## **Dedicated Distributed Storage Service**

## **User Guide (Paris Region)**

 Issue
 01

 Date
 2018-07-30





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# Introduction

## **1.1 What Is Dedicated Storage Service?**

Dedicated Storage Service (DSS) provides you with dedicated storage pools which are physically isolated from other pools to ensure high security. With data redundancy and cache acceleration technologies, DSS delivers highly reliable, durable, low-latency, and stable storage resources. By flexibly interconnecting with various compute services, such as Dedicated Cloud (DeC), Elastic Cloud Server (ECS) and Bare Metal Server (BMS), DSS is suitable for different scenarios, including high performance computing (HPC), online analytical processing (OLAP), and mixed loads.

#### Function Characteristics

- Rich specifications
  - High I/O: Suitable for scenarios that require high performance, high read/ write speed, and real-time data storage.
  - Ultra-high I/O: Excellent for read/write-intensive scenarios that require extremely high performance and read/write speed, and low latency.
- Elastic scalability
  - On-demand capacity improves resource utilization.
  - Linear performance increase can be achieved with capacity expansion.
- Security and reliability
  - Distributed storage with three data replicas ensures 99.9999999% durability.
  - System disks and data disks support data encryption with zero application awareness.
- Backup and restoration
  - Backups can be created for a DSS disk, and the backup data can be used to restore the disk data, maximizing data security and correctness and ensuring service security.

#### **Differences Between DSS and EVS**

Service	Overall Introduction	Storage Category	Typical Application Scenarios	Performance
DSS	DSS provides exclusive physical storage resources for users. The storage pools are physically isolated, and data durability reaches 99.9999999%. Multiple types of compute services, including DeC, ECS and BMS, can be interconnected with DSS at the same time. DSS has abundant features to guarantee data security and reliability.	Dedicated storage pools, which means that storage pools are physically isolated and resources are exclusively used.	<ul> <li>Interconnect ion with compute services, such as ECS and BMS, in a dedicated cloud.</li> <li>Interconnect ion with compute services, such as ECS and BMS, in a non- dedicated cloud.</li> <li>Mixed load. DSS supports hybrid deployment of HPC, database, email, OA, and web applications.</li> <li>High- performanc e computing</li> <li>OLAP applications</li> </ul>	<ul> <li>High I/O storage pool: The initial specification is 13.6 TB, which can be expanded to a maximum of 435.2 TB in 13.6 TB increments. The maximum IOPS is 1500 IOPS/TB.</li> <li>Ultra-high I/O storage pool: The initial specification is 7.225 TB, which can be expanded to a maximum of 289 TB in 7.225 TB increments. The maximum IOPS is 8000 IOPS/TB.</li> </ul>

Table 1-1 Differences between DSS and EVS

Service	Overall Introduction	Storage Category	Typical Application Scenarios	Performance
EVS	Elastic Volume Service (EVS) provides scalable block storage that features high reliability, high performance, and rich specifications for servers.	Shared storage pools	<ul> <li>Enterprise office applications</li> <li>Developmen t and testing</li> <li>Enterprise applications, including SAP, Microsoft Exchange, and Microsoft SharePoint</li> <li>Distributed file systems</li> <li>Various databases, including MongoDB, Oracle, SQL Server, MySQL, and PostgreSQL</li> </ul>	EVS disks start at 10 GB and can be expanded as required in 1 GB increments to a maximum of 32 TB.





## 1.2 Region and AZ

#### Concept

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

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

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

Figure 1-2 Regions and AZs



#### Selecting a Region

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

#### Selecting an AZ

When deploying resources, consider your applications' requirements on disaster recovery (DR) and network latency.

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

#### **Regions and Endpoints**

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

## 1.3 Storage Pool Types

DSS provides two types of storage pools, which differ in I/O performance and price. You can select the storage pool type based on your service requirements.

The disk type must be consistent with the storage pool type you selected.

#### **Application Scenarios**

- High I/O storage pool supports only high I/O disks. It can deliver a maximum of 1500 IOPS per TB and a minimum of 6 ms read/write latency. This type of storage pools is designed for mainstream high-performance, high-reliability application scenarios, such as enterprise applications, large-scale development and testing, and web server logs.
- Ultra-high I/O storage pool supports only ultra-high I/O disks. It can deliver a maximum of 8000 IOPS per TB and a minimum of 1 ms read/write latency. This type of storage pools is perfect for read/write-intensive application scenarios. For example, the distributed file systems in the HPC scenarios or NoSQL and relational databases in I/O-intensive scenarios.

#### Performance

Key metrics of the storage pool performance include read/write I/O latency, IOPS, and throughput.

- IOPS: Number of read/write operations performed per second
- Throughput: Amount of data successfully transmitted per second, that is, the amount of data read from and written to the pool
- Read/write I/O latency: Minimum interval between two consecutive read/ write operations

Metric	High I/O	Ultra-high I/O
IOPS	1500 IOPS/TB	8000 IOPS/TB
Read/write I/O latency	6 ms to 10 ms	1 ms to 3 ms

#### Table 1-2 Storage pool performance

## **1.4 Storage Pool Capacity Description**

 Table 1-3 Storage pool capacity description

Туре	Description
Requested Capacity	Specifies the capacity of the storage pool that you apply for.

Туре	Description
Raw Capacity	Specifies the raw capacity of the storage pool that you apply for.
	The requested capacity of a storage pool is no less than 85% of its raw capacity.
Total Available Capacity	Specifies the total available capacity of a storage pool.
Allocated Capacity	Specifies the storage pool capacity that has been allocated.
	Includes the capacity allocated to:
	<ul> <li>Volumes of VMs, bare metal servers, and containers</li> </ul>
	<ul> <li>Advanced services such as SFS Turbo and RDS</li> </ul>
	<ul> <li>Snapshots created during backup creation</li> </ul>
Used Capacity	Specifies the storage pool physical capacity that has been used.
	Includes the capacity already used by:
	<ul> <li>Volumes of VMs, bare metal servers, and containers</li> </ul>
	<ul> <li>Advanced services such as SFS Turbo and RDS</li> </ul>
	<ul> <li>Snapshots created during backup creation</li> </ul>

 Table 1-4 Storage pool capacity calculation example

Parameter	Capacity
Requested Capacity	27.2 ТВ
Raw Capacity	32 T
Total Available Capacity	27.2*1024 G=27852 G
Allocated Capacity	7330 GB
Used Capacity	432 GB

## 1.5 What Are DSS Disks?

DSS disks are essentially dedicated EVS disks, which can be used as scalable block storage for servers. With high reliability, high performance, and rich specifications,

DSS disks can be used for distributed file systems, development and testing environments, data warehouse applications, and HPC scenarios to meet diverse service requirements. Servers that DSS support include Elastic Cloud Servers (ECSs) and Bare Metal Servers (BMSs).

DSS disks are sometimes just referred to as disks in this document.

## 1.6 DSS Three-Copies of Data Mechanism

#### What Is the Three-Copies of Data Mechanism?

The backend storage system of DSS employs the three-copies of data mechanism to guarantee data reliability. In this mechanism, one piece of data is by default divided into multiple 1 MB data blocks. Each data block is saved in three copies, and these copies are stored on different nodes in the system according to the distributed algorithms.

The three copies of data mechanism has the following characteristics:

- The storage system saves the data copies on different disks of different servers, ensuring that services are not interrupted in case of a single physical device failure.
- The storage system guarantees tight consistency between the data copies.

For example, for data block P1 on physical disk A of server A, the storage system backs up its data to P1" on physical disk B of server B and to P1' on physical disk C of server C. Data blocks P1, P1', and P1" are the three copies of the same data block. If physical disk A where P1 resides is faulty, P1' and P1" can continue providing storage services, ensuring service continuity.





#### How Does the Three-Copies of Data Mechanism Keep Data Consistency?

Data consistency includes the following two aspects: When an application writes a piece of data to the system, the three copies of the data in the storage system must be consistent. When any of the three copies is read by the application later, the data on this copy is consistent with the data previously written to it.

The three copies of data mechanism keeps data consistency in the following ways:

- Data is simultaneously written to the three copies of the data.
  - When an application writes data, the storage system writes it to the three copies of the data simultaneously. In addition, the system returns the write

success response to the application only after the data has been written to all of its copies.

• Storage system automatically restores the damaged copy in case of a data read failure.

When an application fails to read data, the system automatically identifies the failure cause. If the data cannot be read from a physical disk sector, the system reads the data from another copy of the data on another node and writes it back to the original disk sector. This mechanism ensures the number of data copies and data consistency among data copies.

#### How Does the Three-Copies of Data Mechanism Rapidly Rebuild Data?

Each physical disk in the storage system stores multiple data blocks, whose copies are scattered on the nodes in the system according to certain distribution rules. When a physical server or disk fault is detected, the storage system automatically rebuilds the data. Since the copies of data blocks are scattered on different nodes, the storage system will start the data rebuild on multiple nodes simultaneously during a data restore, with only a small amount of data on each node. In this way, the system eliminates the potential performance bottlenecks that may occur when a large amount of data needs to be rebuilt on a single node, and therefore minimizes the adverse impacts exerted on upper-layer applications.

**Figure 1-4** shows the data rebuild process.



Figure 1-4 Data rebuild process

**Figure 1-5** shows the data rebuild principle. For example, if physical disks on server F are faulty, the data blocks on these physical disks will be rebuilt on the physical disks of other servers.



#### Figure 1-5 Data rebuild principle

#### What Are the Differences Between Three-Copies of Data and Disk Backup

The three-copies of data mechanism improves the reliability of the data stored on DSS disks. It is used to tackle data loss or inconsistency caused by physical device faults.

Whereas, disk backup is used to prevent data loss or inconsistency caused by misoperation, viruses, or hacker attacks. Therefore, you are advised to create backups to back up the DSS disk data on a timely basis.

## 1.7 Device Types and Usage Instructions

#### What Device Types Are Available?

There are two EVS device types: Virtual Block Device (VBD) and Small Computer System Interface (SCSI).

• VBD is the default EVS disk device type. VBD EVS disks support only basic read/write SCSI commands.

• SCSI EVS disks support transparent SCSI command transmission and allow the server OS to directly access the underlying storage media. Besides basic read/ write SCSI commands, SCSI disks support advanced SCSI commands.

#### Common Application Scenarios and Usage Instructions of SCSI EVS Disks

- SCSI EVS disks: BMSs support only SCSI EVS disks.
- Shared SCSI EVS disks: Shared SCSI EVS disks must be used together with a distributed file system or cluster software. Because most cluster applications, such as Windows MSCS, Veritas VCS, and Veritas CFS, require the usage of SCSI reservations, you are advised to use shared EVS disks with SCSI.

SCSI reservations take effect only when shared SCSI EVS disks are attached to ECSs in the same ECS group. For more information about shared EVS disks, see **Shared Disks and Usage Instructions**.

#### Do I Need to Install a Driver for SCSI EVS Disks?

To use SCSI EVS disks, you need to install a driver for certain server OSs.

BMS

Both the Windows and Linux images for BMSs are pre-installed with the required SDI card driver. Therefore, no driver needs to be installed.

KVM ECS

You are advised to use SCSI EVS disks with KVM ECSs. Linux images and Windows images for KVM ECSs already have the required driver. Therefore, no driver needs to be installed for KVM ECSs.

**NOTE** 

ECS virtualization types are categorized into KVM and Xen. For details, see **Product Introduction** > **ECS Types** in the *Elastic Cloud Server User Guide*.

• Xen ECS

Due to driver limitations, you are advised not to use SCSI EVS disk with Xen ECSs.

However, a few images support SCSI EVS disks on Xen ECSs. For the supported images, see **Table 1-5**.

#### **NOTE**

After confirming that the OS images of Xen ECSs support SCSI EVS disks, determine whether you need to install the driver:

- Public Windows images are preinstalled with the Paravirtual SCSI (PVSCSI) driver. Therefore, no driver needs to be installed.
- Private Windows images are not preinstalled with the PVSCSI driver. You need to download and install it explicitly.

For details, see **(Optional) Optimizing Windows Private Images** in the *Image Management Service User Guide*.

• Linux images are not preinstalled with the PVSCSI driver. You need to obtain the source code of the open-source Linux driver at <a href="https://github.com/UVP-Tools/sap-HANA-Tools">https://github.com/UVP-Tools/sap-HANA-Tools</a>.

Virtualizatio n Type	OS		
Xen	Windows	See the Windows images listed on the <b>Public Images</b> page.	
		Log in to the management console, choose Image Management Service, click the Public Images tab, and select ECS image and Windows from the drop-down lists, respectively.	
	Linux	• SUSE Linux Enterprise Server 11 SP4 64bit (The kernel version is 3.0.101-68-default or 3.0.101-80-default.)	
		• SUSE Linux Enterprise Server 12 64bit (The kernel version is 3.12.51-52.31-default.)	
		<ul> <li>SUSE Linux Enterprise Server 12 SP1 64bit (The kernel version is 3.12.67-60.64.24- default.)</li> </ul>	
		• SUSE Linux Enterprise Server 12 SP2 64bit (The kernel version is 4.4.74-92.35.1-default.)	

 Table 1-5 OSs supporting SCSI EVS disks

## **1.8 Shared Disks and Usage Instructions**

DSS disks can be classified into non-shared disks and shared disks based on whether a disk can be attached to multiple servers. A non-shared disk can only be attached to one server, whereas a shared disk can be attached to multiple servers.

#### What Are Shared Disks?

Shared disks are block storage devices that support concurrent read/write operations and can be attached to multiple servers. Shared disks feature multiple attachments, high concurrency, high performance, and high reliability. A shared disk can be attached to a maximum of 16 servers. Figure 1-6 shows its application scenario.

Currently, shared disks can be used as data disks only and cannot be used as system disks.



#### Figure 1-6 Application scenario of shared disks



#### **Application Scenarios and Precautions for Shared Disks**

Shared disks are usually used for enterprise key applications that require cluster deployment and high availability (HA). These applications demand concurrent access to a disk from multiple servers. Before you attach a shared disk to multiple servers, the disk device type needs to be determined. The device type can be either VBD or SCSI.

Because most cluster applications, such as Windows MSCS, Veritas VCS, and Veritas CFS, require the usage of SCSI reservations, you are advised to use shared disks with SCSI. If a SCSI disk is attached to a Xen ECS for use, you must install the driver. For details, see **Device Types and Usage Instructions**.

You can create shared VBD disks or shared SCSI disks.

- Shared VBD disks: The device type of a newly created shared disk is VBD by default. Such disks can be used as virtual block storage devices, but do not support SCSI reservations. If SCSI reservations are required for your applications, create shared SCSI disks.
- Shared SCSI disks: These disks support SCSI reservations.

#### NOTICE

- To improve data security, you are advised to use SCSI reservations together with the anti-affinity policy of an ECS group. That said, ensure that the shared SCSI disk is only attached to ECSs in the same anti-affinity ECS group.
- If an ECS does not belong to any anti-affinity ECS group, you are advised not to attach shared SCSI disks to this ECS. Otherwise, SCSI reservations may not work properly, which may put your data at risk.

Concepts of the anti-affinity ECS group and SCSI reservations:

 The anti-affinity policy of an ECS group allows ECSs to be created on different physical servers to improve service reliability.

For details about ECS groups, see **Managing ECS Groups** in the *Elastic Cloud Server User Guide*.

- The SCSI reservation mechanism uses a SCSI reservation command to perform SCSI reservation operations. If an ECS sends such a command to a disk, the disk is displayed as locked to other ECSs, preventing the data damage that may be caused by simultaneous read/write operations to the disk from multiple ECSs.
- ECS groups and SCSI reservations have the following relationship: A SCSI reservation on a single disk cannot differentiate multiple ECSs on the same physical host. For that reason, if multiple ECSs that use the same shared disk are running on the same physical host, SCSI reservations will not work properly. Therefore, you are advised to use SCSI reservations only on ECSs that are in the same ECS group, thus having a working anti-affinity policy.

#### **Advantages of Shared Disks**

- Multiple attachments: A shared disk can be attached to a maximum of 16 servers.
- High-performance: When multiple servers concurrently access a shared ultrahigh I/O disk, random read/write IOPS can reach up to 160,000.
- High-reliability: Shared disks support both manual and automatic backup, delivering highly reliable data storage.
- Wide application scenarios: Shared disks can be used for Linux RHCS clusters where only VBD disks are needed. Whereas, they can also be used for Windows MSCS and Veritas VCS clusters that require SCSI reservations.

#### **Specifications of Shared Disks**

Key metrics of the disk performance include read/write I/O latency, IOPS, and throughput.

- IOPS: Number of read/write operations performed by a disk per second
- Throughput: Amount of data successfully transmitted by a disk per second, that is, the amount of data read from and written to a disk
- Read/write I/O latency: Minimum interval between two consecutive read/ write operations of a disk

Single-queue access latencies of different types of disks are as follows:

- Common I/O: 10 ms to 15 ms
- Ultra-high I/O: 1 ms to 3 ms

#### Table 1-6 Disk performance data

Metric	Common I/O	Ultra-high I/O
IOPS per GB/disk	1	50

Metric	Common I/O	Ultra-high I/O
Min. IOPS/disk	100	100
Max. IOPS/disk	1,000	20,000
IOPS Burst Limit/disk	1,000	10,000
Max. Throughput	40 MB/s	320 MB/s
Number of servers that can be attached to	A shared disk can be attached to a maximum of 16 servers.	

#### D NOTE

To test the performance of a shared disk, the following requirements must be met:

- The shared disk must be attached to multiple ECSs or BMSs.
- If the shared disk is attached to multiple ECSs, these ECSs must belong to the same anti-affinity ECS group.
  - If these ECSs fail to meet the anti-affinity requirement, the optimal performance of the shared disk cannot be achieved.

#### Data Sharing Principle and Common Usage Mistakes of Shared Disks

A shared disk is essentially the disk that can be attached to multiple servers for use, which is similar to a physical disk in that the disk can be attached to multiple physical servers, and each server can read data from and write data into any space on the disk. If the data read/write rules, such as the read/write sequence and meaning, between these servers are not defined, data read/write interference between servers or other unpredictable errors may occur.

Though shared disks are block storage devices that provide shared access for servers, shared disks do not have the cluster management capability. Therefore, you need to deploy a cluster system to manage shared disks. Common cluster management systems include Windows MSCS, Linux RHCS, Veritas VCS, and Veritas CFS.

If shared disks are not managed by a cluster system, the following issues may occur:

• Data inconsistency caused by read/write conflicts

When a shared disk is attached to two servers (server A and server B), server A cannot recognize the disk spaces allocated to server B, vice versa. That said, a disk space allocated to server A may be already used by server B. In this case, repeated disk space allocation occurs, which leads to data errors.

For example, a shared disk has been formatted into the ext3 file system and attached to server A and server B. Server A has written metadata into the file system in space R and space G. Then server B has written metadata into space E and space G. In this case, the data written into space G by server A will be replaced. When the metadata in space G is read, an error will occur.

• Data inconsistency caused by data caching

When a shared disk is attached to two servers (server A and server B), the application on server A has read the data in space R and space G, then cached the data. At that time, other processes and threads on server A would then read this data directly from the cache. At the same time, if the application on server B has modified the data in space R and space G, the application on server A cannot detect this data change and still reads this data from the cache. As a result, the user cannot view the modified data on server A.

For example, a shared disk has been formatted into the ext3 file system and attached to server A and server B. Both servers have cached the metadata in the file system. Then server A has created a new file (file F) on the shared disk, but server B cannot detect this modification and still reads data from its cached data. As a result, the user cannot view file F on server B.

Before you attach a shared disk to multiple servers, the disk device type needs to be determined. The device type can be either VBD or SCSI. Shared SCSI disks support SCSI reservations. Before using SCSI reservations, you need to install a driver in the server OS and ensure that the OS image is included in the compatibility list.

## **1.9 Disk Encryption**

#### What Is Disk Encryption?

In case your services require encryption for the data stored on disks, EVS provides you with the encryption function. You can encrypt new disks. Keys used by encrypted disks are provided by the Key Management Service (KMS), which is secure and convenient. Therefore, you do not need to establish and maintain the key management infrastructure.

#### Keys Used for Disk Encryption

The keys provided by KMS include a Default Master Key and Customer Master Keys (CMKs).

• Default Master Key: A key that is automatically created by EVS through KMS and named **evs/default**.

The Default Master Key cannot be disabled and does not support scheduled deletion.

 CMKs: Keys created by users. You may use existing CMKs or create new CMKs to encrypt disks. For details, see Management > Creating a CMK in the Key Management Service User Guide.

If disks are encrypted using CMKs and a CMK is then disabled or scheduled for deletion, the disks encrypted by this CMK can no longer be read from or written to and data on these disks may never be restored. See **Table 1-7** for more information.

CMK Status	Impact	How to Restore
Disabled	<ul> <li>If an encrypted disk is attached to a server, the disk cannot be accessed or data on the disk cannot be restored after a period of time or even permanently. If this disk is detached later, it cannot be attached again.</li> <li>If an encrypted disk is not attached to any server, it cannot be attached anymore.</li> </ul>	Enable the CMK. For details, see <b>Managing</b> <b>CMKs &gt; Enabling One or</b> <b>More CMKs</b> in the <i>Key</i> <i>Management Service User</i> <i>Guide</i> .
Scheduled deletion		Cancel the scheduled deletion for the CMK. For details, see Managing CMKs > Canceling the Scheduled Deletion of One or More CMKs in the Key Management Service User Guide.
Deleted		Data on the disks can never be restored.

Table 1-7	' Impact of	CMK	unavailability
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#### **Relationships Between Encrypted Disks and Backups**

The encryption function can be used for system disks, data disks, and backups. The detailed descriptions are as follows:

- The system disk encryption depends on images. For details, see the *Image Management Service User Guide*.
- The encryption attribute of an existing disk cannot be changed. You can create new disks and determine whether to encrypt the disks or not.
- When a disk is created from a backup, the encryption attribute of the new disk will be consistent with that of the backup's source disk.

Before using the encryption function, you need to grant KMS access rights to EVS. If you have the right granting permission, grant KMS access rights directly. If you do not have the permission, contact a user with the security administrator rights to add the security administrator rights for you. Then, grant KMS access rights to EVS. For details, see **Who Can Use the Encryption Feature?** 

For details about how to create an encrypted disk, see **Step 2: Create a Disk**.

#### Who Can Use the Disk Encryption Function?

- The security administrator (having the Security Administrator rights) can grant the KMS access rights to EVS for using the disk encryption function.
- When a common user who does not have the Security Administrator rights needs to use the disk encryption function, the condition varies depending on whether the user is the first one ever in the current region or project to use this feature.
  - If the common user is the first one ever in the current region or project to use the feature, the user must contact a user having the Security

Administrator rights to grant the KMS access rights to EVS. Then, the common user can use the disk encryption function.

- If the common user is not the first one ever in the current region or project to use the feature, the common user can use the disk encryption function directly.

From the perspective of a tenant, as long as the KMS access rights have been granted to EVS in a region, all users in the same region can directly use the disk encryption feature.

If there are multiple projects in the current region, KMS access rights need to be granted to each project in this region.

#### **Application Scenarios of Disk Encryption**

**Figure 1-7** shows the user relationships under regions and projects from the perspective of a tenant. The following example uses region B to describe the two application scenarios of the disk encryption function.





- If the security administrator uses the encryption function for the first time ever, the operation process is as follows:
  - a. Grant the KMS access rights to EVS.

After KMS access rights have been granted, the system automatically creates a Default Master Key and names it **evs/default**. DMK can be used for disk encryption.

#### **NOTE**

Disk encryption relies on KMS. When the encryption function is used for the first time ever, KMS access rights need to be granted to EVS. After KMS access rights have been granted, all users in this region can use the encryption function, without requiring the KMS access rights to be granted again.

b. Select a key.

You can select one of the following keys:

- DMK: evs/default
- CMKs: Existing or newly created CMKs. For details, see Creating a CMK in the Key Management Service User Guide.

After the security administrator has used the disk encryption function, all users in Region B can directly use the encryption function.

- If User E (common user) uses the encryption function for the first time ever, the operation process is as follows:
  - a. When user E uses the encryption function, and the system prompts a message indicating that the KMS access rights have not been granted to EVS.
  - b. Contact the security administrator to grant the KMS access rights to EVS.

After the KMS access rights have been granted to EVS, User E as well as all users in Region B can directly use the disk encryption function and do not need to contact the security administrator to grant the KMS access rights to EVS again.

## 1.10 DSS and Other Services

- Elastic Cloud Server (ECS): DSS disks can be attached to ECSs and used as scalable block storage devices.
- Bare Metal Server (BMS): SCSI DSS disks can be attached to BMSs and used as scalable block storage devices.
- CBR: The CBR service can be used to back up disk data to ensure the reliability and security of the server data.

# **2** Quick Start

## 2.1 Operation Procedure

Figure 2-1 shows the basic DSS operation procedure.

Figure 2-1 Basic operation procedure



- Before using DSS, apply for a storage pool first. For more information, see Step 1: Apply for a Storage Pool. In a dedicated cloud, you can apply for multiple storage pools.
- 2. After the storage pool you requested is available, create disks in the storage pool to make use of the storage pool space. For more information, see **Step 2**: **Create a Disk**.
- 3. Attach the disks to servers. For more information, see the following topics:
  - Attaching a Non-Shared Disk
  - Attaching a Shared Disk
- 4. A disk cannot be used right away after being attached to a server. You must log in to the server and initialize the disk. For more information, see the following topics:
  - Introduction to Data Disk Initialization Scenarios and Partition Styles
  - Windows
    - Initializing a Data Disk in Windows (Windows Server 2008)
    - Initializing a Data Disk in Windows (Windows Server 2016)
    - Initializing a Data Disk Greater Than 2 TB in Windows (Windows Server 2008)

- Initializing a Data Disk Greater Than 2 TB in Windows (Windows Server 2012)
- Linux
  - Initializing a Data Disk in Linux (fdisk)
  - Initializing a Data Disk in Linux (parted)
  - Initializing a Data Disk Greater Than 2 TB in Linux (parted)

## 2.2 Step 1: Apply for a Storage Pool

#### Scenarios

DSS provides you with dedicated, physical storage resources, which can be flexibly interconnected with various compute services, such as ECS, BMS, and DeC, and are suitable to a wide-range of scenarios, including HPC, OLAP, and a mixed of loads. Before using DSS, you need to apply for a storage pool first.

This topic describes how to apply for a storage pool. In a dedicated cloud, you can apply for multiple storage pools.

#### Procedure

- **Step 1** Log in to the management console.
- **Step 2** Click <sup>1</sup> in the upper left corner and select a region and project.
- Step 3 Choose Storage > Dedicated Storage Service to switch to the Dedicated Storage Service page.
- Step 4 Click Apply for Storage Pool.
- **Step 5** Apply for a storage pool by referring to the following information:
  - 1. Customer Service

To apply for a storage pool, click **here** to send an email or contact **customer service**.

2. Requirements Confirmation

Fill out a storage pool **application form** and send it to your sales representative.

3. Resource Provisioning

Customer service will process your application. After the storage pool is provisioned, we will inform you through your sales representative or email.

4. Resource Confirmation

Log in to the DSS console and confirm that the storage pool you requested is available.

Parameter	Description
Domain Name	Specifies the domain name of the storage pool. For details, see <b>Obtaining the Domain Name</b> .
Storage Pool Name	Specifies the storage pool name, which can contain a maximum of 255 characters.
Region	Specifies the region where the storage pool belongs. For details, see <b>Obtaining the Region</b> .
AZ	Specifies the AZ where the storage pool belongs.
Туре	Specifies the storage pool type. – High I/O – Ultra-high I/O
Capacity (TB)	Specifies the storage pool capacity.

Table 2-1 Parameters required for enabling DSS

----End

## 2.3 Step 2: Create a Disk

#### **Scenarios**

DSS storage capabilities are implemented through DSS disks. You need to create disks to make use of the storage resources you requested.

This topic describes how to create a disk in a DSS storage pool.

#### Precautions

When disks are created in a storage pool, the type of DSS disks will be the same as that of the storage pool.

#### Procedure

- **Step 1** Log in to the management console.
- Step 2 Choose Storage > Dedicated Storage Service to switch to the Dedicated Storage Service page.
- Step 3 Choose Dedicated Storage Service > Disks.

**NOTE** 

If you have not applied for a storage pool, apply for a storage pool by referring to **Step 1**: **Apply for a Storage Pool**. If the storage pool has not been deployed, wait until the storage pool is deployed and then perform subsequent operations.

- **Step 4** On the displayed page, click **Create Disk**, or in the storage pool list, locate the storage pool in which the disk will be created and click **Create Disk** in the **Operation** column.
- **Step 5** Configure basic information about the disk by referring to **Table 2-2**.

Name	Sub- Paramet er	Description	Example Value
Region	-	Mandatory Specifies the region where the tenant belongs.	-
AZ	-	<ul> <li>Mandatory</li> <li>Specifies the availability zone (AZ) where you want to create the disk.</li> <li><b>NOTE</b> <ul> <li>Disks can only be attached to the servers in the same AZ.</li> <li>The AZ of a disk cannot be changed after the disk has been created.</li> </ul> </li> </ul>	-
Disk Specific ations	Disk Type	Mandatory Select a storage pool from the drop-down list. The disk type is the same as the storage pool type.	Ultra-high I/O
	Capacity (GB)	Mandatory	100GB
	Select Data Source • Creat e from backu p	<ul> <li>Optional</li> <li>If you choose Create from backup, the backup data is used to create the disk. Click Select Data Source and choose Create from backup. On the displayed page, select the target backup and click OK.</li> <li>NOTE <ul> <li>One backup cannot be used for concurrent disk creation operations at the same time. For example, if you are creating disk A from a backup, this backup can be used to create another disk only after disk A has been created.</li> <li>If a disk is created from a backup of a system disk, the new disk can be used as a data disk only.</li> </ul> </li> </ul>	<ul> <li>Create from backup: autobacku p-001</li> </ul>

I

Name	Sub- Paramet er	Description	Example Value
Disk Name	-	<ul> <li>Mandatory</li> <li>If you create disks one by one, this parameter value is used as the actual disk name. The name can contain a maximum of 64 characters.</li> <li>If you create disks in a batch, this parameter value is used as the prefix of disk names, and one disk name will be composed of this parameter value and a four-digit number. The name can contain a maximum of 59 characters.</li> </ul>	For example, if you create two disks and set <b>volume</b> for <b>Disk</b> <b>Name</b> , the EVS disk names will be <b>volume-0001</b> and <b>volume-0002</b>

#### Step 6 Click Next.

Step 7 In the disk list, view the disk status.

When the disk status changes to **Available**, the disk is successfully created.

----End

## 2.4 Step 3: Attach a Disk

### 2.4.1 Attaching a Non-Shared Disk

#### Scenarios

Independently created disks are data disks. In the disk list, the function of such disks is displayed as **Data disk**, and the status is displayed as **Available**. In this case, you need to attach the data disks to servers for use.

This topic describes how to attach a non-shared DSS disk to a server. A non-shared DSS disk can be attached to one server only.

#### Procedure

- **Step 1** Log in to the management console.
- **Step 2** Choose **Storage > Dedicated Storage Service**.

The **Dedicated Storage Service** details page is displayed.

**Step 3** Choose **Dedicated Storage Service** > **Disks**.

The disk list page is displayed.

**Step 4** Locate the target disk in the list and click **Attach** in the **Operation** column.

The **Attach Disk** dialog box is displayed.

**Step 5** Select the server and then select a device name from the drop-down list. Ensure that the disk and server are in the same AZ.

Return to the disk list page. The disk status is **Attaching**, indicating that the disk is being attached to the server. When the disk status changes to **In-use**, the disk is successfully attached.

**Step 6** Initialize the disk.

After the disk has been attached to a server, the disk can be used only after you have initialized it. For details, see **Introduction to Data Disk Initialization Scenarios and Partition Styles**.

----End

### 2.4.2 Attaching a Shared Disk

#### Scenarios

Independently created disks are data disks. In the disk list, the function of such disks is displayed as **Data disk**, and the status is displayed as **Available**. In this case, you need to attach the data disks to servers for use.

This topic describes how to attach a shared DSS disk to servers. A shared DSS disk can be attached to a maximum of 16 servers.

#### Procedure

- **Step 1** Log in to the management console.
- **Step 2** Choose **Storage > Dedicated Storage Service**.

The **Dedicated Storage Service** details page is displayed.

**Step 3** Choose **Dedicated Storage Service** > **Disks**.

The disk list page is displayed.

**Step 4** Locate the target disk in the list and click **Attach** in the **Operation** column.

Shared disks support batch attachment so that you can attach a shared disk to multiple servers at a time. The left area in the **Attach Disk** dialog box shows the server list. After you select the target servers, the selected servers will be displayed in the right area.

**Step 5** Select servers and select a device name from the drop-down list for each server you selected. Ensure that the disk and servers are in the same AZ.

Return to the disk list page. The disk status is **Attaching**, indicating that the disk is being attached to the servers. When the disk status changes to **In-use**, the disk is successfully attached.

#### NOTICE

If you simply attach a shared disk to multiple servers, files cannot be shared between the servers as shared DSS disks do not have the cluster capability. Therefore, build a shared file system or deploy a cluster management system if you need to share files between servers.

----End

## 2.5 Initialize a Data Disk

## 2.5.1 Introduction to Data Disk Initialization Scenarios and Partition Styles

#### **Scenarios**

After a disk is attached to a server, you need to log in to the server to initialize the disk, that is, format the disk. You must initialize a disk before accessing it.

• System disk

A system disk does not require manual initialization because it is automatically created and initialized upon server creation. The default disk partition style is master boot record (MBR).

- Data disk
  - If a data disk is created along with a server, it will be automatically attached to the server.
  - If a data disk is created separately, you need to manually attach it to a server.

In both cases, you must initialize the data disk before using it. Choose a proper disk partition style based on your service plan.

#### Constraints

A disk created from a data source does not need to be initialized. Such a disk contains the data of the data source in the beginning. Initializing the disk may clear the initial data on this disk.

#### Disk Partition Styles

**Table 2-3** lists the common disk partition styles. In Linux, different disk partition styles require different partitioning tools.

Disk Partition Style	Maximum Disk Capacity Supported	Maximum Number of Partitions Supported	Linux Partitioning Tool
Master Boot	2 TB	• 4 primary partitions	• fdisk
Record (IVIBR)		<ul> <li>3 primary partitions and 1 extended partition</li> </ul>	• parted
		With MBR, one may create several primary partitions and an extended partition. An extended partition must be divided into several logical partitions before use. For example, if 6 partitions need to be created, you can create the partitions in the following two ways:	
		• 3 primary partitions and 1 extended partition, with the extended partition divided into 3 logical partitions	
		• 1 primary partition and 1 extended partition, with the extended partition divided into 5 logical partitions	
GUID Partition Table (GPT)	18 EB 1 EB = 1048576 TB	Unlimited Disk partitions created using GPT are not categorized.	parted

 Table 2-3 Disk partition styles

#### NOTICE

The maximum disk capacity supported by MBR is 2 TB, and that supported by GPT is 18 EB. Because a data disk currently supports up to 32 TB, use the GPT partition style if your disk capacity is larger than 2 TB.

If you change the disk partition style after the disk has been used, the data on the disk will be cleared. Therefore, select a proper disk partition style when initializing the disk.

#### **Partitioning Operation Guide**

For a disk smaller than 2 TB, see the following sections:

- Initializing a Data Disk in Windows (Windows Server 2008)
- Initializing a Data Disk in Windows (Windows Server 2016)

- Initializing a Data Disk in Linux (fdisk)
- Initializing a Data Disk in Linux (parted)

For a disk larger than 2 TB, see the following sections:

- Initializing a Data Disk Greater Than 2 TB in Windows (Windows Server 2008)
- Initializing a Data Disk Greater Than 2 TB in Windows (Windows Server 2012)
- Initializing a Data Disk Greater Than 2 TB in Linux (parted)

## 2.5.2 Initializing a Data Disk in Windows (Windows Server 2008)

#### Scenarios

This section uses Windows Server 2008 R2 Enterprise 64bit to describe how to initialize a data disk attached to a server running Windows.

The maximum disk capacity supported by MBR is 2 TB, and that supported by GPT is 18 EB. Therefore, use the GPT partition style if your disk capacity is larger than 2 TB. For details, see Initializing a Data Disk Greater Than 2 TB in Windows (Windows Server 2008). For details about disk partition styles, see Introduction to Data Disk Initialization Scenarios and Partition Styles.

The method for initializing a disk varies depending on the OS running on the server. This document is used for reference only. For the detailed operations and differences, see the product documents of the corresponding OS.

#### Prerequisites

- A data disk has been attached to a server and has not been initialized.
- You have logged in to the server.
  - For how to log in to an ECS, see the *Elastic Cloud Server User Guide*.
  - For how to log in to a BMS, see the *Bare Metal Server User Guide*.

#### Procedure

**Step 1** On the desktop of the server, right-click **Computer** and choose **Manage** from the shortcut menu.

The Server Manager window is displayed.

**Step 2** In the navigation tree, choose **Storage** > **Disk Management**.

The **Disk Management** window is displayed.

- If Figure 2-2 is displayed, the new disk is offline. Go to Step 3.
- If Figure 2-5 is displayed, the Initialize Disk window is prompted. Go to Step 5.

Server Manager		
File Action View Help		
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Server Manager (ECS-EN-FQY)	Disk Management	ent Volume List + Graphical View Actions
Roles     Features	Volume	Layout Type File System Status Disk Management
Configuration     Storage	System Reserved	Simple Basic NTFS Healthy (Boot, Page File, Cr ed Simple Basic NTFS Healthy (System, Active, Pr
Disk Management		
	•	
	Disk 0 Basic 40.00 GB Online	System Re: 100 MB NTFS Healthy (Syst Healthy (Boot, Page File, Crash Dun)
	Image: Constraint of the second se	100.00 GB Unallocated
	Unallocated	Primary partition

Figure 2-2 Disk Management

**Step 3** Disks are displayed in the right pane. In the **Disk 1** area, right-click **Offline** and choose **Online** from the shortcut menu to online the disk.

Figure 2-3 Online the disk

Server Manager		_ 8 ×
File Action View Help		
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Server Manager (ECS-EN-FQY)	Disk Management Volume List + Graphical View Actions	
E P Roles	Volume Layout Type File System Status Disk Management	-
Features	(C:) Simple Basic NTFS Healthy (Boot, Page File, Cr	•
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🖃 🚰 Storage		
Windows Server Backup		
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	Basic System Box (C)	
	40.00 GB 100 MB NTFS 39.90 GB NTFS	
	Online Healthy (Syst Healthy (Boot, Page File, Crash Dun	
	Disk 1	
	Unknown	
	Office T	
	Help Properties	
	Onanocated Primary partition	

#### **NOTE**

If the disk is offline, you need to online the disk before initializing it.

Step 4 After making the disk online, the disk status changes from Offline to Not Initialized. Right-click the disk status and choose Initialize Disk from the shortcut menu, as shown in Figure 2-4.



Server Manager		
File Action View Help		
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Server Manager (ECS-EN-FQY)  Roles  Roles  Configuration  Storage  Disk Management	Disk Management         Volume List + Graphical View         Actions           Volume         Layout         Type         File System         Status         Disk Management           Image: C: Disk Management         Simple         Basic         NTFS         Healthy (Boot, Page File, Cr         More Actions           Image: System Reserved         Simple         Basic         NTFS         Healthy (System, Active, Pr         More Actions	•
	System Ret     100 MB NTFS     Healthy (Syst	
	Oisk 1       Unknown       100.00 GB       Not Initialized       Offline       Properties       Unallocate       Help       tion	

Step 5 In the Initialize Disk dialog box, select the target disk, click MBR (Master Boot Record) or GPT (GUID Partition Table), and click OK, as shown in Figure 2-5.

Figure 2-5 Unallocated space

Server Manager			_ 8 ×
File Action View Help			
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Server Manager (ECS-EN-FQY)	Disk Management Volume List + Graphical View	Actions	
Roles     Features	Volume Layout Type File System Status	Disk Management	-
	C:) Simple Basic NTFS Healthy (Boot, Page File, Cr	More Actions	•
🗉 🎆 Configuration	Initialize Disk		
🖃 🚝 Storage	You must initialize a disk before Logical Disk Manager can access it.		
Windows Server Backup	Select disks:		
Disk Planagement	☑ Disk 1		
	Use the following partition style for the selected disks:		
	MBR (Master Boot Record)		
	C GPT (GUID Partition Table)		
	Note: The GPT partition style is not recognized by all previous versions of Windows, It is recommended for disks larger than 2TB, or disks used on		
	Itanium-based computers.		
	OK Cancel		
		J	
	Unknown		
	100.00 GB 100.00 GB		
	ondirected		
	Unallocated Primary partition		

#### NOTICE

The maximum disk capacity supported by MBR is 2 TB, and that supported by GPT is 18 EB. Because a data disk currently supports up to 32 TB, use the GPT partition style if your disk capacity is larger than 2 TB.

If you change the disk partition style after the disk has been used, the data on the disk will be cleared. Therefore, select a proper disk partition style when initializing the disk.

**Step 6** Right-click at the unallocated space and choose **New Simple Volume** from the shortcut menu, as shown in **Figure 2-6**.

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File Action View Help							
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Server Manager (ECS-B704)	Disk Managemer	nt Volume List + G	Graphical View			Actions	
Roles	Volume	Layout Type	File System S	Status		Disk Management	
	🗀 (C:)	Simple Basic	NTFS H	Healthy (Boot, Page	e File, Crash Dump,	More Actions	•
Event Viewer	System Reserve	d Simple Basic	NTFS H	Healthy (System, A	ctive, Primary Parti		
🕀 💽 Performance							
Bevice Manager							
Configuration     Storage							
Windows Server Backup							
Disk Management							
					F		
	Disk 0				New Simple Volume	2	
	Basic 50.00 GB	System Reser	(C:)	<b>T</b> C	New Spanned Volu	me	
	Online	Healthy (System	Healthy (Boo	ot, Page File, Cra	New Striped Volum	ie	
					New RAID-5 Volum	nie	
	Disk 1				Properties		
	100.00 GB	100.00 GB			Help		
	Online	Unallocated					
	Unallocated	Primary partiti	on				

Figure 2-6 New Simple Volume

Step 7 On the displayed New Simple Volume Wizard window, click Next.



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File Action View Help			
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Server Manager (ECS-B704)	Disk Management Volume List	+ Graphical View	Actions
Roles	Volume Layout Type	File System Status	Disk Management 🛛 🔺
	🔤 New Simple Volume Wizard		× tions
Bug Asses     Bernt Viewer     OPerformance     Device Manager     Sonfiguration     Grane	G	Welcome to the New Simple Volume Wizard	
Windows Server Backup		This wizard helps you create a simple volume on a disk	
Disk Management		A simple volume can only be on a single disk.	
		To continue, click Next	
	<ul> <li>Ц</li> <li>В</li> <li>В</li> <li>В</li> <li>1</li> <li>О</li> </ul>	< Back Next >	Cancel
	<u></u>		
	Unallocated Primary part	ition	

**Step 8** Specify the volume size and click **Next**. The default value is the maximum size.

Figure 2-8 Specify Volume Size

Server Manager		_ 8 ×		
File Action View Help				
Server Manager (ECS-B704)	Disk Management Volume List + Graphical View	Actions		
E Roles	Volume Layout Type File System Status	Disk Management 🔺		
End Diagnostics	🔤 New Simple Volume Wizard	× tions		
	Specify Volume Size Choose a volume size that is between the maximum and minimum sizes.			
Storage     Windows Server Backup     Disk Management	Maximum disk space in MB: 102397			
	16 to 10 to 10 to 10 to 10			
	Minimum disk space in MB: 8			
	Simple volume size in MB:			
	E B 5 O O			
	0 < Back Next >	Cancel		
	Unallocated Primary partition	<u>i</u>		

**Step 9** Assign the driver letter and click **Next**.

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File Action View Help		
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Server Manager (ECS-B704)	Disk Management Volume List + Graphical View	Actions
Roles     Footree	Volume Layout Type File System Status	Disk Management 🛛 🔺
	🖙 New Simple Volume Wizard	× tions
	Assign Drive Letter or Path For easier access, you can assign a drive letter or drive path to your partition.	
<ul> <li>B</li></ul>	Assign the following drive letter:     D      Mount in the following empty NTFS folder:     Browse      Do not assign a drive letter or drive path Bi S O E Bi	
	1 O SBack Next >	Cancel
	Unallocated Primary partition	

Figure 2-9 Assign Driver Letter or Path

**Step 10** Select **Format this volume with the following settings**, set parameters based on the actual requirements, and select **Perform a quick format**. Then, click **Next**.

Figure 2-10 Format Partition

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File Action View Help						
Server Manager (ECS-B704)	Disk Management Volume List + Graphical View	Actions				
🕀 📔 Roles	Volume Layout Type File System Status	Disk Management 🔺				
Features     Diagnostics	New Simple Volume Wizard	× tions				
Bay Didylosus     Event Viewer     Event Viewer     Configuration     Storage     Windows Server Backup     Disk Management	Format Partition To store data on this partition, you must format it first.					
	Choose whether you want to format this volume, and if so, what settings you wa	ant to use.				
	C Do not format this volume					
	Format this volume with the following settings:					
	File system: NTFS					
	Allocation unit size: Default					
	Bi Volume label: New Volume					
	0  ✓ Perform a quick format					
	Enable file and folder compression					
	¢					
	B					
	0 < Back Next >	Cancel				
	Unallocated Primary partition					
File Action View Help  File Action View Help  Roles  Disk Management Volume List + Graphical View  Completing the New Simple Volume Layout Type File System Status  Disk Management Volume Wizard  Volume Wizard  You have successfully completed the New Simple Volume Wizard  Volume Wizard  You have successfully completed the New Simple Volume Wizard  Volume Storage Volume Wizard  Volume Using E Volume View Volume Wizard  Volume View Volum	<b>gale 2</b> II completing the partition creation					
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Server Manager (ECS-8704)          Image: Server Manager (ECS-8704)       Disk Management       Volume Layout Type       File System       Status       Disk Management       Notes         Image: Server Manager (ECS-8704)       Image: Server (ECS-8704)       Image: Server (ECS-8704)	File Action View Help					
Server Manager (ECS-8704)   P Roles   Diagnostics   Performance   Device Manager   Windows Server Backup   Windows Server Backup   Disk Management     You ave successfully completed the New Simple Volume   Windows Server Backup   Windows Server Backup   Disk Management     You ave successfully completed the New Simple Volume   Windows Server Backup   Windows Server Backup   Disk Management     You ave successfully completed the New Simple Volume   Windows Server Backup   Windows Cerver Backup   You ave successfully completed the New Simple Volume   Disk Management     You ave successfully completed the New Simple Volume   Disk Management     You ave successfully completed the New Simple Volume   Disk Management     You ave successfully completed the New Simple Volume   Disk Management     You selected Disk 1   You ave successfully completed the New Simple Volume   Disk Management     You selected Disk 1   You se	🗢 🔿 🖄 📅 🔀 🖬	9 B				
<ul> <li>Roles</li> <li>Peatures</li> <li>Disk Management</li> <li>Wolume</li> <li>Layout Type File System Status</li> <li>Disk Management</li> <li>Wew Simple Volume Wizard</li> <li>Hew Simple Volume Wizard</li> <li>Configuration</li> <li>Configuration</li> <li>Storage</li> <li>Windows Server Badup</li> <li>Windows Server Badup</li> <li>Disk Management</li> <li>Volume tetra path: Disk Management</li> <li>Storage</li> <li>Windows Server Badup</li> <li>Minor Storage</li> <li>Windows Server Badup</li> <li>To close this wizard, click Finish.</li> <li>Unallocated</li> <li>Primary partition</li> </ul>	Server Manager (ECS-B704)	Disk Management Volume List -	+ Graphical View	Actions		
Features     Features     Features     For the second	🕀 🔤 Roles	Volume Lavout Type	File System Status	Disk Management 🔺		
Didgitious:     Device Wear     Device Manager     Device Manager     Windows Server Backup     Windows Server Backup     Disk Management     Volume type: Simple Volume     Disk selected: Disk 1     Volume size: 102397 MB     Drive letter or path: D:     Hie system: NTFS     Allocation unit size: Default     Volume label: New Volume     Outick format: Yee     To close this wizard, click Finish.     Back     Finish     Cancel     Unallocated     Primary partition	Features	New Simple Volume Wizard		XI tions		
Storage       You have successfully completed the New Simple Volume         Windows Server Backup       You selected the following settings:         Volume type: Simple Volume       You selected: Disk 1         Volume size: 102397 MB       This selected: Disk 1         Volume late: NTFS       Allocation unit size: Default         Volume labe: New Volume       Image: NTFS         Allocation unit size: New Volume       Image: NTFS         Volume labe: New Volume       Image: NTFS <td></td> <td></td> <td>Completing the New Simple Volume Wizard</td> <td></td>			Completing the New Simple Volume Wizard			
You selected the following settings: Volume type: Simple Volume Disk selected: Disk 1 Volume size: 102397 MB Drive letter or path: D; File system: NTFS Allocation unit size: Default Volume label: New Volume Outlick format: Yee To close this wizard, click Finish.	E Storage		You have successfully completed the New Simple Volur Wizard.	ne		
1      Back     Finish     Cancel       Unallocated     Primary partition	Disk Management	<mark>. П</mark> . П. В. П. В. П. В. П. В. П. В. П. В.	You selected the following settings: Volume type: Simple Volume Disk selected: Disk 1 Volume size: 102397 MB Drive letter or path: D: File system: NTFS Allocation unit size: Default Volume label: New Volume Curick format: Ves To close this wizard, click Finish.	•		
Unallocated Primary partition		1' O	< Back Finish	Cancel		
		Unallocated Primary part	ition			

Figure 2-11 Completing the partition creation

# NOTICE

The partition sizes supported by file systems vary. Therefore, you are advised to choose an appropriate file system based on your service requirements.

Step 11 Click Finish. Wait for the initialization to complete. When the volume status changes to Healthy, the initialization has finished successfully, as shown in Figure 2-12.

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En Server Manager					
File Action View Help					
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Server Manager (ECS-B704)	Disk Management	t Volume List +	Graphical Viev	N	Actions
Roles	Volume	Layout Type	File System	Status	Disk Management
	🗀 (C:)	Simple Basic	NTFS	Healthy (Boot, Page File, Crash Dump	More Actions
+ Revent Viewer	New Volume (D:)	Simple Basic	NTFS	Healthy (Primary Partition)	
	System Reserved	Simple Basic	NTFS	Healthy (System, Active, Primary Part	i
🚔 🗘 vice Manager					
🗉 🁬 Configuration					
🖃 🚝 Storage					
Windows Server Backup					
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	Basic	System Reser	((.)		
	50.00 GB	100 MB NTFS	49.90 GB	NTFS	
	Online	Healthy (System	Healthy (E	Boot, Page File, Crash Dump, Prima	
	Disk 1				
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	Online	Healthy (Primary	Partition)		
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					1
	Unallocated	Primary partit	ion		
					1]
					j.

#### Figure 2-12 Disk initialization succeeded

----End

# 2.5.3 Initializing a Data Disk in Windows (Windows Server 2016)

# **Scenarios**

This section uses Windows Server 2016 Standard 64bit to describe how to initialize a data disk attached to a server running Windows.

The maximum disk capacity supported by MBR is 2 TB, and that supported by GPT is 18 EB. Therefore, use the GPT partition style if your disk capacity is larger than 2 TB. For details, see Initializing a Data Disk Greater Than 2 TB in Windows (Windows Server 2008). For details about disk partition styles, see Introduction to Data Disk Initialization Scenarios and Partition Styles.

The method for initializing a disk varies depending on the OS running on the server. This document is used for reference only. For the detailed operations and differences, see the product documents of the corresponding OS.

# Prerequisites

- A data disk has been attached to a server and has not been initialized.
- You have logged in to the server.
  - For how to log in to an ECS, see the *Elastic Cloud Server User Guide*.
  - For how to log in to a BMS, see the *Bare Metal Server User Guide*.

# Procedure

**Step 1** On the desktop of the server, click the start icon in the lower left corner.

The **Windows Server** window is displayed.

Step 2 Click Server Manager.

The Server Manager window is displayed.

#### Figure 2-13 Server Manager

🚡 Server Manager		- 0 ×
Server Ma	anager • Dashboard	🕶 🕱   🚩 Manage <u>Tools</u> View Help
Ŭ		Component Services
-	WELCOME TO SERVER MANAGER	Computer Management
Dashboard	WELCOME TO SERVER MANAGER	Defragment and Optimize Drives
Local Server		Disk Cleanup
All Servers	1 Configure this local se	Event Viewer
File and Storage Services 👂	Configure this local se	iSCSI Initiator
	QUICK START	Local Security Policy
	2 Add roles and features	Microsoft Azure Services
		ODBC Data Sources (32-bit)
	3 Add other servers to man	nage ODBC Data Sources (64-bit)
	WHAT'S NEW	Performance Monitor
	4 Create a server group	Print Management
	5 Connect this server to clu	nesource Monitor
	5 Connect this server to cit	Services
	LEARN MORE	System Information
		Task Scheduler
		Windows Firewall with Advanced Security
	ROLES AND SERVER GROUPS	Windows Memory Diagnostic
	Roles: 1   Server groups: 1   Servers total: 1	Windows PowerShell
	File and Storage	Windows PowerShell (x86)
	Services	Windows PowerShell ISE
	Manageability     Manageability	Windows PowerShell ISE (x86)
	Events Events	Windows Server Backup
	Performance 5 Services	
	BPA results Performance	
	BPA results	
	6/16/	2010 4-27 DM

**Step 3** In the upper right corner, choose **Tools** > **Computer Management**.

The **Computer Management** window is displayed.

Computer Management File Action View Help  Computer Management (Loc View Sorge Computer Management (Loc View Sorge Sorg	-	1 5	
File Action View Help	🛃 Computer Management		- 🗆 X
Actions          Image: Computer Management (Local Vision S)       Name       Actions         Image: Computer Management (Local Viser And Groups )       System Tools       Sorage         Image: Computer Management (Local Viser And Groups )       Sorage       Sorage         Image: Computer Management (Local Viser And Groups )       Sorage       Sorage         Image: Computer Management (Local Viser And Groups )       Sorage       Sorage         Image: Computer Management (Local Viser And Applications Sorver Backup Provided Management )       Sorage Sorage       Sorage Sorage         Image: Computer Management )       Image: Computer Management (Local Applications Sorver Backup Provided Management Provide	File Action View Help		
Computer Management (Local System Tools System Tools System Tools Storage Services and Applications Computer Management (L More Actions More Actions More Actions More Actions More Actions	I I I I I I I I I I I I I I I I I I I		
	Computer Management (Local     Computer Management)     Software Folders     Computer Manager     Computer Manager     Computer Management     Disk Management     Services and Applications	Name System Tools Sorrage Services and Applications	Actions Computer Management (L A More Actions >
		L	

Figure 2-14 Computer Management

#### Step 4 Choose Storage > Disk Management.

Disks are displayed in the right pane. If there is a disk that is not initialized, the system will prompt you with the **Initialize Disk** dialog box.

🚂 Computer Management			- 🗆 ×
File Action View Help			
🗢 🔿 🙍 🔂 🖬 🗩 🗙 🗹			
Computer Management (Local Volum	me Layout   Type   File System   Status	С	Actions
V System Tools	Simple Basic NTFS Healthy (Boot, Page File, Crash Dump, Primary Partition)	39	Disk Management 🔹
> (ask scheduler = sys > (ask scheduler > (as	In the served simple basic INTES Preating (system, Active, Primary Partition)	×	More Actions
Device Manager			
> Windows Server Backup	You must initialize a disk before Logical Disk Manager can access it.		
📅 Disk Management	Select disks:		
<ul> <li>Services and applications</li> <li>D Basics 40,00 Onlin</li> <li>OD Unkn 100,0</li> <li>Net I</li> </ul>	Use the following partition style for the selected disks: O MBR (Master Boot Record) Bisk 0 O GPT (GUID Pattion Table) Concel Disk 1 nown D GB 100.00 GB Unallocated Unallocated	> ]	
< >> Un	nallocated Primary partition		

Figure 2-15 Disk list

- **Step 5** In the **Initialize Disk** dialog box, the to-be-initialized disk is selected. Select a disk partition style and click **OK**. In this example, **GPT (GUID Partition Table)** is selected.
  - The **Computer Management** window is displayed.
  - Figure 2-16 Computer Management (Windows Server 2016)

File Action View Help  Computer Management (Loci ) Computer Management (Loci ) Computer Management (Loci ) Computer Viewer Computer Meanagement (Loci ) Computer Viewer Computer Meanagement Computer Management Computer Manageme	🜆 Computer Management							- 0	$\times$
Computer Management (Loc) Computer Management (Loc) System Tools Computer Management (Loc) Simple Basic NTFS Healthy (Boot, Page File, Crash Dump, Primary Partition) So Task Scheduler System Reserved Simple Basic NTFS Healthy (System, Active, Primary Partition) So Performance Doix Management Windows Server Backur Storage Sorvices and Applications Services and Applications System Reserved South Stripe Universe South Management <p< td=""><td>File Action View Help</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></p<>	File Action View Help								
Volume       Layout       Type       File System       Status       C         V (Computer Management (Local > ) Task Scheduler       Simple Basic       NTFS       Healthy (Boot, Page File, Crash Dump, Primary Partition)       Status       Disk Management         > (G) State Folders       Simple Basic       NTFS       Healthy (System, Active, Primary Partition)       Status       More Actions         > (G) State Manager       Storage       Storage       Storage       New Simple Volume       More Actions         > (G) Disk Management       Storage       Storage       Storage       Storage       New Simple Volume         > (G) Storage       Storage       Storage       Storage       Storage       New Simple Volume         > (G) Storage       Storage       Storage       Storage       New Simple Volume       New Simple Volume         > (G) Basic       Basic       System Reserved       Storage       New Simple Volume       New Stored Volume         > (G) Online       System Reserved       Storage       Storage       New Stored Volume       New Stored Volume         > (G) Storage       Storage       Storage       Storage       Storage       New Stored Volume         > (G) Inice       System Reserved       Storage       Storage	🗢 🄿 🖄 📰 🛛 🗩	<b>V F</b>							
C:) System Tools In the Scheduler Support Tools	🜆 Computer Management (Local	Volume	Layout Type	File System	Status		C	Actions	
> © Task Scheduler     = System Reserved Simple Basic NTFS     Healthy (System, Active, Primary Partition)     S       > @ Local Users and Groups     > © Performance     > © Performance       > @ Disk Management     > © System Reserved     Simple Basic       > @ Storage     > © Nindows Server Backup        > © Services and Applications	✓ <sup>™</sup> System Tools	🚍 (C:)	Simple Basic	NTFS	Healthy (Boot, Pa	ge File, Crash Dump, Primary Partition)	39	Disk Management	
<ul> <li>&gt; intered Folders</li> <li>&gt; intered Folders</li></ul>	> 🕑 Task Scheduler	System Reserved	Simple Basic	NTFS	Healthy (System,	Active, Primary Partition)	50	Marco Antione	
Signated Folders Selvice Manager Windows Server Backup Disk Management Services and Applications Services and Applications Image: Service and Applications Services and Applications Services and Applications Services and Applications Image: Service and Applications Services and Applications Image: Service and Applications Services and Applications Services and Applications Image: Service and Applications Ima	> 🛃 Event Viewer							More Actions	
<ul> <li>&gt; Collar Users and Uroups</li> <li>&gt; Operiormance</li> <li>&gt; Device Manager</li> <li>&gt; Device Manager</li> <li>&gt; Disk Management</li> <li>&gt; Services and Applications</li> </ul>	> 🛐 Shared Folders								
Verticitie Manager Windows Server Backup Disk 0 Basic Services and Applications	> Berformance								
Storage Disk Management Disk 0 Basic 4000 GB Online Disk 1 Basic 93.88 GB 93	Device Manager								
Windows Server Backur Disk Management Basic 000 GB 001 MENTES 001 MENTES 001 MENTES 001 MENTES 001 MENTES 001 MENTES 001 MENTES 100 MENTES 10	V 🚝 Storage								
➤ Disk Management > Services and Applications       C     >       Disk 0     Basic       Basic     System Reserved       Online     C:       Disk 1     Basic       99.88 GB     99.88 GB       Online     99.88 GB       Online     1	Windows Server Backup								
Services and Applications       Image: Disk 0     System Reserved 40.00 GB     System Reserved 500 MB NTFS Healthy (System, Active, Pirr     (C) Basic     New Simple Volume New Spaned Volume New Striped Volume New RAID-5 Volume New RAID-5 Volume New RAID-5 Volume New RAID-5 Volume Properties       99.88 GB Online     99.88 GB Umallocated     99.88 GB Umallocated	📅 Disk Management								
System Reserved 40.00 GB Online       System Reserved 500 ME NTFS Online     C:3 39.51 GB NTFS Healthy (System, Active, Prir Healthy (Boot, Pa Healthy (Boot, Pa Healthy (Boot, Pa Healthy (Boot, Pa Healthy Courter New Ritriped Volume New Ritriped Volume New RID-5 Volume New RID-5 Volume Properties Help	> 🚡 Services and Applications								
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C Disk 0 Basic 40,00 GB Online       System Reserved 50 MB NTFS Healthy (System, Active, Prir     (C.) 35.1 GB NTFS Healthy (Boot, Pa     New Simple Volume New Striped Volume New Mirrored Volume New Mirrored Volume New RAID-5 Volume Properties       99.88 GB Online     99.88 GB Unallocated     1									
C     Disk 0 Basic     40.00 GB Online     System Reserved     500 MB NTFS Healthy (System, Active, Prir Healthy (Boot, Pa Healthy (B									
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						Nava Circada Valvara	-1		
Basic 40.00 GB Online       System Reserved 50 MB NTFS Healthy (System, Active, Prin 99.88 GB Online       (C) 39.51 GB NTFS Healthy (Boot, Pa       New Striped Volume New Mirrored Volume New Mirrored Volume New RAID-5 Volume Properties		Disk 0				New Simple volume			
Sub GB     Sub Wei N (FS)     Sub GB (FS)     Sub GB (FS)     New Striped Volume       Disk 1     Basic     99.88 GB     99.88 GB     New Striped Volume       Unallocated     Healthy (System, Active, Prir     Healthy (Boot, Pa)		Basic 40.00 GP	System Reserve	m Reserved (C:)	(C:) New Spanned Volume				
Disk 1     Memory Cyclew, Market M     New Mirrored Volume       Poperties     99.88 GB     99.88 GB       Online     Unallocated		Online	Healthy (System	Active Prir	Healthy (Boot Pa	New Striped Volume			
Disk 1     New RAID-5 Volume       Basic     99,88 GB       Online     99,88 GB       Unallocated				,		New Mirrored Volume			
Disk 1       Basic       99.88 GB       Online       Unallocated			1		þ	New RAID-5 Volume			
99.88 GB Online 99.89 GB Unallocated Help		- Disk 1				Properties			
Online Unallocated Help		99.88 GB	00 88 GB			Topeneo	-1		
		Online	Unallocated			Help			
							2		
		-					_		
< > Unallocated Primary partition	< >	Unallocated	rimary partition						

# NOTICE

The maximum disk capacity supported by MBR is 2 TB, and that supported by GPT is 18 EB. Because a data disk currently supports up to 32 TB, use the GPT partition style if your disk capacity is larger than 2 TB.

If you change the disk partition style after the disk has been used, the data on the disk will be cleared. Therefore, select a proper disk partition style when initializing the disk.

**Step 6** Right-click at the unallocated disk space and choose **New Simple Volume** from the shortcut menu.

The New Simple Volume Wizard window is displayed.

•	•						2	
🛃 Computer Management							- 🗆 ×	<
File Action View Help								
🗢 🔿 🞽 🖬 🛛 🖛 🔄	1							
😓 Computer Management (Local	Volume	Layout Type	e File System Status			С	Actions	_
System Tools     Tack Scheduler	New Simple V	olume Wizard		$\times$	Partition)	39	Disk Management	
<ul> <li>Task Scheduler</li> <li>Event Viewer</li> <li>Shared Folders</li> <li>Local Users and Groups</li> <li>Performance</li> <li>Device Manager</li> <li>Storage</li> <li>Windows Server Backup</li> <li>Services and Applications</li> </ul>	<ul> <li>Ba 40, Or</li> <li>Disk 1 Basic 9,88 GB Online</li> </ul>	99.88 GB Unallocated	Welcome to the New Simple         This wizard helps you create a simple volume on a disk.         A simple volume can only be on a single disk.         To continue, click Next.         < Back		Part	5( ×	More Actions	•
< >	Unallocated	Primary partition	n					

Figure 2-17 New Simple Volume Wizard (Windows Server 2016)

**Step 7** Follow the prompts and click **Next**.

The **Specify Volume Size** page is displayed.

File Action View Help			
Computer Management (Local	Volume Layout Type File System Status	С	Actions
V System Tools	New Simple Volume Wizard X Partition)	35	Disk Management 🔺
<ul> <li>Ask Scheduler</li> <li>I Event Viewer</li> <li>I Shared Folders</li> <li>I Scheduler</li> <l< td=""><td>Specify Volume Size Choose a volume size that is between the maximum and minimum sizes.</td><td>~</td><td>More Actions 🕨</td></l<></ul>	Specify Volume Size Choose a volume size that is between the maximum and minimum sizes.	~	More Actions 🕨
Device Manager     Storage     Mindows Server Backup     Disk Management	Maximum disk space in MB: 102270		
> Services and Applications	Minimum disk space in MB: 8 Simple volume size in MB: 102270		
	<	>	
	Ba 40		
	< Back Next > Cancel		
	Disk 1 Basic 99.88 GB 99.88 GB Online Unallocated		
< >>	Unallocated Primary partition		

Figure 2-18 Specify Volume Size (Windows Server 2016)

**Step 8** Specify the volume size and click **Next**. The system selects the maximum volume size by default. You can specify the volume size as required. In this example, the default setting is used.

The Assign Drive Letter or Path page is displayed.

Figure 2-19 Assign Driver Letter or Path (Windows Server 2016)

🜆 Computer Management		$ \Box$ $\times$
File Action View Help		
Computer Management (Local	Volume Layout Type File System Status C	Actions
Task Scheduler	New Simple Volume Wizard	Disk Management
> 🛃 Event Viewer	Assian Drive Letter or Path	More Actions
> 👸 Shared Folders	For easier access, you can assign a drive letter or drive path to your partition.	
> 🜆 Local Users and Groups		
> 🔊 Performance		
Device Manager		
Windows Server Backur	Assign the following drive letter:	
Disk Management		
> Services and Applications	Mount in the following empty NTPS folder:	
	Drowse	
	O Do not assign a drive letter or drive path	
	< > >	
		-
	40	
	On Part	
	< Back Next > Cancel	
	Basic	
	99.88 GB 99.88 GB	
	Online Unallocated	
		1
< >	Unallocated Primary partition	1

**Step 9** Assign a drive letter or path to your partition and click **Next**. The system assigns drive letter D by default. In this example, the default setting is used.

The Format Partition page is displayed.

🜆 Computer Management					_	□ ×
File Action View Help						
🗢 🄿 🙍 🖬 😰 🗩	<b>V V</b>					
🜆 Computer Management (Local	Volume	Layout   Type   File Sy	/stem Status		C Actions	
V 🙀 System Tools	New Simple Vol	lume Wizard		imes Partition)	39 Disk Management	<b></b>
> () Task Scheduler					5( More Actions	Þ
> B Event Viewer	To store of	i <b>tion</b> data on this partition, you n	nust format it first		morer reality	,
> 🌆 Local Users and Groups						
> 🔞 Performance	Character		alara and an and affire and an analysis and an and a second second			
🛔 Device Manager	Choose w	rietrier you want to format	this volume, and it so, what settings you want to use.			
✓ E Storage		not format this volume				
Windows Server Backup Dick Management	Eor	mat this volume with the fo	owing settings:			
> Services and Applications	0.0	Die ensteen	NEC.			
		nie system.	NIFS V			
		Allocation unit size:	Default 🗸			
	۱   ۱	Volume label:	New Volume			
	<	Perform a quick format			>	
		Enable file and folder or	ompression			
	Ba					
	40.					
	On		< Back Next > Cancel	Part		
	- Disk 1				7	
	Basic 99.88 GB	00 88 GB				
	Online	Unallocated				
					2	
( )	Unallocated	rimary partition				

Figure 2-20 Format Partition (Windows Server 2016)

**Step 10** Specify format settings and click **Next**. The system selects the NTFS file system by default. You can specify the file system type as required. In this example, the default setting is used.

The Completing the New Simple Volume Wizard page is displayed.

Figure 2-21 Completing the New Simple Volume Wizard (Windows Server 2016)



#### NOTICE

The partition sizes supported by file systems vary. Therefore, you are advised to choose an appropriate file system based on your service requirements.

#### Step 11 Click Finish.

Wait for the initialization to complete. When the volume status changes to **Healthy**, the initialization has finished successfully, as shown in **Figure 2-22**.

🚪 Computer Management					-	X
File Action View Help						
Þ 🤿 🙇 📰 🛛 🖬 🗩 🗹 🗉	8					
Computer Management (Local Volu	ume	Layout Type File System	Status	C	Actions	 _
System Tools	(C:)	Simple Basic NTFS	Healthy (Boot, Page File, Crash Dump, Primary Partition)	39	Disk Management	
Iask Scheduler      Isk Scheduler      Second Scheduler	vew volume (D:) System Reserved	Simple Basic NTFS	Healthy (Primary Partition) Healthy (System, Active, Primary Partition)	95 50	More Actions	
> 🕺 Shared Folders	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	surfice basic time				
> 返 Local Users and Groups						
> (N) Performance						
Device Manager						
> 🐞 Windows Server Backur						
Disk Management						
Services and Applications						
				_		
	Disk 0					
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Basi	sic	System Reserved	(C.)			
Basi 40.0 Onl	sic 00 GB Iline	System Reserved 500 MB NTFS Healthy (System, Active, Prir	(C:) 39.51 GB NTFS Healthy (Boot, Page File, Crash Dump, Primary Part			
Bas 40.0 Onl	sic 00 GB line	System Reserved 500 MB NTFS Healthy (System, Active, Prir	(C:) 39.51 GB NTFS Healthy (Boot, Page File, Crash Dump, Primary Part			
Bas 40.0 Onl	sic 00 GB Iline	System Reserved 500 MB NTFS Healthy (System, Active, Prir	(C.) 39.51 GB NTFS Healthy (Boot, Page File, Crash Dump, Primary Part	-		
Bas 40.0 Onl	sic 00 GB Iline Disk 1	System Reserved 500 MB NTFS Healthy (System, Active, Prir New Volume (D:)	(C.) 39.51 GB NTFS Healthy (Boot, Page File, Crash Dump, Primary Part			
Bas 40.0 Onl Bas 99.8	sic 00 GB Iline Disk 1 sic 88 GB	System Reserved 500 MB NTFS Healthy (System, Active, Prir New Volume (D:) 99.87 GB NTFS	(C.) 39.51 GB NTFS Healthy (Boot, Page File, Crash Dump, Primary Part			
Bas 40.0 Onl Bas 99.6 Onl	sic 00 GB Iline Disk 1 sic 88 GB Iline	System Reserved 500 MB NTFS Healthy (System, Active, Prir New Volume (D:) 99.87 GB NTFS Healthy (Primary Partition)	(C.) 39.51 GB NTFS Healthy (Boot, Page File, Crash Dump, Primary Part			
Bas 40.4 Onl Bas 99.5 Onl	sic 00 GB Iline Disk 1 sic 88 GB Iline	System Reserved 500 MB NTFS Healthy (System, Active, Prir New Volume (D:) 99.87 GB NTFS Healthy (Primary Partition)	(C.) 39.51 GB NTFS Healthy (Boot, Page File, Crash Dump, Primary Part			
Bas 40,4 Onl Bas 99,5 Onl	sic 00 GB lline Disk 1 sic 88 GB lline	System Reserved 500 MB NTFS Healthy (System, Active, Prir New Volume (D:) 99.87 GB NTFS Healthy (Primary Partition)	(C.) 39.51 GB NTFS Healthy (Boot, Page File, Crash Dump, Primary Part			
Bas 40.4 Oni Bas 99.5 Oni	sic D GB Disk 1 sic 88 GB line	System Reserved 500 MB NTFS Healthy (System, Active, Prir New Volume (D:) 99.87 GB NTFS Healthy (Primary Partition)	(C.) 39.51 GB NTFS Healthy (Boot, Page File, Crash Dump, Primary Part			
Bas 40.4 Oni Bas 99.8 Oni	sic D GB Disk 1 sic 88 GB line	System Reserved 500 MB NTFS Healthy (System, Active, Prir New Volume (D:) 99.87 GB NTFS Healthy (Primary Partition)	(C.) 39.51 GB NTFS Healthy (Boot, Page File, Crash Dump, Primary Part			

Figure 2-22 Disk initialization succeeded (Windows Server 2016)

**Step 12** After the volume is created, click **I** on the task bar and check whether a new volume appears in **This PC**. In this example, New Volume (D:) is the new volume.

If New Volume (D:) appears, the disk is successfully initialized and no further action is required.



#### Figure 2-23 This PC (Windows Server 2016)

# 2.5.4 Initializing a Data Disk in Linux (fdisk)

## Scenarios

This section uses CentOS 7.4 64bit to describe how to initialize a data disk attached to a server running Linux and use fdisk to partition the data disk.

The maximum disk capacity supported by MBR is 2 TB, and that supported by GPT is 18 EB. Therefore, use the GPT partition style if your disk capacity is larger than 2 TB. In Linux, if you choose to use the GPT partition style, the fdisk partitioning tool cannot be used. Use the parted partitioning tool instead. For details about disk partition styles, see Introduction to Data Disk Initialization Scenarios and Partition Styles.

The method for initializing a disk varies depending on the OS running on the server. This document is used for reference only. For the detailed operations and differences, see the product documents of the corresponding OS.

# Prerequisites

- A data disk has been attached to a server and has not been initialized.
- You have logged in to the server.
  - For how to log in to an ECS, see the *Elastic Cloud Server User Guide*.
  - For how to log in to a BMS, see the *Bare Metal Server User Guide*.

# **Creating and Mounting a Partition**

The following example shows you how a new primary partition can be created on a new data disk that has been attached to a server. The primary partition will be created using fdisk, and MBR is the default partition style. Furthermore, the partition will be formatted using the ext4 file system, mounted on **/mnt/sdc**, and configured with automatic mounting at system start.

**Step 1** Run the following command to query information about the new data disk:

#### fdisk -l

Information similar to the following is displayed: [root@ecs-test-0001 ~]# fdisk -l

```
Disk /dev/vda: 42.9 GB, 42949672960 bytes, 83886080 sectors
Units = sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disk label type: dos
Disk identifier: 0x000bcb4e
```

Device Boot Start End Blocks Id System /dev/vda1 \* 2048 83886079 41942016 83 Linux

Disk /dev/vdb: 107.4 GB, 107374182400 bytes, 209715200 sectors Units = sectors of 1 \* 512 = 512 bytes Sector size (logical/physical): 512 bytes / 512 bytes I/O size (minimum/optimal): 512 bytes / 512 bytes

In the command output, the server contains two disks. **/dev/vda** is the system disk, and **/dev/vdb** is the new data disk.

**Step 2** Run the following command to enter fdisk to partition the new data disk:

fdisk New data disk

In this example, run the following command:

#### fdisk /dev/vdb

Information similar to the following is displayed: [root@ecs-test-0001 ~]# fdisk /dev/vdb Welcome to fdisk (util-linux 2.23.2).

Changes will remain in memory only, until you decide to write them. Be careful before using the write command.

Device does not contain a recognized partition table Building a new DOS disklabel with disk identifier 0x38717fc1.

Command (m for help):

#### **Step 3** Enter **n** and press **Enter** to create a new partition.

```
Information similar to the following is displayed:
Command (m for help): n
Partition type:
p primary (0 primary, 0 extended, 4 free)
e extended
```

There are two types of disk partitions:

- Choosing **p** creates a primary partition.
- Choosing **e** creates an extended partition.

#### D NOTE

If the MBR partition style is used, a maximum of 4 primary partitions, or 3 primary partitions and 1 extended partition can be created. The extended partition cannot be used directly and must be divided into logical partitions before use.

Disk partitions created using GPT are not categorized.

**Step 4** In this example, a primary partition is created. Therefore, enter **p** and press **Enter** to create a primary partition.

Information similar to the following is displayed: Select (default p): p Partition number (1-4, default 1):

**Partition number** indicates the serial number of the primary partition. The value ranges from **1** to **4**.

Step 5 Enter the serial number of the primary partition and press Enter. Primary partition number 1 is used in this example. One usually starts with partition number 1 when partitioning an empty disk.

Information similar to the following is displayed: Partition number (1-4, default 1): 1 First sector (2048-209715199, default 2048):

**First sector** indicates the start sector. The value ranges from **2048** to **209715199**, and the default value is **2048**.

Step 6 Select the default start sector 2048 and press Enter.

The system displays the start and end sectors of the partition's available space. You can customize the value within this range or use the default value. The start sector must be smaller than the partition's end sector.

Information similar to the following is displayed: First sector (2048-209715199, default 2048): Using default value 2048 Last sector, +sectors or +size{K,M,G} (2048-209715199, default 209715199):

Last sector indicates the end sector. The value ranges from 2048 to 209715199, and the default value is 209715199.

Step 7 Select the default end sector 209715199 and press Enter.

The system displays the start and end sectors of the partition's available space. You can customize the value within this range or use the default value. The start sector must be smaller than the partition's end sector.

Information similar to the following is displayed:

Last sector, +sectors or +size{K,M,G} (2048-209715199, default 209715199): Using default value 209715199 Partition 1 of type Linux and of size 100 GiB is set

Command (m for help):

A primary partition has been created for the new data disk.

**Step 8** Enter **p** and press **Enter** to view details about the new partition.

Information similar to the following is displayed: Command (m for help): p

```
Disk /dev/vdb: 107.4 GB, 107374182400 bytes, 209715200 sectors
Units = sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disk label type: dos
Disk identifier: 0x38717fc1
```

 Device Boot
 Start
 End
 Blocks
 Id
 System

 /dev/vdb1
 2048
 209715199
 104856576
 83
 Linux

Command (m for help):

Details about the /dev/vdb1 partition are displayed.

#### **Step 9** Enter **w** and press **Enter** to write the changes to the partition table.

Information similar to the following is displayed: Command (m for help): w The partition table has been altered!

Calling ioctl() to re-read partition table. Syncing disks.

The partition is created.

#### **NOTE**

In case that you want to discard the changes made before, you can exit fdisk by entering **q**.

**Step 10** Run the following command to synchronize the new partition table to the OS:

#### partprobe

**Step 11** Run the following command to set the file system format for the new partition:

mkfs -t File system format /dev/vdb1

In this example, run the following command to set the **ext4** file system for the new partition:

#### mkfs -t ext4 /dev/vdb1

Information similar to the following is displayed: [root@ecs-test-0001 ~]# 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) Stride=0 blocks, Stripe width=0 blocks 6553600 inodes, 26214144 blocks 1310707 blocks (5.00%) reserved for the super user First data block=0 Maximum filesystem blocks=2174746624 800 block groups 32768 blocks per group, 32768 fragments per group 8192 inodes per group Superblock backups stored on blocks: 32768, 98304, 163840, 229376, 294912, 819200, 884736, 1605632, 2654208, 4096000, 7962624, 11239424, 20480000, 23887872 Allocating group tables: done

Writing inode tables: done Creating journal (32768 blocks): done Writing superblocks and filesystem accounting information: done

The formatting takes a period of time. Observe the system running status and do not exit.

#### NOTICE

The partition sizes supported by file systems vary. Therefore, you are advised to choose an appropriate file system based on your service requirements.

**Step 12** Run the following command to create a mount point:

#### mkdir Mount point

In this example, run the following command to create the /mnt/sdc mount point:

#### mkdir /mnt/sdc

**Step 13** Run the following command to mount the new partition on the created mount point:

#### mount Disk partition Mount point

In this example, run the following command to mount the new partition **/dev/vdb1** on **/mnt/sdc**:

#### mount /dev/vdb1 /mnt/sdc

**Step 14** Run the following command to view the mount result:

#### df -TH

Information similar to the following is displayed:

[root@ecs-t	est-0001	~]# df -TH
Filesystem	Type	Size Used Avail Use% Mounted on
/dev/vda1	ext4	43G 1.9G 39G 5% /
devtmpfs	devtm	pfs 2.0G 0 2.0G 0% /dev
tmpfs	tmpfs	2.0G 0 2.0G 0% /dev/shm
tmpfs	tmpfs	2.0G 9.1M 2.0G 1% /run
tmpfs	tmpfs	2.0G 0 2.0G 0% /sys/fs/cgroup
tmpfs	tmpfs	398M 0 398M 0% /run/user/0
/dev/vdb1	ext4	106G 63M 101G 1% /mnt/sdc

New partition /dev/vdb1 is mounted on /mnt/sdc.

#### **NOTE**

If the server is restarted, the mounting will become invalid. You can set automatic mounting for partitions at system start by modifying the **/etc/fstab** file. For details, see **Setting Automatic Mounting at System Start**.

----End

# Setting Automatic Mounting at System Start

Modify the **fstab** file to set automatic disk mounting at server start.

The following procedure shows how to set automatic disk mounting at server start by using UUIDs to identify disks in the **fstab** file. You are advised not to use device names to identify disks in the file because a device name may change (for example, from /dev/vdb1 to /dev/vdb2) during the server stop or start, resulting in improper server running after restart.

#### D NOTE

UUID is the unique character string for disk partitions in a Linux system.

**Step 1** Run the following command to query the partition UUID:

#### blkid Disk partition

In this example, run the following command to query the UUID of the **/dev/vdb1** partition:

#### blkid /dev/vdb1

Information similar to the following is displayed:

[root@ecs-test-0001 ~]# blkid /dev/vdb1 /dev/vdb1: UUID="0b3040e2-1367-4abb-841d-ddb0b92693df" TYPE="ext4"

The UUID of the **/dev/vdb1** partition is displayed.

Step 2 Run the following command to open the fstab file using the vi editor:

#### vi /etc/fstab

- **Step 3** Press **i** to enter the editing mode.
- Step 4
   Move the cursor to the end of the file and press Enter. Then, add the following information:

   UUID=0b3040e2-1367-4abb-841d-ddb0b92693df /mnt/sdc
   ext4 defaults
   0 2
- Step 5 Press Esc, enter :wq, and press Enter.

The system saves the configurations and exits the vi editor.

- **Step 6** Perform the following operations to verify the automatic mounting function:
  - 1. Run the following command to unmount the partition:

umount Disk partition

In this example, run the following command:

#### umount /dev/vdb1

- Run the following command to reload all the content in the /etc/fstab file: mount -a
- Run the following command to query the file system mounting information: mount | grep *Mount point*

In this example, run the following command:

#### mount | grep /mnt/sdc

If information similar to the following is displayed, the automatic mounting function takes effect:

root@ecs-test-0001 ~]# mount | grep /mnt/sdc /dev/vdb1 on /mnt/sdc type ext4 (rw,relatime,data=ordered)

----End

# 2.5.5 Initializing a Data Disk in Linux (parted)

# Scenarios

This section uses CentOS 7.4 64bit to describe how to initialize a data disk attached to a server running Linux and use parted to partition the data disk.

The maximum disk capacity supported by MBR is 2 TB, and that supported by GPT is 18 EB. Therefore, use the GPT partition style if your disk capacity is larger than 2 TB. In Linux, if you choose to use the GPT partition style, the fdisk partitioning tool cannot be used. Use the parted partitioning tool instead. For details about disk partition styles, see Introduction to Data Disk Initialization Scenarios and Partition Styles.

The method for initializing a disk varies depending on the OS running on the server. This document is used for reference only. For the detailed operations and differences, see the product documents of the corresponding OS.

# Prerequisites

- A data disk has been attached to a server and has not been initialized.
- You have logged in to the server.
  - For how to log in to an ECS, see the *Elastic Cloud Server User Guide*.
  - For how to log in to a BMS, see the *Bare Metal Server User Guide*.

# **Creating and Mounting a Partition**

The following example shows you how a new partition can be created on a new data disk that has been attached to a server. The partition will be created using parted, and GPT is used as the partition style. Furthermore, the partition will be formatted using the ext4 file system, mounted on **/mnt/sdc**, and configured automatic mounting at system start.

**Step 1** Run the following command to query information about the new data disk:

lsblk

Information similar to the following is displayed: root@ecs-test-0001~]# lsblk NAME MAJ:MIN RM SIZE RO TYPE MOUNTPOINT vda 253:0 0 40G 0 disk \_\_\_\_vda1 253:1 0 40G 0 part / vdb 253:16 0 100G 0 disk

In the command output, the server contains two disks. **/dev/vda** is the system disk, and **/dev/vdb** is the new data disk.

**Step 2** Run the following command to enter parted to partition the new data disk:

#### parted New data disk

In this example, run the following command:

#### parted /dev/vdb

Information similar to the following is displayed: [root@ecs-test-0001 ~]# parted /dev/vdb GNU Parted 3.1 Using /dev/vdb Welcome to GNU Parted! Type 'help' to view a list of commands. (parted)

#### **Step 3** Enter **p** and press **Enter** to view the current disk partition style.

Information similar to the following is displayed: (parted) p Error: /dev/vdb: unrecognised disk label Model: Virtio Block Device (virtblk) Disk /dev/vdb: 107GB Sector size (logical/physical): 512B/512B Partition Table: unknown Disk Flags: (parted)

In the command output, the **Partition Table** value is **unknown**, indicating that no partition style is set for the new disk.

**Step 4** Run the following command to set the disk partition style:

mklabel Disk partition style

In this example, run the following command to set the partition style to GPT: (Disk partition styles can be MBR or GPT.)

#### mklabel gpt

NOTICE

The maximum disk capacity supported by MBR is 2 TB, and that supported by GPT is 18 EB. Because a data disk currently supports up to 32 TB, use the GPT partition style if your disk capacity is larger than 2 TB.

If you change the disk partition style after the disk has been used, the data on the disk will be cleared. Therefore, select a proper disk partition style when initializing the disk.

**Step 5** Enter **p** and press **Enter** to view the disk partition style.

Information similar to the following is displayed: (parted) mklabel gpt (parted) p Model: Virtio Block Device (virtblk) Disk /dev/vdb: 107GB Sector size (logical/physical): 512B/512B Partition Table: gpt Disk Flags:

Number Start End Size File system Name Flags

(parted)

In the command output, the **Partition Table** value is **gpt**, indicating that the disk partition style is GPT.

Step 6 Enter unit s and press Enter to set the measurement unit of the disk to sector.

Step 7 Run the following command and press Enter:

mkpart Partition name Start sector End sector

In this example, run the following command:

#### mkpart test 2048s 100%

In this example, one partition is created for the new data disk. Variable *2048s* indicates the disk start sector, and variable *100%* indicates the disk end sector. The two values are used for reference only. You can determine the number of partitions and the partition size based on your service requirements.

Information similar to the following is displayed: (parted) mkpart opt 2048s 100% (parted)

#### **Step 8** Enter **p** and press **Enter** to view details about the new partition.

Information similar to the following is displayed: (parted) p Model: Virtio Block Device (virtblk) Disk /dev/vdb: 209715200s Sector size (logical/physical): 512B/512B Partition Table: gpt Disk Flags:

NumberStartEndSizeFile systemNameFlags12048s209713151s209711104stest

(parted)

#### **Step 9** Enter **q** and press **Enter** to exit parted.

Information similar to the following is displayed: (parted) q Information: You may need to update /etc/fstab.

You can set automatic disk mounting by updating the **/etc/fstab** file. Before updating the file, set the file system format for the partition and mount the partition on the mount point.

**Step 10** Run the following command to view the disk partition information:

#### lsblk

Information similar to the following is displayed: [root@ecs-test-0001 ~]# lsblk NAME MAJ:MIN RM SIZE RO TYPE MOUNTPOINT vda 253:0 0 40G 0 disk -vda1 253:1 0 40G 0 part / vdb 253:16 0 100G 0 disk -vdb1 253:17 0 100G 0 part

In the command output, /dev/vdb1 is the partition you created.

**Step 11** Run the following command to set the file system format for the new partition:

#### mkfs -t File system format /dev/vdb1

In this example, run the following command to set the **ext4** file system for the new partition:

#### mkfs -t ext4 /dev/vdb1

Information similar to the following is displayed: [root@ecs-test-0001 ~]# 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) Stride=0 blocks, Stripe width=0 blocks 6553600 inodes, 26213888 blocks 1310694 blocks (5.00%) reserved for the super user First data block=0 Maximum filesystem blocks=2174746624 800 block groups 32768 blocks per group, 32768 fragments per group 8192 inodes per group Superblock backups stored on blocks: 32768, 98304, 163840, 229376, 294912, 819200, 884736, 1605632, 2654208, 4096000, 7962624, 11239424, 20480000, 23887872

Allocating group tables: done Writing inode tables: done Creating journal (32768 blocks): done Writing superblocks and filesystem accounting information: done

The formatting takes a period of time. Observe the system running status and do not exit.

#### NOTICE

The partition sizes supported by file systems vary. Therefore, you are advised to choose an appropriate file system based on your service requirements.

**Step 12** Run the following command to create a mount point:

mkdir Mount point

In this example, run the following command to create the /mnt/sdc mount point:

#### mkdir /mnt/sdc

**Step 13** Run the following command to mount the new partition on the created mount point:

mount Disk partition Mount point

In this example, run the following command to mount the new partition **/dev/vdb1** on **/mnt/sdc**:

#### mount /dev/vdb1 /mnt/sdc

**Step 14** Run the following command to view the mount result:

#### df -TH

Information similar to the following is displayed:

[root@ecs-t	est-0001	~]# df -TH
Filesystem	Туре	Size Used Avail Use% Mounted on
/dev/vda1	ext4	43G 1.9G 39G 5% /
devtmpfs	devtm	npfs 2.0G 0 2.0G 0% /dev
tmpfs	tmpfs	2.0G 0 2.0G 0% /dev/shm
tmpfs	tmpfs	2.0G 9.0M 2.0G 1% /run
tmpfs	tmpfs	2.0G 0 2.0G 0% /sys/fs/cgroup
tmpfs	tmpfs	398M 0 398M 0% /run/user/0
/dev/vdb1	ext4	106G 63M 101G 1% /mnt/sdc

New partition /dev/vdb1 is mounted on /mnt/sdc.

## D NOTE

If the server is restarted, the mounting will become invalid. You can set automatic mounting for partitions at system start by modifying the **/etc/fstab** file. For details, see **Setting Automatic Mounting at System Start**.

----End

# Setting Automatic Mounting at System Start

Modify the **fstab** file to set automatic disk mounting at server start.

The following procedure shows how to set automatic disk mounting at server start by using UUIDs to identify disks in the **fstab** file. You are advised not to use device names to identify disks in the file because a device name may change (for example, from /dev/vdb1 to /dev/vdb2) during the server stop or start, resulting in improper server running after restart.

#### D NOTE

UUID is the unique character string for disk partitions in a Linux system.

**Step 1** Run the following command to query the partition UUID:

#### blkid Disk partition

In this example, run the following command to query the UUID of the **/dev/vdb1** partition:

#### blkid /dev/vdb1

Information similar to the following is displayed:

[root@ecs-test-0001 ~]# blkid /dev/vdb1 /dev/vdb1: UUID="0b3040e2-1367-4abb-841d-ddb0b92693df" TYPE="ext4"

The UUID of the /dev/vdb1 partition is displayed.

Step 2 Run the following command to open the fstab file using the vi editor:

#### vi /etc/fstab

- **Step 3** Press **i** to enter the editing mode.
- **Step 4** Move the cursor to the end of the file and press **Enter**. Then, add the following information:
  - UUID=0b3040e2-1367-4abb-841d-ddb0b92693df /mnt/sdc ext4 defaults 0 2
- Step 5 Press Esc, enter :wq, and press Enter.

The system saves the configurations and exits the vi editor.

- **Step 6** Perform the following operations to verify the automatic mounting function:
  - Run the following command to unmount the partition: umount Disk partition In this example, run the following command: umount /dev/vdb1
  - 2. Run the following command to reload all the content in the **/etc/fstab** file:

#### mount -a

3. Run the following command to query the file system mounting information: **mount | grep** *Mount point* 

In this example, run the following command:

#### mount | grep /mnt/sdc

If information similar to the following is displayed, the automatic mounting function takes effect:

root@ecs-test-0001 ~]# mount | grep /mnt/sdc /dev/vdb1 on /mnt/sdc type ext4 (rw,relatime,data=ordered)

----End

# 2.5.6 Initializing a Data Disk Greater Than 2 TB in Windows (Windows Server 2008)

# **Scenarios**

This section uses Windows Server 2008 R2 Standard 64bit to describe how to initialize a data disk whose capacity is larger than 2 TB. In the following operations, the capacity of the example disk is 3 TB.

The maximum disk capacity supported by MBR is 2 TB, and that supported by GPT is 18 EB. Therefore, use the GPT partition style if your disk capacity is larger than 2 TB. For details, see **Initializing a Data Disk Greater Than 2 TB in Windows** (Windows Server 2008). For details about disk partition styles, see **Introduction** to Data Disk Initialization Scenarios and Partition Styles.

The method for initializing a disk varies depending on the OS running on the server. This document is used for reference only. For the detailed operations and differences, see the product documents of the corresponding OS.

# Prerequisites

- A data disk has been attached to a server and has not been initialized.
- You have logged in to the server.
  - For how to log in to an ECS, see the *Elastic Cloud Server User Guide*.
  - For how to log in to a BMS, see the *Bare Metal Server User Guide*.

# Procedure

**Step 1** On the desktop of the server, click **Start**.

The **Start** window is displayed.

Step 2 Right-click Computer and choose Manage from the short-cut menu.

The Server Manager window is displayed.



Figure 2-24 Server Manager (Windows Server 2008)

**Step 3** Disks are listed in the right pane. If the new disk is in the offline state, bring it online before initialize it.

In the **Disk 1** area, right-click and choose **Online** from the shortcut menu.

When the Disk 1 status changes from **Offline** to **Not Initialized**, the disk has been brought online.

Server Manager								-	. 8 ×
File Action View Help									_
	8 😼								
Server Manager (ECS-EN-WIN8)	Disk Management		Actions						
	Volume	Layout Type	File System	Status	Capacity	Free Space	%	Disk Management	-
Diagnostics	(C:)	Simple Basic	NTES	Healthy (Boot, Crash Dump, Primary Partition)	39.90 GB	19.01 GB	48	More Actions	•
Configuration	System Reserved	Simple Basic	NIFS	Healthy (System, Active, Primary Partition)	100 MB	72 MB	12		
Windows Server Backup									
	Disk 0		-						
	40.00 GB	100 MB NTFS	rver (C:) 39.90	GB NTFS					
	Onine	Healthy (Syster	h, Ac Health	y (Boot, Crash Dump, Primary Partition)					
	Disk 1								
	Unknown 3072.00 GB Not Initialized	3072.00 GB Unallocated							
	Initia	alize Disk							
	Offli	ne							
	Prop	erties							
	Help								
	Unallocated	Primary part	tion						

Figure 2-25 Bring online succeeded (Windows Server 2008)

**Step 4** In the **Disk 1** area, right-click and choose **Initialize Disk** from the shortcut menu. The **Initialize Disk** dialog box is displayed.

5		( , ,	
Server Manager			_ 8 ×
File Action View Help			
🗢 🔿 💋 🗊 🔯 🛍	f 😼		
Server Manager (ECS-EN-WIN8)	Disk Management	Actions	
Roles     Featurer	Volume	Layout Type File System Status Capacity Free Space %	Disk Management 🔺
+ Diagnostics	(C:)	Simple Basic NTFS Healthy (Boot, Crash Dump, Primary Partition) 39.90 GB 19.01 GB 48	More Actions
🕀 👬 Configuration	System Reserved	Simple Basic NTFS Healthy (System, Active, Primary Partition) 100 MB 72 MB 72	
E Storage			
Disk Management			
		Initialize Disk	
		You must initialize a disk before Logical Disk Manager can access it.	
		Select disks:	
		☑ Disk 1	
		Use the following partition style for the selected disks:	
	1	C MBR (Master Boot Record)	
	<b></b>	GPT (GUID Partition Table)	
	Disk 0		
	40.00 GB	Windows. It is recommended for disks larger than 2TB, or disks used on	
	Online	Itanium-based computers.	
		OK Cancel	
	Disk 1		
	3072.00 GB	072.00 GB	
	Not Initialized	nallocated	
	Unallocated	rimary partition	

Figure 2-26 Initialize Disk (Windows Server 2008)

**Step 5** In the **Initialize Disk** dialog box, the to-be-initialized disk is selected. In this example, the disk capacity is larger than 2 TB. Therefore, select **GPT (GUID Partition Table)** and click **OK**.

The Server Manager window is displayed.

5		-		`							
📕 Server Manager											_ 8 ×
File Action View Help											
🗢 🔿 🖄 📷 🔽 🖬 😰 🗉	s 😰										
Server Manager (ECS-EN-WIN8)	Disk Management	: Volume I	List +	Graphical Vie	N					Actions	
Roles	Volume	Layout 1	Type	File System	Status		Capacity	Free Space	%	Disk Management	-
Diagnostics	🕞 (C:)	Simple I	Basic	NTFS	Healthy (Boot, Crash Dump, Prima	ary Partition)	39.90 GB	19.01 GB	48	More Actions	•
Configuration	System Reserved	Simple I	Basic	NTFS	Healthy (System, Active, Primary I	Partition)	100 MB	72 MB	72		
🖃 📇 Storage											
Disk Management											
_											
									ы		
	-								_		
	Disk 0			_							
	40.00 GB	System R 100 MB NT	<b>leser</b> FS	vec (C:) 39.90	GB NTFS						
	Online	Healthy (S	ystem,	Ac Health	y (Boot, Crash Dump, Primary Partit	tion)					
									_		
	Disk 1		1777.	///////////////////////////////////////			///////	////////	77		
	3071.88 GB	3071.88 G	в //						1		
	Online	Unallocate	d ///			New Simpl	e Volume				
	P	///////				New Span	ned Volume.	🎽			
						New Mirror	red Volume				
						New RAID	-5 Volume				
						Properties					
						Help					
	Unallocated	Primary p	partit	ion						<u> </u>	

Figure 2-27 Server Manager (Windows Server 2008)

#### NOTICE

The maximum disk capacity supported by MBR is 2 TB, and that supported by GPT is 18 EB. Because a data disk currently supports up to 32 TB, use the GPT partition style if your disk capacity is larger than 2 TB.

If you change the disk partition style after the disk has been used, the data on the disk will be cleared. Therefore, select a proper disk partition style when initializing the disk.

**Step 6** Right-click at the unallocated disk space and choose **New Simple Volume** from the shortcut menu.

The New Simple Volume Wizard window is displayed.

Figure 2-28 New Simple Volume Wizard (Windows Server 2008)



Step 7 Follow the prompts and click Next.

The **Specify Volume Size** page is displayed.

Figure 2-29 S	pecify Vol	ume Size	(Windows	Server	2008)			
Server Manager								_ 5 ×
File Action View Help	ନ୍ୟ							
Server Manager (ECS-EN-WIN8)	Disk Management V	olume List + Graphical View				S)       Space     9       Actions       Space     9       Disk Hanagement       More Actions		
Roles	Volume Lay	out Type File System	Status	Cap	acity Free Space	% D	isk Management	<b>_</b>
Configuration     Storage     Windows Server Backup	Specify Volume Choose a volu	Wizard Size me size that is between the	maximum and minimum sizes.	X	GB 19.01 GB 18 72 MB	48 72	More Actions	•
::::: Disk Management	Maximum disk Minimum disk i Simple volume	space in MB: space in MB: size in MB:	3145598 8 8125558 <u>*</u>			×		
	4 0 East 3071.88 GB 0nline 3071.88 GB 0nline	L80 G8	< Back Next >	Cancel				
	Unallocated Prin	nary partition						

**Step 8** Specify the volume size and click **Next**. The system selects the maximum volume size by default. You can specify the volume size as required. In this example, the default setting is used.

The Assign Drive Letter or Path page is displayed.

💂 Server Manager		_ 8 ×
File Action View Help		
🗢 🔿 🖄 🔂 🚺 🚺	g 😼	
Server Manager (ECS-EN-WIN8)	Disk Management Volume List + Graphical View	Actions
Roles     Features	Volume Layout Type File System Status Capacity Free Space %	Disk Management 🔺
Diagnostics	GB 19.01 GB 48	More Actions
Configuration     Storage     Windows Server Backup     Disk Management	Assign Drive Letter or Path For easier access, you can assign a drive letter or drive path to your partition.	
	Assign the following drive letter:     Mount in the following empty NTES folder:     Browse      Do not assign a drive letter or drive path	
	Image: Second	
	L - Disk 1 Basic 3071.88 GB Orline Unalocated	
	Unallocated Primary partition	

Figure 2-30 Assign Driver Letter or Path (Windows Server 2008)

**Step 9** Assign a drive letter or path to your partition and click **Next**. The system assigns drive letter D by default. In this example, the default setting is used.

The Format Partition page is displayed.

E carron Manager		
Ele Action View Help		_02
	P 🖬	
Server Manager (ECS-EN-WIN8)	Disk Management Volume List + Graphical View	Actions
Roles	Volume Layout Type File System Status Capacity Free Space %	Disk Management 🔺
Configuration	Itew Simple Volume Wizard     IX     / G8 19.01 G8 48     Format Partition     To store date on this pattion, you must format it first.	More Actions
	Choose whether you want to format this volume, and if so, what settings you want to use.  Choose whether you want to format this volume  Format this volume with the following settings: File system: NTF5 Allocation unit size: Default Volume label: New Volume  Volume label: New Volume  Concel  Concen Concen Concen Concen Concen Concen Concen	
	Unallocated Primary partition	

Figure 2-31 Format Partition (Windows Server 2008)

**Step 10** Specify format settings and click **Next**. The system selects the NTFS file system by default. You can specify the file system type as required. In this example, the default setting is used.

The **Completing the New Simple Volume Wizard** page is displayed.

New Simple Volume Wizard		X
	Completing the New Simple Volume Wizard	
	You have successfully completed the New Simple Volume Wizard. You selected the following settings: Volume type: Simple Volume Disk selected: Disk 1 Volume size: 3145598 MB Drive letter or path: D: File system: NTFS Allocation unit size: Default Volume label: New Volume Quick format: Yes To close this wizard, click Finish.	
	< Back Finish Cancel	

Figure 2-32 Completing the New Simple Volume Wizard

#### NOTICE

The partition sizes supported by file systems vary. Therefore, you are advised to choose an appropriate file system based on your service requirements.

#### Step 11 Click Finish.

Wait for the initialization to complete. When the volume status changes to **Healthy**, the initialization has finished successfully, as shown in **Figure 2-33**.

Figure 2-33 Disk initialization succeeded (Windows Server 2008)

a Server Hallager									10
File Action View Help									
🕨 🔿 者 📅 🚺 🖬 🖄 🛚	Y 😼								
Server Manager (ECS-EN-WIN8)	Disk Managemen	t Volume List ·	+ Graphical Viev	*				Actions	-
E Poles	Mahama	Louis Tree	Els Custom	Chaba	Conneibu	Erro Canan	01	Dick Management	
E 👸 Features	Volume	Cimple Pagia	I File System	Healthu (Reat, Grade Duma, Drimary Dartitica)	20 00 CP	10.01 CR	70	Disk Hunugemene	
Diagnostics	(C:)	Simple Basic	NIFS	Healthy (Boot, Crash Dump, Primary Partition)	39.90 GB	19.01 GB	48	More Actions	
Configuration	Custom December (D:)	Simple Basic	NIFS	Healthy (Primary Partuton)	3071	30/1.09	10		
Storage	System Reserved	i simple basic	NIFS	Healury (System, Acuve, Primary Partuton)	100 MD	72 MD	12		
Windows Server Backup									
Disk Management									
	4						<b>B</b>		
							<u> </u>		
	Disk 0								
	Basic	System Rese	rvec (C:)						
	40.00 GB	100 MB NTFS	39.90	GB NTFS					
	Online	Healthy (Syster	n, Ac Health	y (Boot, Crash Dump, Primary Partition)					
	Cipiele 1								
	Basic	New Volume	(D:)						
	3071.88 GB	3071.87 GB NT	FS				- 1		
	Online	Healthy (Primar	y Partition)				- 1		
							_		
								1	
		Delegance and	ition						

**Step 12** After the volume is created, click and check whether a new volume appears in **Computer**. In this example, New Volume (D:) is the new volume.

If New Volume (D:) appears, the disk is successfully initialized and no further action is required.



Figure 2-34 Computer (Windows Server 2008)

----End

# 2.5.7 Initializing a Data Disk Greater Than 2 TB in Windows (Windows Server 2012)

# **Scenarios**

This section uses Windows Server 2012 R2 Standard 64bit to describe how to initialize a data disk whose capacity is larger than 2 TB. In the following operations, the capacity of the sample disk is 3 TB.

The maximum disk capacity supported by MBR is 2 TB, and that supported by GPT is 18 EB. Therefore, use the GPT partition style if your disk capacity is larger than 2 TB. For details, see Initializing a Data Disk Greater Than 2 TB in Windows (Windows Server 2008). For details about disk partition styles, see Introduction to Data Disk Initialization Scenarios and Partition Styles.

The method for initializing a disk varies depending on the OS running on the server. This document is used for reference only. For the detailed operations and differences, see the product documents of the corresponding OS.

# Prerequisites

- A data disk has been attached to a server and has not been initialized.
- You have logged in to the server.
  - For how to log in to an ECS, see the *Elastic Cloud Server User Guide*.
  - For how to log in to a BMS, see the *Bare Metal Server User Guide*.

**Step 1** On the desktop of the server, click **i** in the lower area.

The Server Manager window is displayed.

Figure 2-35 Server Manager (Windows Server 2012)

Cashboard	WELCOME TO SERVER	MANAGER		Computer Management
Control One of the server     Local Server     All Servers     File and Storage Services	GLACK START	Confi 2 Ad 3 Ad 4 CN 5 Co	gure this local server d roles and features d other servers to manage rate a server group nnect this server to cloud serv	Demogranm and Openian Univers Dent Viewer ACDI Initiatur Local Security Palicy Microsoft Acure Services OOKC Data Secures (32-bit) OOKC Data Secures (34-bit) Performance Monitor Resource Ministra Security Configuration Security Configuration System Information Task Scheluler Windows Timeval with Advanced Security Windows Nemeral Data Advanced Security Windows Nemeral Data
	File and Stora Services Manapublity Events Performance BPA results	<sup>pe</sup> 1	Local Server     Manageability     Events     Services     Performance     BPA results	Windows PowerShaft (AB) Windows PowerShaft (SI Windows PowerShaft (SI (AB)) Windows Server Backup

Step 2 In the upper right corner, choose Tools > Computer Management. The Computer Management window is displayed.

Figure 2-36 Computer Management window (Windows Server 2012)



#### Step 3 Choose Storage > Disk Management.

Disks are displayed in the right pane.

£₽			Compu	ter Management			×
File Action View Help							
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🚁 Computer Management (Local	Volume	Layout Type	File System	Status	Capacity I	Actions	
A 🕅 System Tools	(C:)	Simple Basic	NTFS	Healthy (Boot, Crash Dump, Primary Partition)	39.66 GB	Disk Management	
P → Task Scheduler     B → Task Scheduler     B → Task Scheduler     D → Task Schedul	Car System Reserved	Simple Basic	NIPS	Healthy (bystem, Active, Primary Paristion)	300 MB 7	More Actions	,
	<		ш		>		
	Basic 40.00 GB Online	System Reserv 350 MB NTFS Healthy (Syster	red (C:) 39.66 ( n, Ac Health	58 NTFS y (Boot, Crash Dump, Primary Pa			
	Disk 1     Unknown     3072.00 GB     Offline	3072.00 G8 Unallocated			_		
	0	nline					
	P	roperties					
	н	lelp					
			_				
< 111 >	Unallocated	Primary partition	D				

Figure 2-37 Disk Management list (Windows Server 2012)

**Step 4** (Optional) If the new disk is in the offline state, bring it online before initializing it.

In the **Disk 1** area, right-click and choose **Online** from the shortcut menu.

When the status of Disk 1 changes from **Offline** to **Not Initialized**, the disk has been brought online.

F			Comput	er Management			*
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Computer Management (Local	Volume	Layout Type Fil	le System	Status	Capacity F	Actions	_
# 👔 System Tools	(C:)	Simple Basic NT	TFS	Healthy (Boot, Crash Dump, Primary Partition)	39.66 GB	Disk Management	
<ul> <li>b Test Scheduler</li> <li>b Else Level Viewer</li> <li>b Shared Folders</li> <li>b Police Manager</li> <li>c Police Manager</li> <li>c Police Manager</li> <li>b Windows Server Backup</li> <li>m Disk Management</li> <li>b Services and Applications</li> </ul>	uaraysuent nebetveu	запра разк. на		meaning (upsident, include, mining in anotomy	3301110	More Actions	
	C Disk 0		н		>		
	Basic 40.00 GB Online	System Reserved 350 MB NTFS Healthy (System, Ac	(C:) 39.66 G Health	i8 NTFS y (Boot, Crash Dump, Primary Pa			
	Circle Contract Contr	3072.00 G8 Unallocated		2			
		Initialize Disk					
		Offline					
		Properties					

Figure 2-38 Bring online succeeded (Windows Server 2012)

Step 5 In the Disk 1 area, right-click and choose Initialize Disk from the shortcut menu.The Initialize Disk dialog box is displayed.

Figure 2-39 Initialize Disk (Windows Server 2012)

Initialize Disk	x
You must initialize a disk before Logical Disk Manager can access it.	
Select disks:	
Disk 1	
Use the following partition style for the selected disks:	
O MBR (Master Boot Record)	
GPT (GUID Partition Table)	
Note: The GPT partition style is not recognized by all previous versions of Windows.	
OK Cance	I

**Step 6** In the **Initialize Disk** dialog box, the to-be-initialized disk is selected. In this example, the disk capacity is larger than 2 TB. Therefore, select **GPT (GUID Partition Table)** and click **OK**.

The **Computer Management** window is displayed.

Ø.			Compu	ter Management		_ O X
File Action View Help	63					
S Computer Management (Local	Volume	Layout Type	File System	Status	Capacity	Actions
System Tools	(C:)	Simple Basic NTI	NTES	Healthy (Boot, Crash Dump, Primary Partitio	n) 39.66 GB	Disk Management
O Task Scheduler     Event Viewer     Mared Folders     Mared Folders     Mared Folders     Mared Folders     O Foreformance     Device Manager     O Vindows Server Backup     Disk Management     Services and Applications		angan yana		roaning of poor, more printing randomy	20110	More Actions
	<		ш		>	
Bas 40,0 Oni Bas 307 Oni	CirDisk 0 Basic 40.00 GB Online	System Reserv 350 MB NTFS Healthy (Syster	n, Ac Health	G8 NTFS y (Boot, Crash Dump, Primary Pa		
	Disk 1 Basic 3071.88 GB	3071.88 GB				
	Grinne	unamocated		New	Spanned Volume	e
				New New	Striped Volume. Mirrored Volum	- e_
				New	RAID-5 Volume.	
ш )	Unallocated E	rimary partition		New Prop	RAID-5 Volume. eties	

Figure 2-40 Computer Management (Windows Server 2012)

# NOTICE

The maximum disk capacity supported by MBR is 2 TB, and that supported by GPT is 18 EB. Because a data disk currently supports up to 32 TB, use the GPT partition style if your disk capacity is larger than 2 TB.

If you change the disk partition style after the disk has been used, the data on the disk will be cleared. Therefore, select a proper disk partition style when initializing the disk.

**Step 7** Right-click at the unallocated disk space and choose **New Simple Volume** from the shortcut menu.

The **New Simple Volume Wizard** window is displayed.



Figure 2-41 New Simple Volume Wizard (Windows Server 2012)

**Step 8** Follow the prompts and click **Next**.

The **Specify Volume Size** page is displayed.

2	Computer Management	_ <b>D</b> X
File Action View Help		
🗢 🌩 🙎 📰 📓 🖬	2 B	
Computer Management (Local	Volume Layout Type File System Status	Capacity F Actions
⊿ 1 System Lools ► P Task Scheduler	New Simple Volume Wizard	39.66 GB 2 350 MB 7 Disk Management
<ul> <li>Event Viewer</li> <li>Shared Folders</li> <li>Local Users and Groups</li> </ul>	Specify Volume Size Choose a volume size that is between the maximum and minimum sizes.	More Actions
O Performance     Device Manager     Storage     Windows Server Backur:	Maximum disk space in MB: 3145599	
Disk Management	Minimum disk snace in MB: 8	
Services and Applications		
		>
	d	
	B 4	
	C Cancel	
	Basic         3071.88 GB           Online         Unallocated	
< III >	Unallocated Primary partition	

Figure 2-42 Specify Volume Size (Windows Server 2012)

**Step 9** Specify the volume size and click **Next**. The system selects the maximum volume size by default. You can specify the volume size as required. In this example, the default setting is used.

The Assign Drive Letter or Path page is displayed.

New Simple Volume Wizard
Assign Drive Letter or Path For easier access, you can assign a drive letter or drive path to your partition.
Assign the following drive letter:     Mount in the following empty NTFS folder:     Browse     Do not assign a drive letter or drive path
< Back Next > Cancel

Figure 2-43 Assign Driver Letter or Path (Windows Server 2012)

**Step 10** Assign a drive letter or path to your partition and click **Next**. The system assigns drive letter D by default. In this example, the default setting is used.

The Format Partition page is displayed.

Figure 2-44 Format Partition (Windows Server 2012)

New Simple Volume Wizard					
Format Partition To store data on this partition, you mu	ust format it first.				
Choose whether you want to format the	his volume, and if so, w	hat settings you want to use.			
○ Do not format this volume					
<ul> <li>Format this volume with the following the second sec</li></ul>	owing settings:				
File system:	~				
Allocation unit size:	Default	~			
Volume label:	New Volume				
Perform a quick format					
Enable file and folder cor	mpression				
	< Back	Next > Cance	1		

**Step 11** Specify format settings and click **Next**. The system selects the NTFS file system by default. You can specify the file system type as required. In this example, the default setting is used.

The Completing the New Simple Volume Wizard page is displayed.

Completing the New Simple Volume Wizard	
You have successfully completed the New Simple Vol Wizard. You selected the following settings:	ume
Volume type: Simple Volume Disk selected: Disk 1 Volume size: 3145598 MB Drive letter or path: D: File system: NTFS Allocation unit size: Default Volume label: New Volume	< III
To close this wizard, click Finish.	
< Back Finish	Cancel

Figure 2-45 Completing the New Simple Volume Wizard (Windows Server 2012)

## NOTICE

The partition sizes supported by file systems vary. Therefore, you are advised to choose an appropriate file system based on your service requirements.

#### Step 12 Click Finish.

Wait for the initialization to complete. When the volume status changes to **Healthy**, the initialization has finished successfully, as shown in **Figure 2-46**.

P			Comput	ter Management			×
File Action View Help							
🕨 🗣 🙎 📅 📓 💼 😫 🖬	f 😼						
Computer Management (Local	Volume	Layout Type	File System	Status	Capacity F	Actions	
System Tools	C:)	Simple Basic	NTES	Healthy (Boot, Crash Dump, Primary Partition)	39.66 GB 2	Disk Management	
<ul> <li>J Event Viewer</li> <li>J Shared Foldes</li> <li>Shared Foldes</li> <li>Social Users and Groups</li> <li>Performance</li> <li>Performance</li> <li>Storage</li> <li>Storage</li> <li>Storage</li> <li>Stronge</li> <li>Services and Applications</li> </ul>	Can System Reserved	Simple Basic	NTFS	Healthy (System, Active, Primary Parition)	350 MB 7	More Actions	
	<		ш	-	>		
	Basic 40.00 GB Online	System Reserv 350 MB NTFS Healthy (System	red (C:) 39.66 ( Health	38 NTFS y (Boot, Crash Dump, Primary Pa			
	Disk 1 Basic 3071,88 GB Online	New Volume (D:) 3071.87 GB NTF5 Healthy (Primary Partition)					
	Unallocated P	rimary partition					

Figure 2-46 Disk initialization succeeded (Windows Server 2012)

**Step 13** After the volume is created, click **Level** and check whether a new volume appears in **This PC**. In this example, New Volume (D:) is the new volume.

If New Volume (D:) appears, the disk is successfully initialized and no further action is required.



Figure 2-47 This PC (Windows Server 2012)

----End
# 2.5.8 Initializing a Data Disk Greater Than 2 TB in Linux (parted)

# Scenarios

This section uses CentOS 7.4 64bit to describe how to use parted to initialize a data disk whose capacity is larger than 2 TB. In the following operations, the capacity of the sample disk is 3 TB.

The maximum disk capacity supported by MBR is 2 TB, and that supported by GPT is 18 EB. Therefore, use the GPT partition style if your disk capacity is larger than 2 TB. In Linux, if you choose to use the GPT partition style, the fdisk partitioning tool cannot be used. Use the parted partitioning tool instead. For details about disk partition styles, see Introduction to Data Disk Initialization Scenarios and Partition Styles.

The method for initializing a disk varies depending on the OS running on the server. This document is used for reference only. For the detailed operations and differences, see the product documents of the corresponding OS.

# Prerequisites

- A data disk has been attached to a server and has not been initialized.
- You have logged in to the server.
  - For how to log in to an ECS, see the *Elastic Cloud Server User Guide*.
  - For how to log in to a BMS, see the *Bare Metal Server User Guide*.

# **Creating and Mounting a Partition**

The following example shows you how a new partition can be created on a new data disk that has been attached to a server. The partition will be created using parted, and GPT is used as the partition style. Furthermore, the partition will be formatted using the ext4 file system, mounted on **/mnt/sdc**, and configured automatic mounting at system start.

**Step 1** Run the following command to query information about the new data disk:

# lsblk

Information similar to the following is displayed:

```
[root@ecs-centos74 ~]# lsblk
NAME MAJ:MIN RM SIZE RO TYPE MOUNTPOINT
vda 253:0 0 40G 0 disk

vda1 253:1 0 1G 0 part /boot

vda2 253:2 0 39G 0 part /

vdb 253:16 0 3T 0 disk
```

In the command output, the server contains two disks. **/dev/vda** is the system disk, and **/dev/vdb** is the new data disk.

**Step 2** Run the following command to enter parted to partition the new data disk:

# parted New data disk

In this example, run the following command:

# parted /dev/vdb

Information similar to the following is displayed:

[root@ecs-centos74 ~]# parted /dev/vdb GNU Parted 3.1 Using /dev/vdb Welcome to GNU Parted! Type 'help' to view a list of commands. (parted)

# **Step 3** Enter **p** and press **Enter** to view the current disk partition style.

Information similar to the following is displayed:

(parted) p Error: /dev/vdb: unrecognised disk label Model: Virtio Block Device (virtblk) Disk /dev/vdb: 3299GB Sector size (logical/physical): 512B/512B Partition Table: unknown Disk Flags: (parted)

In the command output, the **Partition Table** value is **unknown**, indicating that no partition style is set for the new disk.

**Step 4** Run the following command to set the disk partition style:

### mklabel Disk partition style

In this example, run the following command to set the disk partition style to GPT: (Disk partition styles can be MBR or GPT.)

# mklabel gpt

# NOTICE

The maximum disk capacity supported by MBR is 2 TB, and that supported by GPT is 18 EB. Because a data disk currently supports up to 32 TB, use the GPT partition style if your disk capacity is larger than 2 TB.

If you change the disk partition style after the disk has been used, the data on the disk will be cleared. Therefore, select a proper disk partition style when initializing the disk.

# **Step 5** Enter **p** and press **Enter** to view the disk partition style.

Information similar to the following is displayed:

(parted) mklabel gpt (parted) p Model: Virtio Block Device (virtblk) Disk /dev/vdb: 3299GB Sector size (logical/physical): 512B/512B Partition Table: gpt Disk Flags: Number Start End Size File system Name Flags

(parted)

Step 6 Enter unit s and press Enter to set the measurement unit of the disk to sector.

**Step 7** Run the following command and press **Enter**:

### **mkpart** *Partition name Start sector End sector*

In this example, run the following command:

### mkpart opt 2048s 100%

In this example, one partition is created for the new data disk. Value **2048s** indicates the disk start sector, and **100%** indicates the disk end sector. The two values are used for reference only. You can determine the number of partitions and the partition size based on your service requirements.

Information similar to the following is displayed: (parted) mkpart opt 2048s 100% Warning: The resulting partition is not properly aligned for best performance. Ignore/Cancel? Ignore

If the preceding warning message is displayed, enter **Ignore** to ignore the performance warning.

### **Step 8** Enter **p** and press **Enter** to view details about the new partition.

Information similar to the following is displayed:

```
(parted) p
Model: Virtio Block Device (virtblk)
Disk /dev/vdb: 6442450944s
Sector size (logical/physical): 512B/512B
Partition Table: gpt
Disk Flags:
```

NumberStartEndSizeFile systemNameFlags12048s6442448895s6442446848sopt

Details about the **dev/vdb1** partition are displayed.

- **Step 9** Enter **q** and press **Enter** to exit parted.
- **Step 10** Run the following command to view the disk partition information:

lsblk

Information similar to the following is displayed:

```
[root@ecs-centos74 ~]# lsblk
NAME MAJ:MIN RM SIZE RO TYPE MOUNTPOINT
vda 253:0 0 40G 0 disk

vda1 253:1 0 1G 0 part /boot

vda2 253:2 0 39G 0 part /

vdb 253:16 0 3T 0 disk

vdb1 253:17 0 3T 0 part
```

In the command output, /dev/vdb1 is the partition you created.

**Step 11** Run the following command to set the file system format for the new partition:

mkfs -t File system format /dev/vdb1

In this example, run the following command to set the **ext4** file system for the new partition:

# mkfs -t ext4 /dev/vdb1

Information similar to the following is displayed:

[root@ecs-centos74 ~]# 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) Stride=0 blocks, Stripe width=0 blocks 201326592 inodes, 805305856 blocks 40265292 blocks (5.00%) reserved for the super user First data block=0 Maximum filesystem blocks=2952790016 24576 block groups 32768 blocks per group, 32768 fragments per group 8192 inodes per group Superblock backups stored on blocks: 32768, 98304, 163840, 229376, 294912, 819200, 884736, 1605632, 2654208, 4096000, 7962624, 11239424, 20480000, 23887872, 71663616, 78675968, 102400000, 214990848, 512000000, 550731776, 644972544 Allocating group tables: done Writing inode tables: done Creating journal (32768 blocks): done

The formatting takes a period of time. Observe the system running status and do not exit.

# NOTICE

The partition sizes supported by file systems vary. Therefore, you are advised to choose an appropriate file system based on your service requirements.

Step 12 Run the following command to create a mount point:

Writing superblocks and filesystem accounting information: done

mkdir Mount point

In this example, run the following command to create the /mnt/sdc mount point:

### mkdir /mnt/sdc

**Step 13** Run the following command to mount the new partition on the created mount point:

mount Disk partition Mount point

In this example, run the following command to mount the new partition **/dev/vdb1** on **/mnt/sdc**:

### mount /dev/vdb1 /mnt/sdc

**Step 14** Run the following command to view the mount result:

### df -TH

Information similar to the following is displayed:

 [root@ecs-centos74 ~]# df -TH

 Filesystem
 Type
 Size
 Used Avail
 Use% Mounted on

 /dev/vda2
 ext4
 42G
 1.5G
 38G
 4% /

 devtmpfs
 devtmpfs
 2.0G
 0
 2.0G
 0% /dev

 tmpfs
 tmpfs
 2.0G
 0
 2.0G
 0% /dev/shm

 tmpfs
 tmpfs
 2.0G
 8.9M
 2.0G
 1% /run

 tmpfs
 tmpfs
 2.0G
 0
 2.0G
 0% /sys/fs/cgroup

 /dev/vda1
 ext4
 1.1G
 153M
 801M
 17% /boot

 tmpfs
 tmpfs
 398M
 0
 398M
 0% /run/user/0

 /dev/vdb1
 ext4
 3.3T
 93M
 3.1T
 1% /mnt/sdc

New partition **dev/vdb1** is mounted on **/mnt/sdc**.

----End

# Setting Automatic Mounting at System Start

Modify the **fstab** file to set automatic disk mounting at server start.

The following procedure shows how to set automatic disk mounting at server start by using UUIDs to identify disks in the **fstab** file. You are advised not to use device names to identify disks in the file because a device name may change (for example, from /dev/vdb1 to /dev/vdb2) during the server stop or start, resulting in improper server running after restart.

### 

UUID is the unique character string for disk partitions in a Linux system.

**Step 1** Run the following command to query the partition UUID:

### blkid Disk partition

In this example, run the following command to query the UUID of the **/dev/vdb1** partition:

### blkid /dev/vdb1

Information similar to the following is displayed:

[root@ecs-test-0001 ~]# blkid /dev/vdb1 /dev/vdb1: UUID="0b3040e2-1367-4abb-841d-ddb0b92693df" TYPE="ext4"

The UUID of the /dev/vdb1 partition is displayed.

**Step 2** Run the following command to open the **fstab** file using the vi editor:

### vi /etc/fstab

- **Step 3** Press **i** to enter the editing mode.
- **Step 4** Move the cursor to the end of the file and press **Enter**. Then, add the following information:
  - UUID=0b3040e2-1367-4abb-841d-ddb0b92693df /mnt/sdc ext4 defaults 0 2
- Step 5 Press Esc, enter :wq, and press Enter.

The system saves the configurations and exits the vi editor.

- **Step 6** Perform the following operations to verify the automatic mounting function:
  - Run the following command to unmount the partition: umount Disk partition In this example, run the following command: umount /dev/vdb1
  - 2. Run the following command to reload all the content in the **/etc/fstab** file: **mount -a**

3. Run the following command to query the file system mounting information: **mount | grep** *Mount point* 

In this example, run the following command:

# mount | grep /mnt/sdc

If information similar to the following is displayed, the automatic mounting function takes effect:

root@ecs-test-0001 ~]# mount | grep /mnt/sdc /dev/vdb1 on /mnt/sdc type ext4 (rw,relatime,data=ordered)

----End

# 2.6 Obtaining the Domain Name

- **Step 1** Log in to the management console.
- **Step 2** Click the username in the upper right corner. In the displayed area, select **My Credential**.
- Step 3 In the Account Information area, obtain the domain name of the user.

----End

# 2.7 Obtaining the Region

- **Step 1** Log in to the management console.
- **Step 2** Check the information next to the  $\bigcirc$  icon in the upper left corner on the management console. The information there indicates the region.

----End

# **3**<sub>Management</sub>

# 3.1 Storage Pool Management

# 3.1.1 Expanding a Storage Pool

# Scenarios

When your storage pool space is insufficient, you can expand the storage pool capacity.

# **Applying for Expansion**

**Step 1** Contact customer service.

To apply for expanding a storage pool, click **here** to send an email or contact **customer service**.

**Step 2** Confirm requirements.

Fill out a storage pool **capacity expansion application form** and send it to your sales representative.

**Step 3** Expand the capacity.

Customer service will process your application. After the storage pool capacity is expanded, they will inform you through your sales representative or email.

Parameter	Description	Example Value
Domain Name	Specifies the domain name of the storage pool. For details, see <b>Obtaining the Domain</b> <b>Name</b> .	John Snow

Table 3-1 Parameters in the capacity expansion application form

Parameter	Description	Example Value
Storage Pool Name	Specifies the storage pool name.	DSS_UXN
ID	Specifies the storage pool ID.	da098bee-2dc2-4bfe-9d2 1-69bdc580f5ed
Region	Specifies the region where the storage pool belongs. For details, see <b>Obtaining the Region</b> .	-
AZ	Specifies the AZ where the storage pool belongs.	-
Capacity (TB)	Specifies the capacity to be expanded.	100 TB

----End

# 3.1.2 Deleting a Storage Pool

# Prerequisites

- The storage pool status is **Available**.
- No disk in the storage pool has been attached.

# Applying for Deletion

**Step 1** Contact customer service.

To apply for the deletion of a storage pool, click **here** to send an email or contact customer service.

- Step 2 Confirm requirements.
- **Step 3** Fill out a storage pool **deletion application form** and send it to your sales representative.
- **Step 4** Reclaim resource.

Customer service will delete your storage pool and reclaim resources in the pool. After the storage pool is deleted and resources are reclaimed, they will inform you through your sales representative or email.

Parameter	Description	Example Value
Domain Name	Specifies the domain name of the storage pool. For details, see section <b>Obtaining the</b> <b>Domain Name</b> .	John Snow
Region	Specifies the region where the storage pool belongs. For details, see section <b>Obtaining the</b> <b>Region</b> .	-
AZ	Specifies the AZ where the storage pool belongs.	-
Name	Specifies the storage pool name.	dss_01
ID	Specifies the storage pool ID.	da098bee-2dc2-4bfe-9d2 1-69bdc580f5ed

Table 3-2 Parameters in the deletion application form

----End

# 3.2 Disk Management

# 3.2.1 Detaching a Disk

# 3.2.1.1 Detaching a System Disk

# **Scenarios**

A system disk can only be detached offline, that is, its server must be in the **Stopped** state before the system disk is detached. Therefore, you need to first stop the server and then detach the system disk.

# Procedure

- **Step 1** Log in to the management console.
- Step 2 Under Computing, click Elastic Cloud Server.

The Elastic Cloud Server page is displayed.

**Step 3** In the server list, locate the row that contains the server whose system disk is to be detached, click **More** in the **Operation** column, and choose **Stop**.

When the server status changes to **Stopped**, the server has been stopped.

**Step 4** Click the name of this server.

The server details page is displayed.

- **Step 5** Click the **Disks** tab to view the system disk attached to the server.
- **Step 6** Locate the row that contains the system disk and click **Detach**.

The **Detach Disk** dialog box is displayed.

**Step 7** Click **OK** to detach the disk.

After the operation succeeded, the detached system disk is no longer displayed under the **Disks** tab.

----End

# 3.2.1.2 Detaching a Data Disk

# Scenarios

Data disks can be detached online or offline, which means that the server containing the to-be-detached data disk can either be in the **Running** or **Stopped** state.

• ECS

Detach a disk online. For details, see **Storage** > **Detaching an EVS Disk from a Running ECS** in the *Elastic Cloud Server User Guide*.

• BMS

Currently, SCSI disks can be attached to BMSs and used as data disks. You can detach a data disk either from a running or stopped BMS.

For a data disk attached to a server, the disk function is displayed as **Data disk**, and the disk status is displayed as **In-use** in the disk list. After the data disk has been detached from the server, the disk function remains unchanged, the disk status changes to **Available** for a non-shared data disk, and the disk status changes to **Available** for a shared data disk after it is detached from all its servers.

# **Detaching a Non-shared Disk**

- **Step 1** Log in to the management console.
- **Step 2** Choose **Dedicated Storage Service** > **Disks**.

The disk list page is displayed.

- **Step 3** Determine whether to view the server information before detaching the disk.
  - If you need to view the server information, perform the following procedure:
    - a. In the disk list, click the name of the to-be-detached disk. The disk details page is displayed.
    - b. Click the **Attachments** tab to view the servers where the target disk has been attached.
    - c. Click  $\square$  to select the server and click **Detach Disk**.

The **Detach Disk** dialog box is displayed.

- d. Click **OK** to detach the disk.
- If you do not need to view the server information, perform the following procedure:
  - a. In the disk list, locate the row that contains the target disk and click **Detach** in the **Operation** column.

The **Detach Disk** dialog box is displayed.

b. Click **OK** to detach the disk.

The disk list is displayed. The disk status is **Detaching**, indicating that the disk is being detached from the server.

When the status changes to Available, the disk is successfully detached.

----End

# **Detaching a Shared Disk**

**Step 1** Log in to the management console.

# **Step 2** Choose **Dedicated Storage Service** > **Disks**.

The disk list page is displayed.

- **Step 3** Determine whether to view the server information before detaching the disk.
  - If you need to view the server information, perform the following procedure:
    - a. In the disk list, click the name of the to-be-detached disk. The disk details page is displayed.
    - b. Click the **Attachments** tab to view the servers where the target disk has been attached.
    - c. Click to select the servers and click **Detach Disk**.

Shared disks support batch detachment so that you can select multiple servers at a time.

The **Detach Disk** dialog box is displayed.

- d. Click **OK** to detach the disk.
- If you do not need to view the server information, perform the following procedure:
  - a. In the disk list, locate the row that contains the target disk and click **Detach** in the **Operation** column.

The **Detach Disk** dialog box is displayed.

b. Click b to select the servers.

Shared disks support batch detachment so that you can select multiple servers at a time.

c. Click **OK** to detach the disk.

The disk list is displayed. The disk status is **Detaching**, indicating that the disk is being detached from the server.

If the shared EVS disk has been attached to multiple servers and needs to be detached from only some of its servers, the disk status will go back to **In-use** after the disk has been detached from the target servers. The disk status changes to **Available** only when it has been detached from all the servers.

----End

# 3.2.2 Deleting a Disk

# Scenarios

If a DSS disk is no longer used, you can release the virtual resources by deleting the disk from the system.

- Before deleting a disk, ensure that the disk status is **Available**, **Error**, **Expansion failed**, **Restoration failed**, or **Rollback failed**.
- Before you delete a shared disk, ensure that the disk has been detached from all its servers.

# Procedure

- **Step 1** Log in to the management console.
- **Step 2** Choose **Dedicated Storage Service** > **Disks**.

The disk list page is displayed.

- Step 3 In the disk list, locate the row that contains the target disk and choose More > Delete.
- **Step 4** (Optional) If multiple disks are to be deleted, select in front of each disk and click **Delete** in the upper area of the list.
- **Step 5** In the displayed dialog box, confirm the information and click **OK**.

----End

# 3.2.3 Expanding the Capacity of a Disk

# 3.2.3.1 Introduction to Expansion Scenarios

# What Is Capacity Expansion?

If the capacity of an existing disk is insufficient, you can expand the disk capacity.

Both system disks and data disks can be expanded. Currently, disk capacities can be expanded only. Capacity reduction is not supported.

# How to Expand the Disk Capacity?

You can expand the disk capacities when the disks are in the **In-use** or **Available** state.

- Expanding an In-use disk means that the to-be-expanded disk has been attached to a server. Currently, only some server OSs support the expansion of In-use disks. Therefore, ensure that your server OS meets the requirements before you expand an In-use disk. For details, see Expanding an In-use Disk.
- Expanding an Available disk means that the to-be-expanded disk has not been attached to any server. For details, see **Expanding an Available Disk**.

# NOTICE

When a disk has been put to use, you must check the disk partition style before expanding its capacity. The details are as follows:

- If the MBR partition style is used, the maximum disk capacity supported is 2 TB (2048 GB), and the disk space exceeding 2 TB cannot be allocated and used.
- If the GPT partition style is used, the maximum disk capacity supported is 18 EB (19327352832 GB). A data disk supports up to 32 TB (32768 GB) so that you can expand the capacity of a data disk to up to 32 TB when GPT is used.

If the in-use partition style is MBR and the disk capacity needs to be expanded to over 2 TB, change the partition style from MBR to GPT. Ensure that the disk data has been backed up before changing the partition style because services will be interrupted and data on the disk will be cleared during this change.

# 3.2.3.2 Expanding an In-use Disk

# Scenarios

Currently, disk capacities can be expanded, but cannot be reduced.

Expanding an In-use disk means that the to-be-expanded disk has been attached to a server.

- During such an expansion, the server containing the to-be-expanded disk must be in the **Running** or **Stopped** state.
- Shared disks must be expanded when they are in the **Available** state. For details, see **Expanding an Available Disk**.
- Currently, only some server OSs support the expansion of In-use disks. Therefore, ensure that your server OS meets the requirements for expanding In-use disks before operation. Table 3-3 lists the server OSs, including the OS images listed on the Public Images page of the IMS console and others, that support In-use disk expansion.

If your server OS does not support capacity expansion of In-use disks, detach the disk and then expand the disk capacity. Otherwise, you may need to stop the server and then start it to make the expansion takes effect.

Table 3-3Supported OSs

OS	Version
CentOS	7.4 64bit

OS	Version
	7.3 64bit
	7.2 64bit
	6.8 64bit
	6.7 64bit
	6.5 64bit
Debian	8.6.0 64bit
	8.5.0 64bit
Fedora	25 64bit
	24 64bit
SUSE	SUSE Linux Enterprise Server 12 SP2 64bit
	SUSE Linux Enterprise Server 12 SP1 64bit
	SUSE Linux Enterprise Server 11 SP4 64bit
	SUSE Linux Enterprise Server 12 64bit
OpenSUSE	42.2 64bit
	42.1 64bit
Oracle Linux Server release	7.3 64bit
	7.2 64bit
	6.8 64bit
	6.7 64bit
Ubuntu Server	16.04 64bit
	14.04 64bit
	14.04.4 64bit
Windows	Windows Server 2008 R2 Enterprise 64bit
	Windows Server 2012 R2 Standard 64bit
	Windows Server 2016 Standard 64bit
Redhat Linux Enterprise	7.3 64bit
	6.8 64bit

# Procedure

- **Step 1** Log in to the management console.
- **Step 2** Choose **Dedicated Storage Service** > **Disks**.

The disk list page is displayed.

- **Step 3** Determine whether to view the server information before expanding the disk.
  - If you need to view the server information, perform the following procedure:
    - a. In the disk list, click the name of the to-be-expanded disk.
      - The disk details page is displayed.
    - b. Click the **Attachments** tab to view the server where the target disk has been attached.
    - c. Click **Expand Capacity** in the upper right corner of the page. The expansion page is displayed.
  - If you do not need to view the server information, perform the following procedure:
    - a. In the disk list, locate the row that contains the target disk and choose More > Expand Capacity in the Operation column. The expansion page is displayed.
- Step 4 Set the Add Capacity (GB) parameter as prompted and click Next.
- Step 5 On the Details page, check the disk information again.
  - If you do not need to modify the specifications, click **Submit** to start the expansion.
  - If you need to modify the specifications, click **Previous** to modify parameters.

After the specifications are submitted, the disk list page is displayed.

**Step 6** In the disk list, view the capacity of the expanded disk.

When the disk status changes from **Expanding** to **In-use**, the additional capacity has been added to the disk and the expansion succeeded.

# **NOTE**

If the expansion fails, customer service personnel will contact you and help you handle this error. Do not perform any operations on the disk before the customer service personnel contact you. If you require that the error be handled as soon as possible, contact our customer service personnel. The disk will no longer be charged once its status changes to **Expansion failed**.

**Step 7** After the capacity expansion has succeeded, perform subsequent operations for the additional space.

The operation method varies depending on the server OS.

- For Windows OSs, see Performing Post-Expansion Operations for a Windows Disk.
- For Linux OSs,

- If the fdisk partitioning tool will be used, see Performing Post-Expansion Operations for a Disk in Linux (fdisk), Performing Post-Expansion Operations for a SCSI Data Disk in Linux (fdisk), or Performing Post-Expansion Operations for a System Disk in Linux (fdisk).
- If the parted partitioning tool will be used, see **Performing Post-Expansion Operations for a Disk in Linux (parted)**.

----End

# 3.2.3.3 Expanding an Available Disk

# Scenarios

Currently, disk capacities can be expanded, but cannot be reduced.

Expanding an **Available** disk means that the to-be-expanded disk has not been attached to a server.

Shared disks cannot be expanded when they are in the **In-use** state. Therefore, you need to detach the disk from all its servers and then perform the expansion. Once the disk status changes to **Available**, you can expand the disk according to the operations provided in this topic.

# Procedure

- **Step 1** Log in to the management console.
- **Step 2** Choose **Dedicated Storage Service** > **Disks**.

The disk list page is displayed.

Step 3 (Optional) If the to-be-expanded disk has been attached to a server, detach it first. For details, see Detaching a Disk.

When the disk status changes to **Available**, the disk is successfully detached.

**Step 4** In the disk list, locate the row that contains the target disk and choose **More** > **Expand Capacity** in the **Operation** column.

The expansion page is displayed.

- Step 5 Set the Add Capacity (GB) parameter as prompted and click Next.
- **Step 6** On the **Details** page, check the disk information again.
  - If you do not need to modify the specifications, click **Submit** to start the expansion.
  - If you need to modify the specifications, click **Previous** to modify parameters.

After the specifications are submitted, the disk list page is displayed.

**Step 7** In the disk list, view the capacity of the expanded disk.

When the disk status changes from **Expanding** to **Available**, the additional capacity has been added to the disk and the expansion succeeded.

# 

If the expansion fails, customer service personnel will contact you and help you handle this error. Do not perform any operations on the disk before the customer service personnel contact you. If you require that the error be handled as soon as possible, contact our customer service personnel. The disk will no longer be charged once its status changes to **Expansion failed**.

- Step 8 Attach the expanded disk to a server. For details, see Step 3: Attach a Disk.
- **Step 9** After the capacity expansion has succeeded, perform subsequent operations for the additional space.

The operation method varies depending on the server OS.

- For Windows OSs, see Performing Post-Expansion Operations for a Windows Disk.
- For Linux OSs,
  - If the fdisk partitioning tool will be used, see Performing Post-Expansion Operations for a Disk in Linux (fdisk), Performing Post-Expansion Operations for a SCSI Data Disk in Linux (fdisk), or Performing Post-Expansion Operations for a System Disk in Linux (fdisk).
  - If the parted partitioning tool will be used, see Performing Post-Expansion Operations for a Disk in Linux (parted).

----End

# 3.2.3.4 Performing Post-Expansion Operations for a Windows Disk

# **Scenarios**

After expanding the disk capacity on the management console, you need to log in to the Windows server to allocate the additional space to an existing volume or a new volume.

This topic uses Windows Server 2008 R2 Enterprise as the sample OS and provides the following capacity expansion methods:

- System disk: Add the additional space to volume (C:).
- Data disk: If volume (D:) already exists, add the additional space to volume (D:).

If you want to create a new volume such as volume (E:), expanding the disk is not the right choice. You need to create a new disk, attach it to server, and initialize it for use.

The method for allocating the additional space varies depending on the server OS. This document is used for reference only. For the detailed operations and differences, see the corresponding OS documents.

# NOTICE

Performing the expansion operations with caution. Misoperation may lead to data loss or exceptions. Therefore, you are advised to use CBR to back up the disk data before expansion. For details, see Managing a Backup.

# Prerequisites

- You have logged in to a server.
  - For how to log in to an ECS, see the *Elastic Cloud Server User Guide*.
  - For how to log in to a BMS, see the *Bare Metal Server User Guide*.
- You have attached the disk to the server, and the additional space has not been allocated.

# System Disk: Add Additional Space to Volume (C:)

In this example, the system disk has 50 GB originally, and 22 GB is added on the management console. The following procedure describes how to add this 22 GB to volume (C:) on the server. After the operation is complete, volume (C:) will have 72 GB of capacity and can be used as a system volume.

**Step 1** On the desktop of the server, right-click **Computer** and choose **Manage** from the shortcut menu.

The Server Manager window is displayed.

Step 2 In the navigation tree, choose Storage > Disk Management.

The **Disk Management** window is displayed.

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File Action View Help							
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🗄 🚏 Roles	bisk Hundgemen	t voidine Eart i	Chapter and	Chalter -	0.0	Dick Management	
🗉 🚮 Features	Volume	Layout Type	Hile System	Status Healthy (Reat, Dago File, Grady Dump, Drimary Dartition)	Cap	Disk Hallagement	-
Diagnostics	System Reserved	Simple Basic	NTES	Healthy (System Active Primary Partition)	100	More Actions	•
Configuration     Sterage		ompic book		reading (append) reader in a county	100		
Storage	Disk 0     Basc G7     Zsc G7     Zsc G7     Orline	System Ret 100 MB NTFS Healthy (Syst	(C.) 49.90 GB NTI Healthy (Boo	F5 1, Page File, Crash Dun Unallocated			
	Disk 1 Unknown 100.00 GB Not Initialized	100.00 GB Unallocated					
X	Unallocated	Primary parti	tion				

Figure 3-1 Disk Management (system disk)

# D NOTE

If you cannot view the additional space, right-click **Disk Management** and choose **Refresh** from the shortcut menu.

- **Step 3** On the **Disk Management** page, select the disk and partition that needs to be extended. The current partition size and unallocated disk space are displayed.
- Step 4 Right-click the selected disk and choose Extend Volume.

3						
🛼 Server Manager						_ 8 ×
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Roles	Volume	Layout Type File System Stat	us	Cap	Disk Management	<b>_</b>
Features	(C:)	Simple Basic NTFS Heal	Ithy (Boot, Page File, Crash Dump, Primary Partition)	49.5	Mara Actions	
Configuration	System Reserved	Simple Basic NTFS Heal	Ithy (System, Active, Primary Partition)	100	Hore Actoris	,
E Storage						
🐌 Windows Server Backup						
Disk Management						
	•			Þ		
	Basic	Surtem Rev (C)				
	72.00 GB	100 MB NTFS 49.90 GB NTFS	Open			
	Online	Healthy (Syst Healthy (Boot, Pag	e File, Cr Explore			
	<u>1</u>					
	Disk 1		Mark Partition as Active			
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	Not Initialized	Unallocated		- 11		
			Extend Volume	_		
			Add Mirror			
			Delete Volume			
			Properties			
			Help			
<u> </u>	Unallocated	Primary partition				

Figure 3-2 Choosing Extend Volume

**Step 5** On the displayed **Extend Volume Wizard** page, click **Next**.

Figure 3-3 Extend Volume Wizard



Step 6 In the text box to the right of Select the amount of space in MB shown in Figure 3-4, enter the amount of the additional capacity and click Next.



Figure 3-4 Selecting space

**Step 7** Click **Finish** to complete the wizard.

After the expansion has succeeded, the disk capacity is greater than the original capacity.

Figure 3-5 Successful capacity expansion

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Features     Diagnostics	🖙 (C:)	Simple Basic NTFS Healthy (Boot, Page File, Crash Dump, Primary Partition) 71.	•
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	•		
	Basic	System Reserved (C:)	
	72.00 GB	100 MB NTFS 71.90 GB NTFS	
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	ColDials 1		
	Unknown		
	Not Initialized	100.00 GB Unallocated	
<u>۱</u>	Unailocated	Primary partition	

----End

# Data Disk: Add Additional Space to Volume (D:)

In this example, the data disk has 100 GB originally, and 50 GB is added on the management console. The following procedure describes how to add this 50 GB to volume (D:) on the server. After the operation is complete, volume (D:) has 150 GB of capacity and can be used as a data volume.

**Step 1** On the desktop of the server, right-click **Computer** and choose **Manage** from the shortcut menu.

The Server Manager window is displayed.

**Step 2** In the navigation tree, choose **Storage > Disk Management**.

The **Disk Management** window is displayed.

Figure 3-6 Disk Management (data disk)

File       Action       View       Help         Image: Server Manager (ECS-8704)       Image: Server Manager (ECS-8704)       Image: Server Manager (ECS-8704)       Actions         Image: Server Manager (ECS-8704)       Image: Server Manager (ECS-8704)       Image: Server Manager (ECS-8704)       Actions         Image: Server Manager (ECS-8704)         Image: Server Manager (ECS-8704)       Image: Server Manager (ECS-8704)       Image: Server Manager (ECS-8704)       Image: Server Manager (ECS-8704)       More Actions         Image: Server Manager (ECS-8704)       Image: Server Manager (ECS-8704)       Image: Server Manager (ECS-8704)       More Actions         Image: Server Manager (ECS-8704)       Image: Server Manager (ECS-8704)       Image: Server Manager (ECS-8704)       More Actions         Image: Server Manager (ECS-8704)       Image: Server Manager (ECS-8704)       Image: Server Manager (ECS-8704)       More Actions         Image: Server Manager (ECS-8704)       Image: Server Manager (ECS-8704)       Image: Server (ECS-8704)       More Actions         Image: Server Manager (ECS-8704)       Image: Server (ECS-8704)       Image: Server (ECS-8704)       More Actions         Image: Server Manager (ECS-8704)       Image: Server (ECS-8704)       Image: Server (ECS-8704)<
Image: Server Manager (ECS-8704)     Disk Management     Volume List + Graphical Vew     Actions       Image: Server Manager (ECS-8704)     Image: Server Manager (ECS-8704)     Image: Server Manager (ECS-8704)     Disk Management     Volume List + Graphical Vew     Actions       Image: Server Manager (ECS-8704)     Image: Server (ECS-8704)     Image: Server Manager (ECS-8704
Server Manager (ECS-8704)     Disk Management     Volume List + Graphical View     Actions       Image: Server Manager (ECS-8704)     Volume     Layout     Type     File System     Status     Disk Management     More Actions       Image: Disk Derformance     Image: Disk Derformance     Simple     Basic     NTFS     Healthy (System, Active, Primary Partition)     More Actions       Image: Disk Derformance     Image: Disk Derformance     Simple     Basic     NTFS     Healthy (System, Active, Primary Partition)       Image: Disk Derformance     Image: Disk Derformance     Simple     Basic     NTFS     Healthy (System, Active, Primary Partition)       Image: Disk Derived Manager       Image: Disk Derived Manager     Image: Disk Derived Manager     Image: Disk Derived Manager     Image: Disk Derived Manager     Image: Disk Derived Manager   <
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Bisk 1
Basic New Volume (D:)
Doline Healthy (Grimary Partition) Unallocated
Preserve and the second s
Inallocated Primary partition

# **NOTE**

If you cannot view the additional space, right-click **Disk Management** and choose **Refresh** from the shortcut menu.

- **Step 3** On the **Disk Management** page, select the disk and partition that needs to be extended. The current partition size and unallocated disk space are displayed.
- **Step 4** Right-click the selected disk and choose **Extend Volume**.

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Server Manager (ECS-B704)	Disk Management	: Volume	List +	Graphical Viev	N	Actions	
Roles	Volume	Layout	Туре	File System	Status	Disk Management	-
Configuration     Configuration     Configuration	(C:)     New Volume (D:)     System Reserved	Simple Simple Simple	Basic Basic Basic	NTFS NTFS NTFS	Healthy (Boot, Page File, Crash Dump, Healthy (Primary Partition) Healthy (System, Active, Primary Parti	More Actions	•
Windows Server Backup Disk Management					Open Explore		
	4				Mark Partition as Active Change Drive Letter and Paths Format		
	Disk 0 Basic 50.00 GB Online	<b>System</b> 100 MB N Healthy ()	<b>Rese</b> i TFS Systerr	<b>(C:)</b> 49.90 Gi Healthy	Extend Volume Shrink Volume Add Mirror Delete Volume		
	Disk 1 Basic 150.00 GB Online	New Vol 100.00 Gi Healthy (l	<b>ume (</b> B NTFS Primary	D:) Partition)	Help Unallocated		
	Unallocated	Primary	partit	ion			

Figure 3-7 Choosing Extend Volume (Windows Server 2008)

Step 5 On the displayed Extend Volume Wizard page, click Next.

Figure 3-8 Extend Volume Wizard (Windows Server 2008)

Server Manager			<u>_8 ×</u>
File Action View Help			
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Server Manager (ECS-B704)	Disk Management Volume List	+ Graphical View	Actions
Roles     Features	Volume Layout Typ	e   File System   Status	Disk Management 🔺
<ul> <li>Diagnostics</li> </ul>	Extend Volume Wizard		tions +
Event Viewer      OPerformance      Device Management	e	Welcome to the Extend Volume	2
Configuration		WIZalu	
<ul> <li>Storage</li> <li>Windows Server Backup</li> <li>Disk Management</li> </ul>		This wizard helps you increase the size of simple and spanned volumes. You can extend a volume by addir space from one or more additional disks.	ŋ
		To continue, click Next.	
	E Bi S		
	E Bi 1		
		Next >	Cancel
	Unallocated Primary par	tition	

Step 6 In the text box to the right of Select the amount of space in MB shown in Figure 3-9, enter the amount of the additional capacity and click Next.

Server Manager		_ @ ×
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Performance		
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Configuration		
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Disk Management	Available: Selected:	
	Add > Disk 1 S1200 MB	
	< Remove	
	C Remove All	
	B	
	5	
	O Total volume size in megabytes (MB): 153597	
	Maximum available enace in MB: 51200	
	Bi Select the amount of space in MB: 51200	
	1	
	0	
	< Back Next >	Cancel
	Unallocated Primary partition	
		J

Figure 3-9 Selecting space (Windows Server 2008)

Step 7 Click Finish to complete the wizard.

After the expansion has succeeded, the disk capacity is greater than the original capacity.

Figure 3-10 Capacity expansion succeeded (Windows Server 2008)



----End

# 3.2.3.5 Performing Post-Expansion Operations for a Disk in Linux (fdisk)

# **Scenarios**

In Linux, after the capacity expansion succeeded, the additional disk space needs to be allocated to an existing partition or a new partition.

This topic uses CentOS 7.0 64bit to describe how to allocate the additional disk space to a partition using fdisk.

The method for allocating the additional space varies depending on the server OS. This document is used for reference only. For the detailed operations and differences, see the corresponding OS documents.

Based on your service requirements and disk condition, you can choose either of the following ways to allocate the additional disk space:

• Create a new partition (services will not be interrupted).

Creating a new partition after expansion does not require the original partitions to be unmounted. Therefore, the impacts on services are minor than expanding an existing partition. This method is recommended for system disks or disks carrying services that cannot be interrupted.

If the MBR partition style is used, ensure that the disk capacity does not exceed 2 TB and the number of partitions does not reach the upper limit after the expansion.

• Expand an existing partition (services will be interrupted).

If the MBR partition style is used and the number of partitions has reached the upper limit, you can only allocate the additional space to an existing partition. Expanding an existing partition does not delete its data, but requires the partition to unmount. Therefore, services will be interrupted.

If the MBR partition style is used and the disk capacity after expansion will exceed 2 TB, the space exceeding 2 TB cannot be used. To make use of that space, change the disk partition style from MBR to GPT. Data on the disk will be cleared during such a change. Therefore, back up the disk data before changing the partition style.

# NOTICE

Performing the expansion operations with caution. Misoperation may lead to data loss or exceptions. Therefore, you are advised to use CBR to back up the disk data before expansion. For details, see **Managing a Backup**.

# Prerequisites

- You have logged in to the server.
  - For how to log in to an ECS, see the *Elastic Cloud Server User Guide*.
    - For how to log in to a BMS, see the *Bare Metal Server User Guide*.
- You have attached the disk to the server, and the additional space has not been allocated.

# Checking File Systems on the To-be-expanded Disk

Before expanding the disk capacity, check whether the file systems on the disk can be properly mounted.

**Step 1** (Optional) If there is an unmounted partition, run the following command to mount the partition on the specified directory:

mount Disk partition Mount point

Example command:

### mount /dev/xvdb1 /mnt/sdc

If the system returns a mount error, check whether the file system is correctly created. For example, a user may create the file system for the **/dev/xvdb** disk instead of the **/dev/xvdb1** partition. In this case, what mounted is actually the **/dev/xvdb** disk, but not the **/dev/xvdb1** partition.

**Step 2** Run the following command to view the disk mounting information:

### df -TH

Information similar to the following is displayed:

[root@ecs-b656 test]# df -TH								
Filesystem	Type	Size Used Avail Use% Mounted on						
/dev/xvda2	xfs	11G 7.4G 3.2G 71%/						
devtmpfs	devtn	npfs 4.1G 0 4.1G 0% /dev						
tmpfs	tmpfs	4.1G 82k 4.1G 1% /dev/shm						
tmpfs	tmpfs	4.1G 9.2M 4.1G 1% /run						
tmpfs	tmpfs	4.1G 0 4.1G 0% /sys/fs/cgroup						
/dev/xvda3	xfs	1.1G 39M 1.1G 4% /home						
/dev/xvda1	xfs	1.1G 131M 915M 13% /boot						
/dev/xvdb1	ext4	11G 38M 9.9G 1% /mnt/sdc						

In the command output, the file system of the **/dev/xvdb1** partition is **ext4**, and the partition is mounted on **/mnt/sdc**.

**Step 3** Run the following command to switch to the mounting directory to view the files on the disk:

Il Mounting directory

Example command:

# ll /mnt/sdc

If the files on the disk can be viewed, the disk is normal and can be expanded.

----End

# Viewing the Partition Style

Before allocating the additional space, query the current disk partition style. If MBR is used, you can use either the fdisk or parted partitioning tool. If GPT is used, you must use the parted partitioning tool.

**Step 1** Run the following command to view the current disk partition style:

# fdisk -l

Information similar to the following is displayed:

[root@ecs-1120 linux]# fdisk -l

Disk /dev/xvda: 42.9 GB, 42949672960 bytes, 83886080 sectors Units = sectors of 1 \* 512 = 512 bytes Sector size (logical/physical): 512 bytes / 512 bytes I/O size (minimum/optimal): 512 bytes / 512 bytes Disk label type: dos Disk identifier: 0x000c5712

Device Boot Start End Blocks Id System /dev/xvda1 2048 83886079 41942016 83 Linux WARNING: fdisk GPT support is currently new, and therefore in an experimental phase. Use at your own discretion.

Disk /dev/xvdb: 161.1 GB, 161061273600 bytes, 314572800 sectors Units = sectors of 1 \* 512 = 512 bytes Sector size (logical/physical): 512 bytes / 512 bytes I/O size (minimum/optimal): 512 bytes / 512 bytes Disk label type: gpt

# Start End Size Type Name
1 34 209715166 100G Microsoft basic opt
2 209715167 314572766 50G Microsoft basic opt1
WARNING: fdisk GPT support is currently new, and therefore in an experimental phase. Use at your own discretion.

Disk /dev/xvdc: 42.9 GB, 42949672960 bytes, 83886080 sectors Units = sectors of 1 \* 512 = 512 bytes Sector size (logical/physical): 512 bytes / 512 bytes I/O size (minimum/optimal): 512 bytes / 512 bytes Disk label type: gpt

 #
 Start
 End
 Size
 Type
 Name

 1
 34
 16777215
 8G
 Microsoft basic opt

 2
 16777216
 83884031
 32G
 Microsoft basic opt

In the command output, parameter **Disk label type** indicates the disk partition style. Value **dos** indicates the MBR partition style, and value **gpt** indicates the GPT partition style.

```
----End
```

# **Creating a New Partition**

The following example shows you how to make use of the additional space of a system disk by creating a new partition and mount the partition on **/opt** without interrupting services.

**Step 1** Run the following command to view the disk partition information:

fdisk -l

Information similar to the following is displayed: (/dev/xvda is the system disk.) [root@ecs-bab9 test]# fdisk -l

```
Disk /dev/xvda: 64.4 GB, 64424509440 bytes, 125829120 sectors
Units = sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disk label type: dos
Disk identifier: 0x000cc4ad
```

```
Device Boot Start End Blocks Id System
/dev/xvda1 * 2048 2050047 1024000 83 Linux
```

/dev/xvda2	2050048	22530047	10240000	83	Linux
/dev/xvda3	22530048	24578047	1024000	83	Linux
/dev/xvda4	24578048	83886079	29654016	5	Extended
/dev/xvda5	24580096	26628095	1024000	82	Linux swap / Solaris

**Step 2** Run the following command to enter fdisk:

### fdisk /dev/vda

Information similar to the following is displayed: [root@ecs-2220 ~]# fdisk /dev/vda Welcome to fdisk (util-linux 2.23.2).

Changes will remain in memory only, until you decide to write them. Be careful before using the write command.

Command (m for help):

### **Step 3** Enter **n** and press **Enter** to create a new partition.

Information similar to the following is displayed: Command (m for help): n All primary partitions are in use Adding logical partition 6 First sector (26630144-83886079, default 26630144):

### **NOTE**

If the MBR partition style is used, a maximum of 4 primary partitions, or 3 primary partitions and 1 extended partition can be created. The extended partition cannot be used directly and must be divided into logical partitions before use.

In this example, the maximum number of primary partitions has been reached for the system disk, and the disk already has 5 partitions (3 primary partitions and 2 logical partitions). Therefore, the system automatically creates a sixth logical partition in the extended partition.

To view the example operations in case that the maximum number of primary partitions is not reached for the system disk, see **Performing Post-Expansion Operations for a System Disk in Linux (fdisk)**.

# **Step 4** Enter the new partition's start sector, for example the default value, and press **Enter**.

The start sector must be greater than end sector of the existing partition.

Information similar to the following is displayed: First sector (26630144-83886079, default 26630144): Using default value 26630144 Last sector, +sectors or +size{K,M,G} (26630144-83886079, default 83886079):

### **Step 5** Enter the new partition's end sector and press **Enter**.

The default end sector is used in this example.

Information similar to the following is displayed: Last sector, +sectors or +size{K,M,G} (26630144-83886079, default 83886079): Using default value 83886079 Partition 6 of type Linux and of size 27.3 GiB is set

Command (m for help):

### **Step 6** Enter **p** and press **Enter** to view the new partition.

Information similar to the following is displayed: Disk /dev/xvda: 64.4 GB, 64424509440 bytes, 125829120 sectors Units = sectors of 1 \* 512 = 512 bytes

Sector size (logical/physical): 512 bytes / 512 bytes I/O size (minimum/optimal): 512 bytes / 512 bytes Disk label type: dos Disk identifier: 0x000cc4ad									
Device Boot /dev/xvda1 * /dev/xvda2	Start 2048 2050048	End Block 2050047 22530047	ks Id Syster 1024000 83 10240000	n 3 Lii 83	nux Linux				
/dev/xvda3	22530048	24578047	1024000	83	Linux				
/dev/xvda4	24578048	83886079	29654016	5	Extended				
/dev/xvda5	24580096	26628095	1024000	82	Linux swap / Solaris				
/dev/xvda6	26630144	83886079	28627968	83	Linux				

Command (m for help):

### **Step 7** Enter **w** and press **Enter** to write the changes to the partition table.

Information similar to the following is displayed: Command (m for help): w The partition table has been altered!

Calling ioctl() to re-read partition table.

WARNING: Re-reading the partition table failed with error 16: Device or resource busy. The kernel still uses the old table. The new table will be used at the next reboot or after you run partprobe(8) or kpartx(8) Syncing disks.

The partition is created.

### **NOTE**

In case that you want to discard the changes made before, you can exit fdisk by entering **q**.

**Step 8** Run the following command to synchronize the new partition table to the OS:

### partprobe

**Step 9** Run the following command to set the file system format for the new partition:

(The ext4 file system is used in this example.)

# mkfs -t ext4 /dev/xvda6

### **NOTE**

The procedure for setting the **xfs** file system is the same as that for the **ext3** or **ext4** file system. The command for creating the **xfs** file system is **mkfs** -t **xfs** /dev/xvda6.

Information similar to the following is displayed: [root@ecs-bab9 test]# mkfs -t ext4 /dev/xvda6

mke2fs 1.42.9 (28-Dec-2013) Filesystem label= OS type: Linux Block size=4096 (log=2) Fragment size=4096 (log=2) Stride=0 blocks, Stripe width=0 blocks 1790544 inodes, 7156992 blocks 357849 blocks (5.00%) reserved for the super user First data block=0 Maximum filesystem blocks=2155872256 219 block groups 32768 blocks per group, 32768 fragments per group 8176 inodes per group Superblock backups stored on blocks: 32768, 98304, 163840, 229376, 294912, 819200, 884736, 1605632, 2654208, 4096000

Allocating group tables: done Writing inode tables: done Creating journal (32768 blocks): done Writing superblocks and filesystem accounting information: done

The formatting takes a while, and you need to observe the system running status. Once **done** is displayed in the command output, the formatting is complete.

**Step 10** Run the following command to mount the new partition on a space-demanding directory, for example **/opt**:

# mount /dev/xvda6 /opt

Information similar to the following is displayed: [root@ecs-bab9 test]# mount /dev/xvda6 /opt [root@ecs-bab9 test]#

# **NOTE**

If the new partition is mounted on a directory that is not empty, the subdirectories and files in the directory will be hidden. Therefore, you are advised to mount the new partition on an empty directory or a new directory. If the new partition must be mounted on a directory that is not empty, move the subdirectories and files in this directory to another directory temporarily. After the partition is successfully mounted, move the subdirectories and files back.

**Step 11** Run the following command to view the mount result:

### df -TH

Information similar to the following is displayed: [root@ecs-bab9 test]# df -TH Size Used Avail Use% Mounted on Filesystem Type 11G 7.4G 3.2G 71% / /dev/xvda2 xfs devtmpfs 4.1G 0 4.1G 0% /dev devtmpfs tmpfs 4.1G 82k 4.1G 1% /dev/shm tmpfs 4.1G 9.2M 4.1G 1% /run tmpfs tmpfs tmpfs 4.1G 0 4.1G 0% /sys/fs/cgroup xfs 1.1G 39M 1.1G 4% /home tmpfs xfs xfs /dev/xvda3 1.1G 131M 915M 13% /boot /dev/xvda1 /dev/xvda6 ext4 29G 47M 28G 1% /opt

# **Expanding an Existing Partition**

The following example shows you how to make use of the additional space of a disk attached to a server by recreating the **/dev/xvdb1** partition and mounting the partition on **/mnt/sdc**. During this process, services will be interrupted.

# NOTICE

During an expansion, the additional space is added to the end of the disk. When the disk has multiple partitions, only the partition at the end of this disk can be expanded.

**Step 1** Run the following command to view the disk partition information:

fdisk -l

<sup>----</sup>End

Information similar to the following is displayed: [root@ecs-b656 test]# fdisk -l Disk /dev/xvda: 42.9 GB, 42949672960 bytes, 83886080 sectors Units = sectors of 1 \* 512 = 512 bytes Sector size (logical/physical): 512 bytes / 512 bytes I/O size (minimum/optimal): 512 bytes / 512 bytes Disk label type: dos Disk identifier: 0x000cc4ad

End Blocks Id System Device Boot Start /dev/xvda1 \* 2048 2050047 1024000 83 Linux 2050048 22530047 10240000 83 Linux 22530048 24578047 1024000 83 Linux /dev/xvda2 /dev/xvda3 /dev/xvda4 24578048 83886079 29654016 5 Extended 24580096 26628095 1024000 82 Linux swap / Solaris /dev/xvda5 Disk /dev/xvdb: 21.5 GB, 21474836480 bytes, 41943040 sectors Units = sectors of 1 \* 512 = 512 bytes Sector size (logical/physical): 512 bytes / 512 bytes I/O size (minimum/optimal): 512 bytes / 512 bytes Disk label type: dos Disk identifier: 0xb00005bd

 Device Boot
 Start
 End
 Blocks
 Id
 System

 /dev/xvdb1
 2048
 20971519
 10484736
 83
 Linux

In the command output, the total capacity of the **/dev/xvdb** disk is 21.5 GB, and the disk has only one partition, **dev/xvdb1**. The partition's start sector is **2048**, and its end sector is **20971519**.

View the **/dev/xvdb** capacity and check whether the additional space is included.

- If the additional space is not included, refresh the capacity according to Performing Post-Expansion Operations for a SCSI Data Disk in Linux (fdisk).
- If the additional space is included, take note of the start and end sectors of the dev/xvdb1 partition and then go to Step 2. These values will be used in the follow-up operations.
- **Step 2** Run the following command to unmount the partition:

### umount /mnt/sdc

**Step 3** Run the following command to enter fdisk and enter **d** to delete the **/dev/xvdb1** partition:

### fdisk /dev/xvdb

Information similar to the following is displayed: [root@ecs-b656 test]# fdisk /dev/xvdb Welcome to fdisk (util-linux 2.23.2).

Changes will remain in memory only, until you decide to write them. Be careful before using the write command.

Command (m for help): d Selected partition 1 Partition 1 is deleted

Command (m for help):

# **NOTE**

After deleting the partition, recreate the partition according to the following steps, and data on this disk will not be lost.

**Step 4** Enter **n** and press **Enter** to create a new partition.

Entering **n** creates a new partition.

Information similar to the following is displayed: Command (m for help): n Partition type: p primary (0 primary, 0 extended, 4 free) e extended

There are two types of disk partitions:

- Choosing **p** creates a primary partition.
- Choosing **e** creates an extended partition.
- Step 5 Ensure that the entered partition type is the same as the partition had before. In this example, a primary partition is used. Therefore, enter p and press Enter to create a primary partition.

Information similar to the following is displayed: Select (default p): p Partition number (1-4, default 1):

In the command output, **Partition number** specifies the primary partition number.

**Step 6** Ensure that the entered partition number is the same as the partition had before. In this example, partition number **1** is used. Therefore, enter **1** and press **Enter**.

Information similar to the following is displayed: Partition number (1-4, default 1): 1 First sector (2048-41943039, default 2048):

In the command output, First sector specifies the start sector.

Data will be lost if the following operations are performed:

- Select a start sector other than the partition had before.
- Select an end sector smaller than the partition had before.
- Step 7 Ensure that the entered start sector is the same as the partition had before. In this example, start sector 2048 is recorded in Step 1. Therefore, enter 2048 and press Enter.

Information similar to the following is displayed: First sector (2048-41943039, default 2048): Using default value 2048 Last sector, +sectors or +size{K,M,G} (2048-41943039, default 41943039):

In the command output, Last sector specifies the end sector.

Step 8 Ensure that the entered end sector is greater than or equal to the end sector recorded in Step 1. In this example, the recorded end sector is 20971519, and the default end sector is used. Therefore, enter 41943039 and press Enter.

Information similar to the following is displayed: Last sector, +sectors or +size{K,M,G} (2048-41943039, default 41943039): Using default value 41943039 Partition 1 of type Linux and of size 20 GiB is set Command (m for help):

The partition is successfully created.

**Step 9** Enter **p** and press **Enter** to view details about the new partition.

Information similar to the following is displayed: Command (m for help): p

```
Disk /dev/xvdb: 21.5 GB, 21474836480 bytes, 41943040 sectors
Units = sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disk label type: dos
Disk identifier: 0xb00005bd
Device Boot Start End Blocks Id System
```

/dev/xvdb1 2048 41943039 20970496 83 Linux

Command (m for help):

Details about the /dev/xvdb1 partition are displayed.

**Step 10** Enter **w** and press **Enter** to write the changes to the partition table.

Information similar to the following is displayed: Command (m for help): w The partition table has been altered!

Calling ioctl() to re-read partition table. Syncing disks.

The partition is created.

### D NOTE

In case that you want to discard the changes made before, you can exit fdisk by entering **q**.

- Step 11 Perform the following operations based on the file system of the disk:
  - For the **ext3** or **ext4** file system
    - a. Run the following command to check the correctness of the file system on /dev/xvdb1:

# e2fsck -f /dev/xvdb1

Information similar to the following is displayed: [root@ecs-b656 test]# e2fsck -f /dev/xvdb1 e2fsck 1.42.9 (28-Dec-2013) 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/xvdb1: 11/655360 files (0.0% non-contiguous), 83137/2621184 blocks

b. Run the following command to extend the size of the file system on /dev/xvdb1:

# resize2fs /dev/xvdb1

Information similar to the following is displayed: [root@ecs-b656 test]# resize2fs /dev/xvdb1 resize2fs 1.42.9 (28-Dec-2013) Resizing the filesystem on /dev/xvdb1 to 5242624 (4k) blocks. The filesystem on /dev/xvdb1 is now 5242624 blocks long.

c. Run the following command to mount the new partition on /mnt/sdc:

# mount /dev/xvdb1 /mnt/sdc

• For the **xfs** file system

- Run the following command to mount the new partition on /mnt/sdc:
   mount /dev/xvdb1 /mnt/sdc
- b. Run the following command to extend the size of the file system on **/dev/xvdb1**:

sudo xfs\_growfs /dev/xvdb1

**Step 12** Run the following command to view the mount result:

df -TH

----End

# Setting Automatic Mounting at System Start

To automatically mount partitions at system starts, do not specify partitions, for example, **/dev/xvdb1**, in **/etc/fstab** because the sequence of cloud devices, and therefore their names may change during the server stop or start. You are advised to use the UUID in **/etc/fstab** to set automatic mounting at system start.

# **NOTE**

UUID is the unique character string for disk partitions in a Linux system.

**Step 1** Run the following command to query the partition UUID:

blkid Disk partition

For example, run the following command to query the UUID of the **/dev/xvdb1** partition:

# blkid /dev/xvdb1

Information similar to the following is displayed:

[root@ecs-b656 test]# blkid /dev/xvdb1 /dev/xvdb1: UUID="1851e23f-1c57-40ab-86bb-5fc5fc606ffa" TYPE="ext4"

The UUID of the /dev/xvdb1 partition is displayed.

Step 2 Run the following command to open the fstab file using the vi editor:

# vi /etc/fstab

- **Step 3** Press **i** to enter the editing mode.
- **Step 4** Move the cursor to the end of the file and press **Enter**. Then, add the following information:

UUID=1851e23f-1c57-40ab-86bb-5fc5fc606ffa /mnt/sdc ext3 defaults 0 2 UUID=1851e23f-1c57-40ab-86bb-5fc5fc606ffa /mnt/sdc ext4 defaults 0 2

# Step 5 Press Esc, enter :wq, and press Enter.

The system saves the configurations and exits the vi editor.

----End

# 3.2.3.6 Performing Post-Expansion Operations for a Disk in Linux (parted)

# Scenarios

In Linux, after the capacity expansion succeeded, the additional disk space needs to be allocated to an existing partition or a new partition.

This topic uses EulerOS 2.0 64bit to describe how to allocate the additional disk space to a partition using parted.

The method for allocating the additional space varies depending on the server OS. This document is used for reference only. For the detailed operations and differences, see the corresponding OS documents.

Based on your service requirements and disk condition, you can choose either of the following ways to allocate the additional disk space:

• Create a new partition (services will not be interrupted).

Creating a new partition after expansion does not require the original partitions to be unmounted. Therefore, the impacts on services are minor than expanding an existing partition. This method is recommended for system disks or disks carrying services that cannot be interrupted.

If the MBR partition style is used, ensure that the disk capacity does not exceed 2 TB and the number of partitions does not reach the upper limit after the expansion.

• Expand an existing partition (services will be interrupted).

If the MBR partition style is used and the number of partitions has reached the upper limit, you can only allocate the additional space to an existing partition. Expanding an existing partition does not delete its data, but requires the partition to unmount. Therefore, services will be interrupted.

If the MBR partition style is used and the disk capacity after expansion will exceed 2 TB, the space exceeding 2 TB cannot be used. To make use of that space, change the disk partition style from MBR to GPT. Data on the disk will be cleared during such a change. Therefore, back up the disk data before changing the partition style.

# NOTICE

Performing the expansion operations with caution. Misoperation may lead to data loss or exceptions. Therefore, you are advised to use CBR to back up the disk data before expansion. For details, see **Managing a Backup**.

# Prerequisites

- You have logged in to the server.
  - For how to log in to an ECS, see the *Elastic Cloud Server User Guide*.
    - For how to log in to a BMS, see the *Bare Metal Server User Guide*.
- You have attached the disk to the server, and the additional space has not been allocated.

# Viewing the Partition Style

Before allocating the additional space, query the current disk partition style. If MBR is used, you can use either the fdisk or parted partitioning tool. If GPT is used, you must use the parted partitioning tool.

**Step 1** Run the following command to view the disk information:

lsblk

Information similar to the following is displayed: [root@ecs-1120 linux]# lsblk NAME MAJ:MIN RM SIZE RO TYPE MOUNTPOINT xvda 202:0 0 40G 0 disk xvda1 202:1 0 40G 0 part / xvdb 202:16 0 150G 0 disk xvdb1 202:17 0 100G 0 part /mnt/sdc xvdb2 202:18 0 50G 0 part /mnt/opt xvdc 202:32 0 40G 0 disk xvdc 202:33 0 8G 0 part xvdc 202:34 0 32G 0 part

**Step 2** Run the following command and enter **p** to view the current disk partition style:

### parted Disk name

For example, run the following command to view the partition style of the **/dev/xvdb** disk:

### parted /dev/xvdb

Information similar to the following is displayed: root@ecs-1120 linux]# parted /dev/xvdb GNU Parted 3.1 Using /dev/xvdb Welcome to GNU Parted! Type 'help' to view a list of commands. (parted) p Model: Xen Virtual Block Device (xvd) Disk /dev/xvdb: 161GB Sector size (logical/physical): 512B/512B Partition Table: gpt Disk Flags: Number Start End Size File system Name Flags

1 17.4kB 107GB 107GB ext4 opt 2 107GB 161GB 53.7GB ext4 opt

In the command output, parameter **Partition Table** indicates the disk partition style. Value **msdos** indicates the MBR partition style, and value **gpt** indicates the GPT partition style.

- **Step 3** Enter **q** and press **Enter** to exit parted.
- **Step 4** Check the disk partition style of other disks. For details, see **Step 2** to **Step 3**.

----End

# **Creating a New Partition**

The following example shows you how to make use of the additional space of a system disk by creating a new partition and mount the partition on **/opt** without interrupting services.

**Step 1** Run the following command to view the disk partition information:

lsblk

```
Information similar to the following is displayed:
[root@ecs-1120 linux]# lsblk
NAME MAJ:MIN RM SIZE RO TYPE MOUNTPOINT
xvda 202:0 0 80G 0 disk
xvda1 202:1 0 40G 0 part /
xvdb 202:16 0 250G 0 disk
 -xvdb1 202:17 0 100G 0 part
  -xvdb2 202:18 0 50G 0 part
xvdc 202:32 0 40G 0 disk
xvdc1 202:33 0 8G 0 part
xvdc2 202:34 0 32G 0 part
```

In the command output, the capacity of the **dev/xvda** system disk is 80 GB, in which the in-use **dev/xvda1** partition takes 40 GB and the additional 40 GB has not been allocated.

**Step 2** Run the following command to enter parted to allocate the additional space of the system disk to a partition:

### parted System disk

In this example, run the following command:

### parted /dev/xvda

Information similar to the following is displayed:

[root@ecs-1120 linux]# parted /dev/xvda GNU Parted 3.1 Using /dev/xvda Welcome to GNU Parted! Type 'help' to view a list of commands.

### **Step 3** Enter **unit s** and press **Enter** to set the measurement unit of the disk to sector.

### **Step 4** Enter **p** and press **Enter** to view the current disk partition style.

Information similar to the following is displayed:

(parted) unit s (parted) p Model: Xen Virtual Block Device (xvd) Disk /dev/xvda: 167772160s Sector size (logical/physical): 512B/512B Partition Table: msdos Disk Flags: Number Start End Size Type File system Flags 2048s 83886079s 83884032s primary ext4

- **Step 5** Enter **mkpart** and press **Enter** to create a new partition.
- **Step 6** In this example, a primary partition is created. Therefore, enter **p** and press **Enter** to create a primary partition.

Information similar to the following is displayed:

(parted) mkpart Partition type? primary/extended? p File system type? [ext2]? ext4 Start? 83886080 End? 1677722159

1
#### **Step 7** Set the file system type and size for the new partition.

Value **83886080** indicates the start sector of the **dev/xvda2** partition you created, and value **167772159** indicates the end sector. The two values are used for reference only. You can determine the number of partitions and partition sizes based on your service requirements.

Information similar to the following is displayed:

(parted) mkpart Partition type? primary/extended? p File system type? [ext2]? ext4 Start? 83886080 End? 1677722159

#### **NOTE**

The file system type may fail to set in this step. Therefore, reconfigure the file system type according to **Step 10** after the partition is created.

The maximum sector can be obtained in either of the following ways:

- Run the fdisk -l command and take note of the value.
- Enter -1s, and the value displayed is the desired value.

#### **Step 8** Enter **p** and press **Enter** to view the new partition.

Information similar to the following is displayed: (parted) p Model: Xen Virtual Block Device (xvd) Disk /dev/xvda: 167772160s Sector size (logical/physical): 512B/512B Partition Table: msdos Disk Flags: Number Start End Size Type File system Flags 1 2048s 83886079s 83884032s primary ext4

2 83886080s 167772159s 83886080s primary

The **dev/xvda2** partition is created.

**Step 9** Enter **q** and press **Enter** to exit parted.

**Step 10** Run the following command to set the file system format for the new partition:

(The ext4 file system is used in this example.)

#### mkfs -t ext4 /dev/xvda2

#### **NOTE**

The procedure for setting the **xfs** file system is the same as that for the **ext3** or **ext4** file system. The command for creating the **xfs** file system is **mkfs** -t **xfs** /dev/xvda2.

Information similar to the following is displayed:

[[root@ecs-1120 linux]# mkfs -t ext4 /dev/xvda2 mke2fs 1.42.9 (28-Dec-2013) Filesystem label= OS type: Linux Block size=4096 (log=2) Fragment size=4096 (log=2) Stride=0 blocks, Stripe width=0 blocks 2621440 inodes, 10485760 blocks 524288 blocks (5.00%) reserved for the super user First data block=0 Maximum filesystem blocks=2157969408 320 block groups
32768 blocks per group, 32768 fragments per group
8192 inodes per group
Superblock backups stored on blocks:
?32768, 98304, 163840, 229376, 294912, 819200, 884736, 1605632, 2654208,
?4096000, 7962624

Allocating group tables: done Writing inode tables: done Creating journal (32768 blocks): done Writing superblocks and filesystem accounting information: done

The formatting takes a while, and you need to observe the system running status. Once **done** is displayed in the command output, the formatting is complete.

**Step 11** Run the following command to mount the new partition on a space-demanding directory, for example **/opt**:

#### mount /dev/xvda6 /opt

Information similar to the following is displayed:

[root@ecs-1120 linux]# mount /dev/xvda2 /opt [root@ecs-1120 linux]#

#### D NOTE

If the new partition is mounted on a directory that is not empty, the subdirectories and files in the directory will be hidden. Therefore, you are advised to mount the new partition on an empty directory or a new directory. If the new partition must be mounted on a directory that is not empty, move the subdirectories and files in this directory to another directory temporarily. After the partition is successfully mounted, move the subdirectories and files back.

#### **Step 12** Run the following command to view the mount result:

#### df -TH

Information similar to the following is displayed:

[root@ecs-1120 linux]# df -TH				
Filesystem	Туре	Size L	Jsed Avail U	se% Mounted on
/dev/xvda1	ext4	43G	8.3G 33G	21% /
devtmpfs	devtm	pfs 8851	VI 0 8851	M 0% /dev
tmpfs	tmpfs	894M	0 894M	0% /dev/shm
tmpfs	tmpfs	894M	18M 877M	1 2% /run
tmpfs	tmpfs	894M	0 894M	0% /sys/fs/cgroup
tmpfs	tmpfs	179M	0 179M	0% /run/user/2000
tmpfs	tmpfs	179M	0 179M	0% /run/user/0
tmpfs	tmpfs	179M	0 179M	0% /run/user/1001
/dev/xvda2	ext4	43G	51M 40G	1% /opt

----End

#### **Expanding an Existing Partition**

The following example shows you how to make use of the additional space of a disk attached to a server by recreating the **/dev/xvdc1** partition mounted on **/mnt/sdc**. Because the **/dev/xvdc** disk only has one partition, this partition is regarded as the partition at the disk end. During the partition recreation, services will be interrupted.

#### NOTICE

During an expansion, the additional space is added to the end of the disk. When the disk has multiple partitions, only the partition at the end of this disk can be expanded.

**Step 1** Run the following command to view the disk partition information:

#### lsblk

Information similar to the following is displayed: [root@ecs-1120 sdc]# lsblk NAME MAJ:MIN RM SIZE RO TYPE MOUNTPOINT xvda 202:0 0 80G 0 disk xvda 202:1 0 40G 0 part / xvda 202:2 0 40G 0 part / xvda 202:16 0 350G 0 disk xvdb 202:16 0 350G 0 disk xvdb 202:17 0 100G 0 part xvdb 202:18 0 200G 0 part xvdc 202:32 0 60G 0 disk xvdc 202:33 0 10G 0 part /mnt/sdc

In the command output, the total capacity of the **/dev/xvdc** disk is 60 GB, in which the existing partition takes 10 GB. The **/dev/xvdc1** partition is at the end of the disk and has been mounted on **/mnt/sdc**.

View the /dev/xvdc capacity and check whether the additional space is included.

- If the additional space is not included, refresh the capacity according to Performing Post-Expansion Operations for a SCSI Data Disk in Linux (fdisk).
- If the additional space is included, go to **Step 2**.
- **Step 2** Run the following command to unmount the partition:

#### umount /mnt/sdc

**Step 3** Run the following command to view the unmount result:

#### lsblk

```
Information similar to the following is displayed:

[root@ecs-1120 linux]# umount /mnt/sdc

[root@ecs-1120 linux]# lsblk

NAME MAJ:MIN RM SIZE RO TYPE MOUNTPOINT

xvda 202:0 0 80G 0 disk

xvda 202:1 0 40G 0 part /

xvda 202:2 0 40G 0 part /

xvda 202:16 0 350G 0 disk

xvdb 202:16 0 350G 0 disk

xvdb 202:17 0 100G 0 part

xvdb 202:18 0 200G 0 part

xvdc 202:32 0 60G 0 disk

xvdc 202:33 0 10G 0 part
```

**Step 4** Run the following command to enter parted to allocate the additional space of the data disk to a partition:

#### parted Data disk

In this example, run the following command:

#### parted /dev/xvdc

Information similar to the following is displayed: [root@ecs-1120 linux]# parted /dev/xvdc GNU Parted 3.1 Using /dev/xvdc Welcome to GNU Parted! Type 'help' to view a list of commands.

- Step 5 Enter unit s and press Enter to set the measurement unit of the disk to sector.
- **Step 6** In this example, a primary partition is created. Therefore, enter **p** and press **Enter** to create a primary partition.

Information similar to the following is displayed:

(parted) mkpart Partition type? primary/extended? p File system type? [ext2]? ext4 Start? 83886080 End? 1677722159

- **Step 7** The **/dev/xvdc1** partition number is **1**. Therefore, enter **rm 1** and press **Enter** to delete the partition.
- **Step 8** Enter **p** and press **Enter** to check whether the **/dev/xvdc1** partition has been deleted.

Information similar to the following is displayed: (parted) rm 1 (parted) p Model: Xen Virtual Block Device (xvd) Disk /dev/xvdc: 125829120s Sector size (logical/physical): 512B/512B Partition Table: gpt Disk Flags:

Number Start End Size File system Name Flags

Step 9 Enter mkpart opt 2048s 125829119 and press Enter to recreate the partition.

*2048* specifies the start sector recorded in **Step 6**, and *125829119* specifies the end sector, which must be greater than or equal to the end sector recorded in **Step 6**.

Information similar to the following is displayed: (parted) mkpart opt 2048s 125829119s Warning: You requested a partition from 2048s to 125829199s (sectors 2048..125829199). The closest location we can manage is 2048s to 125829036s (sectors 2048..125829036). Is this still acceptable to you? Yes/No? Yes

Enter Yes as prompted to set the end sector.

If the following warning message is displayed, enter **Ignore** to ignore the performance warning. The warning message will not be displayed if the start sector with the best disk performance has been entered. In this example, **2048s** is one of such start sectors. Therefore, the system does not display the warning message.

```
Warning: The resulting partition is not properly aligned for best performance. Ignore/Cancel? Ignore
```

#### D NOTE

Data will be lost if the following operations are performed:

- Select a start sector other than the partition had before.
- Select an end sector smaller than the partition had before.

# **Step 10** Enter **p** and press **Enter** to check whether the **/dev/xvdc1** partition has been recreated.

Information similar to the following is displayed: (parted) p Model: Xen Virtual Block Device (xvd) Disk /dev/xvdb: 125829120s Sector size (logical/physical): 512B/512B Partition Table: gpt Disk Flags:

Number StartEndSizeFile systemNameFlags12048s125829086s125827039sext4opt

#### The /dev/xvdc1 partition has been recreated.

- **Step 11** Enter **q** and press **Enter** to exit parted.
- **Step 12** Perform the following operations based on the file system of the disk:
  - For the ext3 or ext4 file system
    - a. Run the following command to check the correctness of the file system on /dev/xvdc1:

#### e2fsck -f /dev/xvdc1

Information similar to the following is displayed: [root@ecs-1120 linux]# e2fsck -f /dev/xvdb2 e2fsck 1.42.9 (28-Dec-2013) 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/xvdc1: 11/655360 files (0.0% non-contiguous), 83137/2620928 blocks

b. Run the following command to extend the size of the file system on /dev/xvdc1:

#### resize2fs /dev/xvdc1

Information similar to the following is displayed: [root@ecs-1120 linux]# resize2fs /dev/xvdc1 resize2fs 1.42.9 (28-Dec-2013) Resizing the filesystem on /dev/xvdc1 to 15728379 (4k) blocks. The filesystem on /dev/xvdc1 is now 15728379 blocks long.

c. Run the following command to view the disk partition information after the partition recreation:

#### lsblk

Information similar to the following is displayed: [root@ecs-1120 linux]# lsblk NAME MAJ:MIN RM SIZE RO TYPE MOUNTPOINT NAME MAJ:MIN RM SIZE RO TYPE MOUNTPOINT xvda 202:0 0 80G 0 disk \_\_\_\_\_\_xvda1 202:1 0 40G 0 part / \_\_\_\_\_xvda2 202:2 0 40G 0 part /opt xvdb 202:16 0 350G 0 disk \_\_\_\_\_xvdb1 202:17 0 100G 0 part \_\_\_\_\_xvdb2 202:18 0 200G 0 part xvdc 202:32 0 60G 0 disk \_\_\_\_\_xvdc1 202:33 0 60G 0 part

In the command output, the total capacity of the **/dev/xvdc** disk is 60 GB, in which the additional 50 GB has been allocated to the **dev/xvdc1** partition.

- Run the following command to mount the new partition on /mnt/sdc: mount /dev/xvdc1 /mnt/sdc
- For the **xfs** file system
  - Run the following command to mount the new partition on /mnt/sdc:
     mount /dev/xvdc1 /mnt/sdc
  - b. Run the following command to extend the size of the file system on **/dev/xvdc1**:

#### sudo xfs\_growfs /dev/xvdc1

c. Run the following command to view the disk partition information after the partition recreation:

#### lsblk

Information similar to the following is displayed: [root@ecs-1120 linux]# lsblk NAME MAJ:MIN RM SIZE RO TYPE MOUNTPOINT NAME MAJ:MIN RM SIZE RO TYPE MOUNTPOINT xvda 202:0 0 80G 0 disk -xvda1 202:1 0 40G 0 part / -xvda2 202:2 0 40G 0 part /opt xvdb 202:16 0 350G 0 disk -xvdb1 202:17 0 100G 0 part -xvdb2 202:18 0 200G 0 part xvdc 202:32 0 60G 0 disk -xvdc1 202:33 0 60G 0 part

In the command output, the total capacity of the **/dev/xvdc** disk is 60 GB, in which the additional 50 GB has been allocated to the **dev/xvdc1** partition.

**Step 13** Run the following command to view the mount result:

#### df -TH

Information similar to the following is displayed: [root@ecs-1120 linux]# mount /dev/xvdc1 /mnt/sdc [root@ecs-1120 linux]# df -TH Filesystem Type Size Used Avail Use% Mounted on /dev/xvda1 ext4 43G 8.3G 33G 21% / devtmpfs devtmpfs 885M 0 885M 0% /dev tmpfs 894M 0 894M 0% /dev/shm tmpfs tmpfs tmpfs 894M 18M 877M 2% /run tmpfs 894M 0 894M 0% /sys/fs/cgroup tmpfs 179M 0 179M 0% /run/user/2000 tmpfs tmpfs tmpfs 179M 0 179M 0% /run/user/0 tmpfs 179M 0 179M 0% /run/user/1001 tmpfs tmpfs /dev/xvda2 ext4 43G 51M 40G 1% /opt /dev/xvdc1 ext4 64G 55M 60G 1% /mnt/sdc

The /dev/xvdc1 partition has been mounted on the /mnt/sdc directory.

----End

#### Setting Automatic Mounting at System Start

To automatically mount partitions at system starts, do not specify partitions, for example, **/dev/xvdb1**, in **/etc/fstab** because the sequence of cloud devices, and therefore their names may change during the server stop or start. You are advised to use the UUID in **/etc/fstab** to set automatic mounting at system start.

#### D NOTE

UUID is the unique character string for disk partitions in a Linux system.

**Step 1** Run the following command to query the partition UUID:

#### blkid Disk partition

For example, run the following command to query the UUID of the **/dev/xvdb1** partition:

#### blkid /dev/xvdb1

Information similar to the following is displayed:

[root@ecs-b656 test]# blkid /dev/xvdb1 /dev/xvdb1: UUID="1851e23f-1c57-40ab-86bb-5fc5fc606ffa" TYPE="ext4"

The UUID of the /dev/xvdb1 partition is displayed.

**Step 2** Run the following command to open the **fstab** file using the vi editor:

#### vi /etc/fstab

- **Step 3** Press **i** to enter the editing mode.
- **Step 4** Move the cursor to the end of the file and press **Enter**. Then, add the following information:

UUID=1851e23f-1c57-40ab-86bb-5fc5fc606ffa /mnt/sdc ext3 defaults 0 2 UUID=1851e23f-1c57-40ab-86bb-5fc5fc606ffa /mnt/sdc ext4 defaults 0 2

Step 5 Press Esc, enter :wq, and press Enter.

The system saves the configurations and exits the vi editor.

----End

# 3.2.3.7 Performing Post-Expansion Operations for a SCSI Data Disk in Linux (fdisk)

#### Scenarios

In Linux, after the capacity expansion succeeded, the additional disk space needs to be allocated to an existing partition or a new partition.

This topic uses SUSE Linux Enterprise Server 11 SP4 64bit to describe how to allocate the additional space of an attached SCSI data disk to a partition using fdisk.

Currently, a disk has been attached to a server, and the original disk capacity is 10 GB. In addition, a 10-GB space has been added to the disk on the management console, and the total disk capacity should be 20 GB. However, the additional space cannot be viewed on the server. The following operations guide you to view the additional space and extend the partition.

The method for allocating the additional space varies depending on the server OS. This document is used for reference only. For the detailed operations and differences, see the corresponding OS documents. Based on your service requirements and disk condition, you can choose either of the following ways to allocate the additional disk space:

• Create a new partition (services will not be interrupted).

Creating a new partition after expansion does not require the original partitions to be unmounted. Therefore, the impacts on services are minor than expanding an existing partition. This method is recommended for system disks or disks carrying services that cannot be interrupted.

If the MBR partition style is used, ensure that the disk capacity does not exceed 2 TB and the number of partitions does not reach the upper limit after the expansion.

• Expand an existing partition (services will be interrupted).

If the MBR partition style is used and the number of partitions has reached the upper limit, you can only allocate the additional space to an existing partition. Expanding an existing partition does not delete its data, but requires the partition to unmount. Therefore, services will be interrupted.

If the MBR partition style is used and the disk capacity after expansion will exceed 2 TB, the space exceeding 2 TB cannot be used. To make use of that space, change the disk partition style from MBR to GPT. Data on the disk will be cleared during such a change. Therefore, back up the disk data before changing the partition style.

#### NOTICE

Performing the expansion operations with caution. Misoperation may lead to data loss or exceptions. Therefore, you are advised to use CBR to back up the disk data before expansion. For details, see **Managing a Backup**.

#### Prerequisites

- You have logged in to the server.
  - For how to log in to an ECS, see the *Elastic Cloud Server User Guide*.
  - For how to log in to a BMS, see the *Bare Metal Server User Guide*.
- You have attached the disk to the server, and the additional space has not been allocated.

#### **Expanding an Existing Partition**

The following procedure shows you how to make use of the additional space of a disk attached to a server by extending the **/dev/sda1** partition and mounting the partition on **/mnt/sdc**. During this process, services will be interrupted.

**Step 1** Run the following command to view the disk partition information:

#### fdisk -l

Information similar to the following is displayed: ecs-xen-02:/home/linux # fdisk -l

Disk /dev/xvda: 107.4 GB, 107374182400 bytes 255 heads, 63 sectors/track, 13054 cylinders, total 209715200 sectors Units = sectors of 1 \* 512 = 512 bytes /dev/sda1

Sector size (logical/physical): 512 bytes / 512 bytes I/O size (minimum/optimal): 512 bytes / 512 bytes Disk identifier: 0x00065c40 Device Boot Start End Blocks Id System 2048 41945087 20971520 82 Linux swap / Solaris /dev/xvda1 /dev/xvda2 \* 41945088 83892223 20973568 83 Linux /dev/xvda3 83892224 209715199 62911488 83 Linux Disk /dev/sda: 10.7 GB, 10737418240 bytes 64 heads, 32 sectors/track, 10240 cylinders, total 20971520 sectors Units = sectors of 1 \* 512 = 512 bytes Sector size (logical/physical): 512 bytes / 512 bytes I/O size (minimum/optimal): 512 bytes / 512 bytes Disk identifier: 0x2f1c057a Device Boot Start End Blocks Id System

2048 20971519 10484736 83 Linux

In the command output, 10 GB has been added to the **/dev/sda** data disk on the management console, and the total capacity should be 20 GB. However, the additional space is not included in the command output. In this case, run the following command to update the data disk capacity on the server:

**Step 2** Run the following command to update the data disk capacity on the server:

#### echo 1 > /sys/class/scsi\_device/%d:%d:%d/device/rescan &

In the command, **%d:%d:%d** indicates a folder in the **/sys/class/scsi\_device/** directory and can be obtained using **ll /sys/class/scsi\_device/**.

Information similar to the following is displayed: (2:0:0:0 indicates the folder to be obtained.) cs-xen-02:/sys/class/scsi\_device # ll /sys/class/scsi\_device/ total 0 Irwxrwxrwx 1 root root 0 Sep 26 11:37 2:0:0:0 -> ../../devices/xen/vscsi-2064/host2/target2:0:0/2:0:0/ scsi\_device/2:0:0:0

Example command:

#### echo 1 > /sys/class/scsi\_device/2:0:0:0/device/rescan &

**Step 3** After the disk capacity is updated, run the following command to view the disk partition information again:

#### fdisk -l

Information similar to the following is displayed: ecs-xen-02:/sys/class/scsi\_device # fdisk -l

Disk /dev/xvda: 107.4 GB, 107374182400 bytes 255 heads, 63 sectors/track, 13054 cylinders, total 209715200 sectors Units = sectors of 1 \* 512 = 512 bytes Sector size (logical/physical): 512 bytes / 512 bytes I/O size (minimum/optimal): 512 bytes / 512 bytes Disk identifier: 0x00065c40

 Device Boot
 Start
 End
 Blocks
 Id
 System

 /dev/xvda1
 2048
 41945087
 20971520
 82
 Linux swap / Solaris

 /dev/xvda2
 \*
 41945088
 83892223
 20973568
 83
 Linux

 /dev/xvda3
 83892224
 209715199
 62911488
 83
 Linux

Disk /dev/sda: 21.5 GB, 21474836480 bytes 64 heads, 32 sectors/track, 20480 cylinders, total 41943040 sectors Units = sectors of 1 \* 512 = 512 bytes Sector size (logical/physical): 512 bytes / 512 bytes I/O size (minimum/optimal): 512 bytes / 512 bytes Disk identifier: 0x2f1c057a

Device BootStartEndBlocksIdSystem/dev/sda12048209715191048473683Linux

In the command output, the additional space has been added to the **/dev/sda** data disk, and the update succeeded. The **/dev/sda** disk has one partition only, **/dev/sda1**. Take note of start and end sectors of the **/dev/sda1** partition. These values will be used during the partition recreation. The partition's start sector is **2048**, and its end sector is **20971519**.

**Step 4** Run the following command to unmount the disk partition:

#### umount /mnt/sdc

**Step 5** Run the following command to enter fdisk and enter **d** to delete the **/dev/sda1** partition:

#### fdisk /dev/sda1

Information similar to the following is displayed: [ecs-xen-02:/sys/class/scsi\_device # fdisk /dev/sda

Command (m for help): d Selected partition 1

Command (m for help):

**Step 6** Enter **n** and press **Enter** to create a new partition.

Entering **n** creates a new partition.

Information similar to the following is displayed: Command (m for help): n Command action e extended p primary partition (1-4)

There are two types of disk partitions:

- Choosing **p** creates a primary partition.
- Choosing **e** creates an extended partition.
- Step 7 Ensure that the entered partition type is the same as the partition had before. In this example, a primary partition is used. Therefore, enter p and press Enter to create a primary partition.

Information similar to the following is displayed:

Partition number (1-4, default 1):

In the command output, Partition number specifies the primary partition number.

**Step 8** Ensure that the entered partition number is the same as the partition had before. In this example, partition number **1** is used. Therefore, enter **1** and press **Enter**.

Information similar to the following is displayed: Partition number (1-4, default 1): 1 First sector (2048-41943039, default 2048):

In the command output, First sector specifies the start sector.

#### D NOTE

Data will be lost if the following operations are performed:

- Select a start sector other than the partition had before.
- Select an end sector smaller than the partition had before.
- Step 9 Ensure that the entered start sector is the same as the partition had before. In this example, start sector 2048 is recorded in Step 3. Therefore, enter 2048 and press Enter.

Information similar to the following is displayed: First sector (2048-41943039, default 2048): Using default value 2048 Last sector, +sectors or +size{K,M,G} (2048-41943039, default 41943039):

In the command output, Last sector specifies the end sector.

Step 10 Ensure that the entered end sector is larger than or equal to the end sector recorded in Step 3. In this example, the recorded end sector is 20971519, and the default end sector is used. Therefore, enter 41943039 and press Enter.

Information similar to the following is displayed: Last sector, +sectors or +size{K,M,G} (2048-41943039, default 41943039): Using default value 41943039

Command (m for help):

The partition is created.

**Step 11** Enter **p** and press **Enter** to view details about the new partition.

Information similar to the following is displayed: (Details about the **/dev/sda1** partition are displayed.) CCommand (m for help): p

Disk /dev/sda: 21.5 GB, 21474836480 bytes 64 heads, 32 sectors/track, 20480 cylinders, total 41943040 sectors Units = sectors of 1 \* 512 = 512 bytes Sector size (logical/physical): 512 bytes / 512 bytes I/O size (minimum/optimal): 512 bytes / 512 bytes Disk identifier: 0x2f1c057a

Device Boot Start End Blocks Id System /dev/sda1 2048 41943039 20970496 83 Linux Command (m for help):

**Step 12** Enter **w** and press **Enter** to write the changes to the partition table.

Information similar to the following is displayed: (The partition is successfully created.) Command (m for help): w The partition table has been altered!

Calling ioctl() to re-read partition table. Syncing disks.

**NOTE** 

In case that you want to discard the changes made before, you can exit fdisk by entering **q**.

**Step 13** Perform the following operations based on the file system of the disk:

• For the **ext3** or **ext4** file system

a. Run the following command to check the correctness of the file system on /dev/sda1:

#### e2fsck -f /dev/sda1

Information similar to the following is displayed: ecs-xen-02:/sys/class/scsi\_device # e2fsck -f /dev/sda1 e2fsck 1.41.9 (22-Aug-2009) 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/sda1: 11/655360 files (0.0% non-contiguous), 79663/2621184 blocks

b. Run the following command to extend the size of the file system on /dev/sda1:

#### resize2fs /dev/sda1

Information similar to the following is displayed: ecs-xen-02:/sys/class/scsi\_device # resize2fs /dev/sda1 resize2fs 1.41.9 (22-Aug-2009) Resizing the filesystem on /dev/sda1 to 5242624 (4k) blocks. The filesystem on /dev/sda1 is now 5242624 blocks long.

c. Run the following command to mount the new partition on /mnt/sdc:

#### mount /dev/sda1 /mnt/sdc

- For the **xfs** file system
  - Run the following command to mount the new partition on /mnt/sdc:
     mount /dev/sda1 /mnt/sdc
  - b. Run the following command to extend the size of the file system on /dev/sda1:

#### sudo xfs\_growfs /dev/sda1

**Step 14** Run the following command to view the mount result:

#### df -TH

----End

#### Setting Automatic Mounting at System Start

To automatically mount partitions at system starts, do not specify partitions, for example, **/dev/xvdb1**, in **/etc/fstab** because the sequence of cloud devices, and therefore their names may change during the server stop or start. You are advised to use the UUID in **/etc/fstab** to set automatic mounting at system start.

#### **NOTE**

UUID is the unique character string for disk partitions in a Linux system.

**Step 1** Run the following command to query the partition UUID:

#### blkid Disk partition

For example, run the following command to query the UUID of the **/dev/xvdb1** partition:

#### blkid /dev/xvdb1

Information similar to the following is displayed:

[root@ecs-b656 test]# blkid /dev/xvdb1 /dev/xvdb1: UUID="1851e23f-1c57-40ab-86bb-5fc5fc606ffa" TYPE="ext4"

The UUID of the /dev/xvdb1 partition is displayed.

**Step 2** Run the following command to open the **fstab** file using the vi editor:

#### vi /etc/fstab

- **Step 3** Press **i** to enter the editing mode.
- **Step 4** Move the cursor to the end of the file and press **Enter**. Then, add the following information:

 UUID=1851e23f-1c57-40ab-86bb-5fc5fc606ffa /mnt/sdc
 ext3 defaults
 0
 2

 UUID=1851e23f-1c57-40ab-86bb-5fc5fc606ffa /mnt/sdc
 ext4 defaults
 0
 2

Step 5 Press Esc, enter :wq, and press Enter.

The system saves the configurations and exits the vi editor.

----End

# 3.2.3.8 Performing Post-Expansion Operations for a System Disk in Linux (fdisk)

#### Scenarios

In Linux, after the capacity expansion succeeded, the additional disk space needs to be allocated to an existing partition or a new partition.

This topic uses CentOS 7.4 64bit to describe how to allocate the additional system disk space to a partition using fdisk.

This document also describes how to create new partitions for system disks. See the following topics for more information:

- To create new partitions using fdisk in CentOS 7.0 64bit, see Creating a New Partition.
- To create new partitions using parted in CentOS 7.0 64bit, see Creating a New Partition.

Currently, a disk has been attached to a server, and the original disk capacity is 40 GB. In addition, a 40-GB space has been added to the disk on the management console, and the total disk capacity should be 80 GB. The following operations guide you to use the additional space and extend the partition.

The method for allocating the additional space varies depending on the server OS. This document is used for reference only. For the detailed operations and differences, see the corresponding OS documents.

Based on your service requirements and disk condition, you can choose either of the following ways to allocate the additional disk space:

• Create a new partition (services will not be interrupted).

Creating a new partition after expansion does not require the original partitions to be unmounted. Therefore, the impacts on services are minor than expanding an existing partition. This method is recommended for system disks or disks carrying services that cannot be interrupted. If the MBR partition style is used, ensure that the disk capacity does not exceed 2 TB and the number of partitions does not reach the upper limit after the expansion.

• Expand an existing partition (services will be interrupted).

If the MBR partition style is used and the number of partitions has reached the upper limit, you can only allocate the additional space to an existing partition. Expanding an existing partition does not delete its data, but requires the partition to unmount. Therefore, services will be interrupted.

If the MBR partition style is used and the disk capacity after expansion will exceed 2 TB, the space exceeding 2 TB cannot be used. To make use of that space, change the disk partition style from MBR to GPT. Data on the disk will be cleared during such a change. Therefore, back up the disk data before changing the partition style.

#### NOTICE

Performing the expansion operations with caution. Misoperation may lead to data loss or exceptions. Therefore, you are advised to use CBR to back up the disk data before expansion. For details, see **Managing a Backup**.

#### Prerequisites

- You have logged in to the server.
  - For how to log in to an ECS, see the *Elastic Cloud Server User Guide*.
  - For how to log in to a BMS, see the *Bare Metal Server User Guide*.
- You have attached the disk to the server, and the additional space has not been allocated.

#### **Creating a New Partition**

The following example shows you how to make use of the additional capacity of a system disk attached to a server by creating a new partition. The system disk already has the **/dev/vda1** partition, which is mounted on **/**. In the following operations, new partition **/dev/vda2** will be created and mounted on **/opt**. During this process, services are not interrupted.

**Step 1** Run the following command to view the disk partition information:

#### fdisk -l

Information similar to the following is displayed: [root@ecs-2220 ~]# fdisk -l

```
Disk /dev/vda: 85.9 GB, 85899345920 bytes, 167772160 sectors
Units = sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disk label type: dos
Disk identifier: 0x0008d18f
```

Device Boot Start End Blocks Id System /dev/vda1 \* 2048 83886079 41942016 83 Linux In the command output, the capacity of the **dev/vda** system disk is 80 GB, in which the in-use **dev/vda1** partition takes 40 GB and the additional 40 GB has not been allocated.

**Step 2** Run the following command to enter fdisk:

#### fdisk /dev/vda

Information similar to the following is displayed: [root@ecs-2220 ~]# fdisk /dev/vda Welcome to fdisk (util-linux 2.23.2).

Changes will remain in memory only, until you decide to write them. Be careful before using the write command.

Command (m for help):

**Step 3** Enter **n** and press **Enter** to create a new partition.

Information similar to the following is displayed: Command (m for help): n Partition type: p primary (1 primary, 0 extended, 3 free) e extended

There are two types of disk partitions:

- Choosing **p** creates a primary partition.
- Choosing **e** creates an extended partition.
- **Step 4** In this example, a primary partition is created. Therefore, enter **p** and press **Enter** to create a primary partition.

Information similar to the following is displayed: Select (default p): p Partition number (2-4, default 2):

Step 5 Enter the serial number of the primary partition and press Enter. Partition number2 is used in this example. Therefore, enter 2 and press Enter.

Information similar to the following is displayed: Partition number (2-4, default 2): 2 First sector (83886080-167772159, default 83886080):

**Step 6** Enter the new partition's start sector, for example the default value, and press **Enter**.

The default start sector is used in this example.

Information similar to the following is displayed: First sector (83886080-167772159, default 83886080): Using default value 83886080 Last sector, +sectors or +size{K,M,G} (83886080-167772159,default 167772159):

**Step 7** Enter the new partition's end sector and press **Enter**.

The default end sector is used in this example.

Information similar to the following is displayed: Last sector, +sectors or +size{K,M,G} (83886080-167772159, default 167772159): Using default value 167772159 Partition 2 of type Linux and of size 40 GiB is set

Command (m for help):

#### **Step 8** Enter **p** and press **Enter** to view the new partition.

Information similar to the following is displayed: Command (m for help): p

Disk /dev/vda: 85.9 GB, 85899345920 bytes, 167772160 sectors Units = sectors of 1 \* 512 = 512 bytes Sector size (logical/physical): 512 bytes / 512 bytes I/O size (minimum/optimal): 512 bytes / 512 bytes Disk label type: dos Disk identifier: 0x0008d18f

Device Boot Start End Blocks Id System /dev/vda1 \* 2048 83886079 41942016 83 Linux /dev/vda2 83886080 167772159 41943040 83 Linux Command (m for help):

#### **Step 9** Enter **w** and press **Enter** to write the changes to the partition table.

Information similar to the following is displayed: Command (m for help): w The partition table has been altered!

Calling ioctl() to re-read partition table.

WARNING: Re-reading the partition table failed with error 16: Device or resource busy. The kernel still uses the old table. The new table will be used at the next reboot or after you run partprobe(8) or kpartx(8) Syncing disks.

The partition is created.

**NOTE** 

In case that you want to discard the changes made before, you can exit fdisk by entering **q**.

**Step 10** Run the following command to synchronize the new partition table to the OS:

#### partprobe

**Step 11** Run the following command to set the file system format for the new partition:

(The ext4 file system is used in this example.)

#### mkfs -t ext4 /dev/vda2

#### **NOTE**

The procedure for setting the **xfs** file system is the same as that for the **ext3** or **ext4** file system. The command for creating the **xfs** file system is **mkfs** -t **xfs** /dev/vda2.

Information similar to the following is displayed:

[root@ecs-2220 ~]# mkfs -t ext4 /dev/vda2 mke2fs 1.42.9 (28-Dec-2013) Filesystem label= OS type: Linux Block size=4096 (log=2) Fragment size=4096 (log=2) Stride=0 blocks, Stripe width=0 blocks 2621440 inodes, 10485760 blocks 524288 blocks (5.00%) reserved for the super user First data block=0 Maximum filesystem blocks=2157969408 320 block groups 32768 blocks per group, 32768 fragments per group 8192 inodes per group Superblock backups stored on blocks: 32768, 98304, 163840, 229376, 294912, 819200, 884736, 1605632, 2654208, 4096000, 7962624

Allocating group tables: done Writing inode tables: done Creating journal (32768 blocks): done Writing superblocks and filesystem accounting information: done

The formatting takes a while, and you need to observe the system running status. Once **done** is displayed in the command output, the formatting is complete.

**Step 12** Run the following command to mount the new partition on a space-demanding directory, for example **/opt**:

#### mount /dev/vda2 /opt

Information similar to the following is displayed: [root@ecs-bab9 test]# mount /dev/vda2 /opt [root@ecs-bab9 test]#

#### D NOTE

If the new partition is mounted on a directory that is not empty, the subdirectories and files in the directory will be hidden. Therefore, you are advised to mount the new partition on an empty directory or a new directory. If the new partition must be mounted on a directory that is not empty, move the subdirectories and files in this directory to another directory temporarily. After the partition is successfully mounted, move the subdirectories and files back.

**Step 13** Run the following command to view the mount result:

#### df -TH

Information similar to the following is displayed:

[root@ecs-2220 ~]# df -TH			
Filesystem	Type	Size Used Avail Use% Mounted on	
/dev/vda1	ext4	43G 2.0G 39G 5% /	
devtmpfs	devtm	npfs 509M 0 509M 0% /dev	
tmpfs	tmpfs	520M 0 520M 0% /dev/shm	
tmpfs	tmpfs	520M 7.2M 513M 2% /run	
tmpfs	tmpfs	520M 0 520M 0% /sys/fs/cgroup	
tmpfs	tmpfs	104M  0  104M 0% /run/user/0	
/dev/vda2	ext4	43G 51M 40G 1% /opt	

<sup>----</sup>End

#### Setting Automatic Mounting at System Start

To automatically mount partitions at system starts, do not specify partitions, for example, **/dev/xvdb1**, in **/etc/fstab** because the sequence of cloud devices, and therefore their names may change during the server stop or start. You are advised to use the UUID in **/etc/fstab** to set automatic mounting at system start.

#### **NOTE**

UUID is the unique character string for disk partitions in a Linux system.

**Step 1** Run the following command to query the partition UUID:

#### blkid Disk partition

For example, run the following command to query the UUID of the **/dev/xvdb1** partition:

#### blkid /dev/xvdb1

Information similar to the following is displayed:

[root@ecs-b656 test]# blkid /dev/xvdb1 /dev/xvdb1: UUID="1851e23f-1c57-40ab-86bb-5fc5fc606ffa" TYPE="ext4"

The UUID of the /dev/xvdb1 partition is displayed.

Step 2 Run the following command to open the fstab file using the vi editor:

#### vi /etc/fstab

- **Step 3** Press **i** to enter the editing mode.
- **Step 4** Move the cursor to the end of the file and press **Enter**. Then, add the following information:

UUID=1851e23f-1c57-40ab-86bb-5fc5fc606ffa /mnt/sdc ext3 defaults 0 2 UUID=1851e23f-1c57-40ab-86bb-5fc5fc606ffa /mnt/sdc ext4 defaults 0 2

Step 5 Press Esc, enter :wq, and press Enter.

The system saves the configurations and exits the vi editor.

----End

### 3.2.4 Managing an Encrypted Disk

#### **Relationships Between Encrypted Disks and Backups**

The encryption function can be used for system disks, data disks, and backups. The detailed descriptions are as follows:

- System disk encryption depends on the image of the server OS. If the server is created from an encrypted image, the system disk will be an encrypted disk. For details, see **Encrypting an Image** in the *Image Management Service User Guide*.
- The encryption attribute of an existing disk cannot be changed. You can create new disks and determine whether to encrypt the disks or not.
- When a disk is created from a backup, the encryption attribute of the new disk will be consistent with that of the backup's source disk.
- When a backup is created for a disk, the encryption attribute of the backup is the same as that of the disk.

For details about how to create an encrypted disk, see **Step 2: Create a Disk**.

#### Creating an Encrypted Disk

Before you use the disk encryption function, KMS access rights need to be granted to EVS. If you have the Security Administrator permission, grant KMS access rights directly. If you do not have this permission, contact a user with the security administrator permission to grant KMS access rights to EVS, then repeat the preceding operations.

For details about how to create an encrypted disk, see **Step 2: Create a Disk**.

#### **Detaching an Encrypted Disk**

Before you detach a disk encrypted by a CMK, check whether the CMK is disabled or scheduled for deletion. If the CMK is unavailable, the disk can still be used, but normal read/write operations are not permanently guaranteed. If the disk is detached and then re-attached, re-attaching this disk will fail. In this case, do not detach the disk and restore the CMK status first.

The restoration method varies depending on the current CMK status. For details, see **Disk Encryption**.

If the CMK is available, the disk can be detached and re-attached, and data on the disk will not be lost.

For details about how to detach an encrypted disk, see **Detaching a Data Disk**.

### 3.2.5 Managing a Shared Disk

#### How to Use Shared VBD and SCSI Disks?

You can create shared VBD disks or shared SCSI disks. It is recommended that you attach the shared disk to the ECSs in the same ECS group to improve service reliability.

- Shared VBD disks: The device type of a newly created shared disk is VBD by default. Such disks can be used as virtual block storage devices, but do not support SCSI reservations. If SCSI reservations are required for your applications, create shared SCSI disks.
- Shared SCSI disks: These disks support SCSI reservations.

#### NOTICE

- To improve data security, you are advised to use SCSI reservations together with the anti-affinity policy of an ECS group. That said, ensure that shared SCSI disk is only attached to ECSs in the same anti-affinity ECS group.
- If an ECS does not belong to any anti-affinity ECS group, you are advised not to attach shared SCSI disks to this ECS. Otherwise, SCSI reservations may not work properly, which may put your data at risk.

Concepts of the anti-affinity ECS group and SCSI reservations:

 The anti-affinity policy of an ECS group allows ECSs to be created on different physical servers to improve service reliability.

For details about ECS groups, see **Managing ECS Groups** in the *Elastic Cloud Server User Guide*.

- The SCSI reservation mechanism uses a SCSI reservation command to perform SCSI reservation operations. If an ECS sends such a command to a disk, the disk is displayed as locked to other ECSs, preventing the data damage that may be caused by simultaneous read/write operations to the disk from multiple ECSs.
- ECS groups and SCSI reservations have the following relationship: A SCSI reservation on a disk cannot differentiate multiple ECSs on the same physical host. For that reason, if multiple ECSs that use the same shared

disk are running on the same physical host, SCSI reservations will not work properly. Therefore, you are advised to use SCSI reservations only on ECSs that are in the same ECS group, thus having a working anti-affinity policy.

#### Attaching a Shared Disk

A common disk can only be attached to one server, whereas a shared disk can be attached to up to 16 servers.

For details about how to attach a shared disk, see Attaching a Shared Disk.

#### **Deleting a Shared Disk**

Because a shared disk can be attached to multiple servers, ensure that a shared disk is detached from all the servers before deletion.

For details about how to delete a shared disk, see **Deleting a Disk**.

#### Expanding a Shared Disk

Shared disks must be expanded when they are in the **Available** state. For details, see **Expanding an Available Disk**.

### **3.2.6 Managing a Backup**

#### **Scenarios**

DSS disk backups are created using the CBR service.

This topic describes how to configure a backup policy for a disk. With backup policies configured, data on DSS disks can be periodically backed up to improve data security.

#### **Configuring a Backup Policy**

- **Step 1** Log in to the management console.
- Step 2 Choose Dedicated Distributed Storage Service > Disks.

The disk list page is displayed.

Step 3 In the disk list, locate the disk whose data you want to back up and choose More > Configure Backup Policy in the Operation column.

The **Configure Backup Policy** dialog box is displayed.

**Step 4** In the backup policy list, locate the target backup policy to be associated and click **Associate**.

**NOTE** 

If the disk has been associated with a backup policy, you need to disassociate the disk with its backup policy and then associate it with the new policy. For details, see **Data Backup Using a Backup Policy** in the *Volume Backup Service User Guide*.

**Step 5** (Optional) To create a new backup policy, click **Edit Backup Policy** to switch to the **Volume Backup Service** page.

For details, see **Data Backup Using a Backup Policy** in the *Volume Backup Service User Guide*.

Step 6 In the displayed Associate Backup Policy dialog box, click OK.

After the association is complete, the system automatically backs up the data on the disk according to the backup policy.

Step 7 In the displayed Associate Backup Policy dialog box, click OK.

After the association is complete, the system automatically backs up the data on the disk according to the backup policy.

----End

# 4 FAQS

# 4.1 What Are the Risks of Not Expanding the Storage Pool Capacity?

In the process of using a DSS storage pool, when the ratio of **Used Capacity (GB)** to **Total Available Capacity (GB)** exceeds 75%, the system will remind you to expand the capacity. If the utilization stays high all the time, the DSS storage pool will be write protected, increasing the possibility of service interruption. It is recommended that you expand the capacity when the storage utilization reaches 75% to ensure that there is enough space available on the disk.

## 4.2 How Many Statuses Does a Storage Pool Have?

A storage pool has several statuses. **Table 4-1** lists the meaning of each status and the operations for each status.

Status	Description	Allowed Operation
Deploying	The storage pool is being deployed.	-
Available	The storage pool is successfully created, and you can create disks in the storage pool.	Creating disks
Expanding	The storage pool capacity is being expanded and cannot be used.	-

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### 4.3 How Many Statuses Does a Disk Have?

A disk has several statuses. Table 4-2 lists the meaning of each status and the operations for each status.

Status	Description	Allowed Operation
In-use	The disk is attached to a server and in use.	<ul> <li>Detaching</li> <li>Creating backups</li> <li>NOTE         If a shared disk is in the In-use state, the disk can be attached.     </li> </ul>
Available	The disk is successfully created and has not been attached to any server.	<ul><li>Attaching</li><li>Expanding</li><li>Deleting</li></ul>
Creating	The disk is being created.	None
Attaching	The disk is being attached to a server.	None
Detaching	The disk is being detached from a server.	None
Deleting	The disk is being deleted.	None
Expanding	The capacity of the disk is being expanded.	None
Uploading	Data on the disk is being uploaded to an image. This status occurs when you create an image from a server.	None
Downloadin g	Data is being downloaded from an image to the disk. This status occurs when you create a server.	None
Error	An error occurs when you try to create a disk.	Deleting
Deletion failed	An error occurs when you try to delete a disk.	No operations can be performed.
Expansion failed	An error occurs when you try to expand the capacity of a disk.	Deleting

Table 4-2 Disk status description

#### **NOTE**

If a DSS disk status is Error, Deletion failed, or Expansion failed, you can rectify the error by following the steps provided in What Should I Do If an Error Occurs on My DSS Disk?

# 4.4 Troubleshooting and Impacts on the DSS Usage

Case one

If server or disk failures cause a disk being removed from the storage pool, the total available capacity becomes smaller. After the fault is rectified, the total available capacity can be restored to the original value.

Case two

If a server or disk is faulty, and no disk is removed from the storage pool, the storage pool is degraded, which does not affect the use of the storage pool. After the fault is rectified, the storage pool becomes normal.

#### **NOTE**

Storage pool degradation refers to that the number of data copies for some data in a storage pool is reduced from three copies to two copies and cannot be automatically restored without manual troubleshooting.

Case three

If a server or disk is faulty, your services may be interrupted. For example, if the used capacity is 98% and a disk is removed due to server or disk failures, the total available capacity decreases. As a result, the proportion of the used capacity to the total available capacity reaches nearly 100%. The write protection is enabled for the storage pool, and your services are interrupted.

### 4.5 Can I Attach a Disk to Multiple Servers?

A non-shared disk can be attached to one server only.

A shared disk can be attached to a maximum of 16 servers.

#### **NOTE**

Shared disks are a type of DSS disks and can be attached to multiple servers.

# 4.6 Will Data in the DSS Disk Be Lost When the DSS Disk Is Detached?

Not necessarily.

To prevent data loss when you detach a DSS disk, perform the following operations:

- 1. Stop the ECS to which the to-be-detached disk has been attached.
- 2. After server has been stopped, detach the disk.

# 4.7 What Should I Do If an Error Occurs on My DSS Disk?

If an error occurs, the disk may show one of the states listed in **Table 4-3**. Take the following measures to handle the exceptions.

Error Status	Handling Suggestion
Error	Delete the disk in the <b>Error</b> state and create another one.
Deletion failed	Contact customer service.
Expansion failed	Customer service personnel will contact you and help you handle this error. Do not perform any operations on the disk before they contact you. If you require that the error be handled as soon as possible, contact customer service.

 Table 4-3 Solutions for disk errors

# 4.8 What Are the Restrictions on Attaching a Disk to an ECS?

- The disk and the target ECS must be located in the same AZ.
- For a non-shared disk, the DSS disk must be in **Available** state. For a shared disk, the target ECS must be in the **In-use** or **Available** state.
- The target ECS must be in **Running** or **Stopped** state.
- A frozen disk cannot be attached to an ECS.
- A SCSI disk cannot be used as an ECS system disk.

# 4.9 What Are the Precautions for Detaching a Disk from an ECS?

#### Scenarios

A disk attached to an ECS can function as a system disk or data disk.

- Disks mounted on /dev/sda or /dev/vda function as system disks. Currently, system disks must be detached offline. In this case, you must stop the ECS before detaching a system disk.
- Disks mounted on other mount points functions as data disks. In addition to offline detachment, a data disk can also be detached online if the server OS supports online detachment. In this case, you do not need to stop the running ECS.

This FAQ describes how to detach a disk from a running ECS.

#### Constraints

• The disk to be detached must be mounted on a mount point other than /dev/sda or /dev/vda.

Disks mounted on **/dev/sda** or **/dev/vda** are system disks and cannot be detached from running ECSs.

- Before detaching a disk from a running Windows ECS, make sure that VMTtools have been installed on the ECS and that the tools are running properly.
- Before detaching a disk from a running Windows ECS, ensure that no program is reading data from or writing data to the disk. Otherwise, data will be lost.
- SCSI disks cannot be detached from running Windows ECSs.
- Before detaching a disk from a running Linux ECS, you must log in to the ECS and run the **umount** command to cancel the association between the disk and the file system. In addition, ensure that no program is reading data from or writing data to the disk. Otherwise, the disk will fail to be detached.

#### **OSs Supporting Disk Detachment from a Running ECS**

OSs supporting disk detachment from a running ECS include two parts:

- For the first part, see "Formats and OSs Supported for External Image Files" in *Image Management Service User Guide*.
- For the second part, see **Table 4-4**.

OS	Version
CentOS	7.3 64bit
	7.2 64bit
	6.8 64bit
	6.7 64bit
Debian	8.6.0 64bit
	8.5.0 64bit
Fedora	25 64bit
	24 64bit
SUSE	SUSE Linux Enterprise Server 12 SP2 64bit
	SUSE Linux Enterprise Server 12 SP1 64bit
	SUSE Linux Enterprise Server 11 SP4 64bit
	SUSE Linux Enterprise Server 12 64bit

#### Table 4-4 OSs supporting disk detachment from a running ECS

OS	Version
OpenSUSE	42.2 64bit
	42.1 64bit
Oracle Linux Server	7.3 64bit
release	7.2 64bit
	6.8 64bit
	6.7 64bit
Ubuntu Server	16.04 64bit
	14.04 64bit
	14.04.4 64bit
Windows (SCSI disks	Windows Server 2008 R2 Enterprise 64bit
a running ECS.)	Windows Server 2012 R2 Standard 64bit
	Windows Server 2016 R2 Standard 64bit
Redhat Linux Enterprise	7.3 64bit
	6.8 64bit

#### **NOTE**

Online detachment is not supported by the ECSs running OSs not listed in the preceding table. For such ECSs, stop the ECSs before detaching disks from them to prevent any possible problems from occurring.

### 4.10 Why My Disk Cannot Be Attached to a Server?

If your disk cannot be attached, verify that your disk meets the following conditions:

- The disk is in the **Available** state if it is a non-shared disk.
- The disk is in the **Available** or **In-use** state if it is a shared disk, and the maximum number of servers that the disk can be attached to is not reached.
- The disk is not added to any replication pair in SDRS. If it has been added to a replication pair, delete the replication pair and try again.
- The disk is not frozen.
- The disk is not locked by any service.



Released On	Description
2019-10-10	This issue is the second official release, which incorporates the following change:
	Optimized the overall document structure and content.
2018-07-30	This issue is the first official release.