been created.

6. Run the following command to format the new partition and create a file system:

```bash
mkfs.<fstype> <Partition path>
```

Select a file system format such as EXT2 or EXT3 as needed.

Taking the EXT3 file system as an example, run the following command:
7. Run the following command to create a mount point:

   mkdir <New mount point>

   This example taking /data1 as the new mount point, run the following command:

   mkdir /data1

8. Run the following command to manually mount the new partition:

   mount <New partition path> <New mount point>

   This example taking /dev/xvdc2 as the new partition path and /data1 as the new mount point, run the following command:

   mount /dev/xvdc2 /data1

9. Run the following command to view the new partition:

   df -h

   If the result as shown in the following figure is returned, the mount is successful, and you can see the data disk.

   ![Image of df -h output]

**Note:**
To allow the CVM to automatically mount a data disk at restart or startup, perform Step 10 and Step 11 to add the new partition information to /etc/fstab.

10. Run the following command to add information:

    ```bash
    echo '/dev/xvdc2 /data1 ext3 defaults 0 0' >> /etc/fstab
    ```

11. Run the following command to view information:

    ```bash
    cat /etc/fstab
    ```
If the result as shown in the following figure is returned, the partition information is successfully added.

![Partition Information](image)

Related Operations

- Extending partitions and file systems (Windows)

FAQs

If you encounter any problem when using a cloud disk, refer to the following documents for troubleshooting based on your actual situation.

- Usage FAQs
- Features FAQs
Unmounting Cloud Disks

Scenario

When you need to mount an elastic cloud disk that is a data disk on another CVM, you can unmount this elastic cloud disk from a CVM, and then mount it to other CVMs. Unmounting an elastic cloud disk does not erase data on this disk. Currently, unmounting of elastic cloud disks that are data disk is supported. You cannot unmount system disks or non-elastic cloud disks. To unmount a cloud disk, you must execute `umount` (Linux) or offline (Windows) operations. Otherwise, the elastic cloud disk may not be recognized by the CVM next time it is mounted.

Prerequisites

Before unmounting the data disk, make sure you understand the following prerequisites:

- In Windows operating systems:
  - To prevent data loss, we recommend that you suspend read and write operations on all file systems of the disk. Otherwise, data that has not been read or written will be lost.
  - When unmounting an elastic cloud disk, you must first set the disk to offline state. Otherwise, you may not be able to remount the elastic cloud disk unless you restart the CVM. This is shown in the following figure:

- In Linux operating systems:
  - You must first log in to the instance, and perform a `umount` operation on the elastic cloud disk you want to unmount. If you directly force unmounting without executing the `umount` operation, the problem shown in the following figure may occur during shutdown and bootup:

If you create a LVM logical volume on the CVM, unmounting the disk directly from the console will cause part of the device data to remain in the CVM memory. If a CVM application attempts to traverse or access this device, a system error will occur. As a result, you must first execute the following operations (this example assumes that logical volume `/dev/test/lv1` is created based on `/dev/vdb1`, and is mounted under the `/data` directory):

a. Execute the `umount /data` command to unmount the disk from the corresponding mounting point in the CVM.
b. Execute the `lvremove /dev/test/lv1` command to remove the LV. If there are multiple LVs, remove all LVs one by one.

c. Execute the `vgremove test` command to remove the VG.

d. Execute the `pvremove /dev/vdb1` command to remove the PV.

e. Modify the `/etc/fstab` file to avoid the continuous mounting of the corresponding LV on next bootup.

Directions

**Using the console to unmount cloud disks**

1. Log in to the CBS Console.
2. You can use the following method to unmount a cloud disk:
   a. Single unmount: In the row of the target cloud disk with the status Mounted, click More > Unmount.
   b. Batch unmount: Select multiple target cloud disks with the status Mounted and click Unmount at the top of the list.
3. In the Unmount Cloud Disk prompt box that pops up, confirm the warning and click Confirm to unmount.

**Using the API to unmount cloud disks**

You can use the `DetachDisks` API to unmount a cloud disk. For more information, see Unmounting cloud disks.
Terminating cloud disks

Introduction

When a cloud disk is no longer in use and important data has been backed up, you can release the virtual resources by terminating the cloud disk. You will not be billed for the cloud disk after termination. When the cloud disk is terminated, all data on the cloud disk will be deleted and cannot be restored. Please note that cloud disks that have been terminated cannot be recovered.

The lifecycle of a non-elastic cloud disk follows that of the CVM, and it can only be terminated when the CVM is terminated. For more information, see Terminate Instances.

The lifecycle of an elastic cloud disk is independent of that of the CVM. Therefore, it can be terminated independently of the CVM. This document describes how to terminate elastic cloud disks.

Elastic cloud disks can be terminated with the following methods:

- Manual termination
  - Manual termination is supported for pay-as-you-go cloud disks, and takes effect immediately.

- Automatic termination
  - A pay-as-you-go cloud disk will be automatically terminated if your balance becomes negative for more than 24 hours. You can continue using it if you top up your account within the specified time.

Prerequisites

- The cloud disk is in the To Be Mounted status. Unmount cloud disks that are mounted.
- All important data are already backed up.

Manually terminating pay-as-you-go cloud disks

1. Log in to the CBS Console.
2. You can use the following methods to terminate a cloud disk:
   a. Single termination: locate the target cloud disk that is in a To Be Mounted status, click More -> Terminate/Return.
   b. Batch termination: select multiple target cloud disks that are in a To Be Mounted status and click Terminate/Return at the top of the list.

3. In the Terminate Cloud Disk pop-up box, Click Submit to complete the termination.
   - The target cloud disk will no longer be billed. It is permanently terminated and cannot be recovered.
Adjusting Cloud Disk Types

Scenario

Tencent Cloud CBS supports the adjustment of storage hardware types when business is in operating state. You can upgrade the type without business interruption to satisfy your business requirements for higher performance. The cloud disk type takes effect immediately after fee payment. For information on fees for adjusting cloud disk types, see Fees for adjusting cloud disk types. Currently, only upgrading is supported for adjusting cloud disk types. Downgrading is not supported. Details are as follows:

- A HDD cloud disk can be adjusted to premium cloud storage or SSD cloud disk.
- A premium cloud storage can only be adjusted to SSD cloud disk.
- A SSD cloud disk cannot be upgraded currently.

Prerequisites

- **CVM Status**
  For a cloud disk that has been mounted to a CVM, adjustment of cloud disk types is only supported when the CVM is in Operating or Shutdown status.
- **Cloud disk status**
  - Adjustment of cloud disk types is currently not supported for system disks and non-elastic data disks.
  - The adjustment of cloud disk types is not supported in Guangzhou Zone 1.
  - The current availability zone has available cloud disk upgrade types. Adjustment of the cloud disk type is only supported when the current disk size is in the range supported by the cloud disk.
  - Adjusting the cloud disk type does not change the size of the disk. After adjusting the disk type, you can refer to Expanding cloud disks to adjust the disk size.
  - Adjusting the cloud disk type does not change the lifecycle, disk ID, disk device name, or mounting point of the cloud disk.

Notes

- Adjusting the cloud disk type uses the data copying method to copy data of the source cloud disk to the target cloud disk. This operation is limited by the data size and data transfer speed, and may take a while.
- Currently, downgrading of the cloud disk type is not supported. The details are as follows:
  - A HDD cloud disk can be adjusted to premium cloud storage or SSD cloud disk.
  - A premium cloud storage can only be adjusted to SSD cloud disk.
  - A SSD cloud disk cannot be upgraded currently.
- **We recommend that you start up and log into the CVM after you perform the adjustment operation to confirm there is no data loss.**

Directions

1. Log in to the CBS Console, and go to the cloud disk list.
2. In the row of the target elastic cloud disk, select More->Adjust the Cloud Disk Type.
3. In the Adjust Cloud Disk Type dialog box, select the target cloud disk you want to adjust, select I agree, and click Convert.
4. Make necessary payment if applicable, and wait for the operation to complete.
Managing Snapshots
Creating Snapshots

Last updated: 2020-05-07 16:20:58

Operation Scenario

With Cloud Block Storage (CBS), you can create snapshots and save cloud disk data at a specific point of time. Tencent Cloud creates snapshots in an incremental manner, which means it only creates data that has changed since the last snapshot. If the size of the changed data is small, snapshot creation is quick. Because snapshots are incrementally created, deleting snapshots does not affect the use of any snapshot data. Therefore, you can restore your cloud disks by using any remaining snapshots.

You can create a snapshot of a cloud disk in any state, but the snapshot will only save the data that is already written to the cloud disk at the current moment. When any app or process is writing data, the data might not yet have been saved to the snapshot that is being created. If this is the case, you can choose to suspend all writes and create the snapshot as soon as possible, or unmount the cloud disk and mount it later to ensure the integrity of snapshot data.

Prerequisites

- You have created a cloud disk.
- The upper limits for the number and total size of snapshots in the current region have not been reached. For more information, see Snapshot Use Limits.

Notes

A snapshot only contains data that is already written to the disk (but not data that is in the memory and not yet written to the disk) at the moment the snapshot is created. We strongly recommend that you shut down the instance or ensure that the memory data is already written to the cloud disk and then suspend all writes to the cloud disk before creating the snapshot. For this purpose, you need to do the following.

Database level

For database services, we recommend that you lock all tables in databases as read-only to avoid a situation where new data is written to the cloud disk and cannot be captured by the snapshot that is being created. By using MySQL as an example, the procedure is as follows:

1. Run the command `FLUSH TABLES WITH READ LOCK` to close all opened tables and use the global read lock to lock all tables in every database, as shown below:

   ```
   mysql> flush_tables_with_read_lock;
   Query OK, 0 rows affected (0.01 sec)
   ```

2. Create a snapshot for the cloud disk.
3. Run `UNLOCK TABLES` to unlock the tables, as shown below:

   ```
   mysql> unlock_tables;
   Query OK, 0 rows affected (0.00 sec)
   ```

System level

For better system performance, data is stored in the memory buffer before it is written to the cloud disk, when appropriate. Therefore, when you create the snapshot, the data stored in the memory buffer and not already written to the cloud disk will not be written to or recovered from the snapshot. As a result, data inconsistency occurs.

To resolve this issue, run the `sync` command to forcibly write the data in the file system memory buffer immediately to the cloud disk and then prevent new data from being written to the cloud disk. If no error message is returned after the command is executed, the data in the memory buffer
has been successfully written to the cloud disk, as shown below:

```
ubuntu@VM-39-151-ubuntu:~$ sync
```

 PROCEDURE

**Creating a snapshot in the console**

1. Log in to the CBS console.
2. Click Create Snapshot for the target cloud disk.
3. In the Create Snapshot dialog box that appears, enter a snapshot name and click Submit.

**Creating a snapshot through the API**

You can use the CreateSnapshot API to create a snapshot. For more information, see CreateSnapshot.
Rolling Back Snapshots

Rolling back snapshot data to a cloud disk can recover the disk data to the state when the snapshot is created. This method is very useful in case of data errors or data losses caused by certain changes.

Snapshots can only be rolled back to the cloud disk in which they are created. If you need to get snapshot data from other cloud disks, please use the service of Creating a Cloud Disk from a Snapshot.

Note:
- When you roll back a snapshot to an elastic cloud disk, the disk must be unmounted.
- When you roll back a snapshot to a non-elastic cloud disk purchased with a CVM, the CVM instance must be shut down.

Rolling Back a Snapshot in Console

1) Open CVM Console.
2) Click “Snapshot” in the navigation pane.
3) Select the snapshot that needs to be rolled back to the disk in the snapshot list, and click “Rollback”.

Overview

Making snapshot is an important method for data sharing and migration. Cloud disks created using a snapshot own all data in the snapshot. You can use a snapshot to create a cloud disk whose capacity is greater than or equal to that of the snapshot.

- When you use a snapshot to create a data disk with the same capacity as that of the snapshot, the data disk does not need to be initialized. To read and write into it, you only need to mount it and choose Server Management -> Storage -> Disk Management to associate it with a CVM.
- When you use a snapshot to create a data disk whose capacity is greater than that of the snapshot, the system only expand the storage block and does not extend the file system or convert the partition format. After you mount the new data disk, it can only use the file system and data of the source snapshot and cannot use the new disk space. You need to manually extend the file system and convert the partition format.

For example, if you want to a 3 TB data disk by using a data disk snapshot that uses the MBR partition format and has a capacity of 1 TB, you need to format the data disk in GPT partition style because the maximum disk space supported in MBR partition style is 2 TB. Please note that this operation will delete original data.

This document describes how to use a snapshot to create a cloud disk on the Snapshot List page. When creating a cloud disk, you can configure the Snapshots parameter to specify a snapshot for creating the cloud disk.

Directions

Creating a cloud disk with a snapshot in the console

1. Log in to the Snapshot List page.
2. In the row of the target snapshot, click More and select Create Cloud Disk.
3. In the Purchase Data Disk dialog box, configure the following parameters:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Availability Zone</td>
<td>Required. The availability zone where the created cloud disk resides. It cannot be modified after the cloud disk is created.</td>
</tr>
<tr>
<td>Cloud Disk Type</td>
<td>Required. The values include: Premium Cloud Storage, SSD Cloud Storage</td>
</tr>
<tr>
<td>Capacity</td>
<td>Required. CBS provides the following cloud disk capacity and specifications: Premium Cloud Storage: 50 to 16,000 GB, SSD Cloud Storage: 100 to 16,000 GB. When you create a cloud disk using a snapshot, the disk capacity cannot be smaller than that of the snapshot. If you do not specify this parameter, the disk capacity is equal to that of the snapshot by default.</td>
</tr>
<tr>
<td>Snapshots</td>
<td>Optional. To use a snapshot to create a cloud disk, select <strong>Create a Cloud Disk with a Snapshot</strong> and select the required snapshot. The disk capacity is the same as that of the snapshot by default. You can adjust the capacity to be greater than that of the snapshot. The disk type is the same as that of the snapshot by default. You can change the cloud disk type.</td>
</tr>
<tr>
<td>Disk Name</td>
<td>Optional. A maximum of 20 characters are supported. It must start with a letter, and can be a combination of letters, digits, and special characters (', &quot;, `, `, <code>-</code>). This parameter can be modified after the cloud disk is created. If you create only one cloud disk, the disk name is the name of the cloud disk you create. If you create multiple cloud disks at one time, the disk name entered will be used as the prefix of the final disk name, in the format of <strong>disk name_number</strong>, for example, &quot;disk name_0&quot; to &quot;disk name_49&quot;.</td>
</tr>
<tr>
<td>Project</td>
<td>Required. When creating a cloud disk, you can configure the project to which the cloud disk belongs. The default value is <strong>DEFAULT PROJECT</strong>.</td>
</tr>
<tr>
<td>Tag</td>
<td>Optional. When creating a cloud disk, you can bind a tag to it. Tags are used to identify cloud resources, helping you easily categorize</td>
</tr>
</tbody>
</table>

Last updated: 2020-08-04 10:55:50
and search for cloud resources. For more information, see Tag.

<table>
<thead>
<tr>
<th>Billing Mode</th>
<th>Required. 4. The value is <strong>Pay as you go</strong>.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scheduled Snapshot</td>
<td>Optional. When creating a cloud disk, you can select <strong>Scheduled Snapshot</strong> to create snapshots for the cloud disk periodically based on the created scheduled snapshot policy. For more information, see Scheduled Snapshot.</td>
</tr>
<tr>
<td>Quantity</td>
<td>Optional. The default value is <strong>1</strong>, which indicates that only one cloud disk is created. Currently, up to 50 cloud disks can be created at one time.</td>
</tr>
<tr>
<td>Period</td>
<td>5. If <strong>Billing Mode</strong> is set to <strong>Pay as you go</strong>, this parameter is not involved.</td>
</tr>
<tr>
<td>Automatic Renewal</td>
<td>6. If <strong>Billing Mode</strong> is set to <strong>Pay as you go</strong>, this parameter is not involved.</td>
</tr>
</tbody>
</table>

7. Click **OK**.
   - If **Billing Mode** is **Pay as you go**, the creation is completed.
     i. After you confirm your configuration, select whether to use a voucher based on actual needs, and then click **OK**.
     ii. Complete the payment.

- You can view the cloud disk(s) you created in the Cloud Block Storage list page. New elastic cloud disks are in the To be mounted state. For more information on how to mount an elastic cloud disk to a CVM in the same availability zone, see Mounting Cloud Disks.

**Using an API to create a cloud disk from snapshot**

You can use the CreateDisks API to create a cloud disk. For more information, see CreateDisks.
Cross-region Snapshot Replicating

Cross-region snapshot replication is now in beta. With this feature, you can easily migrate data and services to other regions, or build a cross-region disaster recovery system for your business.
You can submit an application to use this feature.

Use Limits

- **Apply for Beta**: cross-region snapshot replication is now in beta. You need to submit an application to apply for it.
- **Supported regions**: for more information, see Regions and Availability Zones,

Directions

1. Log in to the [Snapshot List](#) page.
2. Click **Cross-Region Replication** for the target snapshot.
3. Configure the following parameters:
   - **New snapshot name**: (optional) enter the new snapshot name with up to 60 characters.
     By default, a new snapshot name contains the source snapshot ID and region information and is in the following format: *Copied [Source snapshot ID] from [Source snapshot region]*, for example, *Copied snap-oi5spwt2 from ap-shanghai*.
   - **Region**: (required) a target region to which a snapshot is copied
     Please check the snapshot quota and geographical restriction when you select the region.
4. Click **OK** to start the replication. Hover over the information icon to view the status of the source snapshot. The new snapshot is added to the target region.
5. Once the replication is completed, you can view the new snapshot in the snapshot list of the target region.

The source snapshot cannot be deleted during the cross-region replication of this snapshot.

During the process of cross-region replication:
- Status of source snapshot: you can view it by going to the source region’s snapshot list and looking in the status column on the source snapshot’s row.
- Status of target snapshot: you can view it by going to the snapshot list page of the target region.
Deleting Snapshots

Operation Scenarios

When there is no need to use the snapshot again, you can delete the snapshot to release virtual resources.

Descriptions

- When you delete a snapshot, only the data exclusive to the snapshot will be deleted, and the cloud disk for which the snapshot is created will not be affected.
- You can use a snapshot to recover a cloud disk to the data status when the snapshot is created. Deleting a snapshot created earlier for a cloud disk will not affect the continued use of snapshots created later.
- When a snapshot is deleted, it will simultaneously delete all data in the snapshot, and the data cannot be retrieved. Deleted snapshots cannot be restored, so please use with caution.

Directions

Deleting a Snapshot in Console

1. Log in to the Snapshot List page.
2. You can delete snapshots using the following methods:
   a. Single delete: click on Delete in the row of the snapshot to be deleted.
   b. Batch delete: select all of the snapshots you want to delete (make sure the snapshots are not involved in any tasks) and click Delete at the top of the list.
3. Click OK.

Deleting a Snapshot with API

You can use the DeleteSnapshots API to delete a snapshot. For detailed directions, see Delete Snapshots.
Monitoring Cloud Disks

In order to maintain high reliability of data, it is important to provide a good monitoring environment for cloud disks. You can use Cloud Monitor to monitor the cloud disk that has been mounted to an instance. When you need to collect cloud disk statistics, perform Mounting Cloud Disks to CVM Instances. With Cloud Monitor, you can view metric data of a cloud disk, and analyze and set the alarm for the cloud disk. Now, Cloud Monitor provides cloud disks with the following monitoring metrics:

<table>
<thead>
<tr>
<th>Monitoring Item</th>
<th>Monitoring Metric</th>
<th>Meaning in Linux</th>
<th>Meaning in Windows</th>
<th>Unit</th>
<th>Dimension</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disk read traffic</td>
<td>disk_read_traffic</td>
<td>Average data volume read from a disk to a memory per second, take the maximum value among all partitions</td>
<td>Average data volume read from a disk to a memory per second, take the maximum value among all partitions</td>
<td>KB/s</td>
<td>unInstanced</td>
</tr>
<tr>
<td>Disk write traffic</td>
<td>disk_write_traffic</td>
<td>Average data volume written from a memory to a disk per second, take the maximum value among all partitions</td>
<td>Average data volume written from a memory to a disk per second, take the maximum value among all partitions</td>
<td>KB/s</td>
<td>unInstanced</td>
</tr>
<tr>
<td>Disk usage</td>
<td>disk_usage</td>
<td>Percentage of used disk space, displayed by partitions</td>
<td>Percentage of used disk space, displayed by partitions</td>
<td>%</td>
<td>unInstanced</td>
</tr>
<tr>
<td>Disk I/O wait</td>
<td>disk_io_wait</td>
<td>Average waiting time for each I/O operation of a device, take the maximum value among all partitions</td>
<td>Average waiting time for I/O operation of a device, take the maximum value among all partitions</td>
<td>ms</td>
<td>unInstanced</td>
</tr>
</tbody>
</table>

For more information on monitoring metrics, please see Cloud Monitor Product Documentation.

Cloud Monitor collects raw data of a disk from a running CVM instance and displays the data in easy-to-read charts. Statistics can be retained for a month by default so that you can observe the cloud disk situation during the month, and have a better understanding of usage and reading/writing data.

You can get the data via the Cloud Monitor Console or Cloud Monitor API. The console also provides visualized charts of corresponding metrics. For more information, please see Obtaining Monitoring Data of Specific Metrics and Viewing Monitoring Charts.