Image Management Service

User Guide

Issue 01

Date 2025-11-05

HUAWEI

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Contents

1 Using IAM to Grant Access to IMS

1.1 Creating a User and Granting Permissions

Scenarios

This section describes how to use **Identity and Access Management** (IAM) to implement fine-grained permissions control over your images. With IAM, you can:

- Create IAM users for employees based on the organizational structure of your enterprise. Each IAM user has their own identity credentials for accessing images.
- Grant only the permissions required for users to perform a specific task.
- Entrust an account or cloud service to perform professional and efficient O&M on your images.

If your account does not need individual IAM users for permissions management, you can skip this section.

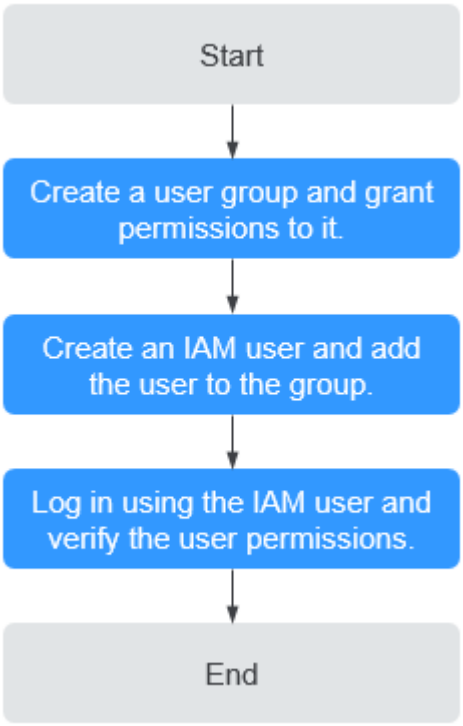
This section uses the **IMS ReadOnlyAccess** permission as an example to describe how to grant permissions to a user. **Figure 1-1** shows the process.

Prerequisites

Learn about the permissions (see **IMS Permissions**) supported by IMS. For the system permissions of other services, see **System Permissions**.

Process Flow

Figure 1-1 Process for granting IMS permissions



1. **Create a user group and grant permissions to it**.

   Create a user group on the IAM console, and grant the read-only permission to the group by assigning the **IMS ReadOnlyAccess** permission.

2. **Create an IAM user and add it to the user group**.

   Create a user on the IAM console and add the user to the group created in **1**.

3. **Log in** and verify permissions.

   Log in to the management console using the IAM user, switch to a region where the permissions take effect, and verify the permissions (assume that the user has only the **IMS ReadOnlyAccess** permission).

   - In the **Service List**, choose **Image Management Service**. On the IMS console, perform operations except querying images, such as creating, modifying, and deleting an image.

     For example, click **Create Private Image** in the upper right corner. If you are prompted insufficient permissions, the **IMS ReadOnlyAccess** permission has taken effect.

   - Choose any other service in the **Service List**, such as **Virtual Private Cloud**. If a message appears indicating insufficient permissions to access the service, the **IMS ReadOnlyAccess** permission has taken effect.

1.2 Creating a Custom Policy

Scenarios

Custom policies can be created as a supplement to the system policies of IMS. For the actions supported by custom policies, see **Permissions and Supported Actions**.

You can create custom policies in either of the following two ways:

- Visual editor: Select cloud services, actions, resources, and request conditions without the need to know policy syntax.
- JSON: Edit JSON policies from scratch or based on an existing policy.

For details, see **Creating a Custom Policy**. This section provides examples of common IMS custom policies.

Example Policies

- Example 1: Allowing users to create images

```
{
   "Version": "1.1",
   "Statement": [
      {
         "Effect": "Allow",
         "Action": [
            "ims:serverImages:create"
         ]
      },
      {
         "Effect": "Allow",
         "Action": [
            "KMS:*:*"
         ]
      },
      {
         "Effect": "Allow",
         "Action": [
            "ecs:cloudServers:get",
            "ecs:servers:get",
            "ecs:serverVolumes:use",
            "ecs:cloudServers:list",
            "ecs:serverVolumeAttachments:list",
            "ecs:servers:list"

         ]
      },
      {
         "Effect": "Allow",
         "Action": [
            "bms:servers:list",
            "bms:servers:get",
            "bms:serverFlavors:get"
         ]
      },
      {
         "Effect": "Allow",
         "Action": [
            "evs:volumes:*"
         ]
      }
   ]
```



```
}
{
   "Version": "1.1",
   "Statement": [
      {
         "Effect": "Allow",
         "Action": [
            "OBS:*:*"
         ]
      }
   ]
}
```

NOTE

The action required for creating an image is **ims:serverImages:create**. Others are dependent actions for creating an image.

- Example 2: Denying image deletion

  A deny policy must be used in conjunction with other policies to take effect. If the policies assigned to a user contain both Allow and Deny actions, the Deny actions take precedence over the Allow actions.

  The following method can be used if you need to assign the **IMS FullAccess** policy to a user but also forbid the user from deleting images. Create a custom policy for denying image deletion, and assign both the policies to the group the user belongs to. Then, the user can perform all operations on IMS except deleting images. The following is an example deny policy:

```
{
   "Version": "1.1",
   "Statement": [
      {
         "Effect": "Deny",
         "Action": [
            "ims:images:delete"
         ]
      }
   ]
}
```


2 Preparations for Creating a Private Image

2.1 Overview

Before creating a private image, you need to configure the image source to initialize the private image and improve the image availability.

An image source can be an ECS, a BMS, or an image file. You can configure them as instructed in the following tables.

- Table 2-1
- Table 2-2
- Table 2-3
- Table 2-4

Image Source: ECS or Image File

Table 2-1 ECS configurations

OS	Configuration
Linux	• Configuring DHCP • (Optional) Installing and Configuring Cloud-Init • Deleting Files from the Network Rule Directory • Changing Disk Identifiers in the GRUB File to UUID • Changing Disk Identifiers in the fstab File to UUID • Installing Native Xen and KVM Drivers on a Xen ECS • Installing Native KVM Drivers on a KVM ECS • Detaching Data Disks from an ECS

NOTE

- If the ECS was created from a public image, the one-click password reset plug-in and Cloud-Init have been installed in it by default.

Table 2-2 Image file configurations

OS	Configuration
Linux	• **Deleting Files from the Network Rule Directory** • **Configuring DHCP** • **Deleting Files from the Network Rule Directory** • **Changing Disk Identifiers in the GRUB File to UUID** • **Changing Disk Identifiers in the fstab File to UUID** • **Installing Native Xen and KVM Drivers on a Xen ECS** • **Installing Native KVM Drivers on a KVM ECS** • **Configuring DHCP** • **(Optional) Enabling NIC Multi-Queue** • **(Optional) Configuring DHCPv6**

NOTE

- To use an image file to create a private image, you are advised to perform the preceding operations on the VM where the image file is exported from.
- When you register a Windows image file as a private image, if you select **Enable automatic configuration**, the cloud platform will check the image file for Guest OS drivers. If no Guest OS drivers are found, the cloud platform will try to install them automatically.

Image Source: BMS or Image File

Table 2-3 BMS configurations

OS	Configuration	Reference
Windows	• Install the **bms-network-config** package. • Install Cloudbase-Init. • Delete residual files from the OS.	**Creating a Private Image from a BMS**
Linux	• Install the **bms-network-config** package. • Install Cloud-Init. • Delete residual files from the OS.	

Table 2-4 Image file configurations

OS	Configuration	Reference
Windows	• Install drivers for x86 V5 BMSs. • Install Cloudbase-Init. • Install the **bms-network-config** package. • (Optional) Install the SDI iNIC driver. • (Optional) Install the one-click password reset plug-in. • Set the time zone. • Set the virtual memory. • (Optional) Configure automatic Windows update. • Configure the SID.	**Private Image Creation Guide**
Linux	• Install and configure Cloud-Init. • Modify the hardware device driver that boots the OS. • Install the **bms-network-config** package. • (Optional) Install the SDI iNIC driver. • (Optional) Install the Hi1822 NIC driver. • (Optional) Install the IB driver. • (Optional) Install drivers for x86 V5 BMSs. • (Optional) Install the multipath software. • (Optional) Install the one-click password reset plug-in. • Perform security configuration. • Configure remote login to the BMS. • Configure the root partition to be automatically extended.	

2.2 Windows Private Images

2.2.1 Configuring DHCP

Scenarios

If a private image is created from an ECS or external image file and the VM where the ECS or external image file is located is configured with a static IP address, you need to configure DHCP so that the new ECSs created from the private image can dynamically obtain an IP address.

This section uses Windows Server 2008 R2 as an example to describe how to configure DHCP. For details about how to configure DHCP on ECSs running other OSs, see the relevant OS documentation.

NOTE

When registering an external image file as a private image, configure DHCP on the VM where the external image file is located. You are advised to configure DHCP on the VM and then export the image file.

Prerequisites

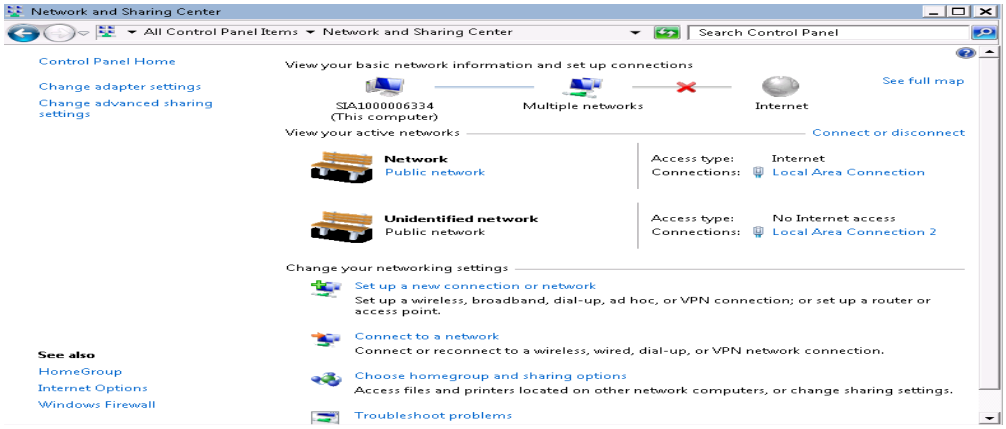
You have logged in to the ECS used to create a Windows private image.

For details about how to log in to an ECS, see *Elastic Cloud Server User Guide*.

Procedure

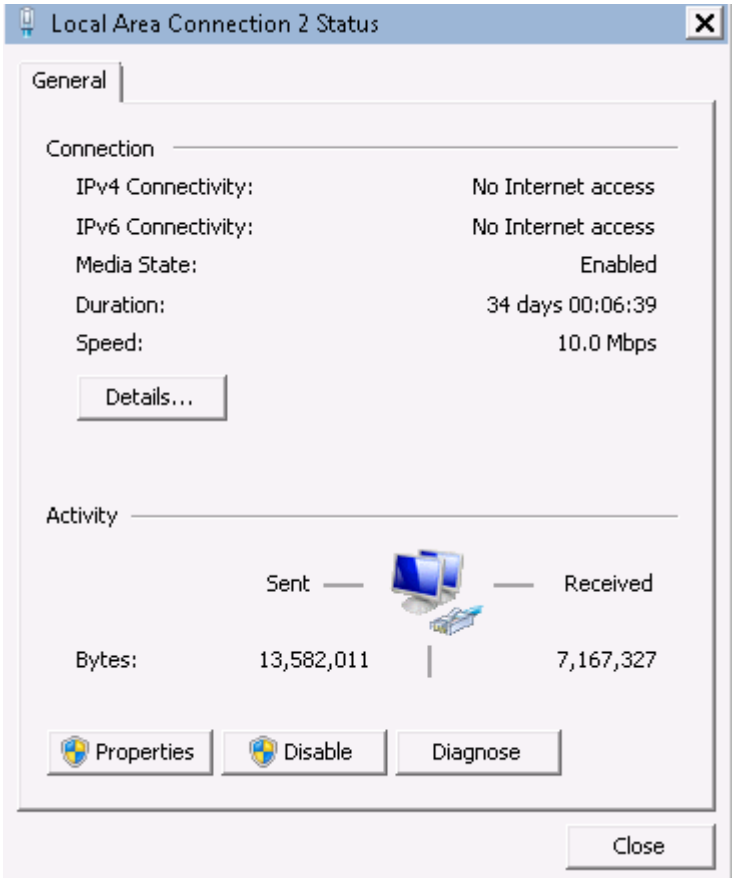
1. On the ECS, choose **Start** > **Control Panel**.
2. Click **Network and Internet Connections**.
3. Click **Network and Sharing Center**.

Figure 2-1 Network and Sharing Center



4. Select the connection configured with the static IP address. For example, click **Local Area Connection 2**.

Figure 2-2 Local Area Connection 2 Status

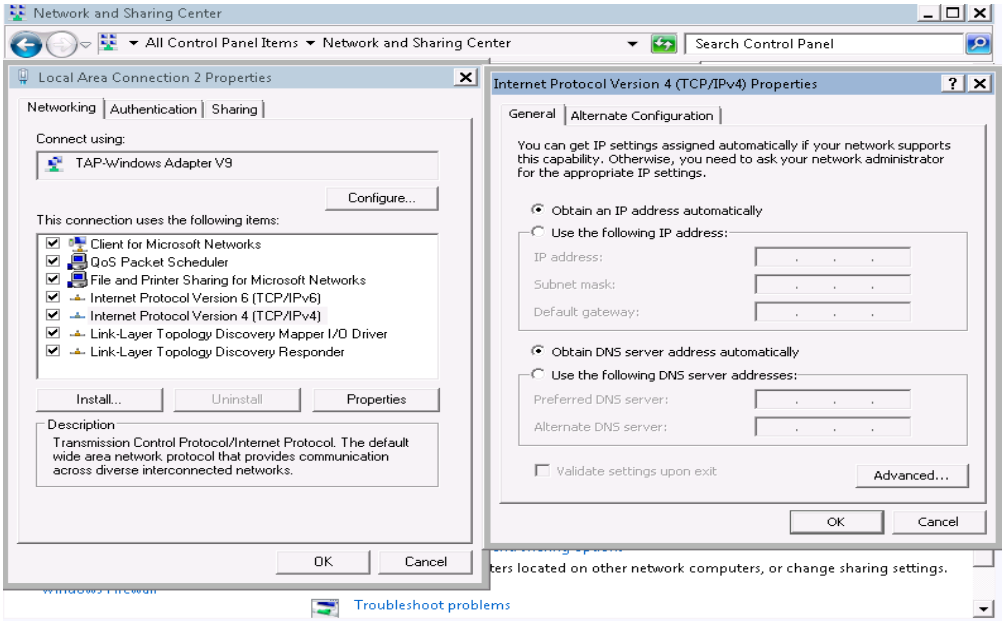


5. Click **Properties** and select the configured Internet protocol version.
6. On the **General** tab, select **Obtain an IP address automatically** and **Obtain DNS server address automatically** and click **OK**, as shown in **Figure 2-3**. The system will automatically obtain an IP address.

   NOTE

   You are advised to record the original network information so that you can restore the network if necessary.

Figure 2-3 Configuring DHCP



2.2.2 Enabling Remote Desktop Connection

Scenarios

If you want to remotely access an ECS, enable remote desktop connection for the source ECS when creating a private image. This function must be enabled for GPU-accelerated ECSs.

NOTE

When registering an external image file as a private image, enable remote desktop connection on the VM where the external image file is located. You are advised to enable this function on the VM and then export the image file.

Prerequisites

You have logged in to the ECS used to create a Windows private image.

For details about how to log in to an ECS, see *Elastic Cloud Server User Guide*.

Procedure

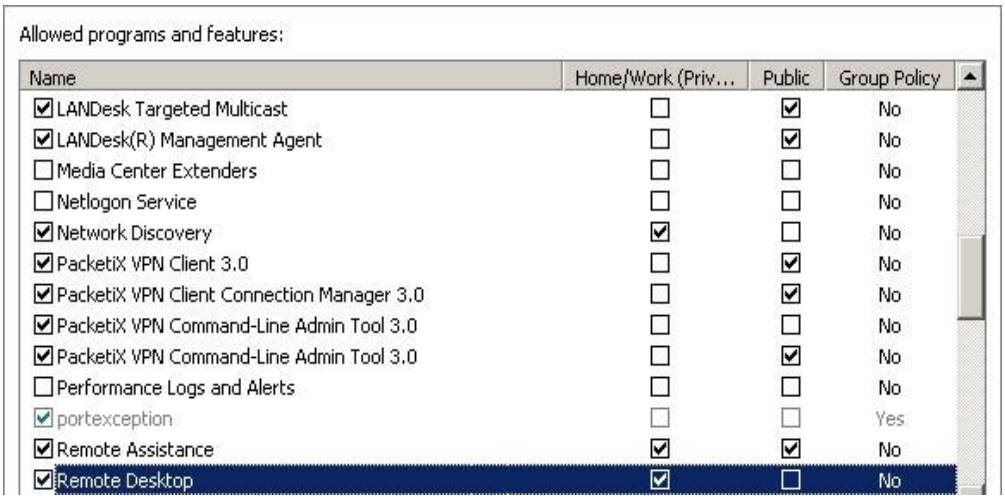
1. Before enabling this function, you are advised to set the resolution of the ECS to 1920×1080.

   On the ECS, choose **Start** > **Control Panel**. Under **Appearance and Personalization**, click **Adjust screen resolution**. Then select a proper value from the **Resolution** drop-down list box.

2. Choose **Start**, right-click **Computer**, and choose **Properties** from the shortcut menu.
3. Click **Remote settings**.

4. In the **Remote** tab, select **Allow connections from computers running any version of Remote Desktop (less secure)**.
5. Click **OK**.
6. Choose **Start** > **Control Panel** and navigate to **Windows Firewall**.
7. Choose **Allow a program or feature through Windows Firewall** in the left pane.
8. Select programs and features that are allowed by the Windows firewall for **Remote Desktop** based on your network requirements and click **OK** in the lower part.

Figure 2-4 Configuring remote desktop



2.2.3 (Optional) Installing and Configuring Cloudbase-Init

Scenarios

To ensure that you can use the user data injection function to inject initial custom information (such as the login password) into ECSs created from a private image, install Cloudbase-Init on the ECS that is used to create the image.

- If Cloudbase-Init is not installed, you cannot customize an ECS. Instead, you can only use the password in the image file to log in to the ECS.
- By default, ECSs created from a public image have Cloudbase-Init installed. You do not need to install or configure Cloudbase-Init on such ECSs.
- For ECSs created from external image files, install and configure Cloudbase-Init by performing the operations in this section.

NOTE

Cloudbase-Init is open-source software. If the installed version has security vulnerabilities, you are advised to upgrade it to the latest version.

Prerequisites

- An EIP has been bound to the ECS.
- You have logged in to the ECS.

- The ECS uses DHCP to obtain IP addresses.

Install Cloudbase-Init

1. On the Windows **Start** menu, choose **Control Panel** > **Programs** > **Programs and Features** and check whether the latest version Cloudbase-Init 1.1.2 is installed.
   - If the latest version is installed, skip the subsequent steps and go to **Configure Cloudbase-Init**.
   - If Cloudbase-Init is installed but it is not the latest version, uninstall Cloudbase-Init and go to the next step.
   - If Cloudbase-Init is not installed, go to the next step.
2. Check whether the OS is Windows desktop.
   - If yes, go to **3**.
   - If the OS is Windows Server, go to **4**.
3. Enable the administrator account (Windows 7 is used as an example).
   a. Click **Start** and choose **Control Panel** > **System and Security** > **Administrative Tools**.
   b. Double-click **Computer Management**.
   c. Choose **System Tools** > **Local Users and Groups** > **Users**.
   d. Right-click **Administrator** and select **Properties**.
   e. Deselect **Account is disabled**.
4. Download the Cloudbase-Init installation package.

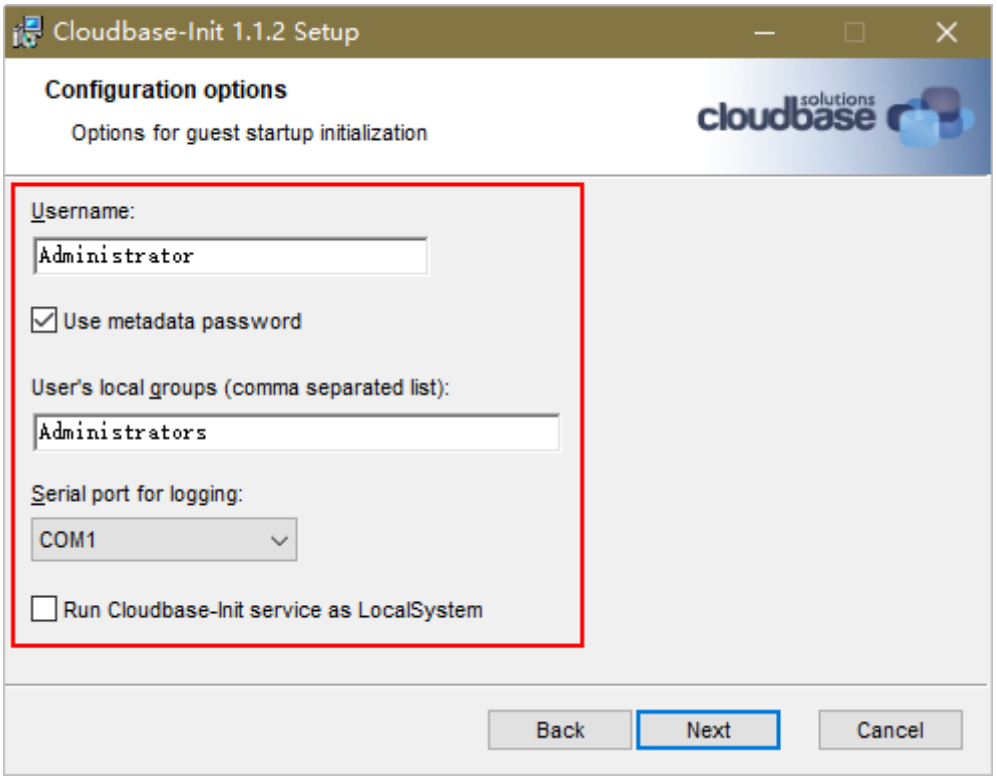
   Download the Cloudbase-Init installation package of the appropriate version based on the OS architecture from the Cloudbase-Init official website (**http://www.cloudbase.it/cloud-init-for-windows-instances/**).

   To obtain the stable version, visit the following paths:
   - 64-bit: **https://www.cloudbase.it/downloads/CloudbaseInitSetup_Stable_x64.msi**
   - 32-bit: **https://www.cloudbase.it/downloads/CloudbaseInitSetup_Stable_x86.msi**
5. Double-click the Cloudbase-Init installation package.
6. Click **Next**.
7. Select **I accept the terms in the License Agreement** and click **Next**.
8. Retain the default path and click **Next**.
9. In the **Configuration options** window, enter **Administrator** for **Username**, select **COM1** for **Serial port for logging**, and deselect **Run Cloudbase-Init service as LocalSystem**.

   NOTE

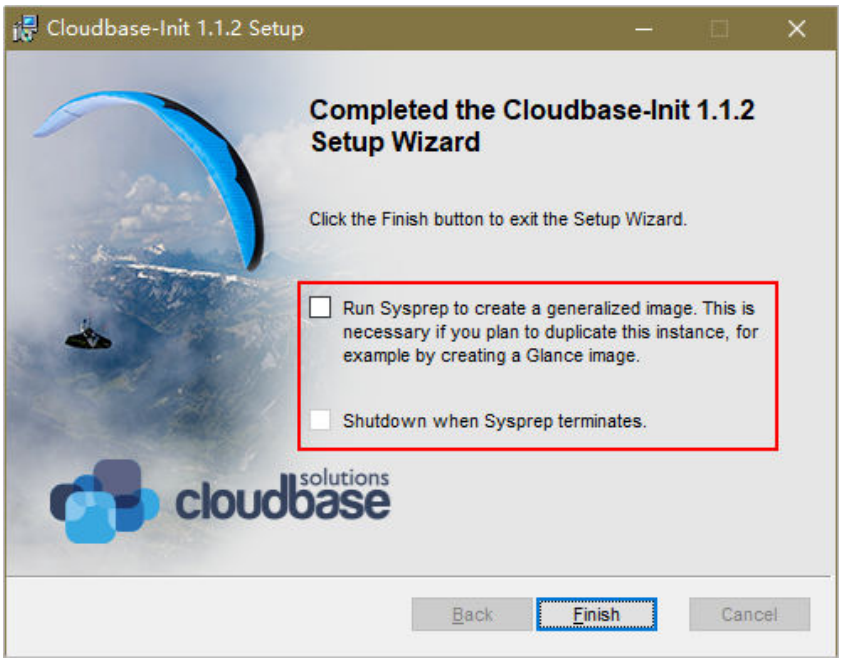
   The version number shown in the figure is for reference only.

Figure 2-5 Configuring parameters



10. Click **Next**.
11. Click **Install**.
12. In the **Files in Use** dialog box, select **Close the application and attempt to restart them** and click **OK**.
13. Check whether the version of the OS is Windows desktop.
    - If yes, go to **15**.
    - If no, go to **14**.
14. In the **Completed the Cloudbase-Init Setup Wizard** window, ensure that neither option is selected.

Figure 2-6 Completing the Cloudbase-Init installation



NOTE

The version number shown in the figure is for reference only.

15. Click **Finish**.

Configure Cloudbase-Init

1. Edit the configuration file **C:\Program Files\Cloudbase Solutions\Cloudbase-Init\conf\cloudbase-init.conf** in the Cloudbase-Init installation path.
   a. Add **netbios_host_name_compatibility=false** to the last line of the file so that the hostname can have a maximum of 63 characters.

      NOTE

      If you are using NetBIOS in your network, the hostname cannot exceed 15 characters because NetBIOS has a 15 character limit.

   b. Add **metadata_services=cloudbaseinit.metadata.services.httpservice.HttpService** to enable the agent to access the IaaS OpenStack data source.
   c. Add **plugins** to configure the plugins that will be loaded. Separate plugins with commas (,). The information in bold is the keyword of each plugin.

      - The following plugins are loaded by default. You can keep all or some of them as needed.

        plugins=cloudbaseinit.plugins.common.localscripts.**LocalScriptsPlugin**,cloudbaseinit.plugins.common.mtu.**MTUPlugin**,cloudbaseinit.plugins.windows.createuser.**CreateUserPlugin**,cloudbaseinit.plugins.common.setuserpassword.**SetUserPasswordPlugin**,cloudbaseinit.plugins.common.sshpublickeys.**SetUserSSHPublicKeysPlugin**,cloudbaseinit.plugins.common.sethostname.**SetHostNamePlugin**,cloudbaseinit.plugins.windows.extendvolumes.**ExtendVolumesPlugin**,cloudbaseinit.plugins.common.userdata.**UserDataPlugin**,cloudbaseinit.plugins.windows.licensing.**WindowsLicensingPlugin**

        Plugin functions:

- **LocalScriptsPlugin** configures scripts.
- **MTUPlugin** configures MTU network interfaces.
- **CreateUserPlugin** creates a user.
- **SetUserPasswordPlugin** configures a password.
- **SetUserSSHPublicKeysPlugin** configures a key.
- **SetHostNamePlugin** configures a hostname.
- **ExtendVolumesPlugin** expands disk space.
- **UserDataPlugin** injects user data.
- **WindowsLicensingPlugin** activates Windows instances.

NOTE

If you need to change the hostname of ECSs after they are created from this image, and services on the ECSs are sensitive to hostname changes, you are not advised to configure the **SetHostNamePlugin** here.

- Optional plugins:
  plugins=cloudbaseinit.plugins.windows.winrmlistener.**ConfigWinRMListenerPlugin**,cloudbaseinit.plugins.windows.winrmcertificateauth.**ConfigWinRMCertificateAuthPlugin**

  Plugin functions:
  - **ConfigWinRMListenerPlugin** configures listening to remote logins.
  - **ConfigWinRMCertificateAuthPlugin** configures remote logins without password authentication.

  CAUTION

  The WinRM plug-ins use weak cryptographic algorithm, which may cause security risks. So, you are advised not to load these plug-ins.

d. (Optional) Add the following configuration items to configure the number of retry times and interval for obtaining metadata:
```
retry_count=40
retry_count_interval=5
```
e. (Optional) Add the following configuration item to prevent metadata network disconnections caused by the default route added by Windows:
```
[openstack]
add_metadata_private_ip_route=False
```
f. (Optional) If the Cloudbase-Init version is 0.9.12 or later, you can customize the password length.

   Change the value of **user_password_length** to customize the password length.

g. (Optional) Add the following configuration item to disable password changing upon first login:

   first_logon_behaviour=no

h. (Optional) Add the following configuration item to ensure that time synchronization from BIOS persists through system restarts:

   real_time_clock_utc=true

NOTE

The registry entry **RealTimeIsUniversal=1** allows the system to synchronize time from BIOS. If **real_time_clock_utc=true** is not added, Cloudbase-Init will be set **RealTimeIsUniversal** back to **0**, causing the system to not synchronize time from BIOS after a restart.

2. Release the current DHCP address so that the created ECSs can obtain correct addresses.

   In the Windows command line, run the following command to release the current DHCP address:

   ipconfig /release

   NOTE

   This operation will interrupt network connection and adversely affect ECS use. The network will automatically recover after the ECSs are started again.

3. When creating an image using a Windows ECS, you need to change the SAN policy of the ECS to **OnlineAll**. Otherwise, EVS disks attached to the ECSs created from the image may be offline.

   Windows has three types of SAN policies: **OnlineAll**, **OfflineShared**, and **OfflineInternal**.

   Table 2-5 SAN policies

Type	Description
OnlineAll	All newly detected disks are automatically brought online.
OfflineShared	All disks on sharable buses, such as iSCSI and FC, are left offline by default, while disks on non-sharable buses are kept online.
OfflineInternal	All newly detected disks are left offline.

   a. Execute **cmd.exe** and run the following command to query the current SAN policy of the ECS using DiskPart:

      diskpart

   b. Run the following command to view the SAN policy of the ECS:

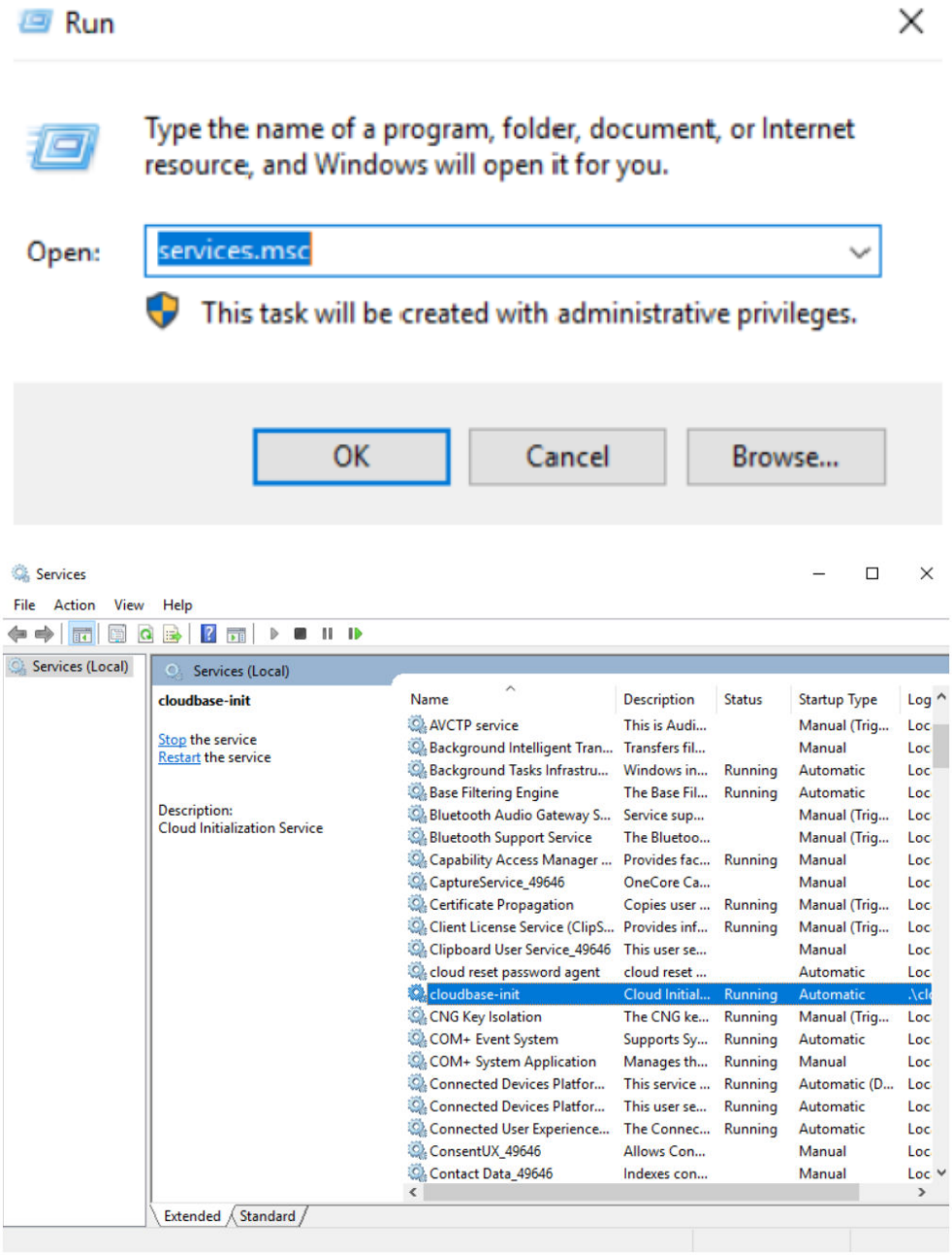
      san

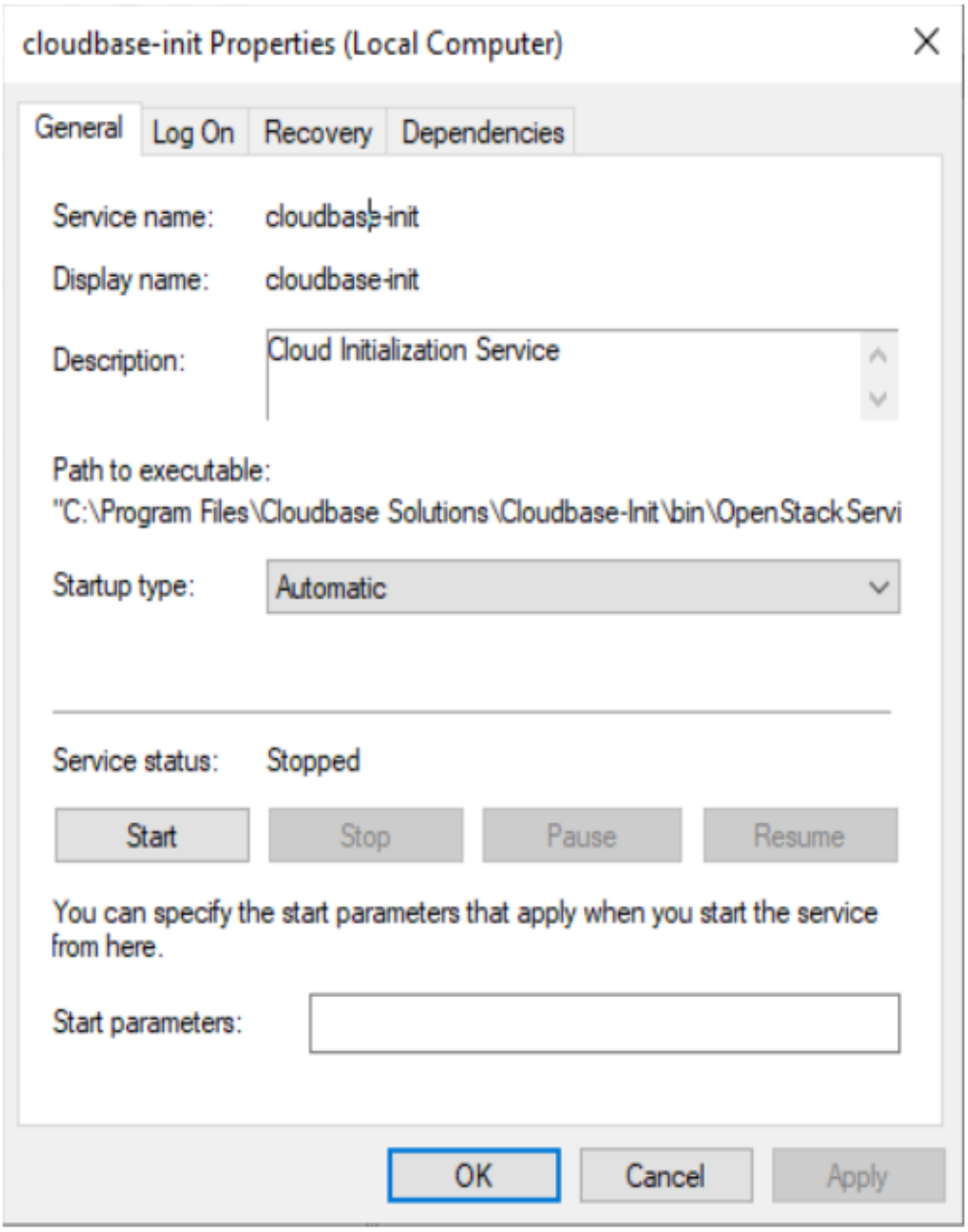
      - If the SAN policy is **OnlineAll**, run the **exit** command to exit DiskPart.
      - If the SAN policy is not **OnlineAll**, go to **3.c**.

   c. Run the following command to change the SAN policy of the ECS to **OnlineAll**:

      san policy=onlineall

4. Press Win+R to open the **Run** window. Enter **services.msc** and click **OK**. In the **Services** window, locate **cloudbase-init**. Set **Startup type** to **Automatic**.





2.2.4 (Optional) Running Sysprep

Scenarios

Running Sysprep ensures that an ECS has a unique SID after it is joined to a Windows domain. **Sysprep** is used to generalize images. It removes server-specific information, like the security identifier (SID), from an image so that cloud servers created from this image can have unique SIDs in a domain. SID conflicts will cause domain login failures. If your Windows cloud servers do not need to be joined to a domain, Sysprep is not required.

After installing Cloudbase-Init on an ECS, you need to decide whether the ECS needs to be added to a domain or whether it must have a unique SID. If yes, run Sysprep as instructed in this section.

Prerequisites

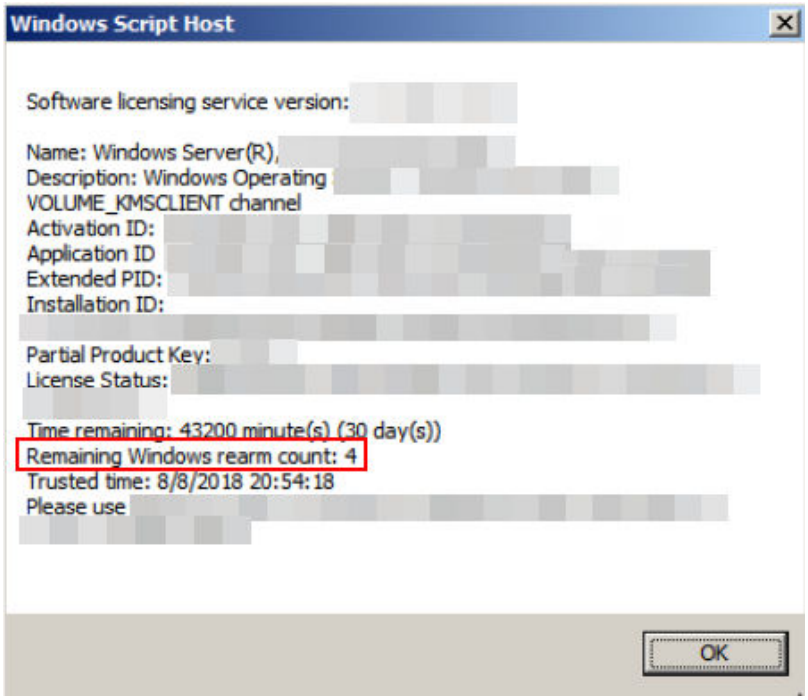
- Run Sysprep as the administrator.
- For a newly activated Windows ECS, you can run Sysprep only once at a time.
- If an ECS is created from an image file, only Sysprep provided by the image file can be used. In addition, Sysprep must always reside in the **%WINDIR%\system32\sysprep** directory.
- Windows must be in the activated state, and the remaining Windows rearm count must be greater than or equal to 1. Otherwise, the Sysprep encapsulation cannot be executed.

  Run the following command in the Windows command line and check how many times you can run Sysprep in the displayed **Windows Script Host** dialog box:

  slmgr.vbs /dlv

  If the value of **Remaining Windows rearm count** is **0**, you cannot run Sysprep.

  Figure 2-7 Windows Script Host



Procedure

1. Enter the Cloudbase-Init installation directory.

   C:\Program Files\Cloudbase Solutions is used as an example of the Cloudbase-Init installation directory. Switch to the root directory of drive C and run the following command to enter the installation directory:

   cd C:\Program Files\Cloudbase Solutions\Cloudbase-Init\conf

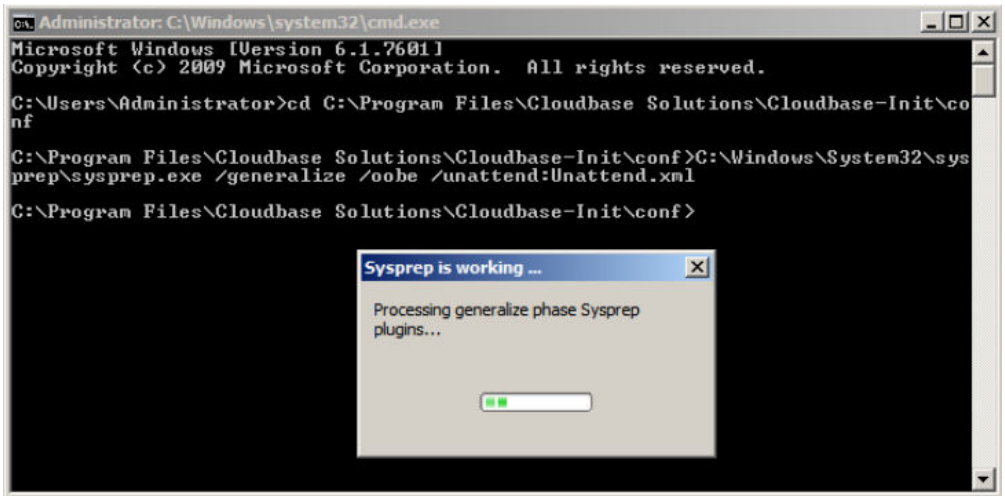
2. Run the following command to encapsulate Windows:

   C:\Windows\System32\sysprep\sysprep.exe /generalize /oobe /unattend:Unattend.xml

CAUTION

- During Sysprep execution, user configuration files of the built-in administrator account (**C:/Users/Administrator**) will be deleted, including the **Desktop**, **Documents**, and **AppData** folders. The files of a non-built-in administrator account (for example, a manually created local administrator) and **Public Profile** (**C:/Users/Public**) will not be deleted.
- Ensure that **/unattend:Unattend.xml** is contained in the preceding command. Otherwise, the username, password, and other important configuration information of the ECS will be reset, and you must configure the OS manually when you use ECSs created from the Windows private image.
- After this command is executed, the ECS will be automatically stopped. After the ECS is stopped, use the ECS to create an image. ECSs created using the image have unique SIDs. If you restart a Windows ECS on which Sysprep has been executed, Sysprep takes effect only for the current ECS. Before creating an image using the ECS, you must run Sysprep again.
- For Windows Server 2012 and Windows Server 2012 R2, the administrator password of the ECS will be deleted after Sysprep is executed on the ECS. You need to log in to the ECS and reset the administrator password. In this case, the administrator password set on the management console will be invalid. Keep the password you set secure.
- If a domain account is required for logins, run Sysprep on the ECS before using it to create a private image. For details about the impact of running Sysprep, see **Why Is Sysprep Required for Creating Private Images Using a Windows ECS?**
- The Cloudbase-Init account of a Windows ECS is an internal account of the Cloudbase-Init agent. This account is used for obtaining metadata and completing relevant configuration when the Windows ECS starts. If you modify or delete this account, or uninstall the Cloudbase-Init agent, you will be unable to inject initial custom information into an ECS created from a Windows private image. Therefore, you are not advised to modify or delete the Cloudbase-Init account.

Figure 2-8 Running Sysprep



Follow-up Procedure

1. Use this ECS to create a private image. For details see **Creating a System Disk Image from an ECS**.
2. Use the image to create ECSs. Each ECS will have a unique SID.

   Run the following command to query the ECS SID:

   whoami /user

   Figure 2-9 ECS SID before Sysprep is executed

   ```
   C:\Users\Administrator>whoami /user

   USER INFORMATION
   ----------------

   User Name                SID
   ======================== ==============================================
   ecs-330f\administrator S-1-5-21-1324385262-1554666476-1954780781-500
   ```

   Figure 2-10 ECS SID after Sysprep is executed

   ```
   C:\Users\Administrator>whoami /user

   USER INFORMATION
   ----------------

   User Name                       SID
   =============================== ==============================================
   win-1194so2rqsk\administrator S-1-5-21-2271228291-953988671-972520728-500
   ```

2.2.5 (Optional) Installing Special Windows Drivers

Scenarios

Before using some types of ECSs to create private images, you need to install special drivers on the ECSs.

GPU Driver

If you want to use the created private image to create GPU-accelerated ECSs, install a proper GPU driver for the image to enable GPU acceleration. There are two types of NVIDIA Tesla GPU drivers for GPU-accelerated ECSs, Tesla and GRID/vGPU drivers.

- To use graphics acceleration, such as OpenGL, DirectX, or Vulcan, install the GRID/vGPU driver and separately configure a GRID license. The GRID/vGPU driver with a vDWS license also supports CUDA for both computing and graphics acceleration.
- To use NVIDIA CUDA computing acceleration, install the Tesla driver.

2.2.6 Installing PV Drivers

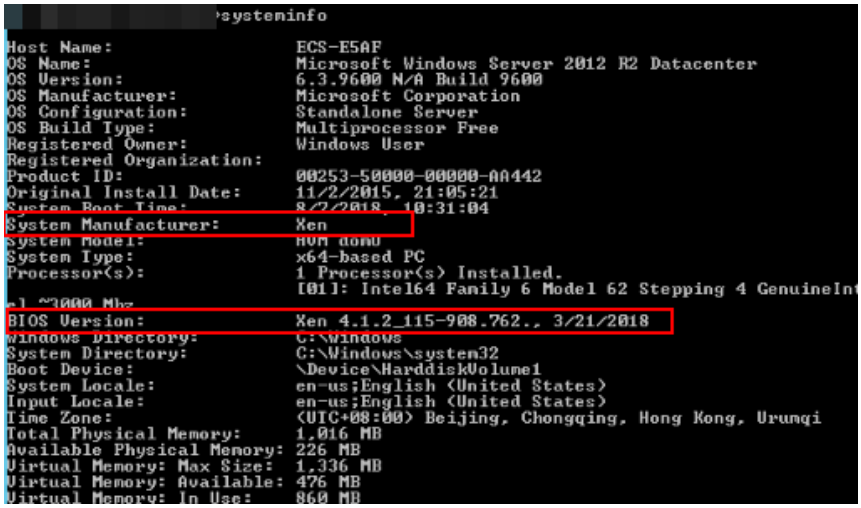
This section only applies to Xen ECSs, which have been discontinued and no longer been available for new users. If you are a new user or you are an existing user that will use this image to create a non-Xen ECS, skip this section.

Run the following command in the cmd window of an ECS to check its virtualization type:

systeminfo

In the command output, if the values of **System Manufacturer** and **BIOS Version** are **XEN**, the virtualization type is Xen.

Figure 2-11 Checking the virtualization type of a Windows ECS



Scenarios

Before using an ECS or external image file to create a private image, ensure that PV drivers have been installed in the OS so that ECSs created from this image can support Xen virtualization, the I/O performance can be improved, and advanced functions such as hardware monitoring can be available.

NOTICE

If you do not install PV drivers, the ECS network performance will be poor, and the security groups and firewall configured for the ECS will not take effect.

PV drivers have been installed by default when you use a public image to create ECSs. You can perform the following operations to verify the installation:

Open the **version** configuration file to check whether the PV drivers are the latest:

C:\Program Files (x86)\Xen PV Drivers\bin\version

- If the PV driver version is later than 2.5, you do not need to install new PV drivers.
- If the PV driver version is not displayed or the version is 2.5 or earlier, perform operations in **Installing PV Drivers**.

Prerequisites

- An OS has been installed for the ECS, and an EIP has been bound to the ECS.
- The remaining capacity of the ECS system disk must be greater than 32 MB.
- If the ECS uses Windows Server 2008, you must install PV drivers as an administrator.

- The PV driver package has been downloaded on the ECS. For details about how to obtain the software package, see **Obtaining the PV Driver Package**.
- To avoid an installation failure, perform the following operations before starting the installation:
  - Uninstall third-party virtualization platform tools, such as Citrix Xen Tools and VMware Tools. For how to uninstall the tools, see the corresponding official documents of the tools.
  - Disable your anti-virus and intrusion detection software. You can enable them after PV drivers are installed.

Obtaining the PV Driver Package

Table 2-6 lists the PV driver packages required for optimizing Windows private images.

Table 2-6 PV driver packages

Software Package	OS	How to Obtain
pvdriver-win2008R2-64bit.zip	Windows Server 2008 R2 64bit	**https://ecs-instance-driver.obs.cn-north-1.myhuaweicloud.com/pvdriver-win2008R2-64bit.zip**
pvdriver-win2012-64bit.zip	Windows Server 2012 64bit	**https://ecs-instance-driver.obs.cn-north-1.myhuaweicloud.com/pvdriver-win2012-64bit.zip**
pvdriver-win2012R2-64bit.zip	Windows Server 2012 R2 64bit	**https://ecs-instance-driver.obs.cn-north-1.myhuaweicloud.com/pvdriver-win2012R2-64bit.zip**
pvdriver-win2016-64bit.zip	Windows Server 2016 64bit	**https://ecs-instance-driver.obs.cn-north-1.myhuaweicloud.com/pvdriver-win2016-64bit.zip**
pvdriver-win2019-64bit.zip	Windows Server 2019 64bit	**https://ecs-instance-driver.obs.cn-north-1.myhuaweicloud.com/pvdriver-win2019-64bit.zip**

Installing PV Drivers

1. Log in to the Windows ECS using VNC.

   For details about how to log in to an ECS, see *Elastic Cloud Server User Guide*.

NOTE

You must log in to the ECS using VNC. Remote desktop connection is not allowed because the NIC driver needs to be updated during the installation but the NIC is in use for the remote desktop connection. As a result, the installation will fail.

2. On the ECS, choose **Start** > **Control Panel**.
3. Click **Uninstall a program**.
4. Uninstall **GPL PV drivers for Windows** *x.x.x.xx* as prompted.
5. Download PV drivers of the required version based on the ECS OS and instructions in **Obtaining the PV Driver Package**.
6. Decompress the PV driver package.
7. Right-click **GPL PV Drivers for Windows** *x.x.x.xx*, select **Run as administrator**, and complete the installation as prompted.
8. Restart the ECS as prompted to make the PV drivers take effect.

   ECSs running Windows Server 2008 must be restarted twice.

   NOTE

   After the PV drivers are installed, the ECS NIC configuration will be lost. If you have configured NICs before, you need to configure them again.

Installing the PV Driver Upgrade Package

1. Log in to the Windows ECS using VNC.

   For details about how to log in to an ECS, see *Elastic Cloud Server User Guide*.

   NOTE

   You must log in to the ECS using VNC. Remote desktop connection is not allowed because the NIC driver needs to be updated during the installation but the NIC is in use for the remote desktop connection. As a result, the installation will fail.

2. On the ECS, choose **Start** > **Control Panel**.
3. Choose **Programs** > **Uninstall a program**, find PV drivers, and uninstall them.
4. After the uninstallation is complete, restart the ECS to clear the environment.
5. Download **pvdriver-windows.zip** from the following link:

   https://ecs-instance-driver.obs.cn-north-1.myhuaweicloud.com/pvdriver-windows.zip
6. Download **pvdriver-windows.zip** from the following link:
7. Click **Setup.exe** to install new PV drivers. The package will automatically adapt to the OS version.
8. Restart the ECS as prompted to make the PV drivers take effect.

   ECSs running Windows Server 2008 must be restarted twice.

   NOTE

   After the PV drivers are installed, the ECS NIC configuration will be lost. If you have configured NICs before, you need to configure them again.

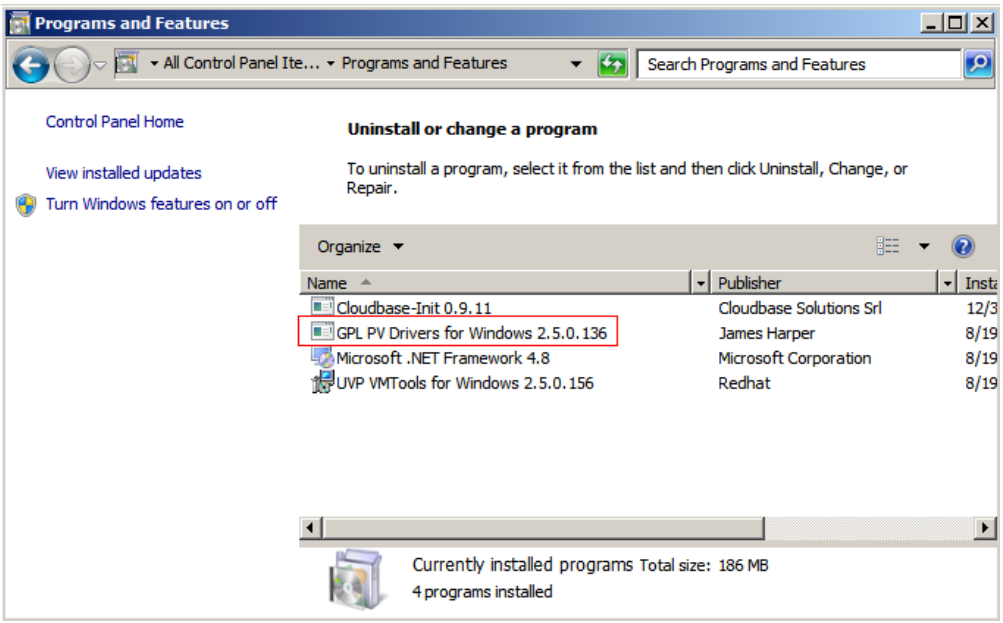
Verifying the Installation

Perform the following steps to verify the installation of PV drivers:

1. Click **Start**. Choose **Control Panel** > **Programs and Features**.
2. Locate PV drivers for Windows.

   If PV drivers for Windows exist, the installation is successful, as shown in Figure 2-12.

Figure 2-12 Verifying the installation



2.2.7 Installing VirtIO Drivers

Scenarios

VirtIO is a standard interface for VMs to access host devices. It is used to improve the I/O performance between VMs and hosts. For details about VirtIO, see **VirtIO**. For details about open source code of virtio-win/kvm-guest-drivers-windows, see **https://github.com/virtio-win/kvm-guest-drivers-windows**.

Before using an ECS or external image file to create a private image, ensure that VirtIO drivers have been installed in the OS so that ECSs created from this image can support KVM virtualization and the network performance can be improved.

This section describes how to install VirtIO drivers on a KVM ECS.

NOTICE

If you do not install VirtIO drivers, ECS NICs cannot be detected. As a result, the ECSs cannot communicate with other resources.

If an ECS is created from a public image, VirtIO drivers have been installed by default.

Prerequisites

An EIP has been bound to the ECS. (This ECS is used to optimize a private image.)

Installing VirtIO Drivers

The following uses **virtio-win-gt-x64.msi** in **version virtio-win-0.1.189-1** as an example to describe how to install VirtIO drivers.

1. Log in to the Windows ECS using VNC.

   For details about how to log in to an ECS, see *Elastic Cloud Server User Guide*.

   NOTE

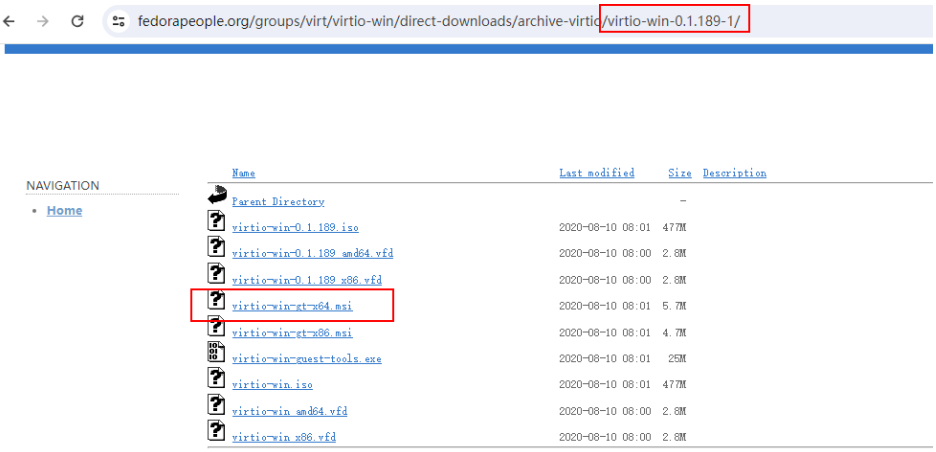
   You must log in to the ECS using VNC. Remote desktop connection is not allowed because the NIC driver needs to be updated during the installation but the NIC is in use for the remote desktop connection. As a result, the installation will fail.

2. Download VirtIO drivers.

   Download path:

   https://fedorapeople.org/groups/virt/virtio-win/direct-downloads/archive-virtio/

   Figure 2-13 Downloading a driver package

3. After the download is complete, right-click **virtio-win-gt-x64.msi** and choose **Run as administrator** from the shortcut menu.

Figure 2-14 Starting the installation

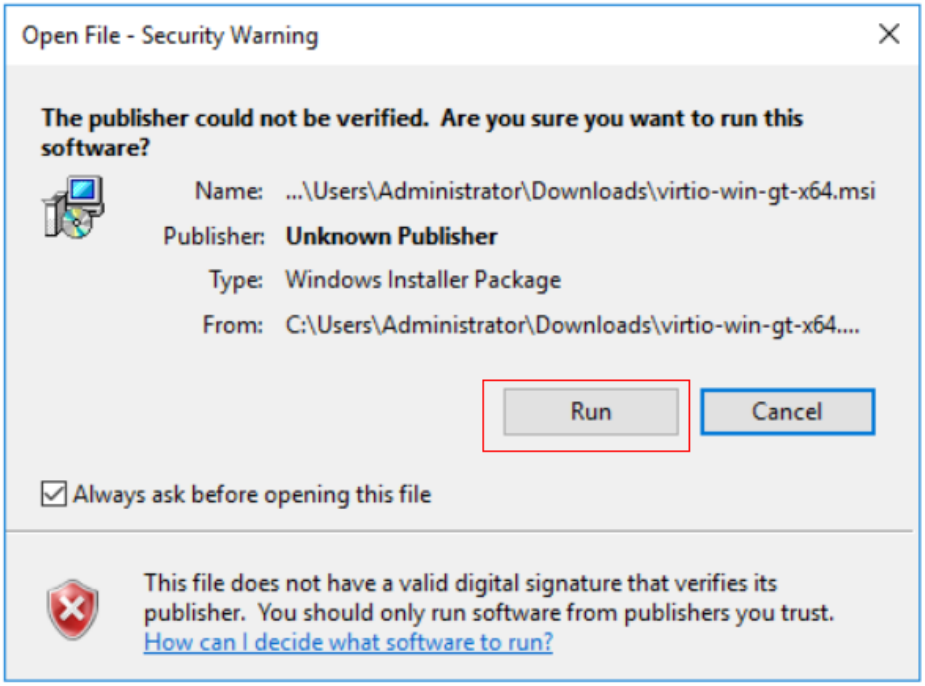


Figure 2-15 Installation wizard

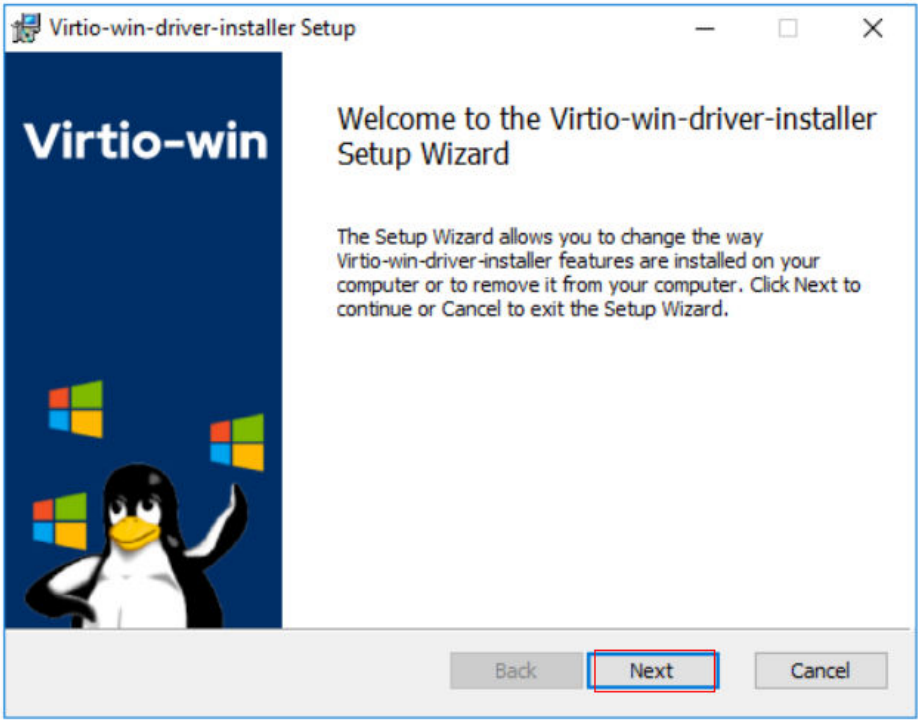
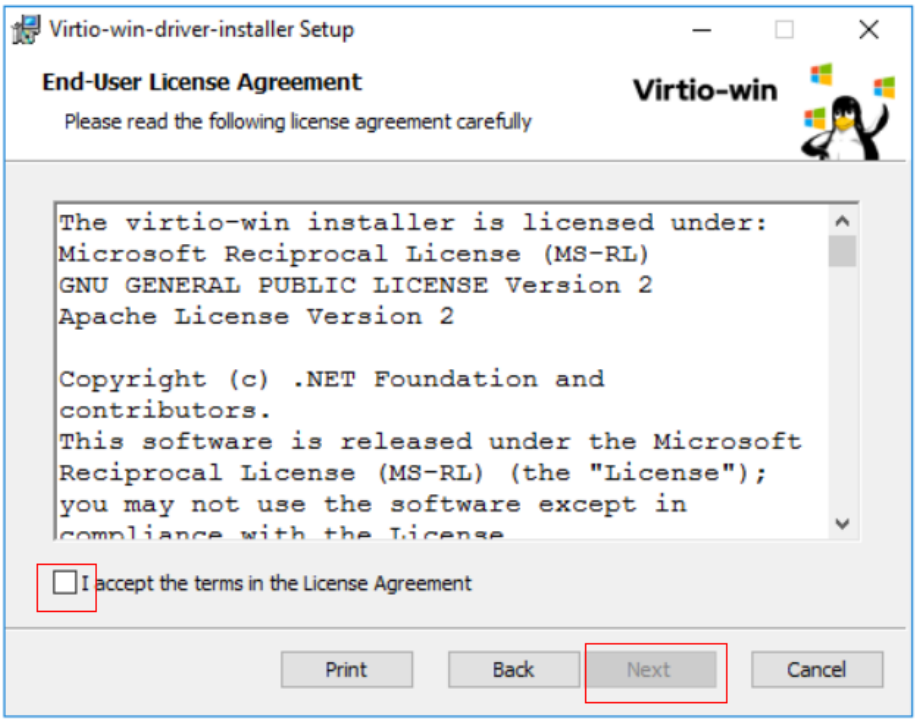


Figure 2-16 Accepting the agreement



Select the VirtIO drivers to be installed. In this example, select all VirtIO drivers.

Figure 2-17 Selecting VirtIO drivers to install

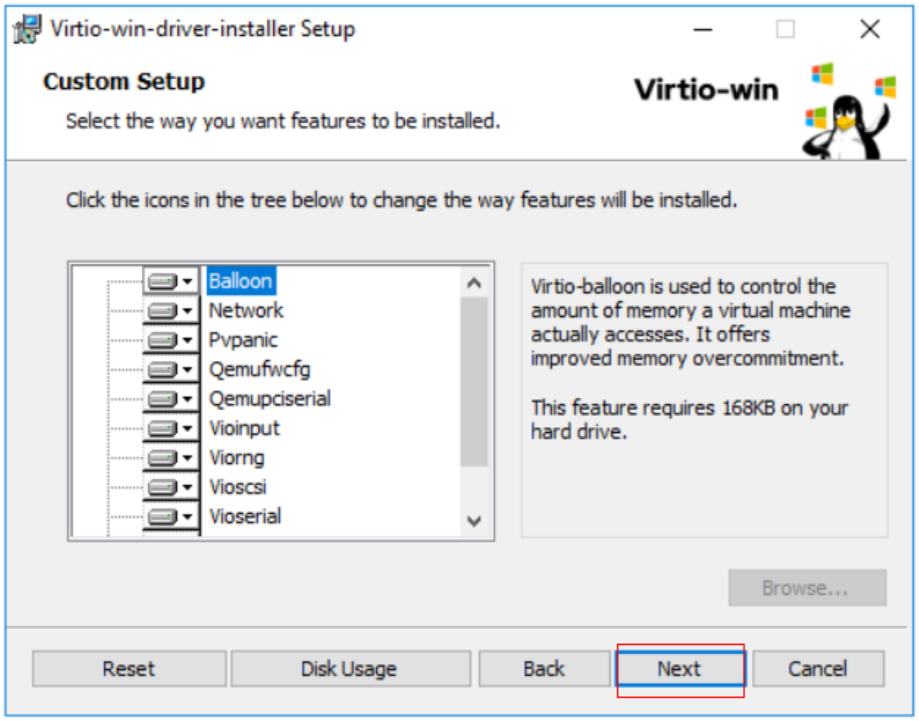
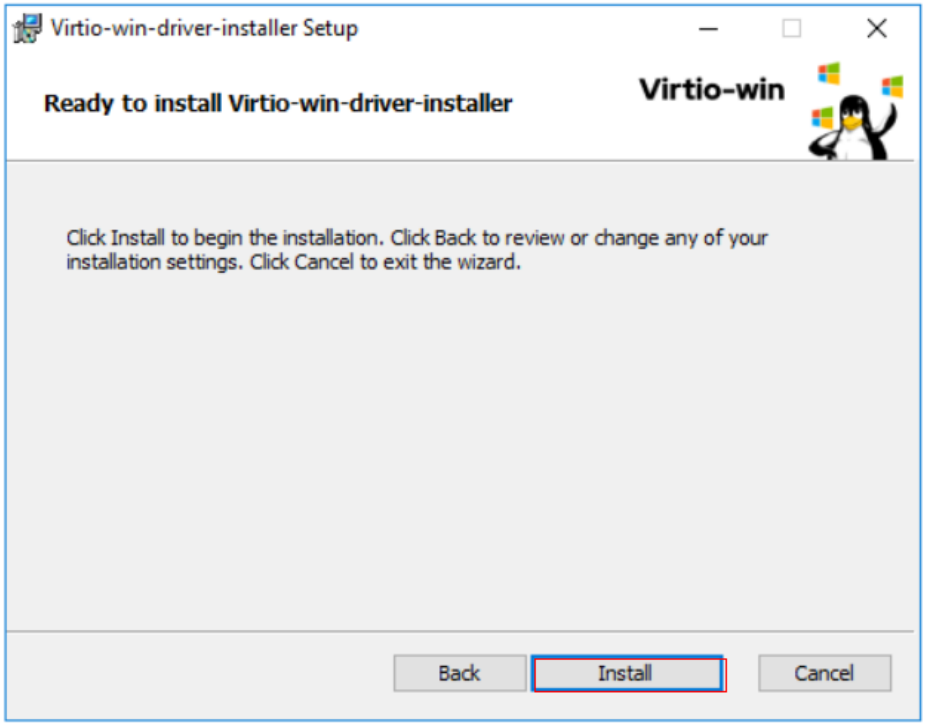
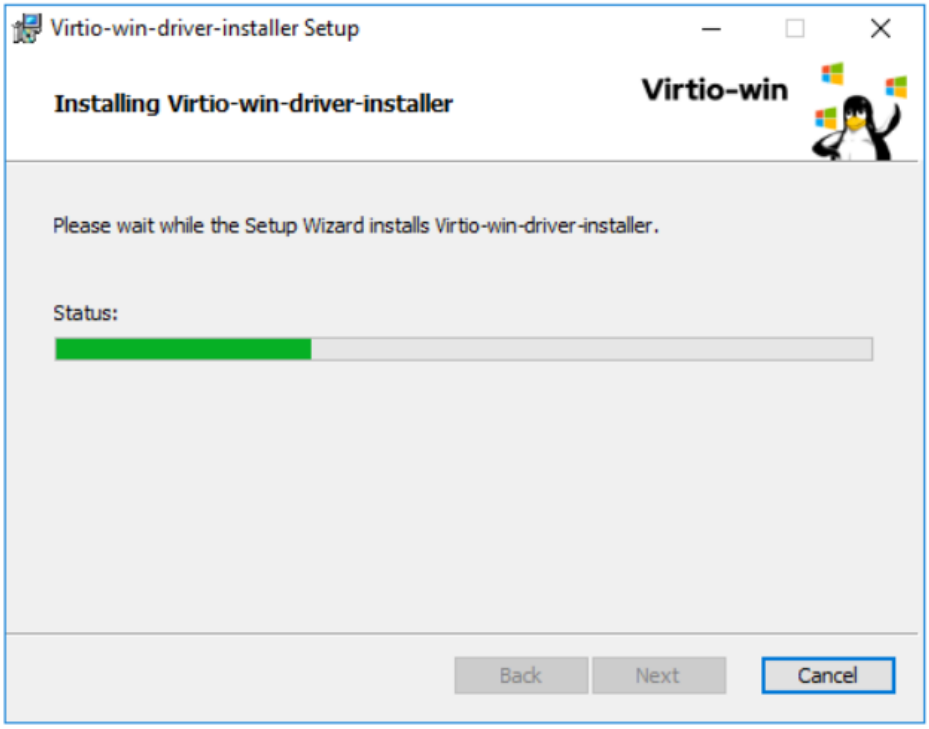


Figure 2-18 Proceeding with the installation.



4. Wait until the installation is complete.

Figure 2-19 Installation in process



5. Restart the ECS after the installation is complete.

Figure 2-20 Installation completed

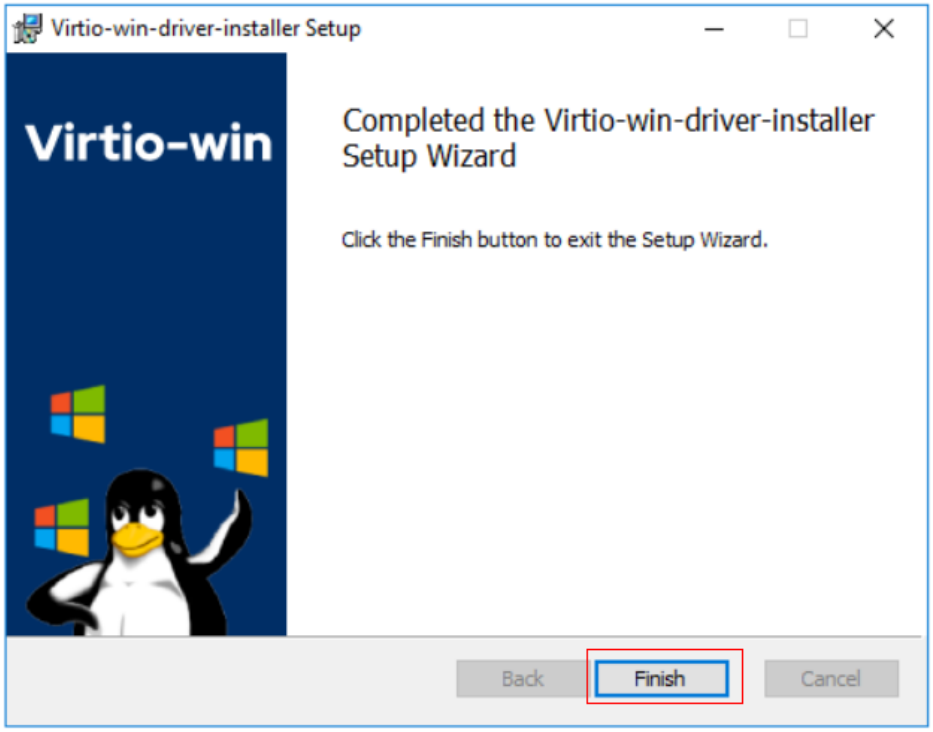
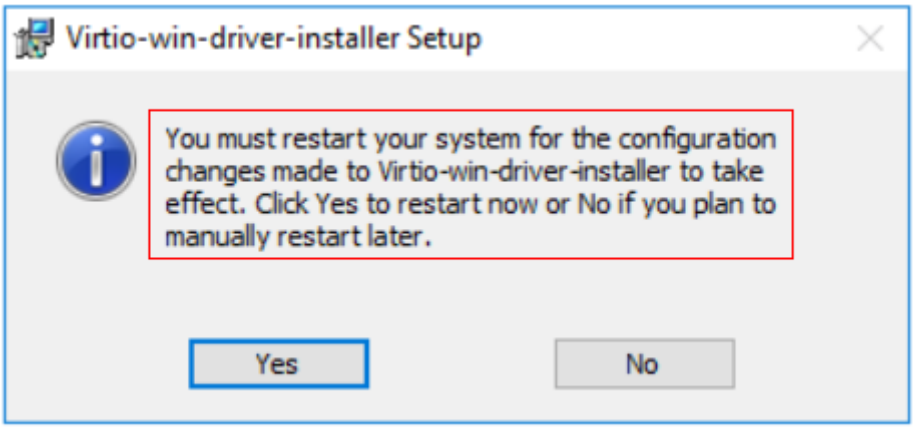


Figure 2-21 Restart prompt



6. After the restart, perform the operations in **Verifying the Installation** to verify that the VirtIO drivers have been successfully installed.

Verifying the Installation

Perform the following steps to verify the installation of the VirtIO drivers:

1. Open **Device Manager** and search for VirtIO drivers.
2. Check whether the VirtIO driver version and date displayed in **Device Manager** are the same as those of the VirtIO drivers you downloaded. If they are the same, the VirtIO drivers have been installed successfully.

Figure 2-22 Version and date of downloaded drivers

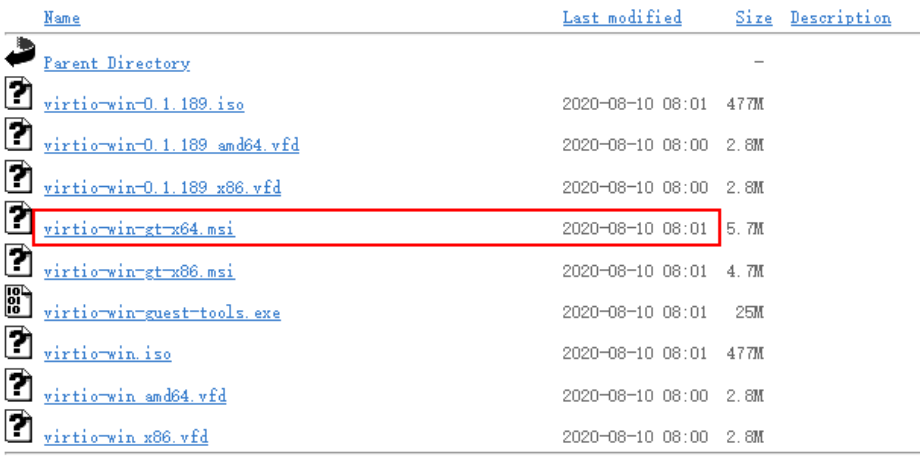
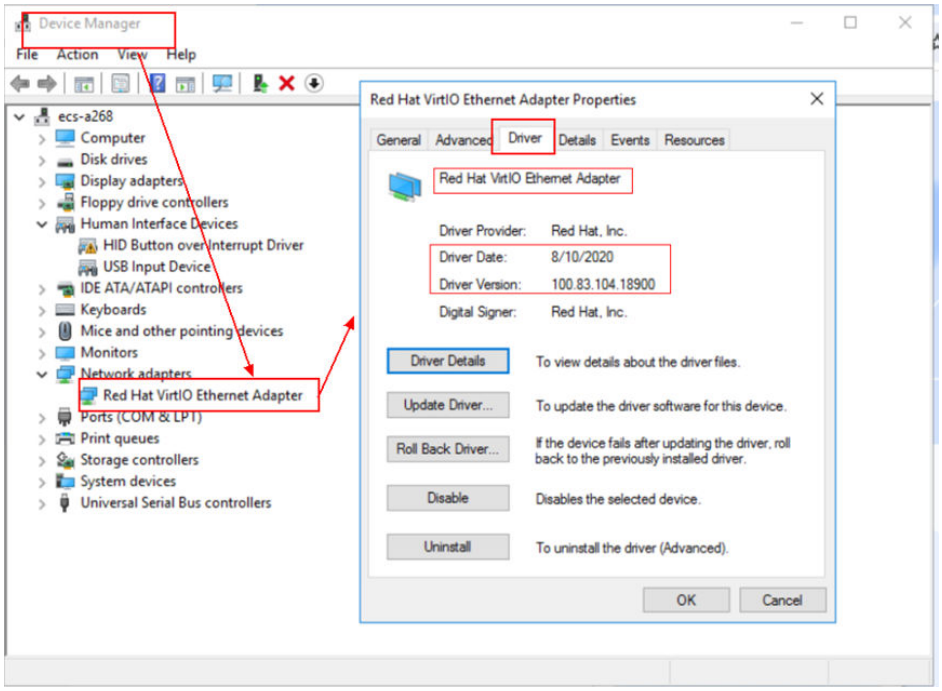


Figure 2-23 Version and date of drivers in Device Manager



Follow-up Procedure

1. On the ECS, choose **Control Panel** > **Power Options**. Click **Choose when to turn off the display**, select **Never** for **Turn off the display**, and save the changes.
2. After the installation of VirtIO drivers is complete, perform the following operations to clear system logs:
   a. For Windows Server 2008 and Windows Server 2012, right-click **Computer** and select **Manage**.
   b. In the displayed dialog box, choose **System Tools** > **Event Viewer** > **Windows Logs** and delete logs of five items.

c. Stop the ECS.

2.3 Linux Private Images

2.3.1 Configuring DHCP

Scenarios

If a private image is created from an ECS or external image file and the VM where the ECS or external image file is located is configured with a static IP address, you need to configure DHCP so that the new ECSs created from the private image can dynamically obtain an IP address.

The configuration method varies depending on OSs.

NOTE

When registering an external image file as a private image, configure DHCP on the VM where the external image file is located. You are advised to configure DHCP on the VM and then export the image file.

Prerequisites

You have logged in to the ECS used to create a Windows private image.

For details about how to log in to an ECS, see **Login Overview**.

Ubuntu 18 or Later

1. Run **vi /etc/netplan/01-netcfg.yaml** on the ECS to open the **/etc/netplan/01-netcfg.yaml** file, and check whether the value of **dhcp4** is **true**.
   - If **dhcp4** is set to **true**, enter **:q** to exit the editor. No further action will be required.

     ```
     network:
       version:2
       renderer:NetworkManager
       ethernets:
           eth0:
               dhcp4: true
     ```

   - If **dhcp4** is set to **no** and a static IP address is configured, go to the next step.

     ```
     network:
       version:2
       renderer:NetworkManager
       ethernets:
           eth0:
               dhcp4: no
               addresses: [192.168.1.109/24]
               gateway4: 192.168.1.1
               nameservers:
                   addresses: [8.8.8.8,114.114.114.114]
     ```

2. Press **i** to enter the editing mode.

   Delete the static IP address settings and set **dhcp4** to **true**. You can also use a number sign (#) to comment out the static IP address settings.

   ```
   network:
     version:2
   ```



```
renderer:NetworkManager
ethernets:
    eth0:
      dhcp4: true   # Set dhcp4 to true.
      #dhcp4: no    # Delete or comment out the static IP address settings.
      #addresses: [192.168.1.109]
      #gateway4: 192.168.1.1
      #nameservers:
      # addresses: [8.8.8.8,114.114.114.114]
```

3. If your ECS has more than one NIC, configure DHCP for all of them.

```
network:
  version:2
  renderer:NetworkManager
  ethernets:
      eth0:
        dhcp4: true
      eth1:
        dhcp4: true
      eth2:
        dhcp4: true
      eth3:
        dhcp4: true
```

4. Press **Esc**, enter **:wq**, and press **Enter** to save the settings and exit the vi editor.
5. Run the **netplan apply** command to make the settings take effect.

Ubuntu 16.04

1. Run the following command on the ECS to open the **/etc/network/interfaces** file:

   vi /etc/network/interfaces

   - If DHCP has been configured for all NICs, enter **:q** to exit the vi editor.

     ```
     auto lo
     iface lo inet loopback
     auto eth0
     iface eth0 inet dhcp

     auto eth1
     iface eth1 inet dhcp
     ```

   - If static IP addresses are set on the NICs, go to **2**.

     ```
     auto lo
     iface lo inet loopback
     auto eth0
     #iface eth0 inet dhcp
     iface eth0 inet static
     address 192.168.1.109
     netmask 255.255.255.0
     gateway 192.168.1.1
     ```

2. Press **i** to enter the editing mode.
3. Delete the static IP address settings and configure DHCP for the NICs.

   You can also use a number sign (#) to comment out the static IP address settings.

   ```
   auto lo
   iface lo inet loopback
   auto eth0
   iface eth0 inet dhcp
   ```

   If the ECS has multiple NICs, you must configure DHCP for all the NICs.

   ```
   auto lo
   iface lo inet loopback
   auto eth0
   ```



```
iface eth0 inet dhcp
auto eth1
iface eth1 inet dhcp
```

4. Press **Esc**, enter **:wq**, and press **Enter**.

   The system saves the settings and exits the vi editor.

Related Operations

Configure DHCP to enable the ECS to obtain IP addresses continuously.

- For CentOS and EulerOS, use the vi editor to add **PERSISTENT_DHCLIENT="y"** to configuration file **/etc/sysconfig/network-scripts/ifcfg-ethX**.
- For SUSE Linux Enterprise, use the vi editor to set **DHCLIENT_USE_LAST_LEASE** to **no** in the configuration file **/etc/sysconfig/network/dhcp**.
- For Ubuntu 12.04 or later, upgrade dhclient to ISC dhclient 4.2.4 so that the NIC can consistently obtain IP addresses from the DHCP server. To perform the upgrade, you need to install isc-dhcp-server first.

2.3.2 Deleting Files from the Network Rule Directory

Scenarios

To prevent NIC name drift when you use a private image to create ECSs, you need to delete files from the network rule directory of the VM where the ECS or image file is located during the private image creation.

NOTE

When registering an external image file as a private image, delete files from the network rule directory on the VM where the external image file is located. You are advised to delete the files on the VM and then export the image file.

Prerequisites

An OS and VirtIO drivers have been installed on the ECS.

Procedure

1. Run the following command to query files in the network rule directory:

   ls -l /etc/udev/rules.d

2. Run the following commands to delete the files whose names contain **persistent** and **net** from the network rule directory:

   Example:

   rm /etc/udev/rules.d/*30-***net_persistent***-*names*.rules**

   rm /etc/udev/rules.d/*70-***persistent-net.rules**

   The italic content in the commands varies depending on your environment.

> **NOTE**
>
> For CentOS 6 images, to prevent NIC name drift, you need to create an empty network rule file.
>
> Example:
>
> **touch /etc/udev/rules.d/***75***-persistent-net-generator.rules** //Replace *75* with the actual value in the environment.

3. Delete network rules.
   - If the OS uses the initrd system image, perform the following operations:
     i. Run the following command to check whether the initrd image file whose name starts with **initrd** and ends with **default** contains the **persistent** and **net** network device rule files (replace the italic content in the following command with the actual OS version):

        lsinitrd /boot/initrd-*2.6.32.12-0.7***-default |grep persistent|grep net**

        - If no, no further action is required.
        - If yes, go to **3.ii**.

     ii. Run the following command to back up the initrd image files (replace the italic part in the following command with the actual OS version):

        cp /boot/initrd-*2.6.32.12-0.7***-default /boot/initrd-***2.6.32.12-0.7***-default_bak**

     iii. Run the following command to generate the initrd file again:

        mkinitrd

   - If the OS uses the initramfs system image (such as Ubuntu), perform the following operations:
     i. Run the following command to check whether the initramfs image file whose name starts with **initrd** and ends with **generic** contains persistent and net rule files.

        lsinitramfs /boot/initrd.img-3.19.0-25-generic|grep persistent|grep net

        - If no, no further action is required.
        - If yes, go to **3.ii**.

     ii. Run the following command to back up the initrd image files:

        cp /boot/initrd.img-3.19.0-25-generic /boot/initrd.img-3.19.0-25-generic_bak

     iii. Run the following command to generate the initramfs image files again:

        update-initramfs -u

2.3.3 (Optional) Installing and Configuring Cloud-Init

Scenarios

To ensure that you can use the user data injection function to inject initial custom information into ECSs created from a private image (such as setting the ECS login password), install Cloud-Init on the ECS used to create the image.

- By default, ECSs created from a public image have Cloud-Init installed. You do not need to install or configure Cloud-Init on such ECSs.
- For ECSs created using an external image file, install and configure Cloud-Init by performing the operations in this section.
- You need to download Cloud-Init from its official website. Therefore, you must bind an EIP to the ECS.
- If Cloud-Init is not installed, you cannot configure an ECS. As a result, you can only use the password in the image file to log in to the created ECSs.

NOTE

Cloud-Init is open-source software. If the installed version has security vulnerabilities, you are advised to upgrade it to the latest version.

Prerequisites

- An EIP has been bound to the ECS.
- You have logged in to the ECS.
- The ECS uses DHCP to obtain IP addresses.

Procedure

1. Check whether Cloud-Init has been installed.

   For details, see **Check Whether Cloud-Init Has Been Installed**.
2. Install Cloud-Init.

   You can install Cloud-Init in any of the following ways: **(Recommended) Install Cloud-Init Using the Official Installation Package**, **Install Cloud-Init Using the Official Source Code Package and pip**, and **Install Cloud-Init Using the Official GitHub Source Code**.

Check Whether Cloud-Init Has Been Installed

Perform the operations provided here to check whether Cloud-Init has been installed. The methods of checking whether Cloud-Init is installed vary depending on the OSs.

- If you are in a Python 3 environment, run the following command to check whether Cloud-Init is installed (Ubuntu 22.0.4 is used as an example):

  which cloud-init

  - If information similar to the following is displayed, Cloud-Init has been installed:

    ```
    /usr/bin/cloud-init
    ```

  - If information similar to the following is displayed, Cloud-Init is not installed:

    ```
    /usr/bin/which: no cloud-init in (/usr/local/bin:/usr/local/sbin:/usr/local/bin:/sbin:/bin:/usr/sbin:/usr/bin)
    ```

- If you are in a Python 2 environment, run the following command to check whether Cloud-Init is installed (CentOS 6 is used as an example):

  which cloud-init

  - If information similar to the following is displayed, Cloud-Init has been installed:


```
cloud-init-0.7.5-10.el6.centos.2.x86_64
```

- If no information is returned, Cloud-Init is not installed.

  NOTE

  To confirm Cloud-Init is really not installed, you are advised to run **rpm -qa |grep cloud-init** to check again. If either of **which cloud-init** and **rpm -qa |grep cloud-init** shows that Cloud-Init has been installed, Cloud-Init is installed.

If Cloud-Init has been installed, perform the following operations:

- Determine whether to continue to use the SSH certificate in the OS of this ECS. If no, delete it.
  - If the certificate is stored in a directory of user **root**, for example, */$path/$to/$root***/.ssh/authorized_keys**, run the following commands:

    cd /root/.ssh

    rm authorized_keys
  - If the certificate is not stored in a directory of user **root**, for example, */$path/$to/$none-root***/.ssh/authorized_keys**, run the following commands:

    cd /home/centos/.ssh

    rm authorized_keys
- Delete the cache data generated by Cloud-Init to ensure that ECSs created from the private image can be logged in by using an SSH certificate:

  sudo rm -rf /var/lib/cloud/*

NOTE

After the operations are complete, do not restart the ECS. Otherwise, you need to perform these operations again.

(Recommended) Install Cloud-Init Using the Official Installation Package

The method of installing Cloud-Init on an ECS varies depending on the OS. Perform the installation operations as user **root**.

The following describes how to install Cloud-Init on an ECS running SUSE Linux, CentOS, Fedora, Debian, and Ubuntu. For other OS types, install the required type of Cloud-Init. For example, you need to install coreos-cloudinit on ECSs running CoreOS.

- SUSE Linux

  Paths for obtaining the Cloud-Init installation package for SUSE Linux

  https://ftp5.gwdg.de/pub/opensuse/repositories/Cloud:/Tools/

  http://download.opensuse.org/repositories/Cloud:/Tools/

  NOTE

  Select the required repo installation package in the provided paths.

  Take SUSE Enterprise Linux Server 12 as an example. Perform the following steps to install Cloud-Init:

  a. Log in to the ECS used to create a Linux private image.

  b. Run the following command to install the online installation source for SUSE Enterprise Linux Server 12:

zypper ar https://ftp5.gwdg.de/pub/opensuse/repositories/Cloud:/Tools/SLE_12_SP3/Cloud:Tools.repo

c. Run the following command to update the online installation source:

zypper refresh

d. Run the following command to install Cloud-Init:

zypper install cloud-init

e. Run the following commands to enable Cloud-Init to automatically start upon system boot:

- SUSE 11

  chkconfig cloud-init-local on; chkconfig cloud-init on; chkconfig cloud-config on; chkconfig cloud-final on

  service cloud-init-local status; service cloud-init status; service cloud-config status; service cloud-final status

- SUSE 12 and openSUSE 12/13/42

  systemctl enable cloud-init-local.service cloud-init.service cloud-config.service cloud-final.service

  systemctl status cloud-init-local.service cloud-init.service cloud-config.service cloud-final.service

CAUTION

For SUSE and openSUSE, perform the following steps to prevent DHCP from changing the hostname:

1. Run the following command to open the **dhcp** file using the vi editor:

   vi etc/sysconfig/network/dhcp

2. Change the value of **DHCLIENT_SET_HOSTNAME** in the **dhcp** file to **no**.

- **CentOS**

  Table 2-7 lists the Cloud-Init installation paths for CentOS. Select an epel-release installation package matching your OS.

Table 2-7 Cloud-Init installation package addresses

OS Type	Version	How to Obtain
CentOS	6 32-bit	https://archives.fedoraproject.org/pub/archive/epel/6/i386/
	6 64-bit	https://archives.fedoraproject.org/pub/archive/epel/6/x86_64/
	7 64-bit	https://archives.fedoraproject.org/pub/archive/epel/7/x86_64/Packages/e/

a. Run the following commands to install Cloud-Init:

yum install *Cloud-Init installation package address*/**epel-release-***x-y*.**noarch.rpm**

yum install cloud-init

NOTE

Cloud-Init installation package address indicates the address of the Cloud-Init epel-release installation package, and *x-y* indicates the version of the Cloud-Init epel-release required by the current OS. Replace them with the actual values according to **Table 2-7**.

- Take CentOS 6 64-bit as an example. If the version is 6.8, the command is as follows:

  yum install https://archives.fedoraproject.org/pub/archive/epel/6/x86_64/epel-release-6-8.noarch.rpm

- Take CentOS 7 64-bit as an example. If the version is 7.14, the command is as follows:

  yum install https://archives.fedoraproject.org/pub/archive/epel/7/x86_64/Packages/e/epel-release-7-14.noarch.rpm

b. Run the following commands to enable Cloud-Init to automatically start upon system boot:

systemctl enable cloud-init-local.service cloud-init.service cloud-config.service cloud-final.service

systemctl status cloud-init-local.service cloud-init.service cloud-config.service cloud-final.service

- Fedora

  Before installing Cloud-Init, ensure that the online installation source has been configured for the OS by checking whether the **/etc/yum.repo.d/fedora.repo** file contains the installation source address of the software package. If the file does not contain the address, configure the address by following the instructions on the Fedora official website.

  a. Run the following command to install Cloud-Init:

  yum install cloud-init

  b. Run the following commands to enable Cloud-Init to automatically start upon system boot:

  systemctl enable cloud-init-local.service cloud-init.service cloud-config.service cloud-final.service

  systemctl status cloud-init-local.service cloud-init.service cloud-config.service cloud-final.service

- Debian and Ubuntu

  Before installing Cloud-Init, ensure that the online installation source has been configured for the OS by checking whether the **/etc/apt/sources.list** file contains the installation source address of the software package. If the file does not contain the address, configure the address by following the instructions on the Debian or Ubuntu official website.

  a. Run the following commands to install Cloud-Init:

  apt-get update

  apt-get install cloud-init

b. Run the following commands to enable Cloud-Init to automatically start upon system boot:

systemctl enable cloud-init-local.service cloud-init.service cloud-config.service cloud-final.service

systemctl status cloud-init-local.service cloud-init.service cloud-config.service cloud-final.service

Cloud-Init-23.2.2 is used as an example to describe how to install Cloud-Init on CentOS, Fedora, Ubuntu, Debian, and SUSE.

Download the **cloud-init-23.2.2.tar.gz** source code package from **https://launchpad.net/cloud-init/trunk/23.2.2/+download/cloud-init-23.2.2.tar.gz**.

- **Centos 7/Fedora Server 36**

NOTICE

Ensure that Python 3 has been installed.

a. Check whether Cloud-Init has been installed. If any command output is displayed, Cloud-Init has been installed.
```
cloud-init -v
```

b. Delete the cache directory of Cloud-Init.
```
rm -rf /var/lib/cloud/*
```

c. Install dependency packages of Cloud-Init.
```
yum install python3-pip -y
yum install python3-devel
```

d. Download the Cloud-Init package.
```
wget https://launchpad.net/cloud-init/trunk/23.2.2/+download/cloud-init-23.2.2.tar.gz
```

e. Decompress the Cloud-Init package.
```
tar -zxvf cloud-init-23.2.2.tar.gz
```

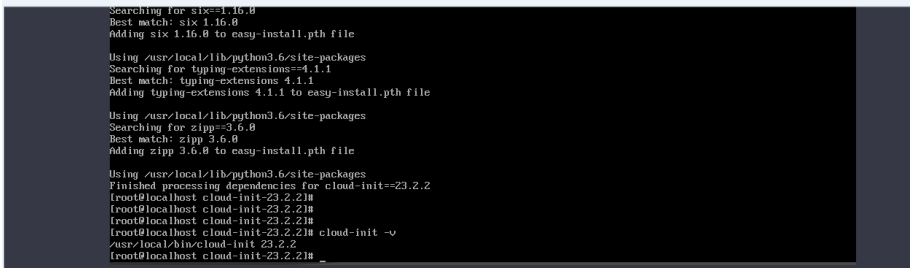
f. Go to the **cloud-init-23.2.2** directory and install dependent libraries:
```
cd cloud-init-23.2.2
pip3 install -r requirements.txt
```

g. Install Cloud-Init.
```
python3 setup.py build
python3 setup.py install --init-system systemd
```

h. (Optional) Disable Cloud-Init's network configuration capability by modifying the **/etc/cloud/cloud.cfg** file.
```
vi /etc/cloud/cloud.cfg
```

Add the following content to the file:
```
network:
  config: disabled
```

i. Restart Cloud-Init and check its status.
```
systemctl restart cloud-init-local.service cloud-init.service cloud-config.service cloud-final.service
systemctl status cloud-init-local.service cloud-init.service cloud-config.service cloud-final.service
```

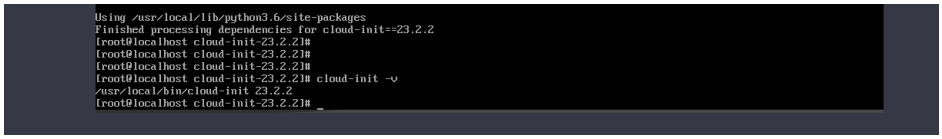



j. Enable Cloud-Init related services to automatically start upon system boot.

```
systemctl enable cloud-init-local.service cloud-init.service cloud-config.service cloud-final.service
```

k. Check whether Cloud-Init is running properly.

```
cloud-init -v
cloud-init init --local
```



- **Ubuntu 22.0.4/Debian 11**

NOTICE

Ensure that Python 3 has been installed.

a. Check and delete redundant Cloud-Init configuration files.

```
rm -rf /var/lib/cloud/*
rm -f /var/log/cloud-init*
```

Delete all files except log-related configuration files from the **/etc/cloud/cloud.cfg.d/** directory.

b. Update your package list and check whether Wget is installed. If it is not, install it.

```
sudo apt update
sudo apt install wget
```

c. Install dependency packages.

```
apt-get install cloud-guest-utils -y
apt-get install python3-pip -y
apt-get install python3-devel
```

d. Download the Cloud-Init package.

```
wget https://launchpad.net/cloud-init/trunk/23.2.2/+download/cloud-init-23.2.2.tar.gz
```

e. Decompress the Cloud-Init package.

```
tar -zxvf cloud-init-23.2.2.tar.gz
```

f. Go to the **cloud-init** directory.

```
cd cloud-init-23.2.2
```

g. Install dependent libraries.

```
pip3 install -r requirements.txt
```

h. Install Cloud-Init.

```
python3 setup.py install
```

i. (Optional) Disable Cloud-Init's network configuration capability.

You need to do so when the Cloud-Init version is 0.7.9 or later and you want to configure the network.

NOTE

1. Open the **/etc/cloud/cloud.cfg** file.

```
vi /etc/cloud/cloud.cfg
```

2. Enter **i** and configure **network**. (If there is no such a configuration item, add it.)

```
network:
  config: disabled
```

j. Restart Cloud-Init and check its status.

```
systemctl restart cloud-init-local.service cloud-init.service cloud-config.service cloud-final.service
systemctl status cloud-init-local.service cloud-init.service cloud-config.service cloud-final.service
```

k. Enable Cloud-Init related services to automatically start upon system boot.

```
systemctl enable cloud-init-local.service cloud-init.service cloud-config.service cloud-final.service
```

l. Check whether Cloud-Init is running properly.

```
cloud-init -v
cloud-init init --local
```

- **SUSE Enterprise Linux Server 15**

NOTICE

Ensure that Python 3 has been installed.

a. View existing SUSE repositories.

```
zypper lr
```

b. Delete the SUSE repositories.

```
zypper rr No. of repositories listed in 1
```

c. Configure a SUSE repository.

```
zypper ar https://ftp5.gwdg.de/pub/opensuse/repositories/Cloud:/Tools/SLE_15_SP4/ Cloud:Tools.repo
```

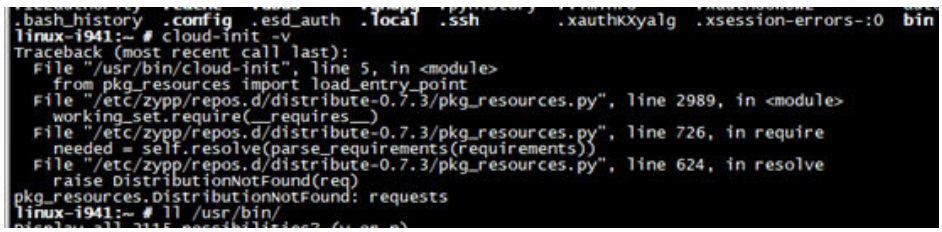
d. Refresh the SUSE repository.

```
zypper refresh
```

e. Install Cloud-Init.

```
zypper install cloud-init
```

f. Run **cloud-init -v**. If error messages similar to the following are displayed, install the dependency packages.




```
    100% |                                | 1.3MB 60kB/s
Collecting wheel
  Downloading https://files.pythonhosted.org/packages/1b/d2/22cde5ea9af055f81814
f9f2545f5ed8a053eb749c08d186b369959189a8/wheel-0.31.0-py2.py3-none-any.whl (41kB
)
    100% |                                | 51kB 65kB/s
cloud-init 18.1 requires configobj, which is not installed.
cloud-init 18.1 requires jinja2, which is not installed.
cloud-init 18.1 requires jsonpatch, which is not installed.
cloud-init 18.1 requires jsonschema, which is not installed.
cloud-init 18.1 requires oauthlib, which is not installed.
cloud-init 18.1 requires pyyaml, which is not installed.
cloud-init 18.1 requires requests, which is not installed.
Installing collected packages: pip, wheel
Successfully installed pip-10.0.1 wheel-0.31.0
linux-i941:~ # pip -V
pip 10.0.1 from /usr/lib/python2.7/site-packages/pip (python 2.7)
linux-i941:~ #
```

pip install requests pyyaml oauthlib jsonschema jsonpatch jinja2 configobj

g. Check whether Cloud-Init is successfully installed. If the following error message is displayed, configure **datasource_list** in **/etc/cloud/cloud.cfg**.

```
host-192-168-0-123:~ #
host-192-168-0-123:~ # cloud-init init --local
Cloud-init v. 23.1-150400.9.3 running 'init-local' at Sat, 19 Aug 2023 00:00:22 +0000. Up 3588.28 seconds.
2023-08-19 00:00:22,259 - util.py[WARNING]: Getting data from <class 'cloudinit.sources.DataSourceGCE.DataSourceGCELocal'> faile
d
2023-08-19 00:00:22,296 - DataSourceVMware.py[ERROR]: failed to find a valid data access method
host-192-168-0-123:~ #
```

datasource_list: [OpenStack]
datasource:
OpenStack:
metadata_urls: ['http://169.254.169.254']
max_wait: 120
timeout: 5
apply_network_config: false

h. Modify the configuration file, restart Cloud-Init, and check the Cloud-Init status.

systemctl restart cloud-init-local.service cloud-init.service cloud-config.service cloud-final.service
systemctl status cloud-init-local.service cloud-init.service cloud-config.service cloud-final.service

i. Enable Cloud-Init related services to automatically start upon system boot.

systemctl enable cloud-init-local.service cloud-init.service cloud-config.service cloud-final.service

```
Aug 19 16:25:04 ecs-suse-cloud cloud-init[1543]: Cloud-init v. 23.1-150400.9.3 running 'modules:config' at Sat, 19 Aug 2023 00:2
5:04 +0000. Up 26.03 seconds.
Aug 19 16:25:04 ecs-suse-cloud systemd[1]: Finished Apply the settings specified in cloud-config.

● cloud-final.service - Execute cloud user/final scripts
     Loaded: loaded (/usr/lib/systemd/system/cloud-final.ser
vice; enabled; vendor preset: disabled)
     Active: active (exited) since Sat 2023-08-19 16:25:05 CST; 55s ago
    Process: 1544 ExecStart=/usr/bin/cloud-init modules --mode=final (code=exited, status=0/SUCCESS)
--More--

ecs-suse-cloud:~ # cd /home/
ecs-suse-cloud:/home #
ecs-suse-cloud:/home # ls
sles  socket-tool  user.txt
ecs-suse-cloud:/home #
ecs-suse-cloud:/home #
```

j. Check whether Cloud-Init is running properly.

cloud-init -v
cloud-init init --local

Install Cloud-Init Using the Official Source Code Package and pip

The following operations use Cloud-Init 0.7.9 as an example to describe how to install Cloud-Init.

1. Download the **cloud-init-0.7.9.tar.gz** source code package and upload it to the **/home/** directory of the ECS.

   Download **cloud-init-0.7.9.tar.gz** from the following path:

https://launchpad.net/cloud-init/trunk/0.7.9/+download/cloud-init-0.7.9.tar.gz

2. Create a **pip.conf** file in the **~/.pip/** directory and edit the following content:

   NOTE

   If the **~/.pip/** directory does not exist, run the **mkdir ~/.pip** command to create it.

   ```
   [global]
   index-url  = https://<$mirror>/simple/
   trusted-host = <$mirror>
   ```

   NOTE

   Replace *<$mirror>* with a public network PyPI source.

   Public network PyPI source: **https://pypi.python.org/**

3. Run the following command to install the downloaded Cloud-Init source code package (select **--upgrade** as needed during installation):

   pip install [--upgrade] /home/cloud-init-0.7.9.tar.gz

   NOTE

   For details about how to install a Cloud-Init source code package, see **Cloud-Init Documentation**

4. Run the **cloud-init -v** command. Cloud-Init is installed successfully if the following information is displayed:

   ```
   cloud-init 0.7.9
   ```

5. Enable Cloud-Init to automatically start upon system boot.
   - If the OS uses SysVinit to manage automatic start of services, run the following commands:

     chkconfig --add cloud-init-local; chkconfig --add cloud-init; chkconfig --add cloud-config; chkconfig --add cloud-final

     chkconfig cloud-init-local on; chkconfig cloud-init on; chkconfig cloud-config on; chkconfig cloud-final on

     service cloud-init-local status; service cloud-init status; service cloud-config status; service cloud-final status
   - If the OS uses Systemd to manage automatic start of services, run the following commands:

     systemctl enable cloud-init-local.service cloud-init.service cloud-config.service cloud-final.service

     systemctl status cloud-init-local.service cloud-init.service cloud-config.service cloud-final.service

CAUTION

If you install Cloud-Init using the official source code package and pip, pay attention to the following:

1. Add user **syslog** to the **adm** group during the installation. If user **syslog** exists, add it to the **adm** group. For some OSs (such as CentOS and SUSE), user **syslog** may not exist. Run the following commands to create user **syslog** and add it to the **adm** group:

   useradd syslog

   groupadd adm

   usermod -g adm syslog

2. Change the value of **distro** in **system_info** in the **/etc/cloud/cloud.cfg** file based on the OS release version, such as **distro: ubuntu**, **distro: sles**, **distro: debian**, and **distro: fedora**.

Install Cloud-Init Using the Official GitHub Source Code

You can obtain the Cloud-Init source code from GitHub at **https://github.com/canonical/cloud-init/**

1. Run the following commands to download the source code package and copy it to the **/tmp/CLOUD-INIT** folder:

   NOTE

   Cloud-Init 0.7.6: **https://github.com/canonical/cloud-init/archive/refs/tags/0.7.6.zip**
   Cloud-Init 0.7.9: **https://github.com/canonical/cloud-init/archive/refs/tags/0.7.9.zip**
   All versions: **https://github.com/canonical/cloud-init/releases**

   wget https://github.com/canonical/cloud-init/archive/refs/tags/0.7.6.zip

   mkdir /tmp/CLOUD-INIT

   cp cloud-init-0.7.6.zip /tmp/CLOUD-INIT

   cd /tmp/CLOUD-INIT

2. Run the following command to decompress the package:

   unzip cloud-init-0.7.6.zip

3. Run the following command to enter the **cloud-init-0.7.6** folder:

   cd cloud-init-0.7.6

4. (Optional) If the Cloud-Init version is 18.3 to 22.3, run the following commands:

   sed -i '/VALID_DMI_ASSET_TAGS =/a\VALID_DMI_ASSET_TAGS += ["HUAWEICLOUD"]' cloudinit/sources/DataSourceOpenStack.py

   cat cloudinit/sources/DataSourceOpenStack.py | grep VALID_DMI_ASSET_TAGS

   If the following information is displayed, the execution is successful.

5. Install Cloud-Init. The commands vary depending on the OS type.
   - For CentOS 6.x or SUSE 11.x, run the following commands:

     python setup.py build

     python setup.py install --init-system sysvinit
   - For CentOS 7.x or SUSE 12.x, run the following commands:

     python setup.py build

     python setup.py install --init-system systemd

   NOTE

   Add user **syslog** to the **adm** group during the installation. If user **syslog** exists, add it to the **adm** group. For some OSs (such as CentOS and SUSE), user **syslog** may not exist. Run the following commands to create user **syslog** and add it to the **adm** group:

   useradd syslog

   groupadd adm

   usermod -g adm syslog
6. Enable Cloud-Init to automatically start upon system boot.
   - If the OS uses SysVinit to manage automatic start of services, run the following commands:

     chkconfig --add cloud-init-local; chkconfig --add cloud-init; chkconfig --add cloud-config; chkconfig --add cloud-final

     chkconfig cloud-init-local on; chkconfig cloud-init on; chkconfig cloud-config on; chkconfig cloud-final on

     service cloud-init-local status; service cloud-init status; service cloud-config status; service cloud-final status
   - If the OS uses Systemd to manage automatic start of services, run the following commands:

     systemctl enable cloud-init-local.service cloud-init.service cloud-config.service cloud-final.service

     systemctl status cloud-init-local.service cloud-init.service cloud-config.service cloud-final.service
7. Run the following commands to check whether Cloud-Init has been installed:

   cloud-init -v

   cloud-init init --local

   Cloud-Init is successfully installed if the following information is displayed:

   ```
   cloud-init 0.7.6
   ```

Configure Cloud-Init

1. Enable SSH authentication and remote password login for user **root**.

   Take CentOS 6.7 as an example. If the value of **disable_root** in the **/etc/cloud/cloud.cfg** file is **0**, the permissions are enabled. (In some OSs, value **true** indicates that the permissions are disabled, and **false** indicates that the permissions are enabled). Set **ssh_pwauth** to **1**, and **lock_passwd** to **False** (indicating that user passwords are not locked).

   ```
   users:
    - name: root
      lock_passwd: False
   ```

```
disable_root: 0
ssh_pwauth: 1
```

NOTE

- If you inject a password, use it for remote login through SSH or noVNC.
- If you inject a key, use it for remote login through SSH.

2. Modify the **/etc/cloud/cloud.cfg** file to disable Cloud-Init's network configuration capability.

   If the Cloud-Init version is 0.7.9 or later, add the following content to **/etc/cloud/cloud.cfg**:

   Figure 2-24 Disabling Cloud-Init's network configuration capability

   ```
   users:
    - name: root
      lock_passwd: False

   disable_root: 0
   ssh_pwauth:   1

   datasource_list: ['OpenStack']

   network:
     config: disabled
   ```

   NOTE

   The added content must be in the YAML format.

3. Enable the agent to access the IaaS OpenStack data source.

   Add the following information to the last line of **/etc/cloud/cloud.cfg**:

   ```
   datasource_list: [ OpenStack ]
   datasource:
    OpenStack:
      metadata_urls: ['http://169.254.169.254']
      max_wait: 120
      timeout: 5
      apply_network_config: false
   ```

   NOTE

   - You can decide whether to set **max_wait** and **timeout**. The values of **max_wait** and **timeout** in the preceding command output are only for reference.
   - If the OS version is earlier than Debian 8 or CentOS 5, you cannot enable the agent to access the IaaS OpenStack data source.
   - The default zeroconf route must be disabled for CentOS and EulerOS ECSs for accurate access to the IaaS OpenStack data source.

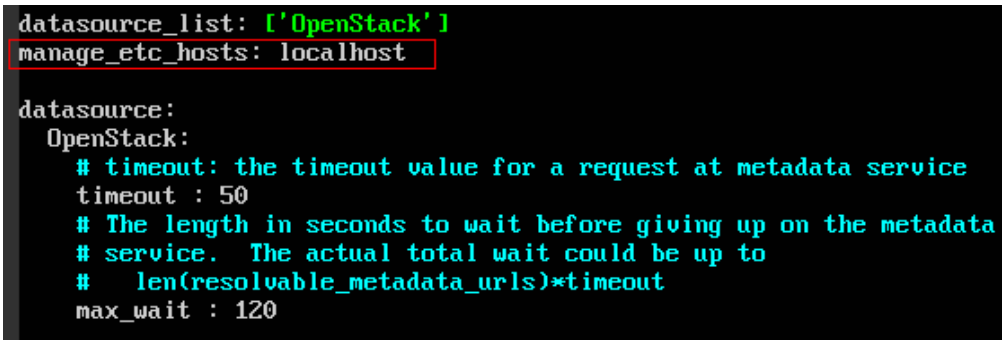
     echo "NOZEROCONF=yes" >> /etc/sysconfig/network
   - **apply_network_config: false** is only requited by users who use Cloud-Init 18.3 or later.

4. Add the following content to **/etc/cloud/cloud.cfg**:

   manage_etc_hosts: localhost

   This prevents the system from staying in the **Waiting for cloudResetPwdAgent** state for a long time during ECS startup.

Figure 2-25 Adding **manage_etc_hosts: localhost**



5. Run the **vi /etc/ssh/sshd_config** command to open the **/etc/ssh/sshd_config** file using the vi editor.

   Change the value of **PasswordAuthentication** in the **sshd_config** file to **yes**.

   NOTE

   For SUSE and openSUSE, change the values of the following parameters in the **sshd_config** file to **yes**:

   - PasswordAuthentication
   - ChallengeResponseAuthentication

6. Modify **cloud_init_modules** in the **cloud.cfg** configuration file.

   - Move **ssh** from the bottom to the top to speed up the SSH login.
   - Enable the hostname update. Do not comment out or delete the **- update_hostname** statement.

   ```
   cloud_init_modules:
    - ssh
    - migrator
    - bootcmd
    - write-files
    - growpart
    - resizefs
    - set_hostname
    - update_hostname
    - update_etc_hosts
    - rsyslog
    - users-groups
   ```

7. Modify the configuration so that the hostname of the ECS created from the image does not contain the **.novalocal** suffix and can contain a dot (.).

   a. Run the following command to modify the **__init__.py** file:

      vi /usr/lib/python*.*/site-packages/cloudinit/sources/__init__.py

      The Python version varies depending on the OS.

      Press **i** to enter editing mode. Modify the file content as follows based on the keyword **toks**:

      ```
      if toks:
          toks = str(toks).split('.')
      else:
          #toks = ["ip-%s" % lhost.replace(".", "-")] # Comment out this line.
          toks = lhost.split(".novalocal")    # Add this line.

      if len(toks) > 1:
          hostname = toks[0]
          #domain = '.'.join(toks[1:]) # Comment out this line.
      else:
          hostname = toks[0]
      ```



```
if fqdn and domain != defdomain:
    return hostname
   #return "%s.%s" % (hostname, domain) # Comment out this line.
else:
   return hostname
```

After the modification is complete, press **Esc** to exit the editing mode and enter **:wq!** to save the settings and exit.

b. Run the following command to switch to the **cloudinit/sources** folder:

cd /usr/lib/python*.*/site-packages/cloudinit/sources/

The Python version varies depending on the OS.

c. Run the following commands to delete the **__init__.pyc** file and the optimized **__init__.pyo** file:

rm -rf __init__.pyc

rm -rf __init__.pyo

d. Run the following commands to clear the logs:

rm -rf /var/lib/cloud/*

rm -rf /var/log/cloud-init*

Delete all files except log-related configuration files from the **/etc/cloud/cloud.cfg.d/** directory.

8. Run the following command to edit the **/etc/cloud/cloud.cfg.d/05_logging.cfg** file to use cloudLogHandler to process logs:

vim /etc/cloud/cloud.cfg.d/05_logging.cfg

```
[logger_cloudinit]
level=DEBUG
qualname=cloudinit
handlers=cloudLogHandler
propagate=1
```

9. Delete user **linux** and the **/home/linux** directory from the image template.

userdel linux

rm -fr /home/linux

10. Ensure that Cloud-Init is enabled.

If the **/etc/cloud/cloud-init.disabled** file exists, run **cloud-init clean --machine-id**. If there is no such a file, skip this step.

Check the Cloud-Init Configuration

Run the following command to check whether Cloud-Init has been properly configured:

cloud-init init --local

If Cloud-Init has been properly installed, the version information is displayed and no error occurs. For example, messages indicating lack of files will not be displayed.

NOTE

(Optional) Run the following command to set the password validity period to the maximum:

chage -M 99999 $user_name

user_name is a system user, such as user **root**.

You are advised to set the password validity period to **99999**.

2.3.4 Detaching Data Disks from an ECS

Scenarios

If multiple data disks are attached to the ECS used to create a private image, ECSs created from the image may be unavailable. Therefore, you need to detach all data disks from the ECS before using it to create a private image.

This section describes how to detach all data disks from an ECS.

Prerequisites

You have logged in to the ECS used to create a Linux private image.

Procedure

1. Check whether the ECS has data disks.

   Run the following command to check the number of disks attached to the ECS:

   fdisk -l

   - If the number is greater than 1, the ECS has data disks. Go to **2**.
   - If the number is equal to 1, no data disk is attached to the ECS. Go to **3**.

2. Run the following command to check the data disks attached to the ECS:

   mount

   - If the command output does not contain any EVS disk information, no EVS data disks need to be detached.
     ```
     /dev/vda1 on / type ext4 (rw,relatime,data=ordered)
     ```
   - If information similar to the following is displayed, go to **3**:
     ```
     /dev/vda1 on / type ext4 (rw,relatime,data=ordered)
     /dev/vdb1 on /mnt/test type ext4 (rw,relatime,data=ordered)
     ```

3. Delete the configuration information in the **fstab** file.

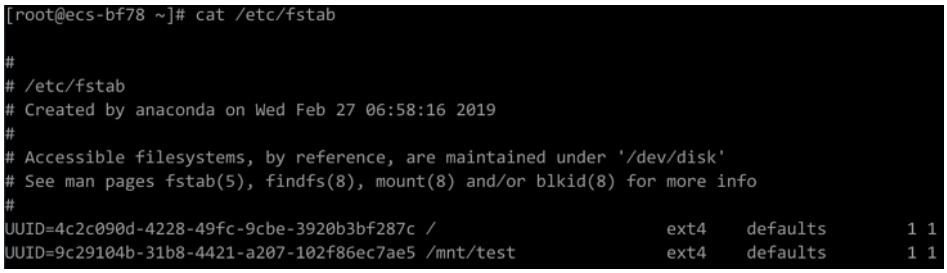
   a. Run the following command to edit the **fstab** file:

      vi /etc/fstab

   b. Delete the disk configuration from the **fstab** file.

      The **/etc/fstab** file contains information about the file systems and storage devices automatically attached to the ECS when the ECS starts. The configuration about data disks automatically attached to the ECS needs to be deleted, for example, the last line shown in the following figure.

Figure 2-26 EVS disk configuration in the **fstab** file



4. Run the following command to detach data disks from the ECS:

   Run the following command to detach the disks:

   umount */dev/vdb1*

5. Run the following command to check the data disks attached to the ECS:

   mount

   If the command output contains no information about the data disks, they have been detached from the ECS.

2.3.5 Changing Disk Identifiers in the GRUB File to UUID

Scenarios

Before using an ECS to create a private image, you need to change disk identifiers to UUID in the GRUB file of the ECS.

Modify the **menu.lst** or **grub.cfg** file (**/boot/grub/menu.lst**, **/boot/grub/grub.cfg**, **/boot/grub2/grub.cfg**, **/boot/grub/grub.conf**, or **/boot/efi/EFI/euleros/grub.cfg**), and configure the boot partition using a UUID.

NOTE

The root partition identified in the configuration file varies depending on the OS. It may be **root=/dev/xvda** or **root=/dev/disk**.

Procedure

- Ubuntu 14.04: Run **blkid** to obtain the UUID of the root partition. Modify the **/boot/grub/grub.cfg** file and use the UUID of the root partition to configure the boot item. If the root partition already uses UUID, no change is required. The procedure is as follows:

  a. Log in to the ECS as user **root**.

  b. Run the following command to query all types of mounted file systems and device UUIDs:

     blkid

     The following information is displayed:

     /dev/xvda1: UUID="ec51d860-34bf-4374-ad46-a0c3e337fd34" TYPE="ext3"
     /dev/xvda5: UUID="7a44a9ce-9281-4740-b95f-c8de33ae5c11" TYPE="swap"

  c. Run the following command to query the **grub.cfg** file:

     cat /boot/grub/grub.cfg

     The following information is displayed:

```
.....menuentry 'Ubuntu Linux, with Linux 3.13.0-24-generic' --class ubuntu --class gnu-linux --
class gnu --class os --unrestricted $menuentry_id_option 'gnulinux-3.13.0-24-generic-advanced-
ec51d860-34bf-4374-ad46-a0c3e337fd34' {
recordfail
load_video
gfxmode $linux_gfx_mode
insmod gzio
insmod part_msdos
insmod ext2
if [ x$feature_platform_search_hint = xy ]; then
search --no-floppy --fs-uuid --set=root ec51d860-34bf-4374-ad46-a0c3e337fd34
else
search --no-floppy --fs-uuid --set=root ec51d860-34bf-4374-ad46-a0c3e337fd34
fi
echo 'Loading Linux 3.13.0-24-generic ...'
linux /boot/vmlinuz-3.13.0-24-generic root=/dev/xvda1 ro
echo 'Loading initial ramdisk ...'
initrd /boot/initrd.img-3.13.0-24-generic
}
```

d. Check whether the root partition in the **/boot/grub/grub.cfg** configuration file contains **root=/dev/xvda1** or **root=UUID=ec51d860-34bf-4374-ad46-a0c3e337fd34**.

   - If **root=UUID=ec51d860-34bf-4374-ad46-a0c3e337fd34** is contained, the root partition is in UUID format and requires no change.
   - If **root=/dev/xvda1** is contained, the root partition is in the device name format. Go to **5**.

e. Identify the UUID of the root partition device based on **root=/dev/xvda1** (device name of the root partition) and the partition information obtained by running the **blkid** command.

f. Run the following command to open the **grub.cfg** file:

   vi /boot/grub/grub.cfg

g. Press **i** to enter editing mode and change the root partition to the UUID format, for example, from **root=/dev/xvda1** to **root=UUID=ec51d860-34bf-4374-ad46-a0c3e337fd34**.

h. Press **Esc**, enter **:wq**, and press **Enter**. The system saves the configuration and exits the vi editor.

i. Run the following command to verify the change:

   cat /boot/grub/grub.cfg

   The change is successful if information similar to the following is displayed:

```
.....menuentry 'Ubuntu Linux, with Linux 3.13.0-24-generic' --class ubuntu --class gnu-linux --
class gnu --class os --unrestricted $menuentry_id_option 'gnulinux-3.13.0-24-generic-advanced-
ec51d860-34bf-4374-ad46-a0c3e337fd34' {
recordfail
load_video
gfxmode $linux_gfx_mode
insmod gzio
insmod part_msdos
insmod ext2
if [ x$feature_platform_search_hint = xy ]; then
search --no-floppy --fs-uuid --set=root ec51d860-34bf-4374-ad46-a0c3e337fd34
else
search --no-floppy --fs-uuid --set=root ec51d860-34bf-4374-ad46-a0c3e337fd34
fi
echo 'Loading Linux 3.13.0-24-generic ...'
linux /boot/vmlinuz-3.13.0-24-generic root=UUID=ec51d860-34bf-4374-ad46-a0c3e337fd34 ro
```



```
echo 'Loading initial ramdisk ...'
initrd /boot/initrd.img-3.13.0-24-generic
}
```

- CentOS 6.5: Run **blkid** to obtain the UUID of the root partition. Modify the **/boot/grub/grub.conf** file and use the UUID of the root partition to configure the boot item. If the root partition already uses UUID, no change is required. The procedure is as follows:
  a. Log in to the ECS as user **root**.
  b. Run the following command to query all types of mounted file systems and device UUIDs:

     blkid

     The following information is displayed:

     ```
     /dev/xvda1: UUID="749d6c0c-990a-4661-bed1-46769388365a" TYPE="swap"
     /dev/xvda2: UUID="f382872b-eda6-43df-9516-5a687fecdce6" TYPE="ext4"
     ```

  c. Run the following command to query the **grub.conf** file:

     cat /boot/grub/grub.conf

     The following information is displayed:

     ```
     default=0
     timeout=5
     splashimage=(hd0,1)/boot/grub/splash.xpm.gz
     hiddenmenu
     title CentOS (2.6.32-573.8.1.el6.x86_64)
     root (hd0,1)
     kernel /boot/vmlinuz-2.6.32-573.8.1.el6.x86_64 ro root=/dev/xvda2 rd_NO_LUKS rd_NO_LVM
     LANG=en_US.UTF-8 rd_NO_MD SYSFONT=latarcyrheb-sun16
     crashkernel=autoKEYBOARDTYPE=pc KEYTABLE=us rd_NO_DM rhgb quiet
     initrd /boot/initramfs-2.6.32-573.8.1.el6.x86_64.img
     ```

  d. Check whether the root partition in the **/boot/grub/grub.conf** configuration file contains **root=/dev/xvda2** or **root=UUID=f382872b-eda6-43df-9516-5a687fecdce6**.
     - If **root=UUID=f382872b-eda6-43df-9516-5a687fecdce6** is contained, the root partition is in UUID format and requires no change.
     - If **root=/dev/xvda2** is contained, the root partition is in the device name format. Go to **5**.
  e. Identify the UUID of the root partition device based on **root=/dev/xvda2** (device name of the root partition) and the partition information obtained by running the **blkid** command.
  f. Run the following command to open the **grub.conf** file:

     vi /boot/grub/grub.conf

  g. Press **i** to enter editing mode and change the root partition to the UUID format, for example, from **root=/dev/xvda2** to **root=UUID=f382872b-eda6-43df-9516-5a687fecdce6**.
  h. Press **Esc**, enter **:wq**, and press **Enter**. The system saves the configuration and exits the vi editor.
  i. Run the following command to verify the change:

     cat /boot/grub/grub.conf

     The change is successful if information similar to the following is displayed:


```
default=0
timeout=5
splashimage=(hd0,1)/boot/grub/splash.xpm.gz
hiddenmenu
title CentOS (2.6.32-573.8.1.el6.x86_64)
root (hd0,1)
kernel /boot/vmlinuz-2.6.32-573.8.1.el6.x86_64 ro root=UUID=f382872b-eda6-43df-9516-5a687fecdce6 rd_NO_LUKS rd_NO_LVM LANG=en_US.UTF-8 rd_NO_MD SYSFONT=latarcyrheb-sun16 crashkernel=autoKEYBOARDTYPE=pc KEYTABLE=us rd_NO_DM rhgb quiet
initrd /boot/initramfs-2.6.32-573.8.1.el6.x86_64.img
```

- CentOS 7.0: Run **blkid** to obtain the UUID of the root partition. Modify the **/boot/grub2/grub.cfg** file and use the UUID of the root partition to configure the boot item. If the root partition already uses UUID, no modification is required.
  a. Log in to the ECS as user **root**.
  b. Run the following command to query all types of mounted file systems and device UUIDs:

     blkid

     The following information is displayed:

     ```
     /dev/xvda2: UUID="4eb40294-4c6f-4384-bbb6-b8795bbb1130" TYPE="xfs"
     /dev/xvda1: UUID="2de37c6b-2648-43b4-a4f5-40162154e135" TYPE="swap"
     ```

  c. Run the following command to query the **grub.cfg** file:

     cat /boot/grub2/grub.cfg

     The following information is displayed:

     ```
     ......
     menuentry 'CentOS Linux (3.10.0-229.el7.x86_64) 7 (Core)' --class fedora --class gnu-linux --class gnu --class os --unrestricted $menuentry_id_option 'gnulinux-3.10.0-229.el7.x86_64-advanced-4eb40294-4c6f-4384-bbb6-b8795bbb1130' {
     load_video
     set gfxpayload=keep
     insmod gzio
     insmod part_msdos
     insmod xfs
     set root='hd0,msdos2'
     if [ x$feature_platform_search_hint = xy ]; then
     search --no-floppy --fs-uuid --set=root --hint='hd0,msdos2'4eb40294-4c6f-4384-bbb6-b8795bbb1130
     else
     search --no-floppy --fs-uuid --set=root 4eb40294-4c6f-4384-bbb6-b8795bbb1130
     fi
     linux16 /boot/vmlinuz-3.10.0-229.el7.x86_64 root=/dev/xvda2 ro crashkernel=auto rhgb quiet LANG=en_US.UTF-8
     initrd16 /boot/initramfs-3.10.0-229.el7.x86_64.img
     }
     ```

  d. Check whether the root partition in the **/boot/grub2/grub.cfg** configuration file contains **root=/dev/xvda2** or **root=UUID=4eb40294-4c6f-4384-bbb6-b8795bbb1130**.
     - If **root=UUID=4eb40294-4c6f-4384-bbb6-b8795bbb1130** is contained, the root partition is in UUID format and requires no change.
     - If **root=/dev/xvda2** is contained, the root partition is in the device name format. Go to **5**.
  e. Identify the UUID of the root partition device based on **root=/dev/xvda2** (device name of the root partition) and the partition information obtained by running the **blkid** command.

f. Run the following command to open the **grub.cfg** file:

vi /boot/grub2/grub.cfg

g. Press **i** to enter editing mode and change the root partition to the UUID format, for example, from **root=/dev/xvda2** to **root=UUID=4eb40294-4c6f-4384-bbb6-b8795bbb1130**.

h. Press **Esc**, enter **:wq**, and press **Enter**. The system saves the configuration and exits the vi editor.

i. Run the following command to verify the change:

cat /boot/grub2/grub.cfg

The change is successful if information similar to the following is displayed:

```
.....
menuentry 'CentOS Linux (3.10.0-229.el7.x86_64) 7 (Core)' --class fedora --class gnu-linux --
class gnu --class os --unrestricted $menuentry_id_option 'gnulinux-3.10.0-229.el7.x86_64-
advanced-4eb40294-4c6f-4384-bbb6-b8795bbb1130' {
load_video
set gfxpayload=keep
insmod gzio
insmod part_msdos
insmod xfs
set root='hd0,msdos2'
if [ x$feature_platform_search_hint = xy ]; then
search --no-floppy --fs-uuid --set=root --hint='hd0,msdos2'4eb40294-4c6f-4384-bbb6-
b8795bbb1130
else
search --no-floppy --fs-uuid --set=root 4eb40294-4c6f-4384-bbb6-b8795bbb1130
fi
linux16 /boot/vmlinuz-3.10.0-229.el7.x86_64 root=UUID=4eb40294-4c6f-4384-bbb6-
b8795bbb1130 ro crashkernel=auto rhgb quiet LANG=en_US.UTF-8
initrd16 /boot/initramfs-3.10.0-229.el7.x86_64.img
}
```

2.3.6 Changing Disk Identifiers in the fstab File to UUID

Scenarios

Before using an ECS to create a private image, you need to change disk identifiers to UUID in the fstab file of the ECS.

Procedure

- Take CentOS 7.0 as an example. Run **blkid** to obtain the UUIDs of all partitions. Modify the **/etc/fstab** file and use the partition UUIDs to configure automatic partition mounting.

1. Log in to the ECS as user **root**.
2. Run the following command to query all types of mounted file systems and device UUIDs:

   blkid

   The following information is displayed:

   ```
   /dev/xvda2: UUID="4eb40294-4c6f-4384-bbb6-b8795bbb1130" TYPE="xfs"
   /dev/xvda1: UUID="2de37c6b-2648-43b4-a4f5-40162154e135" TYPE="swap"
   ```

3. Run the following command to query the **fstab** file:

   cat /etc/fstab

   The following information is displayed:


```
[root@CTU1000028010 ~]# cat /etc/fstab
/dev/xvda2 /      xfs     defaults    0 0
/dev/xvda1 swap    swap    defaults    0 0
```

4. Check whether the disk identifier in the **fstab** file is the device name.
   - If the disk is represented by a UUID, no further operation is required.
   - If the disk is represented by the device name, go to 5.
5. Run the following command to open the **fstab** file:

   vi /etc/fstab
6. Press **i** to enter editing mode and change the disk identifier in the **fstab** file to UUID.

- Take CentOS 7.1 as an example. Run **blkid** to obtain the UUIDs of all partitions. Modify the **/etc/fstab** file and use the partition UUIDs to configure automatic partition mounting.

1. Log in to the ECS as user **root**.
2. Run the following command to query all types of mounted file systems and device UUIDs:

   blkid

   ```
   /dev/xvda2: UUID="4eb40294-4c6f-4384-bbb6-b8795bbb1130" TYPE="xfs"
   /dev/xvda1: UUID="2de37c6b-2648-43b4-a4f5-40162154e135" TYPE="swap"
   ```

   Before the change:

   ```
   [root@CTU1000028010 ~]# cat /etc/fstab
   /dev/xvda2 /      xfs     defaults    0 0
   /dev/xvda1 swap    swap    defaults    0 0
   ```

   After the change:

   ```
   [root@CTU1000028010 ~]# cat /etc/fstab
   UUID=4eb40294-4c6f-4384-bbb6-b8795bbb1130 /      xfs     defaults    0 0
   UUID=2de37c6b-2648-43b4-a4f5-40162154e135 swap    swap    defaults    0 0
   ```
3. Press **Esc**, enter **:wq**, and press **Enter**. The system saves the configuration and exits the vi editor.
4. Run the following command to verify the change:

   cat /etc/fstab

   The change is successful if information similar to the following is displayed:

   ```
   [root@CTU1000028010 ~]# cat /etc/fstab
   UUID=4eb40294-4c6f-4384-bbb6-b8795bbb1130 /      xfs     defaults    0 0
   UUID=2de37c6b-2648-43b4-a4f5-40162154e135 swap    swap    defaults    0 0
   ```

2.3.7 Installing Native Xen and KVM Drivers on a Xen ECS

Scenarios

Before using a Xen ECS to create a private image, you need to install native Xen and KVM drivers on the ECS.

This section describes how to install native Xen and KVM drivers.

CAUTION

If an ECS has no Xen drivers installed, the network performance of the ECS will be poor, and the security groups and firewall configured for the ECS will not take effect.

If an ECS has no KVM drivers installed, the NICs of the ECS may not be detected and the ECS will be unable to communicate with other resources.

Prerequisites

- The virtualization type of the ECS is Xen.

  You can run the following command to check the virtualization type of an ECS:

  lscpu

  - If the value of **Hypervisor vendor** is **Xen**, install drivers as instructed in this section.
  - If the value of **Hypervisor vendor** is **KVM**, install drivers as instructed in **Installing Native KVM Drivers on a KVM ECS**.

  Figure 2-27 Checking the virtualization type of a Linux ECS

```
# lscpu
Architecture:          x86_64
CPU op-mode(s):        32-bit, 64-bit
Byte Order:            Little Endian
CPU(s):                4
On-line CPU(s) list:   0-3
Thread(s) per core:    1
Core(s) per socket:    4
Socket(s):             1
NUMA node(s):          1
Vendor ID:             GenuineIntel
CPU family:            6
Model:                 62
Model name:            Intel(R) Xeon(R) CPU E5-2690 v2 @ 3.00GHz
Stepping:              4
CPU MHz:               3000.079
BogoMIPS:              6000.15
Hypervisor vendor:     Xen
Virtualization type:   full
L1d cache:             32K
L1i cache:             32K
L2 cache:              256K
L3 cache:              25600K
NUMA node0 CPU(s):     0-3
You have new mail in /var/spool/mail/root
```

- The ECS kernel version must be later than 2.6.24.
- Disable your antivirus and intrusion detection software. You can enable them after the driver installation is complete.
- Operations in **Changing Disk Identifiers in the GRUB File to UUID** and **Changing Disk Identifiers in the fstab File to UUID** have been completed.

Uninstall PV Drivers

To ensure that you can successfully install native Xen and KVM drivers, you must uninstall PV drivers from the ECS first.

1. Log in to the ECS as **root** using VNC.
2. Check whether PV drivers are installed in the OS.

   ps -ef | grep uvp-monitor

   – If the following information is displayed, PV drivers are installed.

   – Otherwise, PV drivers are not installed. No further actions are required.

   ```
   root     4561     1    0   Jun29 ?          00:00:00   /usr/bin/uvp-monitor
   root     4567     4561    0   Jun29 ?          00:00:00   /usr/bin/uvp-monitor
   root     6185     6085    0   03:04  pts/2     00:00:00   grep uvp-monitor
   ```

3. In the VNC login window, open the CLI. (For how to open the CLI, see the OS manual.)
4. Uninstall PV drivers.

   /etc/.uvp-monitor/uninstall

   – If the following information is displayed, PV drivers are uninstalled successfully:

   ```
   The PV driver is uninstalled successfully. Reboot the system for the uninstallation to take effect.
   ```

   – If the command output indicates that **.uvp-monitor** is not found, go to **5**.

   ```
   -bash: /etc/.uvp-monitor/uninstall: No such file or directory
   ```

5. To prevent log overflow, perform the following operations to delete uvp-monitor that failed to be applied in KVM:

   a. Check whether UVP user-mode programs are installed in the OS.

      rpm -qa | grep uvp

      Information similar to the following is displayed:

      ```
      libxenstore_uvp3_0-3.00-36.1.x86_64
      uvp-monitor-2.2.0.315-3.1.x86_64
      kmod-uvpmod-2.2.0.315-3.1.x86_64
      ```

   b. Delete the installation packages.

      rpm -e kmod-uvpmod

      rpm -e uvp-monitor

      rpm -e libxenstore_uvp

Procedure

Modify the configuration file depending on the OS.

- CentOS, EulerOS

  Take CentOS 7.0 as an example. Modify the **/etc/dracut.conf** file. Add Xen PV and VirtIO drivers to **add_drivers**. Xen PV drivers include xen-blkfront and xen-netfront. VirtIO drivers include virtio_blk, virtio_scsi, virtio_net, virtio_pci, virtio_ring, and virtio. Separate driver names with spaces. Save and exit the **/etc/dracut.conf** file. Run the **dracut -f** command to regenerate initrd.

  For details, see **CentOS and EulerOS**.

- Ubuntu and Debian

  Modify the **/etc/initramfs-tools/modules** file. Add Xen PV and VirtIO drivers. Xen PV drivers include xen-blkfront and xen-netfront. VirtIO drivers include virtio_blk, virtio_scsi, virtio_net, virtio_pci, virtio_ring, and virtio. Separate driver names with spaces. Save and exit the **/etc/initramfs-tools/modules** file. Run the **update-initramfs -u** command to regenerate initrd.

  For details, see **Ubuntu and Debian**.

- SUSE and openSUSE
  - If the OS version is earlier than SUSE 12 SP1 or openSUSE 13, modify the **/etc/sysconfig/kernel** file and add Xen PV and VirtIO drivers to **INITRD_MODULES=""**. Xen PV drivers include xen_vnif, xen_vbd, and xen_platform_pci. VirtIO drivers include virtio_blk, virtio_scsi, virtio_net, virtio_pci, virtio_ring, and virtio. Separate driver names with spaces. Run the **mkinitrd** command to regenerate initrd.
  - If the OS version is SUSE 12 SP1, modify the **/etc/dracut.conf** file and add Xen PV and VirtIO drivers to **add_drivers**. Xen PV drivers include xen_vnif, xen_vbd, and xen_platform_pci. VirtIO drivers include virtio_blk, virtio_scsi, virtio_net, virtio_pci, virtio_ring, and virtio. Separate driver names with spaces. Run the **dracut -f** command to regenerate initrd.
  - If the OS version is later than SUSE 12 SP1 or openSUSE 13, modify the **/etc/dracut.conf** file and add Xen PV and VirtIO drivers to **add_drivers**. Xen PV drivers include xen-blkfront and xen-netfront. VirtIO drivers include virtio_blk, virtio_scsi, virtio_net, virtio_pci, virtio_ring, and virtio. Separate driver names with spaces. Save and exit the **/etc/dracut.conf** file. Run the **dracut -f** command to regenerate initrd.

  For details, see **SUSE and openSUSE**.

  NOTE

  For SUSE, run the following command to check whether xen-kmp (driver package for Xen PV) is installed:

  rpm -qa |grep xen-kmp

  If information similar to the following is displayed, xen-kmp is installed in the OS:

  ```
  xen-kmp-default-4.2.2_04_3.0.76_0.11-0.7.5
  ```

  If xen-kmp is not installed, obtain it from the ISO file and install it.

  If you add built-in drivers to the initrd or initramfs file by mistake, the ECS will not be affected.

CentOS and EulerOS

1. Run the following command to open the **/etc/dracut.conf** file:

   vi /etc/dracut.conf

2. Press **i** to enter editing mode and add Xen PV and VirtIO drivers to **add_drivers** (the format varies depending on the OS).

   ```
   [root@CTU10000xxxxx ~]# vi /etc/dracut.conf
   # additional kernel modules to the default
   add_drivers+="xen-blkfront xen-netfront virtio_blk virtio_scsi virtio_net virtio_pci virtio_ring virtio"
   ......
   ```

3. Press **Esc**, enter **:wq**, and press **Enter**. The system saves the change and exits the **/etc/dracut.conf** file.

4. Run the following command to regenerate initrd:

   dracut -f /boot/initramfs-2.6.32-573.8.1.el6.x86_64.img

   If the virtual file system is not the default initramfs, run **dracut -f** *Name of the initramfs or initrd file actually used*. You can obtain the actual initramfs or initrd file name from the **grub.cfg** file, which can be **/boot/grub/grub.cfg**, **/boot/grub2/grub.cfg**, or **/boot/grub/grub.conf** depending on the OS.

5. Check whether native Xen and KVM drivers have been installed. If the virtual file system is initramfs, run the following commands:

lsinitrd /boot/initramfs-`uname -r`.img | grep xen

lsinitrd /boot/initramfs-`uname -r`.img | grep virtio

If the virtual file system is initrd, run the following commands:

lsinitrd /boot/initrd-`uname -r` | grep xen

lsinitrd /boot/initrd-`uname -r` | grep virtio

Assume that the virtual file system is initramfs. The command output will be:

```
[root@CTU10000xxxxx home]# lsinitrd /boot/initramfs-`uname -r`.img | grep xen
-rwxr--r--   1 root     root        54888 Jul 16 17:53 lib/modules/2.6.32-573.8.1.el6.x86_64/kernel/drivers/block/xen-blkfront.ko
-rwxr--r--   1 root     root        45664 Jul 16 17:53 lib/modules/2.6.32-573.8.1.el6.x86_64/kernel/drivers/net/xen-netfront.ko

[root@CTU10000xxxxx home]# lsinitrd /boot/initramfs-`uname -r`.img | grep virtio
-rwxr--r--   1 root     root        23448 Jul 16 17:53 lib/modules/2.6.32-573.8.1.el6.x86_64/kernel/drivers/block/virtio_blk.ko
-rwxr--r--   1 root     root        50704 Jul 16 17:53 lib/modules/2.6.32-573.8.1.el6.x86_64/kernel/drivers/net/virtio_net.ko
-rwxr--r--   1 root     root        28424 Jul 16 17:53 lib/modules/2.6.32-573.8.1.el6.x86_64/kernel/drivers/scsi/virtio_scsi.ko
drwxr-xr-x   2 root     root            0 Jul 16 17:53 lib/modules/2.6.32-573.8.1.el6.x86_64/kernel/drivers/virtio
-rwxr--r--   1 root     root        14544 Jul 16 17:53 lib/modules/2.6.32-573.8.1.el6.x86_64/kernel/drivers/virtio/virtio.ko
-rwxr--r--   1 root     root        21040 Jul 16 17:53 lib/modules/2.6.32-573.8.1.el6.x86_64/kernel/drivers/virtio/virtio_pci.ko
-rwxr--r--   1 root     root        18016 Jul 16 17:53 lib/modules/2.6.32-573.8.1.el6.x86_64/kernel/drivers/virtio/virtio_ring.ko
```

NOTE

If you add built-in drivers to the initrd or initramfs file, the ECS will not be affected but such drivers cannot be shown by running the **lsinitrd** command. You can run the following commands to check whether there are built-in drivers in the kernel:

cat /boot/config-`uname -r` | grep CONFIG_VIRTIO | grep y

cat /boot/config-`uname -r` | grep CONFIG_XEN | grep y

Ubuntu and Debian

1. Run the following command to open the **modules** file:

   vi /etc/initramfs-tools/modules

2. Press **i** to enter editing mode and add Xen PV and VirtIO drivers to the **/etc/initramfs-tools/modules** file (the format varies depending on the OS).

   ```
   [root@CTU10000xxxxx ~]#vi /etc/initramfs-tools/modules
   ......
   # Examples:
   #
   # raid1
   # sd_mOd
   xen-blkfront
   xen-netfront
   virtio_blk
   virtio_scsi
   virtio_net
   virtio_pci
   virtio_ring
   virtio
   ```

3. Press **Esc**, enter **:wq**, and press **Enter**. The system saves the change and exits the **/etc/initramfs-tools/modules** file.

4. Run the following command to regenerate initrd:

update-initramfs -u

5. Run the following commands to check whether native Xen and KVM drivers have been installed:

   lsinitramfs /boot/initrd.img-`uname -r` |grep xen

   lsinitramfs /boot/initrd.img-`uname -r` |grep virtio

```
[root@ CTU10000xxxxx home]# lsinitramfs /boot/initrd.img-`uname -r` |grep xen
lib/modules/3.5.0-23-generic/kernel/drivers/net/ethernet/qlogic/netxen
lib/modules/3.5.0-23-generic/kernel/drivers/net/ethernet/qlogic/netxen/netxen_nic.ko
lib/modules/3.5.0-23-generic/kernel/drivers/net/xen-netback
lib/modules/3.5.0-23-generic/kernel/drivers/net/xen-netback/xen-netback.ko
lib/modules/3.5.0-23-generic/kernel/drivers/block/xen-blkback
lib/modules/3.5.0-23-generic/kernel/drivers/block/xen-blkback/xen-blkback.ko

[root@ CTU10000xxxxx home]# lsinitramfs /boot/initrd.img-`uname -r` |grep virtio
lib/modules/3.5.0-23-generic/kernel/drivers/scsi/virtio_scsi.ko
```

   NOTE

   If you add built-in drivers to the initrd or initramfs file by mistake, the ECS will not be affected. The drivers cannot be found by running the **lsinitrd** command. You can run the following commands to check whether built-in drivers are in the kernel:

```
[root@ CTU10000xxxxx home]# cat /boot/config-`uname -r` | grep CONFIG_VIRTIO | grep y
CONFIG_VIRTIO_BLK=y
CONFIG_VIRTIO_NET=y
CONFIG_VIRTIO=y
CONFIG_VIRTIO_RING=y
CONFIG_VIRTIO_PCI=y
CONFIG_VIRTIO_MMIO_CMDLINE_DEVICES=y
[root@ CTU10000xxxxx home]# cat /boot/config-`uname -r` | grep CONFIG_XEN | grep y
CONFIG_XEN_BLKDEV_FRONTEND=y
CONFIG_XEN_NETDEV_FRONTEND=y
```

SUSE and openSUSE

If the OS version is earlier than SUSE 12 SP1 or openSUSE 13, modify the **/etc/sysconfig/kernel** file to install the drivers. For details, see **scenario 1**.

If the OS version is SUSE 12 SP1, modify the **/etc/dracut.conf** file to install the drivers. For details, see **scenario 2**.

If the OS version is later than SUSE 12 SP1 or openSUSE 13, modify the **/etc/dracut.conf** file to install the drivers. For details, see **scenario 3**.

- Earlier than SUSE 12 SP1 or openSUSE 13:

  NOTE

  Before installing the drivers, run the following command to check whether xen-kmp (driver package for Xen PV) is installed:

  rpm -qa |grep xen-kmp

  If information similar to the following is displayed, xen-kmp is installed:

```
xen-kmp-default-4.2.2_04_3.0.76_0.11-0.7.5
```

  If xen-kmp is not installed, obtain it from the ISO package and install it first.

  a. Run the following command to open the **/etc/sysconfig/kernel** file:

     vi /etc/sysconfig/kernel

  b. Add Xen PV and VirtIO drivers to **INITRD_MODULES=** (the format varies depending on the OS).

```
SIA10000xxxxx:~ # vi /etc/sysconfig/kernel
# (like drivers for scsi-controllers, for lvm or reiserfs)
```



```
#
INITRD_MODULES="ata_piix ata_generic xen_vnif xen_vbd xen_platform_pci virtio_blk
virtio_scsi virtio_net virtio_pci virtio_ring virtio"
```

c. Run the **mkinitrd** command to regenerate initrd.

NOTE

If the virtual file system is not the default initramfs or initrd, run **dracut -f** *Name of the initramfs or initrd file actually used*. The actual initramfs or initrd file name can be obtained from the **menu.lst** or **grub.cfg** file (**/boot/grub/menu.lst**, **/boot/grub/grub.cfg**, or **/boot/grub2/grub.cfg**).

The following is an example initrd file of SUSE 11 SP4:

```
default 0
timeout 10
gfxmenu (hd0,0)/boot/message
title sles11sp4_001_[_VMX_]
root (hd0,0)
kernel /boot/linux.vmx vga=0x314 splash=silent console=ttyS0,115200n8 console=tty0
net.ifnames=0 NON_PERSISTENT_DEVICE_NAMES=1 showopts
initrd /boot/initrd.vmx
title Failsafe_sles11sp4_001_[_VMX_]
root (hd0,0)
kernel /boot/linux.vmx vga=0x314 splash=silent ide=nodma apm=off noresume edd=off
powersaved=off nohz=off highres=off processor.max+cstate=1 nomodeset x11failsafe
console=ttyS0,115200n8 console=tty0 net.ifnames=0 NON_PERSISTENT_DEVICE_NAMES=1
showopts
initrd /boot/initrd.vmx
```

/boot/initrd.vmx is the initrd file actually used. If **/boot** is missing in the initrd file path, you need to add it when you run the **dracut -f** command. In this case, the command should be **dracut -f /boot/initramfs***-xxx*.

d. Run the following commands to check whether Xen PVOPS and KVM VirtIO drivers have been installed:

lsinitrd /boot/initrd-`uname -r` | grep xen

lsinitrd /boot/initrd-`uname -r` | grep virtio

```
SIA10000xxxxx:~ # lsinitrd /boot/initrd-`uname -r` | grep xen
-rwxr--r-- 1 root root 42400 Jun 22 2012 lib/modules/2.6.32-279.el6.x86_64/kernel/drivers/block/
xen-blkfront.ko
-rwxr--r-- 1 root root 44200 Jun 22 2012 lib/modules/2.6.32-279.el6.x86_64/kernel/drivers/net/
xen-netfront.ko

SIA10000xxxxx:~ # lsinitrd /boot/initrd-`uname -r` | grep virtio
-rwxr--r-- 1 root root 19248 Jun 22 2012 lib/modules/2.6.32-279.el6.x86_64/kernel/drivers/scsi/
virtio_scsi.ko
-rwxr--r-- 1 root root 23856 Jun 22 2012 lib/modules/2.6.32-279.el6.x86_64/kernel/drivers/block/
virtio_blk.ko
drwxr-xr-x 2 root root 0 Jul 12 14:53 lib/modules/2.6.32-279.el6.x86_64/kernel/drivers/virtio
-rwxr--r-- 1 root root 15848 Jun 22 2012 lib/modules/2.6.32-279.el6.x86_64/kernel/drivers/virtio/
virtio_ring.ko
-rwxr--r-- 1 root root 20008 Jun 22 2012 lib/modules/2.6.32-279.el6.x86_64/kernel/drivers/virtio/
virtio_pci.ko
-rwxr--r-- 1 root root 12272 Jun 22 2012 lib/modules/2.6.32-279.el6.x86_64/kernel/drivers/virtio/
virtio.ko
-rwxr--r-- 1 root root 38208 Jun 22 2012 lib/modules/2.6.32-279.el6.x86_64/kernel/drivers/net/
virtio_net.ko
```

e. Restart the ECS.

f. Modify the **/boot/grub/menu.lst** file to add **xen_platform_pci.dev_unplug=all** and change the root settings.

Before the modification:

```
###Don't change this comment -YaST2 identifier: Original name: linux###
title SUSE Linux Enterprise Server 11SP4 - 3.0.76-0.11 (default)
root (hd0,0)
```



```
kernel /boot/vmlinuz-3.0.76-0.11-default root=UUID=4eb40294-4c6f-4384-bbb6-b8795bbb1130 splash=silentcrashkernel=256M-:128M showopts vga=0x314
initrd /boot/initrd-3.0.76-0.11-default
```

After the modification:

```
###Don't change this comment -YaST2 identifier: Original name: linux###
title SUSE Linux Enterprise Server 11SP4 - 3.0.76-0.11 (default)
root (hd0,0)
kernel /boot/vmlinuz-3.0.76-0.11-default root=UUID=4eb40294-4c6f-4384-bbb6-b8795bbb1130 splash=silentcrashkernel=256M-:128M showopts vga=0x314 xen_platform_pci.dev_unplug=all
initrd /boot/initrd-3.0.76-0.11-default
```

NOTE

- Ensure that the root partition is in UUID format.
- **xen_platform_pci.dev_unplug=all** is used to shield QEMU devices.
- For SUSE 11 SP1 64bit to SUSE 11 SP4 64bit, add **xen_platform_pci.dev_unplug=all** to the **menu.lst** file. For SUSE 12 or later, QEMU device shield is enabled by default, and you do not need to configure it.

g. Run the following commands to check whether Xen drivers exist in initrd:

lsinitrd /boot/initrd-`uname -r` | grep xen

lsinitrd /boot/initrd-`uname -r` | grep virtio

```
SIA10000xxxxx:~ # lsinitrd /boot/initrd-`uname -r` | grep xen
-rwxr--r-- 1 root root 42400 Jun 22 2012 lib/modules/2.6.32-279.el6.x86_64/kernel/drivers/block/xen-blkfront.ko
-rwxr--r-- 1 root root 44200 Jun 22 2012 lib/modules/2.6.32-279.el6.x86_64/kernel/drivers/net/xen-netfront.ko

SIA10000xxxxx:~ # lsinitrd /boot/initrd-`uname -r` | grep virtio
-rwxr--r-- 1 root root 19248 Jun 22 2012 lib/modules/2.6.32-279.el6.x86_64/kernel/drivers/scsi/virtio_scsi.ko
-rwxr--r-- 1 root root 23856 Jun 22 2012 lib/modules/2.6.32-279.el6.x86_64/kernel/drivers/block/virtio_blk.ko
drwxr-xr-x 2 root root 0 Jul 12 14:53 lib/modules/2.6.32-279.el6.x86_64/kernel/drivers/virtio
-rwxr--r-- 1 root root 15848 Jun 22 2012 lib/modules/2.6.32-279.el6.x86_64/kernel/drivers/virtio/virtio_ring.ko
-rwxr--r-- 1 root root 20008 Jun 22 2012 lib/modules/2.6.32-279.el6.x86_64/kernel/drivers/virtio/virtio_pci.ko
-rwxr--r-- 1 root root 12272 Jun 22 2012 lib/modules/2.6.32-279.el6.x86_64/kernel/drivers/virtio/virtio.ko
-rwxr--r-- 1 root root 38208 Jun 22 2012 lib/modules/2.6.32-279.el6.x86_64/kernel/drivers/net/virtio_net.ko
```

NOTE

If you add built-in drivers to the initrd or initramfs file by mistake, the ECS will not be affected. The drivers cannot be found by running the **lsinitrd** command. You can run the following commands to check whether built-in drivers are in the kernel:

cat /boot/config-`uname -r` | grep CONFIG_VIRTIO | grep y

cat /boot/config-`uname -r` | grep CONFIG_XEN | grep y

- SUSE 12 SP1:

a. Run the following command to open the **/etc/dracut.conf** file:

vi /etc/dracut.conf

b. Press **i** to enter editing mode and add Xen PV and VirtIO drivers to **add-drivers** (the format varies depending on the OS).

```
[root@CTU10000xxxxx ~]# vi /etc/dracut.conf
# additional kernel modules to the default
```



```
add_drivers+="ata_piix ata_generic xen_vnif xen_vbd xen_platform_pci virtio_blk virtio_scsi virtio_net virtio_pci virtio_ring virtio"
```

c. Press **Esc**, enter **:wq**, and press **Enter**. The system saves the change and exits the **/etc/dracut.conf** file.

d. Run the following command to regenerate initrd:

dracut -f /boot/initramfs-*File name*

If the virtual file system is not the default initramfs, run the **dracut -f** *Name of the initramfs or initrd file actually used* command. The actual initramfs or initrd file name can be obtained from the **grub.cfg** file, which can be **/boot/grub/grub.cfg**, **/boot/grub2/grub.cfg**, or **/boot/grub/grub.conf** depending on the OS.

e. Check whether native Xen and KVM drivers have been installed. If the virtual file system is initramfs, run the following commands:

lsinitrd /boot/initramfs-`uname -r`.img | grep xen

lsinitrd /boot/initramfs-`uname -r`.img | grep virtio

If the virtual file system is initrd, run the following commands:

lsinitrd /boot/initrd-`uname -r` | grep xen

lsinitrd /boot/initrd-`uname -r` | grep virtio

- Later than SUSE 12 SP1 or openSUSE 13:

  Take SUSE Linux Enterprise Server 12 SP2 (x86_64) as an example.

  a. Run the following command to open the **/etc/dracut.conf** file:

  vi /etc/dracut.conf

  b. Press **i** to enter editing mode and add Xen PV and VirtIO drivers to **add_drivers** (the format varies depending on the OS).

  ```
  [root@CTU10000xxxxx ~]# vi /etc/dracut.conf
  # additional kernel modules to the default
  add_drivers+="ata_piix ata_generic xen-blkfront xen-netfront virtio_blk virtio_scsi virtio_net virtio_pci virtio_ring virtio"
  ```

  c. Press **Esc**, enter **:wq**, and press **Enter**. The system saves the change and exits the **/etc/dracut.conf** file.

  d. Run the following command to regenerate initrd:

  dracut -f /boot/initramfs-*File name*

  If the virtual file system is not the default initramfs, run the **dracut -f** *Name of the initramfs or initrd file actually used* command. The actual initramfs or initrd file name can be obtained from the **grub.cfg** file, which can be **/boot/grub/grub.cfg**, **/boot/grub2/grub.cfg**, or **/boot/grub/grub.conf** depending on the OS.

  e. Check whether native Xen and KVM drivers have been installed. If the virtual file system is initramfs, run the following commands:

  lsinitrd /boot/initramfs-`uname -r`.img | grep xen

  lsinitrd /boot/initramfs-`uname -r`.img | grep virtio

  If the virtual file system is initrd, run the following commands:

  lsinitrd /boot/initrd-`uname -r` | grep xen

  lsinitrd /boot/initrd-`uname -r` | grep virtio

  Assume that the virtual file system is initrd. The command output will be:

  ```
  sluo-ecs-30dc:~ # lsinitrd /boot/initrd-`uname -r` | grep xen
  -rw-r--r-- 1 root root 69575 Oct 26 2016 lib/modules/4.4.21-69-default/kernel/drivers/block/xen-
  ```



```
blkfront.ko
-rw-r--r-- 1 root root 53415 Oct 26 2016 lib/modules/4.4.21-69-default/kernel/drivers/net/xen-netfront.ko
drwxr-xr-x 2 root root 0 Sep 28 10:21 lib/modules/4.4.21-69-default/updates/pvdriver/xen-hcall
-rwxr-xr-x 1 root root 8320 Sep 28 10:21 lib/modules/4.4.21-69-default/updates/pvdriver/xen-hcall/xen-hcall.ko

sluo-ecs-30dc:~ # lsinitrd /boot/initrd-`uname -r` | grep virtio
-rw-r--r-- 1 root root 29335 Oct 26 2016 lib/modules/4.4.21-69-default/kernel/drivers/block/virtio_blk.ko
-rw-r--r-- 1 root root 57007 Oct 26 2016 lib/modules/4.4.21-69-default/kernel/drivers/net/virtio_net.ko
-rw-r--r-- 1 root root 32415 Oct 26 2016 lib/modules/4.4.21-69-default/kernel/drivers/scsi/virtio_scsi.ko
drwxr-xr-x 2 root root 0 Sep 28 10:21 lib/modules/4.4.21-69-default/kernel/drivers/virtio
-rw-r--r-- 1 root root 19623 Oct 26 2016 lib/modules/4.4.21-69-default/kernel/drivers/virtio/virtio.ko
-rw-r--r-- 1 root root 38943 Oct 26 2016 lib/modules/4.4.21-69-default/kernel/drivers/virtio/virtio_pci.ko
-rw-r--r-- 1 root root 24431 Oct 26 2016 lib/modules/4.4.21-69-default/kernel/drivers/virtio/virtio_ring.ko
```

NOTE

If you add built-in drivers to the initrd or initramfs file by mistake, the ECS will not be affected. The drivers cannot be found by running the **lsinitrd** command. You can run the following commands to check whether built-in drivers are in the kernel:

cat /boot/config-`uname -r` | grep CONFIG_VIRTIO | grep y

cat /boot/config-`uname -r` | grep CONFIG_XEN | grep y

Follow-up Procedure

Delete log files, historical records, and other data.

1. Delete unnecessary key files.

   echo > *$path/$to/$root*/.ssh/authorized_keys

   Example: **echo > /root/.ssh/authorized_keys**

   echo > *$path/$to/$none-root*/.ssh/authorized_keys

   Example: **echo > /home/linux/.ssh/authorized_keys**

2. Delete log files from the **/var/log** directory.

   rm -rf /var/log/*

   NOTE

   Before deleting log files, back up log directories and log files required by application startup. For example, if the default Nginx log directory **/var/log/nginx** is deleted, Nginx may fail to be started.

3. Delete historical records.

   echo > /root/.bash_history

   history -c

2.3.8 Installing Native KVM Drivers on a KVM ECS

Scenarios

Before using a KVM ECS to create a private image, you need to install native KVM drivers on the ECS. If the drivers have been installed, skip this section.

> **CAUTION**
>
> If you do not install KVM drivers, NICs of the ECS may not be detected and the ECS cannot communicate with other resources.

Prerequisites

- The virtualization type of the ECS is KVM.

  You can run the following command to check the virtualization type of an ECS:

  lscpu

  - If the value of **Hypervisor vendor** is **XEN**, install drivers as instructed in **Installing Native Xen and KVM Drivers on a Xen ECS**.
  - If the value of **Hypervisor vendor** is **KVM**, install drivers as instructed in this section.

    > **NOTE**
    >
    > If the command output does not contain **Hypervisor vendor**, install drivers as instructed in this section.

- No native KVM drivers are installed on the ECS.

  a. Check whether VirtIO drivers are installed. The command varies depending on the OS.

  - CentOS/EulerOS

    If the root filesystem is mounted by initramfs, run the following command:

    lsinitrd /boot/initramfs-`uname -r`.img | grep virtio

    If the root filesystem is mounted by initrd, run the following command:

    lsinitrd /boot/initrd-`uname -r` | grep virtio

  - Ubuntu/Debian

    lsinitramfs /boot/initrd.img-`uname -r` |grep virtio

  - SUSE/openSUSE
    - SUSE 12 SP1/openSUSE 13 or earlier:

      lsinitrd /boot/initrd-`uname -r` | grep virtio

    - SUSE 12 SP1 or later than SUSE 12 SP1/openSUSE 13:

      If the root filesystem is mounted by initramfs, run the following command:

      lsinitrd /boot/initramfs-`uname -r`.img | grep virtio

      If the root filesystem is mounted by initrd, run the following command:

      lsinitrd /boot/initrd-`uname -r` | grep virtio

  If VirtIO drivers have been installed, skip this section.

If VirtIO drivers have not been installed, install them as instructed in this section.

- The ECS kernel must be later than 2.6.24.
- Disable your antivirus and intrusion detection software. You can enable the software after KVM drivers are installed.
- You have performed operations in **Changing Disk Identifiers in the GRUB File to UUID** and **Changing Disk Identifiers in the fstab File to UUID**.

Procedure

Modify the configuration file based on the OS version.

Table 2-8 Modifying configuration files for different OSs

OS	Configuration	Reference
CentOS/EulerOS	Take CentOS 7.0 as an example. 1. In the **/etc/dracut.conf** file, add VirtIO drivers to **add_drivers**, including virtio_blk, virtio_scsi, virtio_net, virtio_pci, virtio_ring, and virtio. Separate driver names with spaces. 2. Save and exit the **/etc/dracut.conf** file and run the **dracut -f** command to generate **initrd** again.	**CentOS and EulerOS**
Ubuntu/Debian	1. In the **/etc/initramfs-tools/modules** file, add VirtIO drivers, including virtio_blk, virtio_scsi, virtio_net, virtio_pci, virtio_ring, and virtio. Separate driver names with spaces. 2. Save and exit the **/etc/initramfs-tools/modules** file and run the **update-initramfs -u** command to generate **initrd** again.	**Ubuntu and Debian**

OS	Configuration	Reference
SUSE and openSUSE	If the OS version is earlier than SUSE 12 SP1 or openSUSE 13: 1. In the **/etc/sysconfig/kernel** file, add VirtIO drivers to **INITRD_MODULES=""**. VirtIO drivers include virtio_blk, virtio_scsi, virtio_net, virtio_pci, virtio_ring, and virtio. Separate driver names with spaces. 2. Run the **mkinitrd** command to generate **initrd** again.	**SUSE and openSUSE (Earlier than SUSE 12 SP1 or openSUSE 13)**
	If the OS version is SUSE 12 SP1: 1. In the **/etc/dracut.conf** file, add VirtIO drivers to **add_drivers**. VirtIO drivers include virtio_blk, virtio_scsi, virtio_net, virtio_pci, virtio_ring, and virtio. Separate driver names with spaces. 2. Run the **dracut -f** command to generate **initrd** again.	**SUSE and openSUSE (SUSE 12 SP1)**
	If the OS version is later than SUSE 12 SP1 or openSUSE 13: 1. In the **/etc/dracut.conf** file, add VirtIO drivers to **add_drivers**, including virtio_blk, virtio_scsi, virtio_net, virtio_pci, virtio_ring, and virtio. Separate driver names with spaces. 2. Save and exit the **/etc/dracut.conf** file and run the **dracut -f** command to generate **initrd** again.	**SUSE and openSUSE (Later than SUSE 12 SP1 or openSUSE 13)**

CentOS and EulerOS

1. Run the following command to open the **/etc/dracut.conf** file:

   vi /etc/dracut.conf

2. Press **i** to enter the editing mode and add VirtIO drivers to **add_drivers** (the format varies depending on the OS).

   ```
   [root@CTU10000xxxxx ~]# vi /etc/dracut.conf
   # additional kernel modules to the default
   add_drivers+="virtio_blk virtio_scsi virtio_net virtio_pci virtio_ring virtio"
   ....
   ```

3. Press **Esc**, enter **:wq**, and press **Enter**. The system saves the change and exits the **/etc/dracut.conf** file.

4. Run the following command to regenerate initrd:

   dracut -f */boot/initramfs-2.6.32-573.8.1.el6.x86_64.img*

If the virtual file system is not the default initramfs, run the **dracut -f** *Name of the initramfs or initrd file actually used* command. The actual initramfs or initrd file name can be obtained from the **grub.cfg** file, which can be **/boot/grub/grub.cfg**, **/boot/grub2/grub.cfg**, or **/boot/grub/grub.conf** depending on the OS.

5. If the virtual file system is initramfs, run the following command to check whether native KVM drivers have been installed:

   lsinitrd /boot/initramfs-`uname -r`.img | grep virtio

   If the virtual file system is initrd, run the following command to check whether native KVM drivers have been installed:

   lsinitrd /boot/initrd-`uname -r` | grep virtio

   Assume that the virtual file system is initramfs. The following command output will be displayed:

   ```
   [root@CTU10000xxxxx home]# lsinitrd /boot/initramfs-`uname -r`.img | grep virtio
   -rwxr--r--   1 root     root        23448 Jul 16 17:53 lib/modules/2.6.32-573.8.1.el6.x86_64/kernel/drivers/block/virtio_blk.ko
   -rwxr--r--   1 root     root        50704 Jul 16 17:53 lib/modules/2.6.32-573.8.1.el6.x86_64/kernel/drivers/net/virtio_net.ko
   -rwxr--r--   1 root     root        28424 Jul 16 17:53 lib/modules/2.6.32-573.8.1.el6.x86_64/kernel/drivers/scsi/virtio_scsi.ko
   drwxr-xr-x   2 root     root            0 Jul 16 17:53 lib/modules/2.6.32-573.8.1.el6.x86_64/kernel/drivers/virtio
   -rwxr--r--   1 root     root        14544 Jul 16 17:53 lib/modules/2.6.32-573.8.1.el6.x86_64/kernel/drivers/virtio/virtio.ko
   -rwxr--r--   1 root     root        21040 Jul 16 17:53 lib/modules/2.6.32-573.8.1.el6.x86_64/kernel/drivers/virtio/virtio_pci.ko
   -rwxr--r--   1 root     root        18016 Jul 16 17:53 lib/modules/2.6.32-573.8.1.el6.x86_64/kernel/drivers/virtio/virtio_ring.ko
   ```

   NOTE

   If you add built-in drivers to the initrd or initramfs file, the ECS will not be affected. This makes it easy to modify the drivers. However, you cannot check the drivers by running the **lsinitrd** command. You can run the following command to check whether the drivers are built-in ones in the kernel:

   cat /boot/config-`uname -r` | grep CONFIG_VIRTIO | grep y

Ubuntu and Debian

1. Run the following command to open the **modules** file:

   vi /etc/initramfs-tools/modules

2. Press **i** to enter the editing mode and add VirtIO drivers to the **/etc/initramfs-tools/modules** file (the format varies depending on the OS).

   ```
   [root@CTU10000xxxxx ~]#vi /etc/initramfs-tools/modules
   ...
   # Examples:
   #
   # raid1
   # sd_mOd
   virtio_blk
   virtio_scsi
   virtio_net
   virtio_pci
   virtio_ring
   virtio
   ```

3. Press **Esc**, enter **:wq**, and press **Enter**. The system saves the change and exits the **/etc/initramfs-tools/modules** file.

4. Run the following command to regenerate initrd:

   update-initramfs -u

5. Run the following command to check whether native KVM drivers have been installed:

   lsinitramfs /boot/initrd.img-`uname -r` |grep virtio

   ```
   [root@ CTU10000xxxxx home]# lsinitramfs /boot/initrd.img-`uname -r` |grep virtio
   lib/modules/3.5.0-23-generic/kernel/drivers/scsi/virtio_scsi.ko
   ```

   NOTE

   If you add built-in drivers to the initrd or initramfs file, the ECS will not be affected. This makes it easy to modify the drivers. However, you cannot check the drivers by running the **lsinitrd** command. You can run the following command to check whether the drivers are built-in ones in the kernel:

   ```
   [root@ CTU10000xxxxx home]# cat /boot/config-`uname -r` | grep CONFIG_VIRTIO | grep y
   CONFIG_VIRTIO_BLK=y
   CONFIG_VIRTIO_NET=y
   CONFIG_VIRTIO=y
   CONFIG_VIRTIO_RING=y
   CONFIG_VIRTIO_PCI=y
   CONFIG_VIRTIO_MMIO_CMDLINE_DEVICES=y
   ```

SUSE and openSUSE (Earlier than SUSE 12 SP1 or openSUSE 13)

Modify the **/etc/sysconfig/kernel** file.

1. Run the following command to modify the **/etc/sysconfig/kernel** file:

   vi /etc/sysconfig/kernel

2. Add VirtIO drivers to **INITRD_MODULES=""** (the format of drivers depends on the OS).

   ```
   SIA10000xxxxx:~ # vi /etc/sysconfig/kernel
   # (like drivers for scsi-controllers, for lvm or reiserfs)
   #
   INITRD_MODULES="ata_piix ata_generic virtio_blk virtio_scsi virtio_net virtio_pci virtio_ring virtio"
   ```

3. Run the **mkinitrd** command to generate **initrd** again.

   NOTE

   If the virtual file system is not the default initramfs or initrd, run the **dracut -f** *Name of the initramfs or initrd file actually used* command. The actual initramfs or initrd file name can be obtained from the **menu.lst** or **grub.cfg** file (**/boot/grub/menu.lst**, **/boot/grub/grub.cfg**, or **/boot/grub2/grub.cfg**).

   The following is an example initrd file of SUSE 11 SP4:

   ```
   default 0
   timeout 10
   gfxmenu (hd0,0)/boot/message
   title sles11sp4_001_[_VMX_]
   root (hd0,0)
   kernel /boot/linux.vmx vga=0x314 splash=silent console=ttyS0,115200n8 console=tty0 net.ifnames=0 NON_PERSISTENT_DEVICE_NAMES=1 showopts
   initrd /boot/initrd.vmx
   title Failsafe_sles11sp4_001_[_VMX_]
   root (hd0,0)
   kernel /boot/linux.vmx vga=0x314 splash=silent ide=nodma apm=off noresume edd=off powersaved=off nohz=off highres=off processor.max+cstate=1 nomodeset x11failsafe console=ttyS0,115200n8 console=tty0 net.ifnames=0 NON_PERSISTENT_DEVICE_NAMES=1 showopts
   initrd /boot/initrd.vmx
   ```

   /boot/initrd.vmx in the **initrd** line is the **initrd** file actually used. Run the **dracut -f /boot/initrd.vmx** command. If the **initrd** file does not contain the **/**

boot directory, such as **/initramfs-***xxx*, run the **dracut -f /boot/initramfs-***xxx* command.

4. Run the following command to check whether KVM VirtIO drivers have been installed:

   lsinitrd /boot/initrd-`uname -r` | grep virtio

   ```
   SIA10000xxxxx:~ # lsinitrd /boot/initrd-`uname -r` | grep virtio
   -rwxr--r-- 1 root root 19248 Jun 22 2012 lib/modules/2.6.32-279.el6.x86_64/kernel/drivers/scsi/virtio_scsi.ko
   -rwxr--r-- 1 root root 23856 Jun 22 2012 lib/modules/2.6.32-279.el6.x86_64/kernel/drivers/block/virtio_blk.ko
   drwxr-xr-x 2 root root 0 Jul 12 14:53 lib/modules/2.6.32-279.el6.x86_64/kernel/drivers/virtio
   -rwxr--r-- 1 root root 15848 Jun 22 2012 lib/modules/2.6.32-279.el6.x86_64/kernel/drivers/virtio/virtio_ring.ko
   -rwxr--r-- 1 root root 20008 Jun 22 2012 lib/modules/2.6.32-279.el6.x86_64/kernel/drivers/virtio/virtio_pci.ko
   -rwxr--r-- 1 root root 12272 Jun 22 2012 lib/modules/2.6.32-279.el6.x86_64/kernel/drivers/virtio/virtio.ko
   -rwxr--r-- 1 root root 38208 Jun 22 2012 lib/modules/2.6.32-279.el6.x86_64/kernel/drivers/net/virtio_net.ko
   ```

5. Restart the ECS.
6. Run the following command to check whether KVM drivers exist in initrd:

   lsinitrd /boot/initrd-`uname -r` | grep virtio

   ```
   SIA10000xxxxx:~ # lsinitrd /boot/initrd-`uname -r` | grep virtio
   -rwxr--r-- 1 root root 19248 Jun 22 2012 lib/modules/2.6.32-279.el6.x86_64/kernel/drivers/scsi/virtio_scsi.ko
   -rwxr--r-- 1 root root 23856 Jun 22 2012 lib/modules/2.6.32-279.el6.x86_64/kernel/drivers/block/virtio_blk.ko
   drwxr-xr-x 2 root root 0 Jul 12 14:53 lib/modules/2.6.32-279.el6.x86_64/kernel/drivers/virtio
   -rwxr--r-- 1 root root 15848 Jun 22 2012 lib/modules/2.6.32-279.el6.x86_64/kernel/drivers/virtio/virtio_ring.ko
   -rwxr--r-- 1 root root 20008 Jun 22 2012 lib/modules/2.6.32-279.el6.x86_64/kernel/drivers/virtio/virtio_pci.ko
   -rwxr--r-- 1 root root 12272 Jun 22 2012 lib/modules/2.6.32-279.el6.x86_64/kernel/drivers/virtio/virtio.ko
   -rwxr--r-- 1 root root 38208 Jun 22 2012 lib/modules/2.6.32-279.el6.x86_64/kernel/drivers/net/virtio_net.ko
   ```

   NOTE

   If you add built-in drivers to the initrd or initramfs file, the ECS will not be affected. This makes it easy to modify the drivers. However, you cannot check the drivers by running the **lsinitrd** command. You can run the following command to check whether the drivers are built-in ones in the kernel:

   cat /boot/config-`uname -r` | grep CONFIG_VIRTIO | grep y

SUSE and openSUSE (SUSE 12 SP1)

Modify the **/etc/dracut.conf** file.

1. Run the following command to open the **/etc/dracut.conf** file:

   vi /etc/dracut.conf

2. Press **i** to enter the editing mode and add VirtIO drivers to **add-drivers** (the format varies depending on the OS).

   ```
   [root@CTU10000xxxxx ~]# vi /etc/dracut.conf
   # additional kernel modules to the default
   add_drivers+="ata_piix ata_generic virtio_blk virtio_scsi virtio_net virtio_pci virtio_ring virtio"
   ```

3. Press **Esc**, enter **:wq**, and press **Enter**. The system saves the change and exits the **/etc/dracut.conf** file.
4. Run the following command to regenerate initrd:

dracut -f /boot/initramfs-*File name*

If the virtual file system is not the default initramfs, run the **dracut -f** *Name of the initramfs or initrd file actually used* command. The actual initramfs or initrd file name can be obtained from the **grub.cfg** file, which can be **/boot/grub/grub.cfg**, **/boot/grub2/grub.cfg**, or **/boot/grub/grub.conf** depending on the OS.

5. If the virtual file system is initramfs, run the following command to check whether native KVM drivers have been installed:

   lsinitrd /boot/initramfs-`uname -r`.img | grep virtio

   If the virtual file system is initrd, run the following command to check whether native KVM drivers have been installed:

   lsinitrd /boot/initrd-`uname -r` | grep virtio

SUSE and openSUSE (Later than SUSE 12 SP1 or openSUSE 13)

Modify the **/etc/dracut.conf** file.

Take SUSE Linux Enterprise Server 12 SP2 (x86_64) as an example.

1. Run the following command to open the **/etc/dracut.conf** file:

   vi /etc/dracut.conf

2. Press **i** to enter the editing mode and add VirtIO drivers to **add_drivers** (the format varies depending on the OS).

   ```
   [root@CTU10000xxxxx ~]# vi /etc/dracut.conf
   # additional kernel modules to the default
   add_drivers+="ata_piix ata_generic virtio_blk virtio_scsi virtio_net virtio_pci virtio_ring virtio"
   ```

3. Press **Esc**, enter **:wq**, and press **Enter**. The system saves the change and exits the **/etc/dracut.conf** file.

4. Run the following command to regenerate initrd:

   dracut -f /boot/initramfs-*File name*

   If the virtual file system is not the default initramfs, run the **dracut -f** *Name of the initramfs or initrd file actually used* command. The actual initramfs or initrd file name can be obtained from the **grub.cfg** file, which can be **/boot/grub/grub.cfg**, **/boot/grub2/grub.cfg**, or **/boot/grub/grub.conf** depending on the OS.

5. If the virtual file system is initramfs, run the following command to check whether native KVM drivers have been installed:

   lsinitrd /boot/initramfs-`uname -r`.img | grep virtio

   If the virtual file system is initrd, run the following command to check whether native KVM drivers have been installed:

   lsinitrd /boot/initrd-`uname -r` | grep virtio

   Assume that the virtual file system is initrd. The following command output will be displayed:

   ```
   sluo-ecs-30dc:~ # lsinitrd /boot/initrd-`uname -r` | grep virtio
   -rw-r--r-- 1 root root 29335 Oct 26 2016 lib/modules/4.4.21-69-default/kernel/drivers/block/
   virtio_blk.ko
   -rw-r--r-- 1 root root 57007 Oct 26 2016 lib/modules/4.4.21-69-default/kernel/drivers/net/
   virtio_net.ko
   -rw-r--r-- 1 root root 32415 Oct 26 2016 lib/modules/4.4.21-69-default/kernel/drivers/scsi/
   virtio_scsi.ko
   drwxr-xr-x 2 root root 0 Sep 28 10:21 lib/modules/4.4.21-69-default/kernel/drivers/virtio
   ```



```
-rw-r--r-- 1 root root 19623 Oct 26 2016 lib/modules/4.4.21-69-default/kernel/drivers/virtio/virtio.ko
-rw-r--r-- 1 root root 38943 Oct 26 2016 lib/modules/4.4.21-69-default/kernel/drivers/virtio/
virtio_pci.ko
-rw-r--r-- 1 root root 24431 Oct 26 2016 lib/modules/4.4.21-69-default/kernel/drivers/virtio/
virtio_ring.ko
```

NOTE

If you add built-in drivers to the initrd or initramfs file, the ECS will not be affected. This makes it easy to modify the drivers. However, you cannot check the drivers by running the **lsinitrd** command. You can run the following command to check whether the drivers are built-in ones in the kernel:

cat /boot/config-`uname -r` | grep CONFIG_VIRTIO | grep y

Follow-up Procedure

Delete log files, historical records, and other data.

1. Delete unnecessary key files.

   echo > *$path/$to/$root*/.ssh/authorized_keys

   Example: **echo > /root/.ssh/authorized_keys**

   echo > *$path/$to/$none-root*/.ssh/authorized_keys

   Example: **echo > /home/linux/.ssh/authorized_keys**

2. Delete log files from the **/var/log** directory.

   rm -rf /var/log/*

   NOTE

   Before deleting log files, back up log directories and log files required by application startup. For example, if the default Nginx log directory **/var/log/nginx** is deleted, Nginx may fail to be started.

3. Delete historical records.

   echo > /root/.bash_history

   history -c

3 Creating a Private Image from a Cloud Server or a Backup

3.1 Overview

A private image contains an OS or service data, preinstalled public applications, and a user's personal applications. Private images are only available to the users who created them.

IMS provides multiple methods for creating private images.

Table 3-1 Creating a private image

Method	Description	Helpful Link
Creating a private image from a cloud server or a backup	If you already have an ECS on Huawei Cloud and configured it based on your service requirements (for example, by installing software or setting up an application environment), you can use this ECS to create a private image. A private image can be a system disk image, data disk image, or full-ECS image. • System disk image: contains an OS and application software from the system disk. • Data disk image: contains service data from data disks. • Full-ECS image: contains data of an entire ECS, that is, the OS and application software from the system disk and service data from data disks.	• **Creating a System Disk Image from an ECS**

Method	Description	Helpful Link
Creating a private image from an image file	You can import an image file from your local PC or other cloud platforms to Huawei Cloud IMS and register it as a private image. Then, you can use the image to create new ECSs or data disks, or change the OS for existing ECSs. This way, your services can be migrated to the cloud or in the cloud.	Overview

3.2 Creating a System Disk Image from an ECS

Scenarios

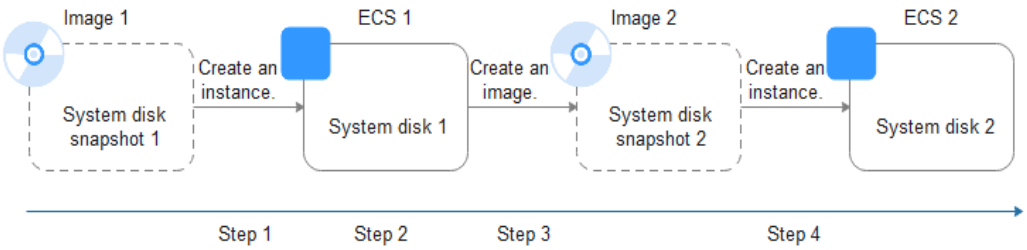
If you have created and configured an ECS based on your service requirements (for example, by installing software and setting up an application environment), you can use this ECS to create a system disk image. Then, all new ECSs created from this image will have the same software and environment preinstalled.

Creating a system disk image does not affect services on the cloud server or cause data loss.

Background

The following figure shows the process of creating a system disk image from a cloud server and using the image to create new cloud servers.

Figure 3-1 Creating a system disk image and using it to create new cloud servers



- System disk images are often used for application scale-out. They can also be used for hybrid cloud deployment. You can create system disk images for resource synchronization on and off cloud. The procedure is as follows:
  a. Create a system disk image from a cloud server.

NOTE

If the cloud server is created from any of the following images, the system disk image cannot be exported:

- ISO images
- Private images created from an Ubuntu or Windows public image

b. Export the image to an OBS bucket. For details, see **Exporting an Image**.

c. Download the image file from the OBS bucket.

- You can create an image from a running cloud server.

  The image creation does not affect services on the cloud server.

  In this process, do not stop, start, or restart the cloud server, or the image creation may fail.
- The time required for creating an image depends on the system disk size, network quality, and the number of concurrent tasks.
- A system disk image will be created in the same region as the cloud server that was used to create it.
- If a cloud server has expired or been released, you can use the system disk image created from the cloud server to restore it.

Constraints

The system disk capacity of the cloud server used to create a system disk image must be no greater than 1 TB.

If the capacity is greater than 1 TB for an ECS, you can only use it to create a full-ECS image.

Prerequisites

Before creating a private image from a cloud server:

- Delete any sensitive data the ECS may contain.
- Ensure that the ECS is in the **Running** or **Stopped** state.
- Complete all operations in **Windows Private Images** or **Linux Private Images** to configure the cloud server.
- If the cloud server is a BMS, understand the related constraints and prerequisites. For details, see **Creating a Private Image from a BMS**.

Procedure

Step 1 Access the IMS console.

1. Log in to the management console.
2. Under **Compute**, click **Image Management Service**.

   The IMS console is displayed.

Step 2 Create a system disk image.

1. Click **Create Image** in the upper right corner.
2. Set image parameters.

Table 3-2 and Table 3-3 list the parameters in the **Image Type and Source** and **Image Information** areas, respectively.

Table 3-2 Image type and source

Parameter	Description
Type	Select **System disk image**.
Source	Select a cloud server with required configurations.

Table 3-3 Image information

Parameter	Description
Encryption	This parameter specifies whether the image will be encrypted. The value is provided by the system and cannot be changed. – Only an unencrypted private image can be created from an unencrypted ECS. – Only an encrypted private image can be created from an encrypted ECS.
Name	Set a name for the image.
Enterprise Project	Select an enterprise project from the drop-down list. This parameter is available only if you have enabled enterprise projects or your account is an enterprise account. To enable this function, contact your customer manager. An enterprise project provides central management of cloud resources on a project.
Tag	(Optional) Set a tag key and a tag value for the image to make identification and management of your images easier.
Description	(Optional) Describe the image.

3. Read and agree to the disclaimer, and click **Next**.
4. Confirm the settings and click **Submit**.

Step 3 Go back to the **Private Images** page and view the new system disk image.

The time required for creating an image depends on the ECS system disk size, network quality, and the number of concurrent tasks. When the image status changes to **Normal**, the image creation is complete.

NOTE

- Do not perform any operations on the selected ECS or its associated resources during image creation.
- A cloud server created from an encrypted image is also encrypted. The key used for encrypting the cloud server is the same as that used for encrypting the image.
- An image created from an encrypted cloud server is also encrypted. The key used for encrypting the image is the same as that used for encrypting the cloud server.

----End

Follow-up Procedure

After a system disk image is created, you can:

- Use the image to create new cloud servers. For details, see **Creating an ECS from an Image**.
- Use the image to change the OSs of existing cloud servers. For details, see **Changing the OS**.

3.3 Creating a Data Disk Image from an ECS

Scenarios

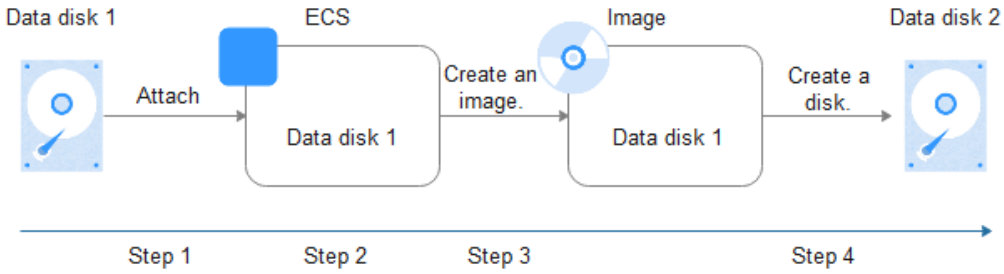
A data disk image contains only service data. You can create a data disk image from an ECS and then use the image to create new EVS disks. This is a convenient way to migrate data from an ECS to EVS disks.

For example, you can create a data disk image to clone the data of an ECS whose disk is about to expire.

Background

The following figure shows the process of creating a data disk image from an ECS.

Figure 3-2 Creating a data disk image and using it to create data disks



Prerequisites

- A data disk has been attached to the ECS. For details, see *Elastic Cloud Server User Guide*.
- The ECS status is **Running** or **Stopped**.

Constraints

- The data disk capacity of the cloud server must be no greater than 1 TB.
- If the capacity is greater than 1 TB for an ECS, you can only use it to create a full-ECS image.

Procedure

Step 1 Access the IMS console.

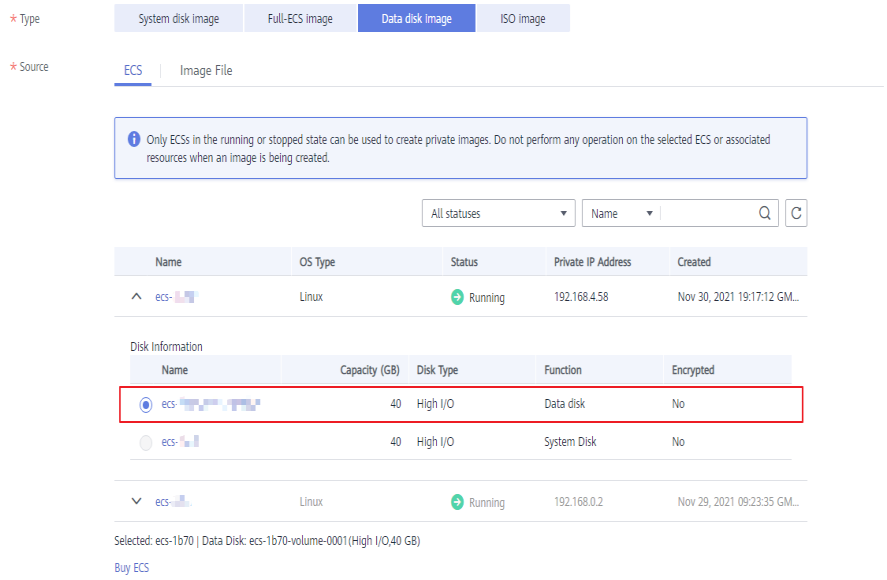
1. Log in to the management console.
2. Under **Compute**, click **Image Management Service**.

   The IMS console is displayed.

Step 2 Create a data disk image.

1. Click **Create Image** in the upper right corner.
2. In the **Image Type and Source** area, select **Data disk image** for **Type**.
3. Select **ECS** for **Source** and then select a data disk of the ECS.

   Figure 3-3 Creating a data disk image



4. In the **Image Information** area, set **Name**, **Tag**, and **Description**, and select an enterprise project.

   If the data disk is not encrypted, the private image created from it is also not encrypted. The encryption attribute cannot be changed during image creation. After the image is created, you can change its encryption attribute based on **Replicating Images Within a Region**.
5. Click **Next**.
6. Confirm the settings. Read the image disclaimer and select **I have read and agree to the Image Disclaimer**, and click **Submit**.

   The private image list is displayed. Wait until the data disk image is created successfully.

Step 3 Go back to the **Private Images** page and view the new data disk image.

----End

Follow-up Procedure

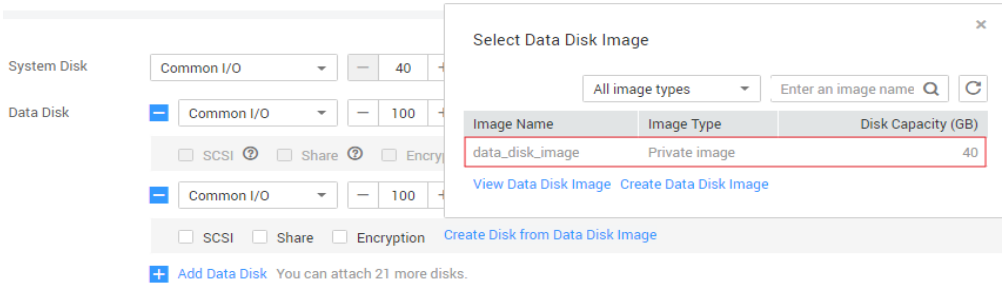
If you want to use the created data disk image to create an EVS disk and attach it to an ECS, you can perform either of the following operations:

- Locate the row that contains the created data disk image and click **Create Data Disk** to create one or multiple data disks. Then attach the data disks to an ECS.
- On the page for creating ECSs, click **Create Disk from Data Disk Image** and select the data disk image.

  NOTE

  In this way, a data disk image can be used to create a data disk for an ECS only once. For example, a data disk created from data disk image **data_disk_image** has been added to the ECS. No any other data disk created from this image can be added to the ECS.

Figure 3-4 Adding data disks



3.4 Creating a Full-ECS Image from an ECS

Scenarios

You can create an image of an entire ECS, including not just the OS, but also the software and all the service data. You can then use this image to migrate data by quickly provisioning exact clones of the original ECS.

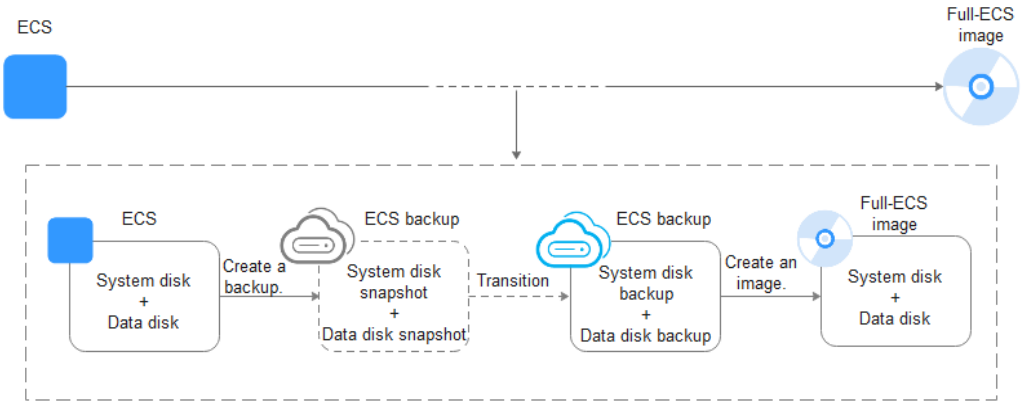
NOTE

This section does not apply to a BMS.

Background

The following figure shows the process of creating an image from an entire ECS, with both the system and data disks included.

Figure 3-5 Creating a full-ECS image from an ECS



- The time required for creating a full-ECS image depends on the disk size, network quality, and the number of concurrent tasks.
- The ECS used to create a full-ECS image must be in **Running** or **Stopped** state. To create a full-ECS image containing a database, use a stopped ECS.
- If an ECS is in **Stopped** state, do not start it when you are using it to create a full-ECS image.
- When a full-ECS image is being created from an ECS, do not perform any operations on the ECS, or the image creation may fail.
- In **Figure 3-5**, if there are snapshots of the system disk and data disks but the ECS backup creation is not complete, the full-ECS image you create will only be available in the AZ where the source ECS is and can only be used to provision ECSs in this AZ. You cannot provision ECSs in other AZs in the region until the original ECS is fully backed up and the full-ECS image is in the **Normal** state.
- If you use a full-ECS image to change an ECS OS, only the system disk data can be written into the ECS. Therefore, if you want to restore or migrate the data disk data of an ECS by using a full-ECS image, you can only use the image to create a new ECS rather than use it to change the ECS OS.

Constraints

- When creating a full-ECS image from an ECS, ensure that the ECS has been properly configured, or the image creation may fail.

  For details, see
- A Linux ECS used to create a full-ECS image cannot have a disk group or logical disk that contains multiple physical disks, or data may be lost when ECSs are created from that image.
- An ECS used to create a full-ECS image cannot contain a Dedicated Distributed Storage Service (DSS) disk.
- A full-ECS image cannot be exported.
- A full-ECS image cannot be replicated within a region.
- Cross-region replication of full-ECS images is only available for certain regions.

If a full-ECS image cannot be replicated to a different region, you can use it to create an ECS, use the ECS to create a system disk image and a data disk image, and replicate the images to the destination region.

A full-ECS image created using an ECS backup can be replicated from the region where they reside to another region, but the replicated full-ECS image cannot be replicated across regions again.

- When creating a full-ECS image from a Windows ECS, you need to change the SAN policy of the ECS to OnlineAll. Otherwise, EVS disks attached to the ECSs created from the image may be offline.

  Windows has three types of SAN policies: **OnlineAll**, **OfflineShared**, and **OfflineInternal**.

- **Table 3-4** SAN policies in Windows

Type	Description
OnlineAll	All newly detected disks are automatically brought online.
OfflineShared	All disks on sharable buses, such as iSCSI and FC, are left offline by default, while disks on non-sharable buses are kept online.
OfflineInternal	All newly detected disks are left offline.

a. Execute **cmd.exe** and run the following command to query the current SAN policy of the ECS:

   diskpart

b. Run the following command to view the SAN policy of the ECS:

   san

   - If the SAN policy is **OnlineAll**, run the **exit** command to exit DiskPart.
   - If the SAN policy is not **OnlineAll**, go to **c**.

c. Run the following command to change the SAN policy of the ECS to **OnlineAll**:

   san policy=onlineall

Procedure

Step 1 Access the IMS console.

1. Log in to the management console.
2. Under **Compute**, click **Image Management Service**.

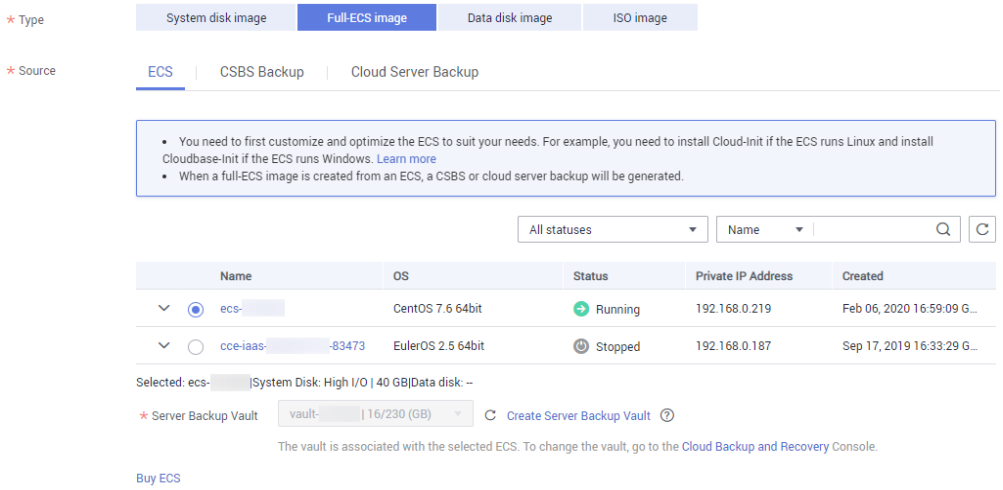
   The IMS console is displayed.

Step 2 Create a full-ECS image.

1. Click **Create Image** in the upper right corner.
2. In the **Image Type and Source** area, select **Full-ECS image** for **Type**.

3. Select **ECS** for **Source** and then select an ECS from the list.

Figure 3-6 Creating a full-ECS image using an ECS



4. Specify **Server Backup Vault** to store backups.

   The created full-ECS image and backup are stored in the server backup vault.

   If no server backup vault is available, click **Create Server Backup Vault** to create one. Ensure that you select **Backup** for **Protection Type**. For more information about CBR backups and vaults, see **What Is CBR?**

5. In the **Image Information** area, configure basic image details, such as the image name and description.
6. Click **Next**.
7. Confirm the settings. Read the image disclaimer and select **I have read and agree to the Image Disclaimer**, and click **Submit**.

Step 3 Go back to the **Private Images** page and view the new full-ECS image.

- When the image status changes to **Normal**, the image creation is complete.
- If **Available in AZ***X* is displayed under **Normal** in the **Status** column for a full-ECS image, the backup for this ECS has not been created and only a disk snapshot is created. (**AZ***X* indicates the AZ where the source ECS of the image resides.)

  In this case, the full-ECS image can be used to provision ECSs only in the specified AZ. If you want to use this image to provision ECSs in other AZs of the region, you need to wait until **Available in AZ***X* disappears from under **Normal**, which indicates that the ECS backup has been successfully created. This process takes about 10 minutes, depending on the data volume of the source ECS.

----End

Follow-up Procedure

- If you want to use the full-ECS image to create ECSs, click **Apply for Server** in the **Operation** column. On the displayed page, create ECSs by following the instructions in *Elastic Cloud Server User Guide*.

NOTE

When you use a full-ECS image to create an ECS:

- The system and data disk information defaulted by the image will be automatically displayed.
- If the full-ECS image contains multiple data disks, it takes some time to load and display the disk information.

- If you use a full-ECS image to change an ECS OS, only the system disk data can be written into the ECS. Therefore, if you want to restore or migrate the data disk data of an ECS by using a full-ECS image, you can only use the image to create a new ECS rather than use it to change the ECS OS.
- If you want to share the full-ECS image with other tenants, you can use either of the following methods:
  - If the ECS the full-ECS image was created from has a CSBS backup, you must first migrate the backup to CBR before you share the image because CSBS is being deprecated.
  - If the ECS has no such a backup, you can share the full-ECS image directly.

3.5 Creating a Full-ECS Image from a CSBS Backup

Scenarios

Create a full-ECS image from a CSBS backup. This image can then be used to create ECSs.

Background

- If you use a CSBS backup to create a full-ECS image, you will only be charged for the CSBS backup. For detailed service pricing, see **Cloud Server Backup Service** in **Product Pricing Details**.
- When deleting a full-ECS image, you can choose whether to delete the associated CSBS backup. If you choose not to delete the CSBS backup, you will continue to be charged for it.
- If you use a full-ECS image to change an ECS OS, only the system disk data can be written into the ECS. Therefore, if you want to restore or migrate the data disk data of an ECS by using a full-ECS image, you can only use the image to create a new ECS rather than use it to change the ECS OS.

Constraints

- When creating a full-ECS image from a CSBS backup, ensure that the source ECS of the CSBS backup has been properly configured, or the image creation may fail.

  For details, see
- If an ECS is in **Stopped** state, do not start it when you are using it to create a full-ECS image.
- A CSBS backup used to create a full-ECS image cannot have shared disks.
- Only an available CSBS backup can be used to create a full-ECS image. A CSBS backup can be used to create only one full-ECS image.

- A full-ECS image cannot be exported.
- A full-ECS image cannot be replicated within a region.
- Cross-region replication of full-ECS images is only available for certain regions.

  If a full-ECS image cannot be replicated to a different region, you can use it to create an ECS, use the ECS to create a system disk image and a data disk image, and replicate the images to the destination region.

  A full-ECS image created using an ECS backup can be replicated from the region where they reside to another region, but the replicated full-ECS image cannot be replicated across regions again.

Procedure

Step 1 Access the IMS console.

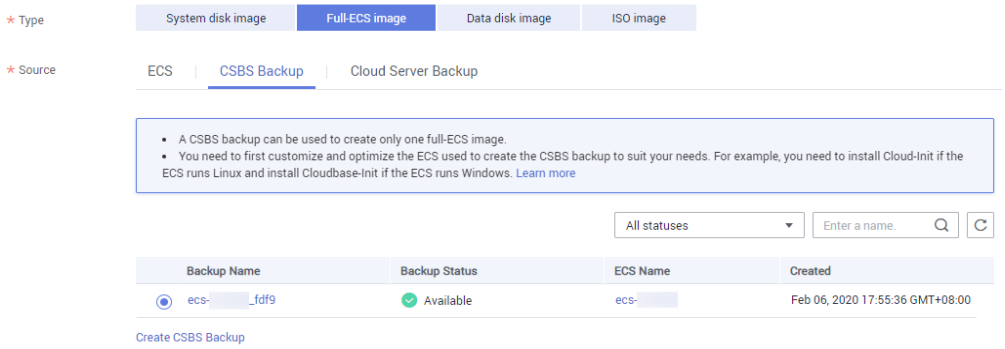
1. Log in to the management console.
2. Under **Compute**, click **Image Management Service**.

   The IMS console is displayed.

Step 2 Create a full-ECS image.

1. Click **Create Image** in the upper right corner.
2. In the **Image Type and Source** area, select **Full-ECS image** for **Type**.
3. Select **CSBS Backup** for **Source** and then select a backup from the list.

   Figure 3-7 Creating a full-ECS image using a CSBS backup



4. In the **Image Information** area, configure basic image details, such as the image name and description.
5. Click **Next**.
6. Confirm the settings. Read the image disclaimer and select **I have read and agree to the Image Disclaimer**, and click **Submit**.

Step 3 Switch back to the **Image Management Service** page to monitor the image status.

When the image status changes to **Normal**, the image creation is complete.

----End

Follow-up Procedure

- If you want to use the full-ECS image to create ECSs, click **Apply for Server** in the **Operation** column. On the displayed page, create ECSs by following the instructions in *Elastic Cloud Server User Guide*.

  NOTE

  When you use a full-ECS image to create an ECS:

  - The system and data disk information defaulted by the image will be automatically displayed.
  - If the full-ECS image contains multiple data disks, it takes some time to load and display the disk information.
- If you use a full-ECS image to change an ECS OS, only the system disk data can be written into the ECS. Therefore, if you want to restore or migrate the data disk data of an ECS by using a full-ECS image, you can only use the image to create a new ECS rather than use it to change the ECS OS.
- If you want to share a full-ECS image with other tenants, you must migrate the associated backup to CBR first because only full-ECS images created from CBR backups can be shared.

3.6 Creating a Full-ECS Image from a CBR Backup

Scenarios

You can use a Cloud Backup and Recovery (CBR) backup to create a full-ECS image, which can be used to create ECSs.

Background

- CBR provides the backup service for EVS disks, BMSs, and ECSs. If you have created a backup for an ECS using CBR, you can use the backup to create a full-ECS image.
- If you use a CBR backup to create a full-ECS image, you will only be charged for the CBR backup. For pricing details, see "Cloud Backup and Recovery" in **Product Pricing Details**.
- When deleting a full-ECS image, you can choose whether to delete the associated CBR backup. If you choose not to delete the CBR backup, you will continue to be charged for it.
- If you use a full-ECS image to change an ECS OS, only the system disk data can be written into the ECS. Therefore, if you want to restore or migrate the data disk data of an ECS by using a full-ECS image, you can only use the image to create a new ECS rather than use it to change the ECS OS.

Constraints

- When creating a full-ECS image from a CBR backup, ensure that the source ECS of the CBR backup has been properly configured, or the image creation may fail.

  For details, see
- A CBR backup can be used to create only one full-ECS image.

- If an ECS is in **Stopped** state, do not start it when you are using it to create a full-ECS image.
- A full-ECS image created from a CBR backup can be shared with other tenants. However, if it is a shared CBR backup, the full-ECS image created from it cannot be shared.
- A full-ECS image cannot be exported.
- A full-ECS image cannot be replicated within a region.
- Cross-region replication of full-ECS images is only available for certain regions.

  If a full-ECS image cannot be replicated to a different region, you can use it to create an ECS, use the ECS to create a system disk image and a data disk image, and replicate the images to the destination region.

  A full-ECS image created using an ECS backup can be replicated from the region where they reside to another region, but the replicated full-ECS image cannot be replicated across regions again.

Procedure

Step 1 Access the IMS console.

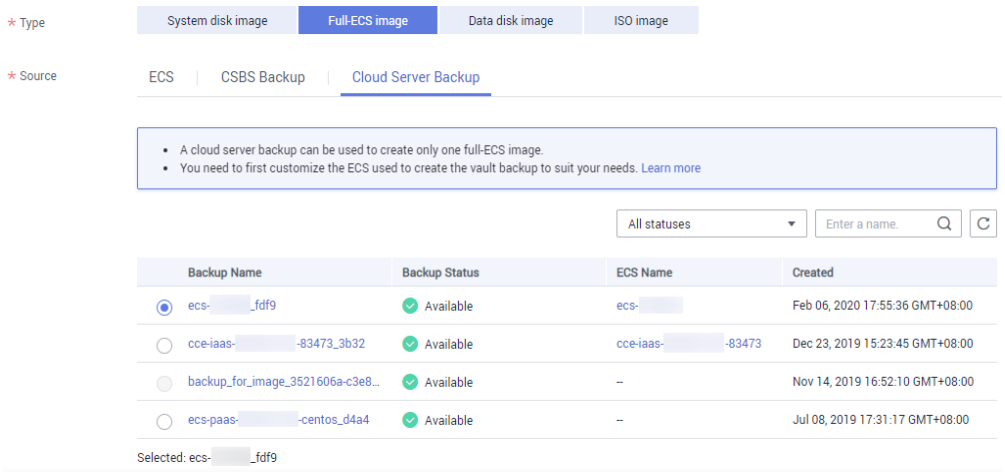
1. Log in to the management console.
2. Under **Compute**, click **Image Management Service**.

   The IMS console is displayed.

Step 2 Create a full-ECS image.

1. Click **Create Image** in the upper right corner.
2. In the **Image Type and Source** area, select **Full-ECS image** for **Type**.
3. Select **Cloud Server Backup** for **Source** and then select a CBR backup from the list.

   Figure 3-8 Creating a full-ECS image using a CBR backup



4. In the **Image Information** area, configure basic image details, such as the image name and description.
5. Click **Next**.

6. Confirm the settings. Read the image disclaimer and select **I have read and agree to the Image Disclaimer**, and click **Submit**.

Step 3 Switch back to the **Image Management Service** page to monitor the image status.

When the image status changes to **Normal**, the image creation is complete.

----End

Follow-up Procedure

After the full-ECS image creation is complete, you can perform the following operations:

- If you want to use the image to create ECSs, click **Apply for Server** in the **Operation** column. On the displayed page, select **Private image** and then select the full-ECS image. For details, see **Purchasing an ECS in Custom Config Mode**.

  NOTE

  When you use a full-ECS image to create an ECS:
  - The system and data disk information defaulted by the image will be automatically displayed.
  - If the full-ECS image contains multiple data disks, it takes some time to load and display the disk information.
- If you want to share the image with other tenants, click **More** in the **Operation** column and select **Share** from the drop-down list. In the displayed dialog box, enter the project IDs of the image recipients. For details, see **Sharing Specified Images**.
- If you use a full-ECS image to change an ECS OS, only the system disk data can be written into the ECS. Therefore, if you want to restore or migrate the data disk data of an ECS by using a full-ECS image, you can only use the image to create a new ECS rather than use it to change the ECS OS.

3.7 Creating a System Disk Image from a BMS

You can use either of the following methods to create a BMS private image:

- **Creating a Private Image from a BMS**
- **Creating a Private Image from an External Image File**

4 Creating a Private Image from an Image File

4.1 Overview

A private image contains an OS or service data, preinstalled public applications, and a user's personal applications. Private images are only available to the users who created them.

You can import an image file from your local PC or other cloud platforms to Huawei Cloud IMS and register it as a private image. Then, you can use the image to create new cloud servers or data disks, or change the OS for existing cloud servers. This way, your services can be migrated to the cloud or in the cloud.

The methods for creating a private image from an image file vary depending on the image file format and size.

Table 4-1 Overview

Image File Format	Image File Size	Helpful Link
VMDK, VHD, QCOW2, VHDX, QED, VDI, QCOW, or ZVHD	No larger than 128 GB	• **Creating a System Disk Image from an Image File** • **Creating a Data Disk Image from an Image File**
RAW or ZVHD2	No larger than 1 TB	• **Fast Import of an Image File** • **Creating a Data Disk Image from an Image File**
ISO	No larger than 128 GB	• **Creating a Windows System Disk Image from an ISO File** • **Creating a Linux System Disk Image from an ISO File**

You can also create a private image from a cloud server or a backup. For details, see **Overview**.

4.2 Creating a System Disk Image from an Image File

You can import a system disk image file from your local PC or other cloud and register the image file as a private image. Then, you can use this image to create ECSs or reinstall the OSs for existing ECSs.

Constraints

- The image file format can be VMDK, VHD, QCOW2, RAW, VHDX, QED, VDI, QCOW, ZVHD2, or ZVHD.
- The image file size cannot exceed 128 GB.

  If an image file is between 128 GB and 1 TB, convert it into RAW or ZVHD2 and import it using fast import.

  - For details about how to convert the image file format, see **Converting the Image Format Using qemu-img-hw**.
  - For details about fast import, see **Fast Import of an Image File**.
- For details about the supported OS versions, see **External Image File Formats and Supported OSs**. These OSs support automatic configuration. For details, see **What Will the System Do to an Image File When I Use the File to Register a Private Image?** For other OSs, check and install drivers by yourself. For Windows, see **Installing PV Drivers** and **Installing VirtIO Drivers**.

  For Linux, see **Installing Native Xen and KVM Drivers on a Xen ECS**. When you register an image file as a private image, select **Other Windows** or **Other Linux**. The OS can start up normally only after all the required drivers are installed.
- The OS cannot be bound to specific hardware.
- The OS must support full virtualization.
- Currently, images with data disks cannot be created. The image file must contain only a system disk, and the system disk size must be [40 GB, 1024 GB].
- The initial password in the image file must contain uppercase letters, lowercase letters, digits, and special characters (!@$%^-_=+[{}]:,./?).
- The boot partition and system partition must be on the same disk.
- The image file must contain a valid tenant administrator account and password.
- If you use an image file to create a Windows system disk image and then use the image to create a cloud server, you cannot log in to the cloud server using a key pair or obtain the password from the key pair.
- Supported boot modes:

  Some x86 OS images support the UEFI boot mode. (For details, see **OSs Supporting UEFI Boot Mode**.)

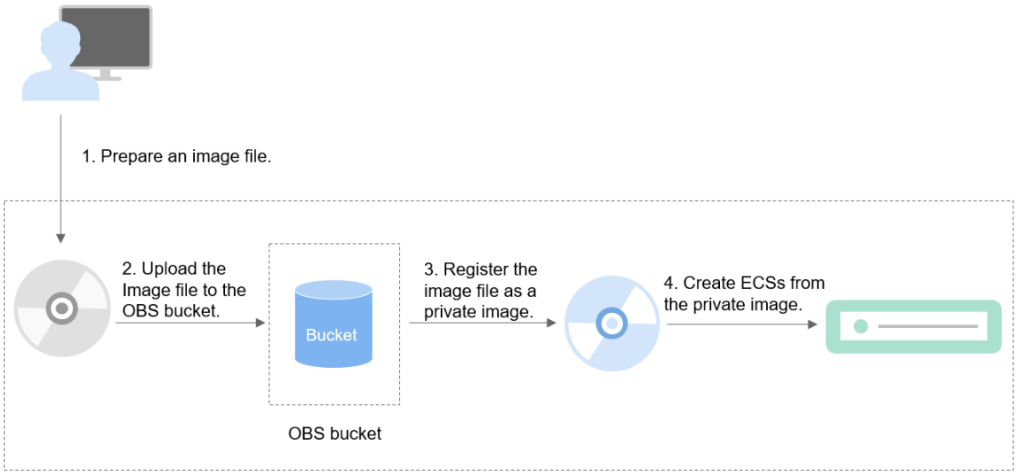
  Arm OS images support only the UEFI boot mode.
- The image file cannot be encrypted, or cloud servers created from the registered image may not work properly.

- A VMDK image file must be generated from a VM created in VMware Tools. Otherwise, the system may fail to start due to image parsing problems.

Process

Figure 4-1 shows the process of creating a private image.

Figure 4-1 Creating a system disk image



The steps are as follows:

1. Prepare an image file that meets the cloud platform requirements. For details, see **Prepare an Image File**.
2. Upload the image file to your OBS bucket. For details, see **Upload an Image File**.
3. On the management console, select the uploaded image file and register it as a private image. For details, see **Register an Image File as a Private Image**.
4. After the private image is registered, you can use it to create ECSs. For details, see **Create an ECS from an Image**.

Prepare an Image File

Before preparing an image file, you need to understand the constraints in this section.

The initial configuration mentioned in **Preparations for Creating a Private Image** must be completed on the source VM before an image file is exported from it.

If you did not configure it, use the image file to create an ECS, configure the ECS, and use the ECS to create a private image. For details, see **What Do I Do If a Windows Image File Is Not Pre-Configured When I Use It to Register a Private Image?**

Upload an Image File

You are advised to use OBS Browser+ to upload external image files to OBS buckets.

NOTE

- Only unencrypted external image files or those encrypted using SSE-KMS can be uploaded to an OBS bucket.
- The storage class of the OBS bucket must be Standard.
- If you want to create a data disk image along with the system disk image, you also need to upload an image file containing data disks to the OBS bucket. You can create one system disk image and no more than three data disk images.

Register an Image File as a Private Image

Step 1 Access the IMS console.

1. Log in to the management console.
2. Under **Compute**, click **Image Management Service**.

   The IMS console is displayed.

Step 2 Register an external image file as a private image.

1. Click **Create Image** in the upper right corner.
2. Set image parameters.

   Table 4-2 and **Table 4-3** list the parameters in the **Image Type and Source** and **Image Information** areas, respectively.

Table 4-2 Image type and source

Parameter	Description
Type	Select **System disk image**.
Source	Select **Image File** for **Source**. Select the bucket storing the image file from the list and then select the image file.
Enable Fast Create	This parameter is available only when you select a ZVHD2 or RAW image file. This function enables fast image creation and supports import of large files (maximum: 1 TB) as long as the files to be uploaded are converted to ZVHD2 or RAW format and optimized. If you have a file that meets the requirements, select **Enable Fast Create** and select the confirmation information following **Image File Preparation**. **NOTE** To learn how to convert image file formats and generate bitmap files, see **Fast Import of an Image File**.

Table 4-3 Image information

Parameter	Description
Enable automatic configuration	If you select this option, the system will automatically check and optimize the image file. For details, see **What Will the System Do to an Image File When I Use the File to Register a Private Image?**
Function	Specifies whether the image is used to create ECSs or BMSs. The value can be **ECS system disk image** or **BMS system disk image**. This section uses **ECS system disk image** as an example.
Architecture	The value can be **x86** or **ARM**. – If the system identifies that the architecture in the image file is different from what you set here, the identified architecture prevails. – If the system fails to identify an architecture, the architecture you set will be used.
Boot Mode	This parameter is optional. The value can be **BIOS** or **UEFI**. For details about the differences between them, see **How Is BIOS Different from UEFI?** For details about which OSs support UEFI boot, see **OSs supporting UEFI Boot Mode**. The boot mode must be the same as that in the image file. You need to confirm which boot mode is used in the image file. After you select the right boot mode, the boot mode will be configured for the image at the background. Select the right boot mode, or ECSs created using the image will not be able to boot up.
OS	To ensure that the image can be created and used properly, select an OS consistent with that in the image file. If you do not select an OS, the system attempts to automatically identify the OS in the image file. **NOTE** – If the system identifies that the OS in the image file is different from the one you select here, the identified OS prevails. – If the system fails to identify an OS, the OS you select will be used. – If the OS you selected or identified by the system is inconsistent with the actual one, ECSs created from the image file may not work properly.

Parameter	Description
System Disk (GB)	The system disk capacity (value range: 40 GB to 1024 GB). Ensure that this value is not less than the system disk capacity in the image file. **NOTE** If the uploaded VHD image is generated using qemu-img or similar tools, check the system disk capacity based on **What Do I Do If the System Disk Capacity in a VHD Image File Exceeds the One I Have Specified on the Management Console When I Use This File to Register a Private Image?**
Data Disk (GB)	You can also add data disks to the image. You need to obtain an image file containing data disks in advance. This function is used to migrate VMs and data disks from other platforms to the current platform. To add data disks, click ⊕, configure the data disk capacity, and click **Select Image File**. In the displayed dialog box, select the target bucket and then the target image file containing the data disk. A maximum of three data disks can be added.
Name	Set a name for the image.
Encryption	(Optional) If you want to encrypt the image, select **KMS encryption** and select the key to be used from the key list. After you select **KMS encryption**, the system will create a default key **ims/default** for you. You can also select a key from the key list. For how to encrypt an image, see **Introduction**.
Enterprise Project	Select an enterprise project from the drop-down list. This parameter is available only if you have enabled enterprise projects or your account is an enterprise account. An enterprise project provides central management of cloud resources on a project by project basis.
Tag	(Optional) Set a tag key and a tag value for the image to make identification and management of your images easier.
Description	(Optional) Describe the image.

3. Click **Next** and confirm the image specifications. Read and agree to the disclaimer and click **Submit**.

Step 3 Go back to the **Private Images** page. The image is successfully registered when its status becomes **Normal**.

If you add data disks during image creation, a system disk image and data disk images will be generated. The number of data disk images depends on the number of data disks you add (a maximum of 3).

NOTE

The time required for image registration is determined by the image file size. You may need to wait a long period of time for the image file to be successfully registered as a private image.

----End

Create an ECS from an Image

Create an ECS by referring to **Creating an ECS from an Image**.

Note the following when setting the parameters:

- **Region**: Select the region where the private image is located.
- **Specifications**: Select a flavor based on the OS type in the image and the OS versions described in **OSs Supported for Different Types of ECSs**.
- **Image**: Select **Private image** and then the created image from the drop-down list.
- (Optional) **Data Disk**: Add data disks. These data disks are created from a data disk image generated together with a system disk image. In this way, you can migrate the data of data disks together with system disk data from the VM on the original platform to the current cloud platform.

Follow-up Procedure

After a system disk image is created, you can use it to change the OS of an ECS. For details, see **Changing the OS**.

4.3 Creating a Data Disk Image from an Image File

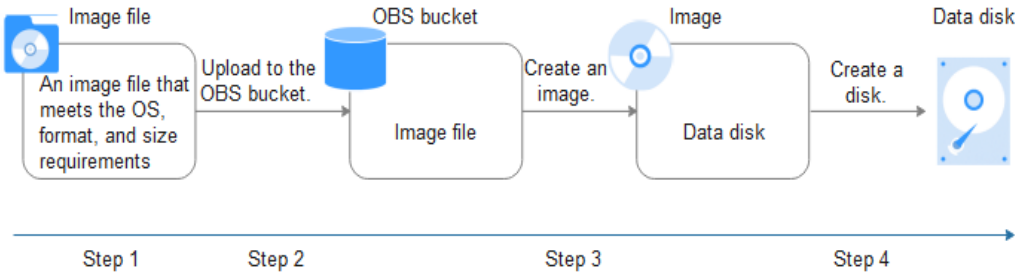
Scenarios

A data disk image contains only service data. You can create a data disk image using a local image file or an external image file (image file on another cloud platform). Then, you can use the data disk image to create EVS disks and migrate your service data to the cloud.

Background

The following figure shows the process of creating a data disk image from an external image file.

Figure 4-2 Creating a data disk image from an external image file



1. Prepare an external image file. The file must be in VHD, VMDK, QCOW2, RAW, VHDX, QCOW, VDI, QED, ZVHD, or ZVHD2 format. If you want to use an image file in other formats, convert the file into any of the listed formats before importing it to the cloud platform.

   For details about image file format conversion, see **Converting the Image Format Using qemu-img** or **Converting the Image Format Using qemu-img-hw**.
2. When uploading the external image file, you must select an OBS bucket with standard storage. For details, see **Upload an Image File**.
3. Create a data disk image. For details, see **Procedure**.
4. Use the data disk image to create data disks. For details, see **Follow-up Procedure**.

Procedure

Step 1 Access the IMS console.

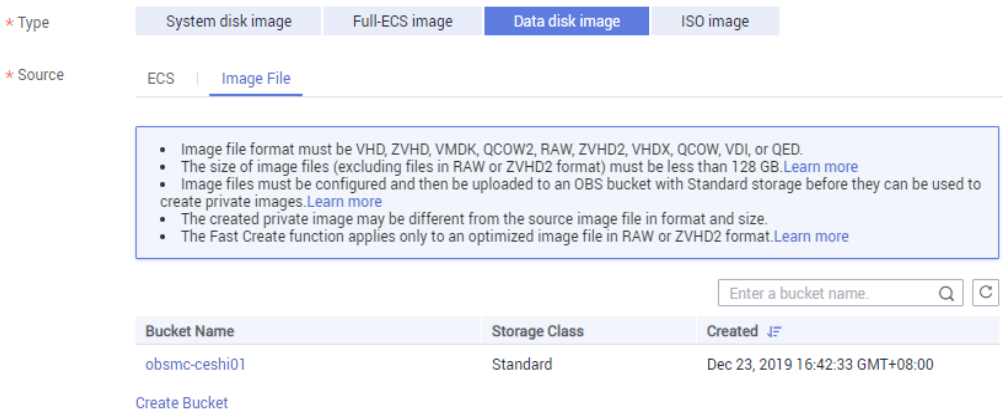
1. Log in to the management console.
2. Under **Compute**, click **Image Management Service**.

   The IMS console is displayed.

Step 2 Create a data disk image.

1. Click **Create Image** in the upper right corner.
2. In the **Image Type and Source** area, select **Data disk image** for **Type**.
3. Select **Image File** for **Source**. Select the bucket storing the image file from the list and then select the image file.

   Figure 4-3 Creating a data disk image from an external image file



4. To register the image file using Fast Create, select **Enable Fast Create**.

   NOTE

   - Currently, fast import is only available for ZVHD2 and RAW image files.
   - For how to convert image file formats and generate bitmap files, see **Fast Import of an Image File**.

   After you select **Enable Fast Create**, select the confirmation information following **Image File Preparation** if you have prepared the required files.

5. In the **Image Information** area, set the following parameters.
   - **OS Type**: The value is **Linux**.
   - **Data Disk**: The value ranges from 40 GB to 2048 GB and must be no less than the data disk capacity in the image file.
   - **Name**: Enter a name for the image.
   - (Optional) **Encryption**: If you want to encrypt the image, select **KMS encryption** and then select the key to be used from the key list.
   - **Enterprise Project**: Select an enterprise project from the drop-down list. This parameter is available only if you have enabled enterprise projects or your account is an enterprise account. To enable this function, contact your customer manager. An enterprise project provides central management of cloud resources on a project.
   - (Optional) **Tag**: Set a tag key and a tag value for the image to easily identify and manage it.
   - (Optional) **Description**: Describe the image.
6. Click **Next**.
7. Confirm the settings. Read the image disclaimer and select **I have read and agree to the Image Disclaimer**, and click **Submit**.

Step 3 Go back to the **Private Images** page and view the new data disk image.

When the image status changes to **Normal**, the image creation is complete.

----End

Follow-up Procedure

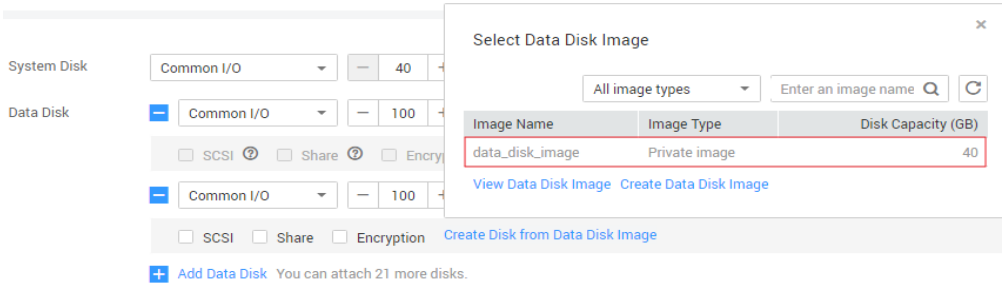
If you want to use the created data disk image to create an EVS disk and attach it to an ECS, you can perform either of the following operations:

- Locate the row that contains the created data disk image and click **Create Data Disk** to create one or multiple data disks. Then attach the data disks to an ECS.
- On the page for creating ECSs, click **Create Disk from Data Disk Image** and select the data disk image.

  NOTE

  In this way, a data disk image can be used to create a data disk for an ECS only once. For example, a data disk created from data disk image **data_disk_image** has been added to the ECS. No any other data disk created from this image can be added to the ECS.

Figure 4-4 Adding data disks



4.4 Creating a Windows System Disk Image from an ISO File

4.4.1 Overview

An ISO file is a disk image of an optical disc. A large number of data files can be compressed into a single ISO file. Likewise, to access the files stored in an ISO, the ISO file needs to be decompressed. For example, you can use a virtual CD-ROM to open an ISO file, or burn the ISO file to a CD or DVD and then use the CD-ROM to read the image.

This section describes how to create a Windows system disk image from an ISO file.

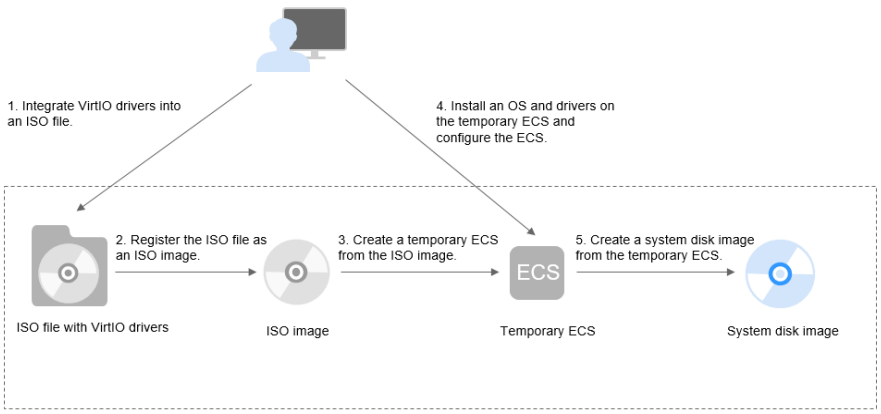
NOTE

This section is applicable only to the management console. If you are an API user, see **Creating an Image from an ISO File**.

Creation Process

Figure 4-5 shows the process of creating a Windows system disk image from an ISO file.

Figure 4-5 Creating a Windows system disk image



The procedure is as follows:

1. Integrate VirtIO drivers into the ISO file.

   Windows uses Integrated Drive Electronics (IDE) disks and VirtIO NICs. Before registering an image on the cloud platform, integrate VirtIO drivers into the Windows ISO file. For details, see **Integrating VirtIO Drivers into an ISO File**.
2. Register the ISO file as an ISO image.

On the management console, register the ISO file with VirtIO drivers as an image. The image is an ISO image and cannot be used to provision ECSs. For details, see **Registering a Windows ISO File as a Private Image**.

3. Create a temporary ECS from the ISO image.

   Use the registered ISO image to create a temporary ECS. The ECS has no OS or driver installed. For details, see **Creating a Windows ECS from an ISO Image**.

4. Install an OS and necessary drivers for the temporary ECS and configure related settings.

   You need to install an OS, PV drivers, and VirtIO drivers, and configure NICs. For details, see **Installing a Windows OS and VirtIO Drivers** and **Step 1** in **Configuring the ECS and Creating a Windows System Disk Image**.

5. Create a system disk image from the temporary ECS.

   On the management console, create a system disk image from the temporary ECS on which the installation and configuration have been completed. After the image is created, delete the temporary ECS to avoid generating any additional charges. For details, see **Creating a System Disk Image from an ECS**.

Constraints

- An ISO image created from an ISO file is used only for creating a temporary ECS. It will not be available on the ECS console. You cannot use it to create ECSs or change ECS OSs. You need to install an OS on the temporary ECS and use that ECS to create a system disk image which can be used to create ECSs or change ECS OSs.
- A temporary ECS has limited functionality. For example, you cannot attach disks to it. You are not advised to use it as a normal ECS.

4.4.2 Integrating VirtIO Drivers into an ISO File

Scenarios

Windows uses IDE disks and VirtIO NICs. Before registering an image on the cloud platform, integrate VirtIO drivers into the Windows ISO file. Typically, an ISO file contains all the files that would be included on an optical disc. Some software can be installed only from a CD-ROM drive. So, a virtual CD-ROM drive is required.

This section uses AnyBurn and UltraISO as examples to describe how to integrate VirtIO drivers into an ISO file.

NOTE

- AnyBurn is lightweight CD/DVD/Blu-ray burning software with a free version.
- UltraISO is an ISO CD/DVD image file handling tool. A free trial version is limited to ISO files of 300 MB or less. You are advised to buy a standard version.
- VirtIO is a standard interface for VMs to access host devices. It is used to improve the I/O performance between VMs and hosts. For details about VirtIO, see **VirtIO**. For details about open source code of virtio-win/kvm-guest-drivers-windows, see **https://github.com/virtio-win/kvm-guest-drivers-windows**.

Prerequisites

You have obtained an ISO file.

NOTE

The ISO file name can contain only letters, digits, hyphens (-), and underscores (_).

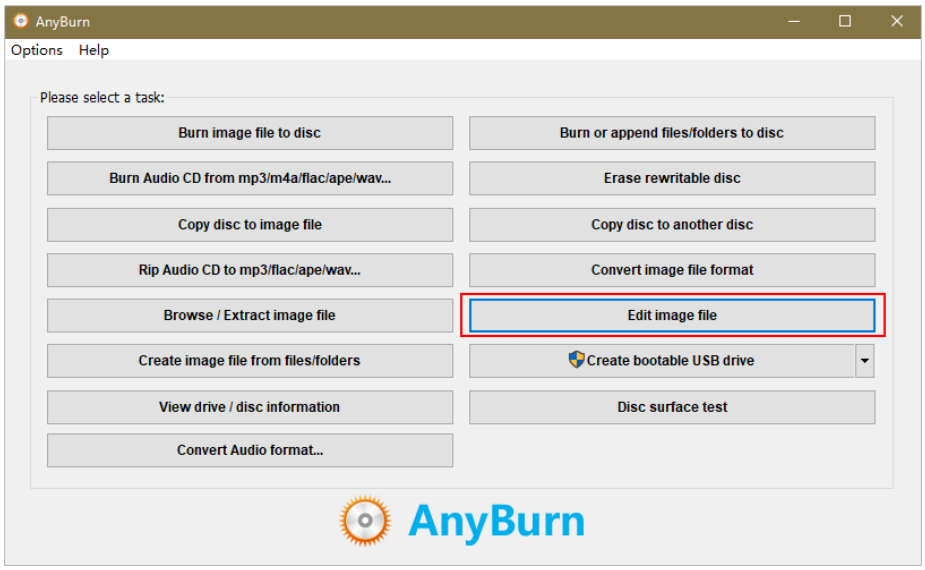
AnyBurn

1. Download **AnyBurn** and install it on your local PC.
2. Download VirtIO drivers.

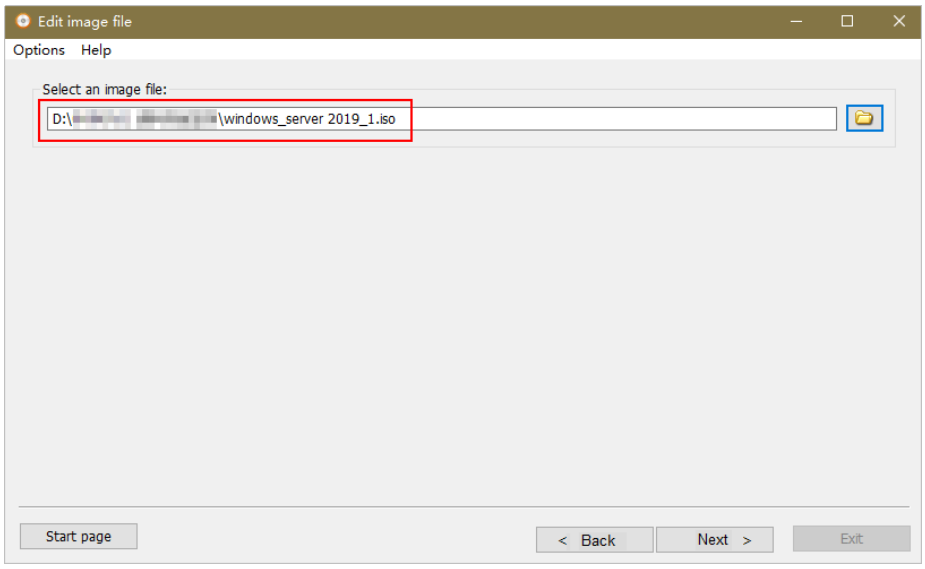
   https://fedorapeople.org/groups/virt/virtio-win/direct-downloads/stable-virtio/virtio-win.iso

   Other versions:

   https://fedorapeople.org/groups/virt/virtio-win/direct-downloads/archive-virtio/
3. Use AnyBurn to open the ISO file.
   a. Open AnyBurn and select **Edit Image File**.

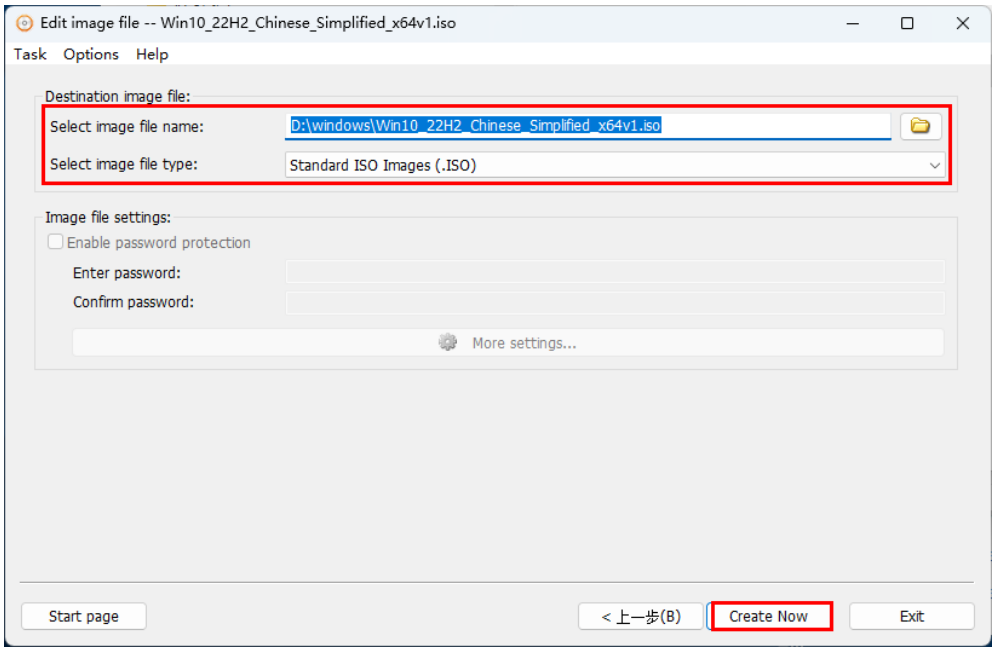


   b. Select the ISO file and click **Next**.



4. Edit the ISO file to integrate VirtIO drivers into it.
   a. Decompress the **virtio-win.iso** file downloaded in **2**.
   b. Click **Add**. Select all the decompressed files to add them to the parent node of the ISO file, and click **Next**.
   c. Select a path to save the new ISO file and specify a name for the new file. Select **ISO** as the file type. Click **Create Now**.

      After the new ISO file is generated, view VirtIO drivers in it.



UltraISO

1. Download UltraISO and install it on your local PC.

   Download address: **https://www.ultraiso.com/**
2. Download VirtIO drivers.

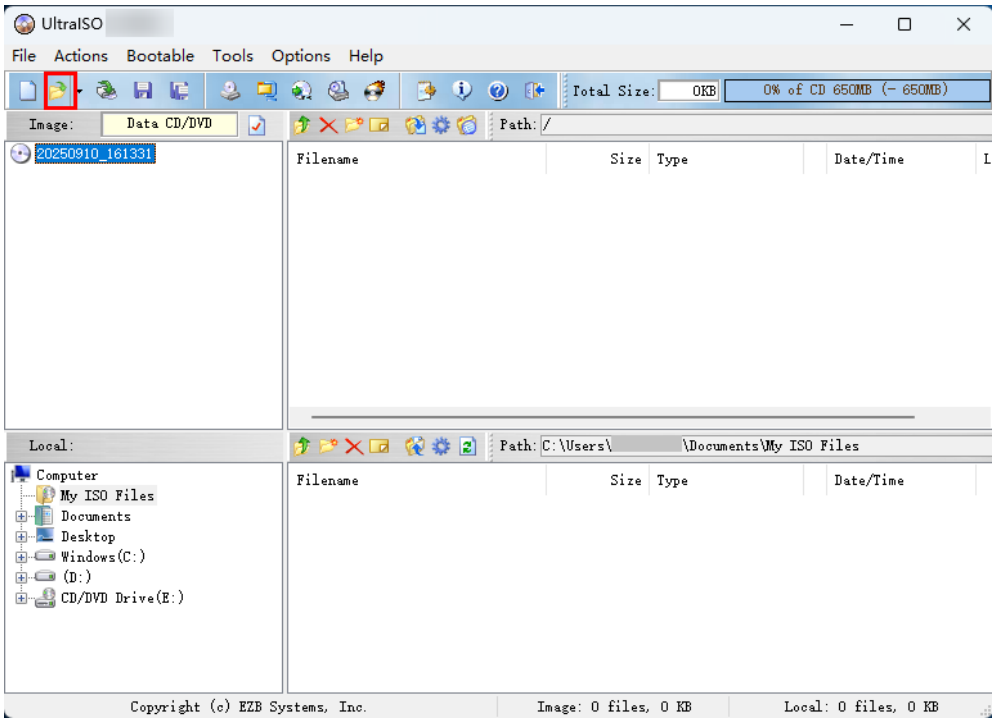
https://fedorapeople.org/groups/virt/virtio-win/direct-downloads/stable-virtio/virtio-win.iso

Other versions:

https://fedorapeople.org/groups/virt/virtio-win/direct-downloads/archive-virtio/

3. Use UltraISO to open the VirtIO ISO file.

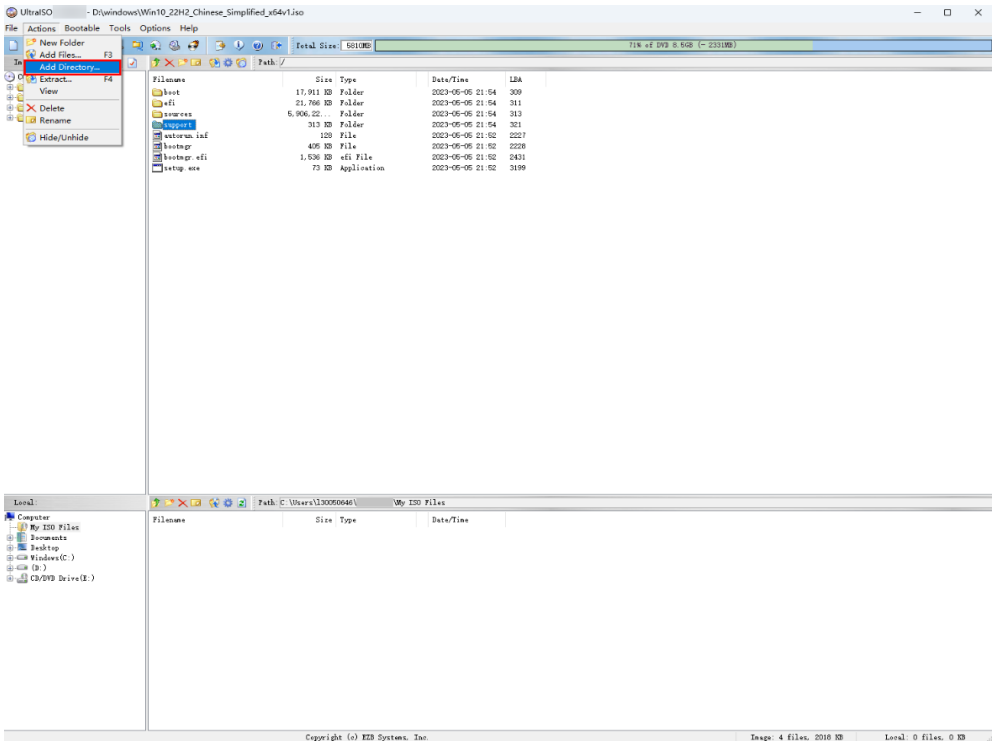
Figure 4-6 Opening the VirtIO ISO file



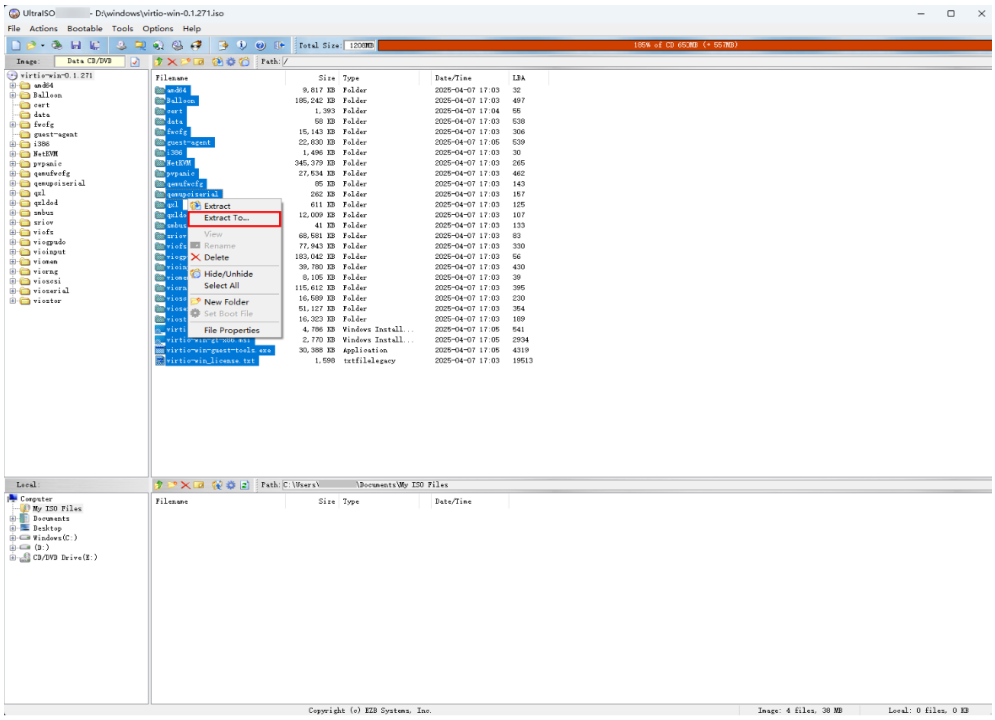
CAUTION

Do not extract the ISO file or open it with any tool other than UltraISO, or the boot data will be lost.

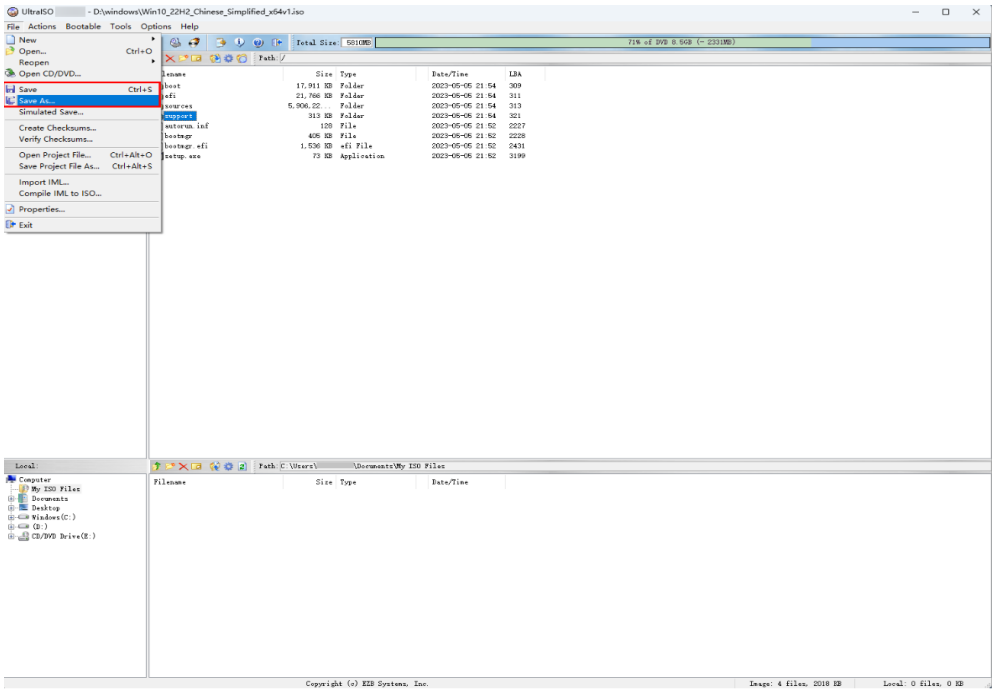
4. Extract the VirtIO ISO file into a specified temporary folder.



5. Use UltraISO to open the Windows ISO file on your local PC and add the extracted VirtIO files into the **sources** folder.



6. After confirming that correct VirtIO files are added, save the Windows ISO file.



4.4.3 Registering a Windows ISO File as a Private Image

Scenarios

Register an external ISO file on the cloud platform as a private image (ISO image). Before registering an image, ensure that the ISO file with VirtIO drivers integrated has been uploaded to an OBS bucket.

An ISO image cannot be replicated or exported.

Prerequisites

- The file to be registered must be in ISO format.
- The ISO file has been uploaded to an OBS bucket. For details, see **Upload an Image File**.

Procedure

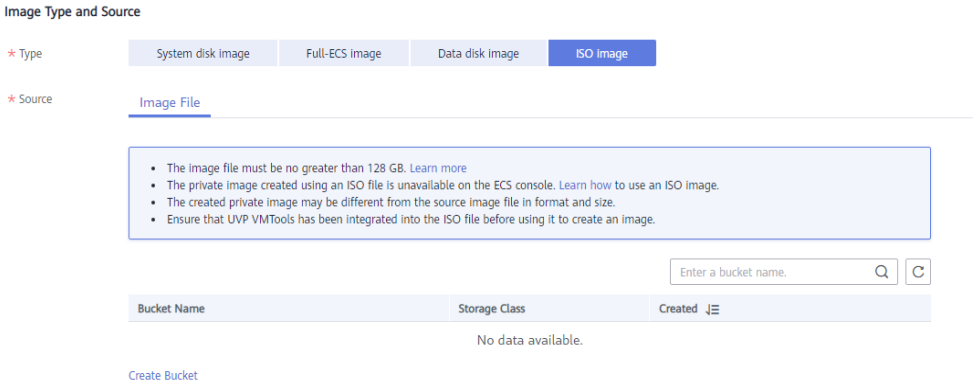
Step 1 Access the IMS console.

1. Log in to the management console.
2. Under **Compute**, click **Image Management Service**.
   The IMS console is displayed.

Step 2 Register an ISO file as an ISO image.

1. Click **Create Image** in the upper right corner.
2. In the **Image Type and Source** area, select **ISO image** for **Type**.
3. In the image file list, select the bucket and then the image file.

Figure 4-7 Creating a private image from an ISO file



4. In the **Image Information** area, set the following parameters.
   - **Architecture**: Select **x86** or **ARM**.

     NOTE

     This parameter is required only in regions that support both x86 and Arm.
   - **Boot Mode**: Select **BIOS** or **UEFI**. Ensure that the selected boot mode is the same as that in the image file, or the ECSs created from this image will not be able to boot up. The Arm architecture does not support the BIOS boot mode.
   - **OS**: Select the OS specified in the ISO file to ensure that the image can be created and used properly.
   - **System Disk**: Set the system disk capacity (value range: 40 GB to 1024 GB), which must be no less than the capacity of the system disk in the image file.
   - **Name**: Enter a name for the image to be created.
   - **Enterprise Project**: Select the enterprise project your image belongs to.
   - **Tag**: (Optional) Add a tag to the image to be created.
   - (Optional) **Description**: Describe the image as needed.
5. Click **Next**.
6. Confirm the settings. Read and agree to the disclaimer and click **Submit**.

Step 3 Switch back to the **Image Management Service** page to check the image status.

When the image status changes to **Normal**, the image is registered successfully.

----End

4.4.4 Creating a Windows ECS from an ISO Image

Scenarios

This section describes how to create an ECS from a registered ISO image.

Procedure

Step 1 Access the IMS console.

1. Log in to the management console.
2. Under **Compute**, click **Image Management Service**.

   The IMS console is displayed.

Step 2 Use an ISO image to create a Windows ECS.

1. Click the **Private Images** tab. Locate the row that contains the ISO image and click **Create ECS** in the **Operation** column.

   The created ECS is for temporary use only and needs to be deleted when you are finished with it. The system creates a pay-per-use ECS with fixed specifications. When you use the private image created from this ECS to create new ECSs, you can customize the specifications and billing mode then.
2. Configure the ECS as prompted and click **OK**.

----End

Follow-up Procedure

After the ECS is created, you can log in remotely to continue with OS and drivers installation.

4.4.5 Installing a Windows OS and VirtIO Drivers

Scenarios

This section uses Windows Server 2019 64-bit as an example to describe how to install Windows on an ECS.

The installation procedure varies depending on the image file you use. Perform operations as prompted.

NOTE

Set the time zone, KMS address, patch server, input method, and language based on service requirements.

Prerequisites

You have remotely logged in to the ECS and entered the installation page.

Procedure

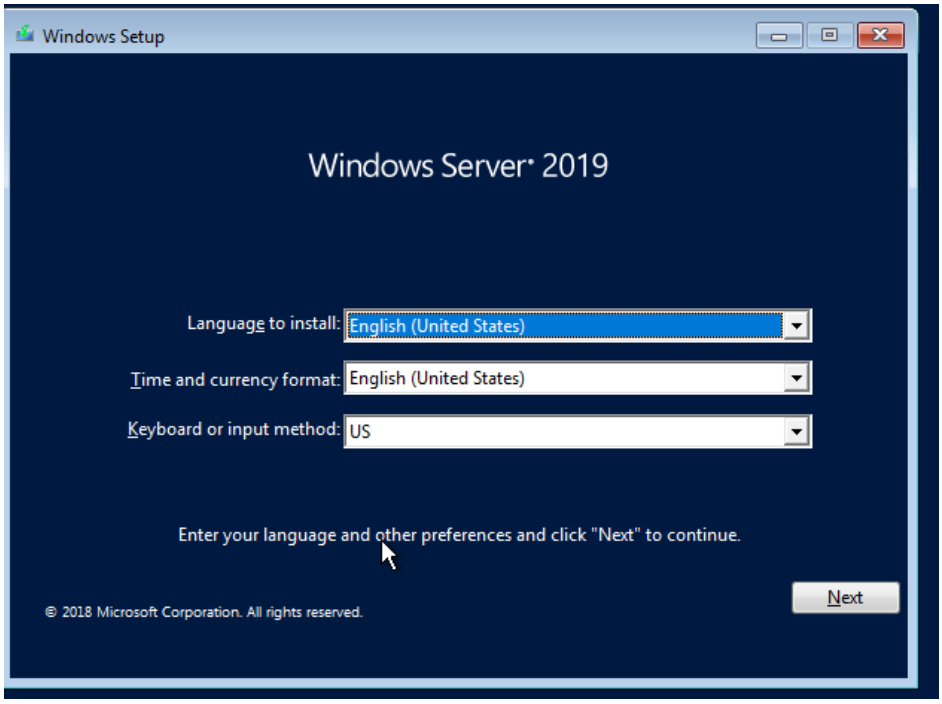
CAUTION

Do not stop or restart the ECS during the OS installation. Otherwise, the OS installation will fail.

Step 1 Install the Windows OS.

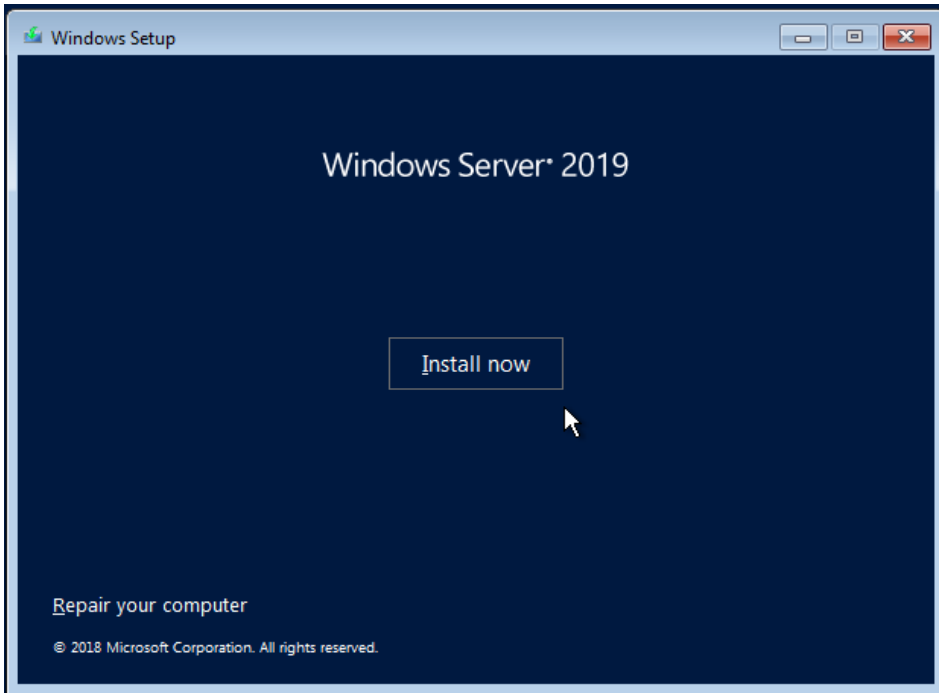
1. Configure Windows setup.

Figure 4-8 Windows setup



2. Click **Next**.
   The installation confirmation window is displayed.

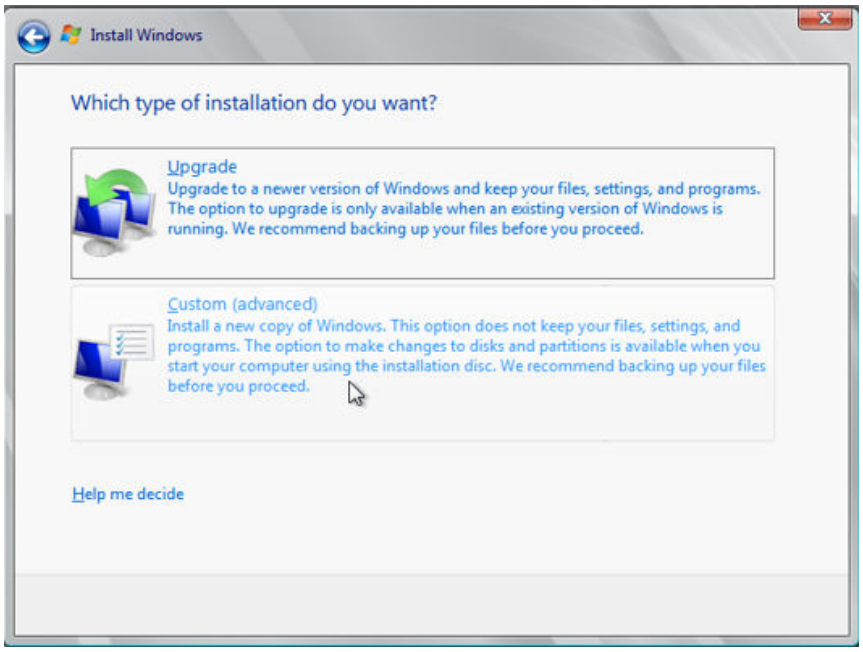
Figure 4-9 Installation confirmation



3. Click **Install now**.
   The **Select the operating system you want to install** dialog box is displayed.
4. Select the version of the OS to be installed and click **Next**.
   The **Please read the license terms** dialog box is displayed.

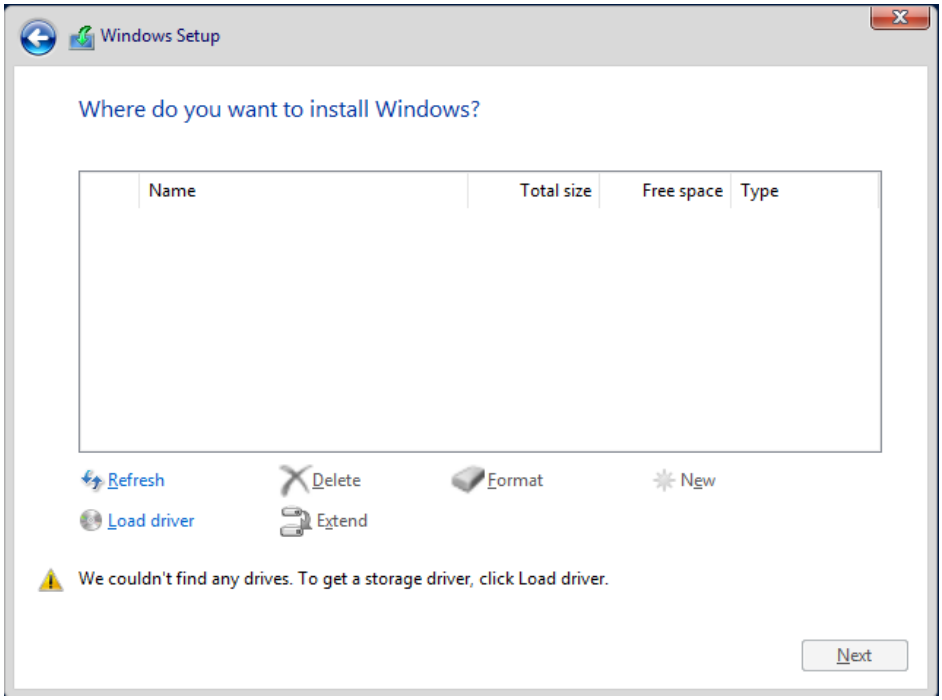
5. Select **I accept the license terms**, and click **Next**.
   The **Which type of installation do you want?** dialog box is displayed.

   Figure 4-10 Installation type



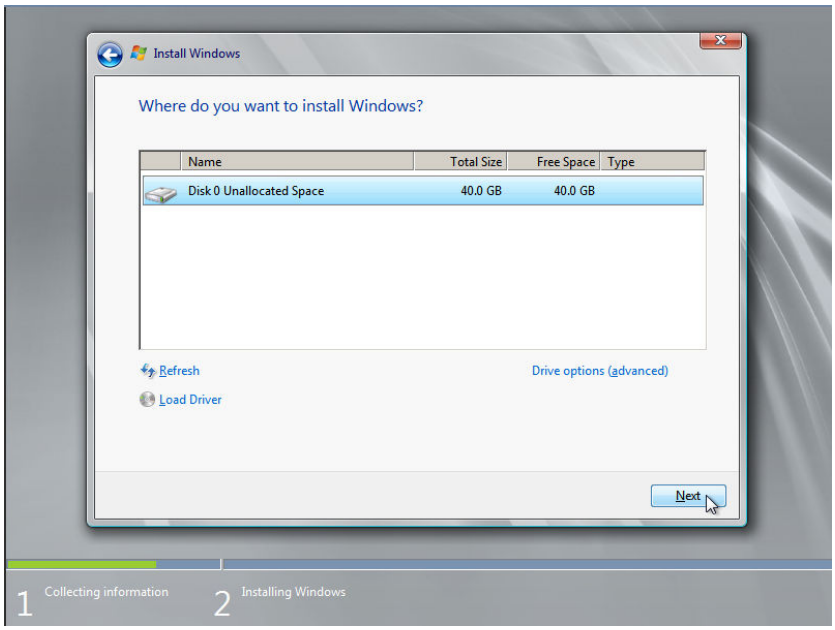
6. Select **Custom (advanced)**.
   The **Where do you want to install Windows?** dialog box is displayed.
   - If the system displays a message indicating that no driver is found, go to **Step 1.7**.

   Figure 4-11 Installation path



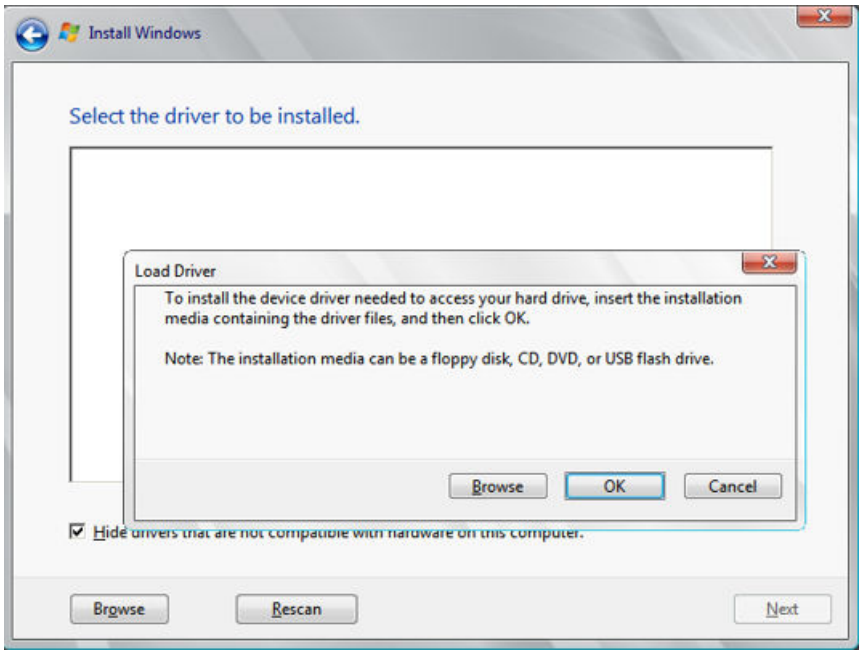
- If a disk is displayed, go to **Step 1.9**.

Figure 4-12 Installation path



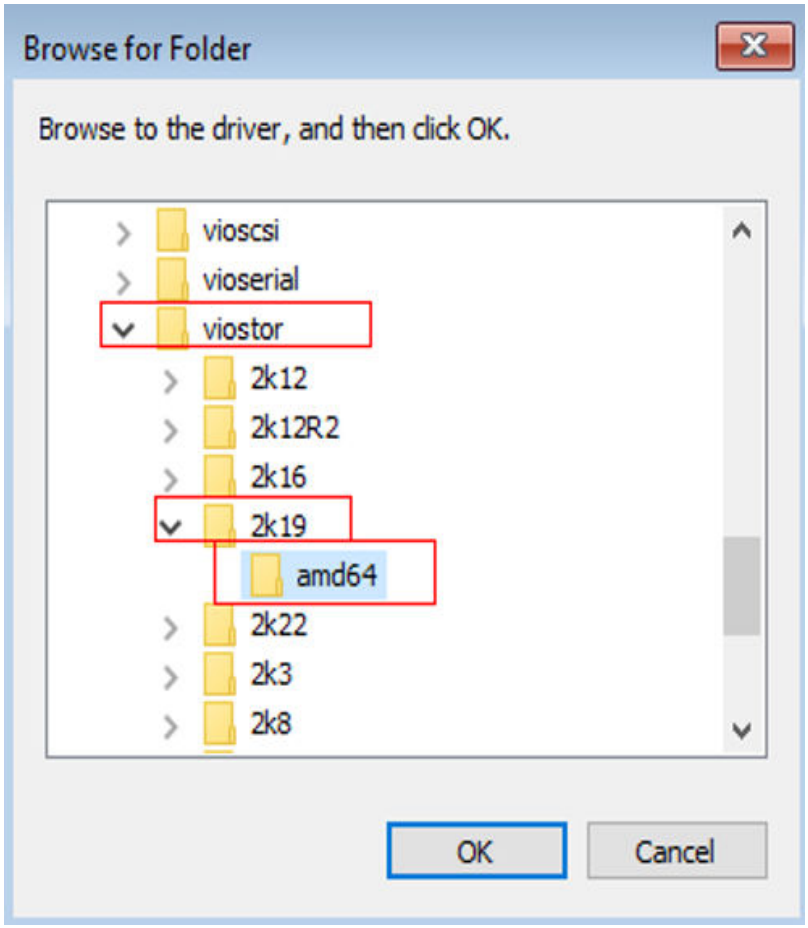
7. Click **Load driver** and then **Browse**.

Figure 4-13 Loading drivers



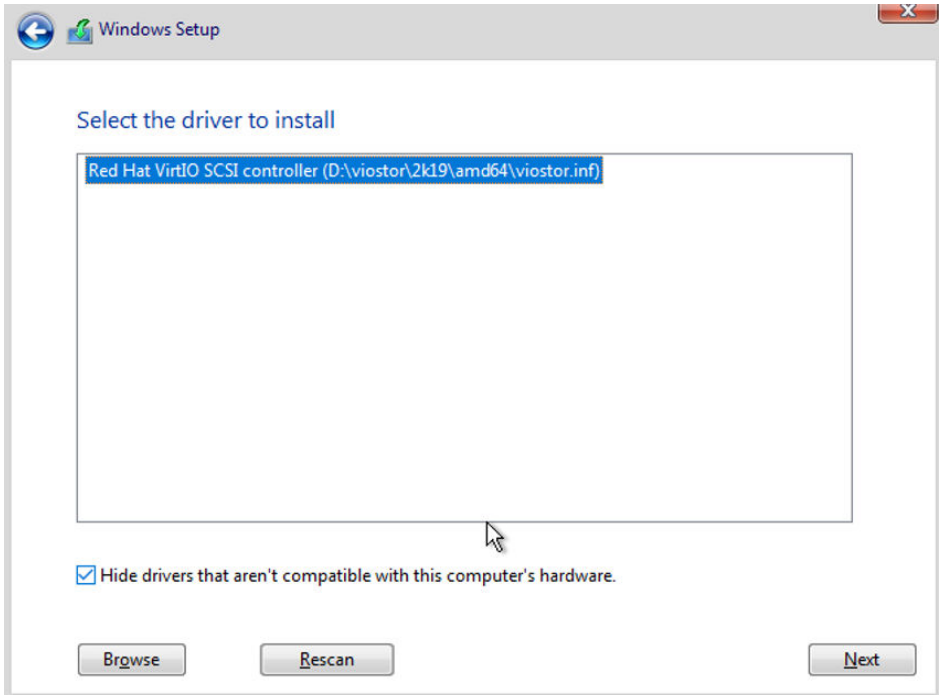
8. Select a driver based on the disk type.
   - If the disk type is VBD, choose **viostor** > **2k19** > **amd64** and click **OK**.

Figure 4-14 Browsing for a folder



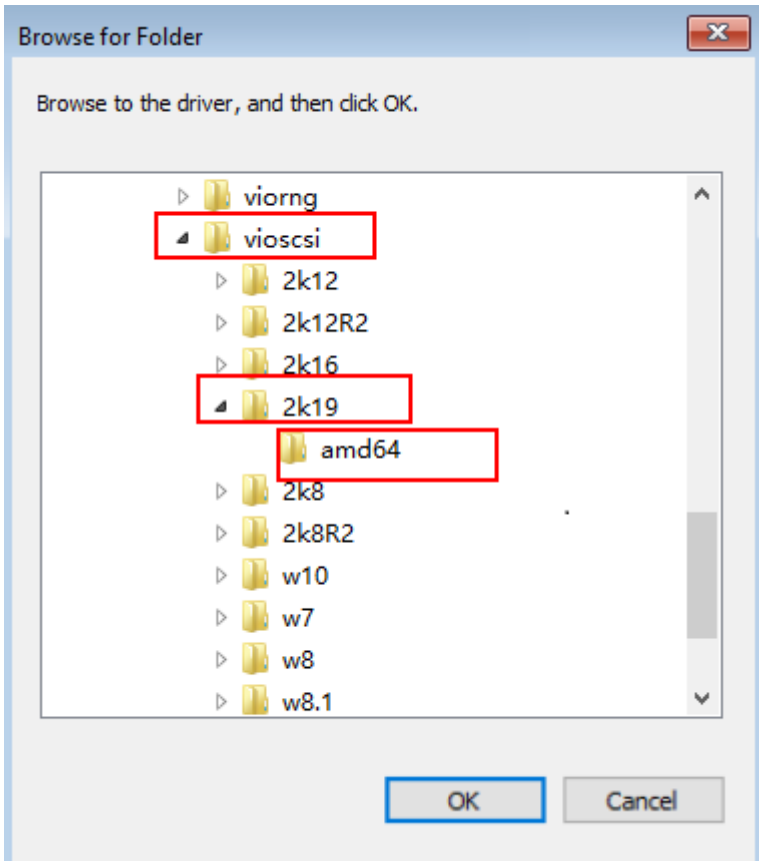
Select the **viostor.inf** driver and click **Next**.

Figure 4-15 Selecting the driver to install



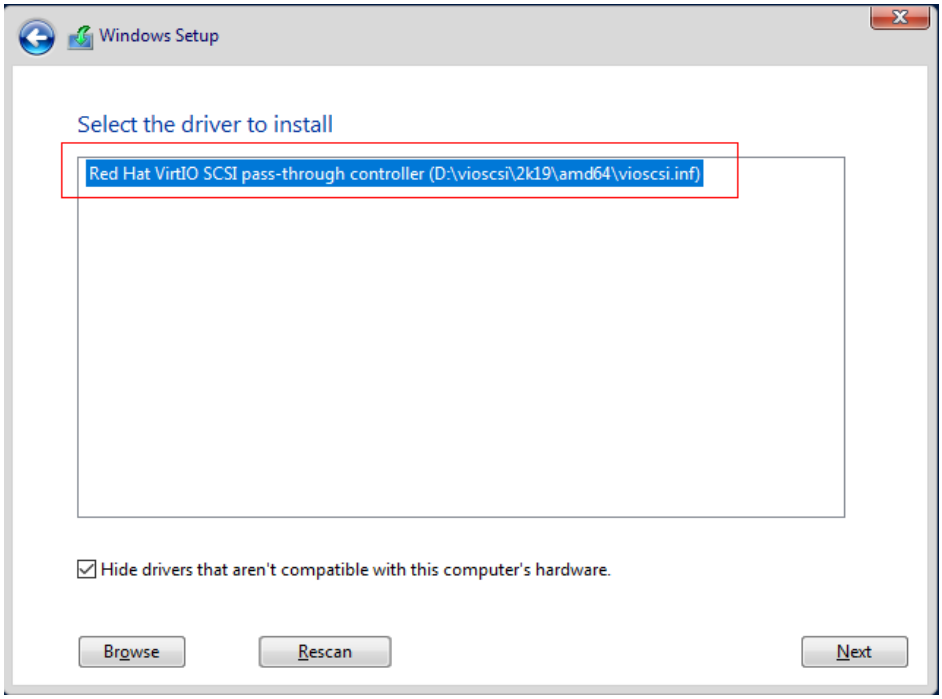
– If the disk type is SCSI, choose **vioscsi** > **2k19** > **amd64** and click **OK**.

Figure 4-16 Browsing for a folder



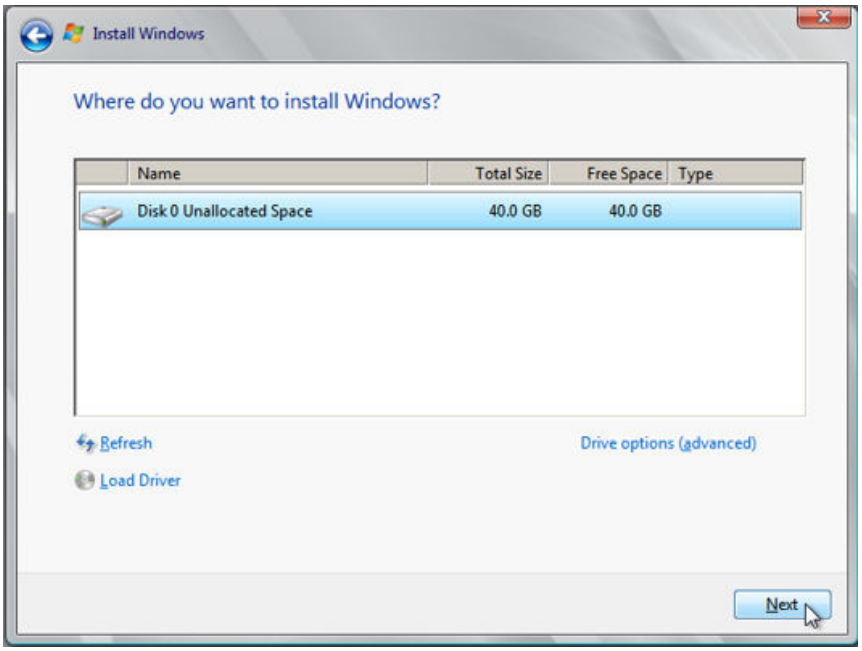
Select the **vioscsi.inf** driver and click **Next**.

Figure 4-17 Selecting the driver to install



9. Select the disk and click **Next**.

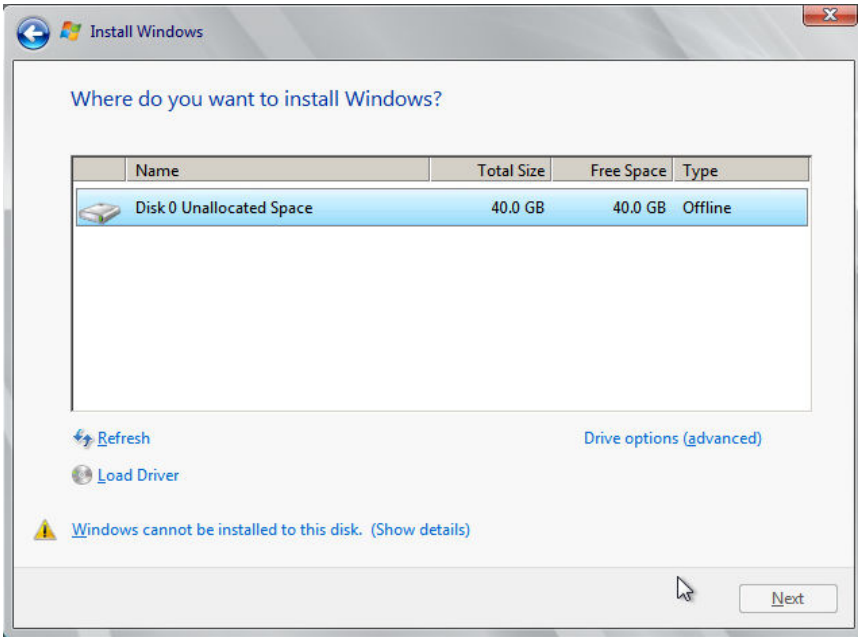
Figure 4-18 Installation path



NOTE

If the disk type is **Offline**, you can stop and then start the ECS, and restart the OS installation process.

Figure 4-19 Offline disk



10. The **Installing Windows** dialog box is displayed, and the OS installation starts.

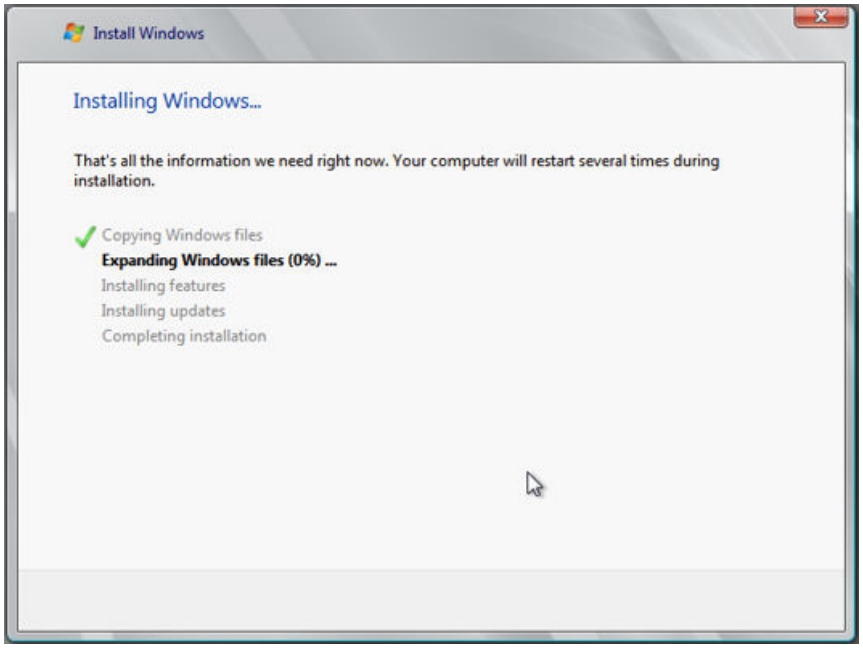
    The installation takes about 50 minutes. The ECS restarts during the installation. After the ECS successfully restarts, log in to it again and configure the OS as prompted.

    NOTE

    You are required to set a password for the OS user.

    Supported special characters include !@$%^-_=+[{}]:,./?

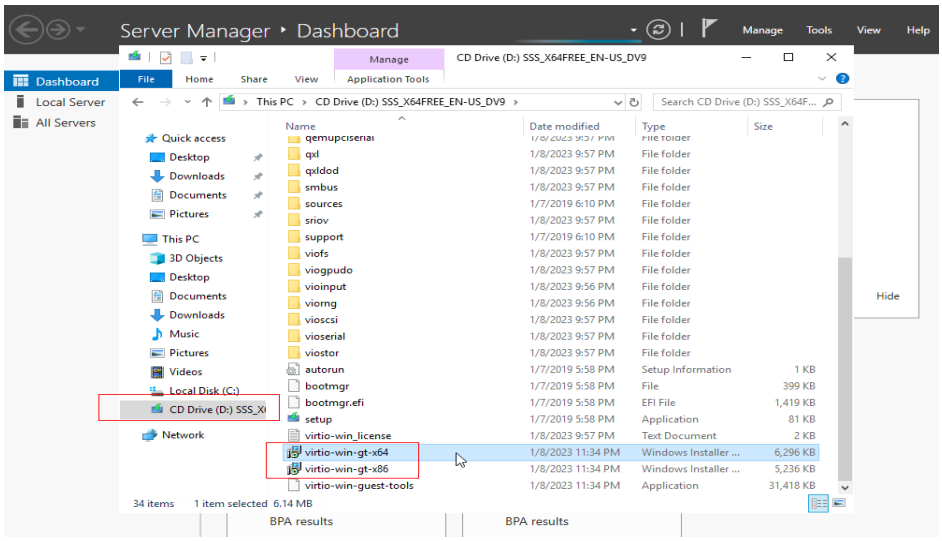
Figure 4-20 Installation progress



Step 2 Install drivers.

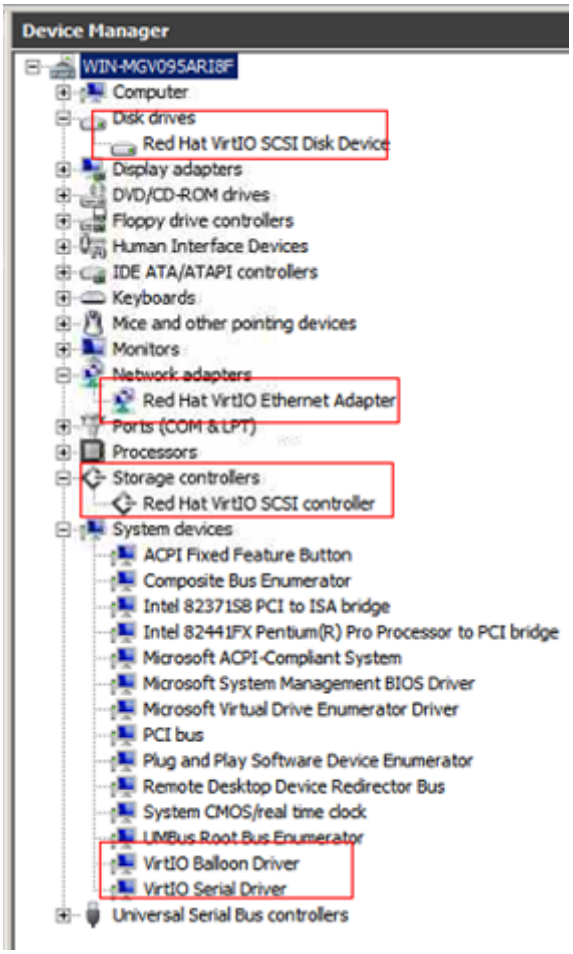
1. Open **Computer** and double-click the CD drive.

Figure 4-21 Starting the CD drive



2. Double-click **virtio-win-gt-x64** or **virtio-win-gt-x86**. Install drivers as prompted.
3. After the installation is complete, start **Device Manager** and check that all the drivers shown in the red box are successfully installed.

Figure 4-22 Device Manager

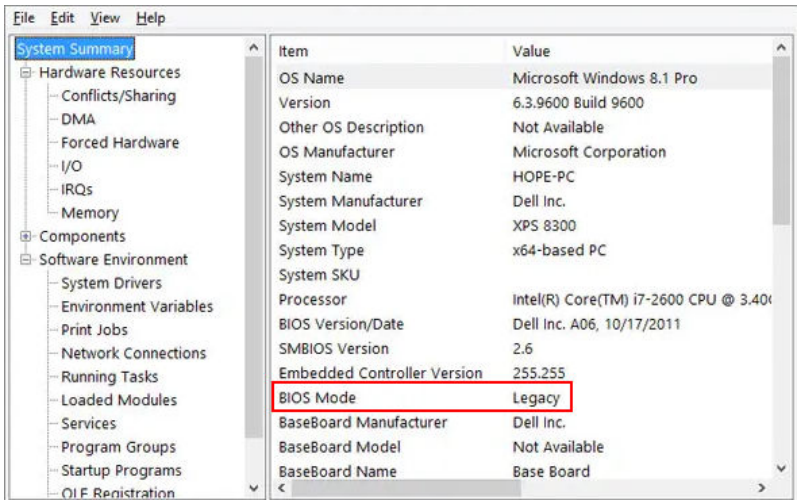


----End

Follow-up Procedure

Check whether the resolution can be changed. If it cannot, address it based on the system boot modes.

Hold down the **Windows** key and press **R** on your keyboard, enter **msinfo32** in the **Run** box, and press **Enter**. In the right pane of the **System Information** dialog box, locate **BIOS Mode**.



- If the value of **BIOS Mode** is **Legacy**, the system boot mode is BIOS. Go to the step for **configuring image information**, select **BIOS** for **Boot Mode**.
- If the value of **BIOS Mode** is **UEFI**, address the resolution change failure by referring to **What Do I Do If I Cannot Change the Resolution of a Windows OS Booted in UEFI Mode?**

4.4.6 Configuring the ECS and Creating a Windows System Disk Image

Scenarios

After installing an OS for the temporary ECS, configure the ECS and install Guest OS drivers provided by the cloud platform so that ECSs that will be created with this temporary ECS as a source can work properly.

NOTE

The Guest OS drivers are VirtIO and PV drivers. VirtIO drivers have been installed on the ECS in the preceding section, so this section only describes how to install PV drivers.

This section describes how to configure a Windows ECS, install the Guest OS drivers, and create a Windows system disk image.

Procedure

Step 1 Configure the ECS.

1. Check whether DHCP is configured. If the ECS is configured with a static IP address, change its IP address assignment mode to DHCP as instructed in **Configuring DHCP**.
2. Enable remote desktop connection for the ECS as needed. For details about how to enable this function, see **Enabling Remote Desktop Connection**.
3. To install PV drivers, see **Installing PV Drivers**.

   After the installation is complete, you need to delete system logs. For details, see **Clearing System Logs**.
4. Install and configure Cloudbase-Init. User data injection on the management console is available for the new ECSs created from the image only after this

tool is installed. For example, you can use data injection to set the login password for a new ECS. For details, see **Installing and Configuring Cloudbase-Init**.

5. (Optional) Configure value-added functions.
   - Enable NIC multi-queue. For details, see **How Do I Enable NIC Multi-Queue for an Image?**
   - Configure dynamic assignment of IPv6 addresses. For details, see **How Do I Configure a Cloud Server to Dynamically Acquire IPv6 Addresses?**

Step 2 Stop the ECS to make the configurations take effect.

Step 3 Use the ECS to create a Windows system disk image.

For details, see **Creating a System Disk Image from an ECS**.

----End

Follow-up Procedure

After the system disk image is created, delete the temporary ECS in a timely manner to avoid generating any additional charges.

4.5 Creating a Linux System Disk Image from an ISO File

4.5.1 Overview

An ISO file is a disk image of an optical disc. A large number of data files can be compressed into a single ISO file. Likewise, to access the files stored in an ISO, the ISO file needs to be decompressed. For example, you can use a virtual CD-ROM to open an ISO file, or burn the ISO file to a CD or DVD and then use the CD-ROM to read the image.

This section describes how to create a Linux system disk image using an ISO file.

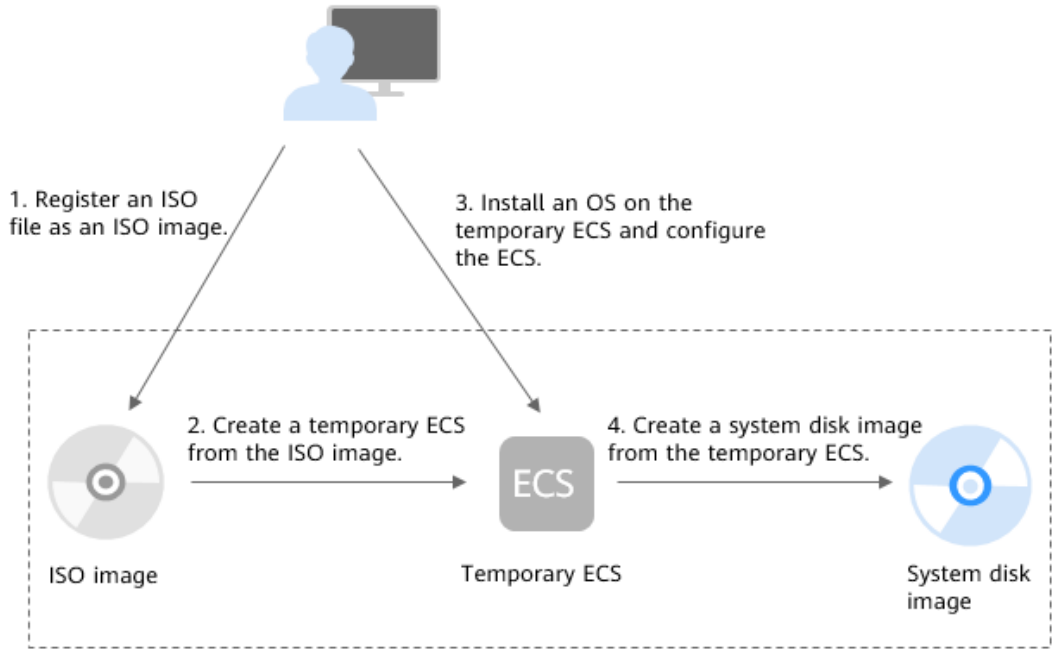
NOTE

This section is applicable only to the management console. If you are an API user, see **Creating an Image from an ISO File**.

Creation Process

Figure 4-23 shows the process of creating a Linux system disk image from an ISO file.

Figure 4-23 Creating a Linux system disk image



The procedure is as follows:

1. Register an ISO file as an ISO image.

   On the management console, register the prepared ISO file as an image. The image is an ISO image and cannot be used to provision ECSs. For details, see **Registering a Linux ISO File as a Private Image**.

2. Create a temporary ECS from the ISO image.

   Use the registered ISO image to create a temporary ECS. The ECS has no OS or driver installed. For details, see **Creating a Linux ECS from an ISO Image**.

3. Install an OS and necessary drivers for the temporary ECS and configure related settings.

   The operations include installing an OS, installing native Xen and KVM drivers, configuring NICs, and deleting files from the network rule directory. For details, see **Installing a Linux OS** and **Step 1** in **Configuring the ECS and Creating a Linux System Disk Image**.

4. Create a system disk image from the temporary ECS.

   On the management console, create a system disk image from the temporary ECS on which the installation and configuration have been completed. After the image is created, delete the temporary ECS to avoid generating any additional charges. For details, see **Creating a System Disk Image from an ECS**.

Constraints

- An ISO image created from an ISO file is used only for creating a temporary ECS. It will not be available on the ECS console. You cannot use it to create ECSs or change ECS OSs. You need to install an OS on the temporary ECS and use that ECS to create a system disk image which can be used to create ECSs or change ECS OSs.

- A temporary ECS has limited functionality. For example, you cannot attach disks to it. You are not advised to use it as a normal ECS.

4.5.2 Registering a Linux ISO File as a Private Image

Scenarios

Register an external ISO file on the cloud platform as a private image (ISO image). Before registering an image, upload the ISO file to the OBS bucket.

An ISO image cannot be replicated or exported.

Prerequisites

- The file to be registered must be in ISO format.
- The ISO image file has been uploaded to the OBS bucket. For details, see **Upload an Image File**.

  NOTE

  The ISO image file name can contain only letters, digits, hyphens (-), and underscores (_). If the image file name does not meet the requirements, change the name before uploading the image file to the OBS bucket.

Procedure

Step 1 Access the IMS console.

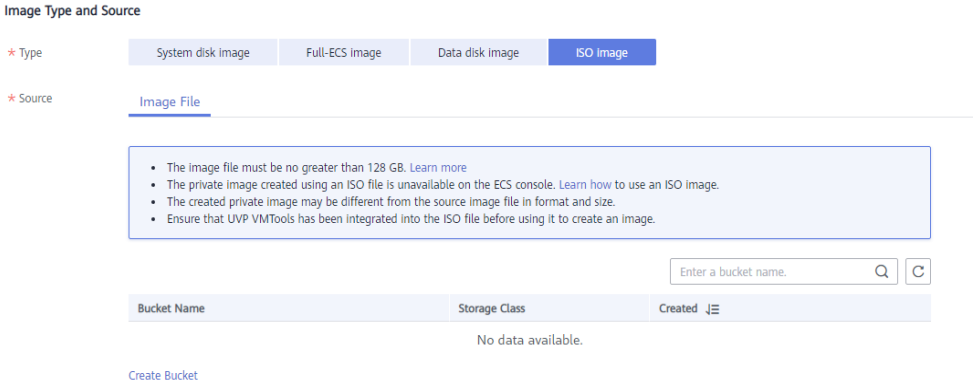
1. Log in to the management console.
2. Under **Compute**, click **Image Management Service**.

   The IMS console is displayed.

Step 2 Register an ISO file as an ISO image.

1. Click **Create Image** in the upper right corner.
2. In the **Image Type and Source** area, select **ISO image** for **Type**.
3. In the image file list, select the bucket and then the image file.

   Figure 4-24 Creating a private image from an ISO file



4. In the **Image Information** area, set the following parameters.

- **Architecture**: Select **x86** or **ARM**.

  NOTE

  This parameter is required only in regions that support both x86 and Arm.

- **Boot Mode**: Select **BIOS** or **UEFI**. Ensure that the selected boot mode is the same as that in the image file, or the ECSs created from this image will not be able to boot up. The Arm architecture does not support the BIOS boot mode.
- **OS**: Select the OS specified in the ISO file to ensure that the image can be created and used properly.
- **System Disk**: Set the system disk capacity (value range: 40 GB to 1024 GB), which must be no less than the capacity of the system disk in the image file.
- **Name**: Enter a name for the image to be created.
- **Enterprise Project**: Select the enterprise project your image belongs to.
- **Tag**: (Optional) Add a tag to the image to be created.
- (Optional) **Description**: Describe the image as needed.

5. Click **Next**.
6. Confirm the settings. Read and agree to the disclaimer and click **Submit**.

Step 3 Switch back to the **Image Management Service** page to check the image status.

When the image status changes to **Normal**, the image is registered successfully.

----End

4.5.3 Creating a Linux ECS from an ISO Image

Scenarios

This section describes how to create an ECS from a registered ISO image.

Procedure

Step 1 Access the IMS console.

1. Log in to the management console.
2. Under **Compute**, click **Image Management Service**.

   The IMS console is displayed.

Step 2 Use an ISO image to create a Linux ECS.

1. Click the **Private Images** tab. Locate the row that contains the ISO image and click **Create ECS** in the **Operation** column.

   The created ECS is for temporary use only and needs to be deleted when you are finished with it. The system creates a pay-per-use ECS with fixed specifications. When you use the private image created from this ECS to create new ECSs, you can customize the specifications and billing mode then.

2. Configure the ECS as prompted and click **OK**.

----End

Follow-up Procedure

After the ECS is created, you can log in remotely to continue with OS and drivers installation.

4.5.4 Installing a Linux OS

Scenarios

This section uses CentOS 7 64-bit as an example to describe how to install Linux on an ECS.

The installation procedure varies depending on the image file you use. Perform operations as prompted.

NOTE

Set the time zone, repo source update address, input method, language, and other items based on service requirements.

Prerequisites

You have remotely logged in to the ECS and entered the installation page.

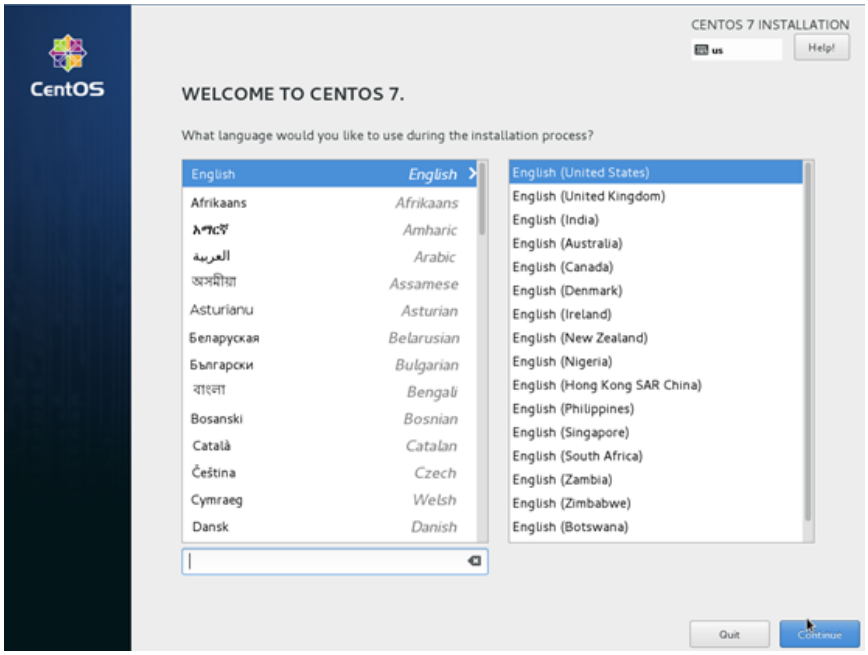
Procedure

CAUTION

Do not stop or restart the ECS during the OS installation. Otherwise, the OS installation will fail.

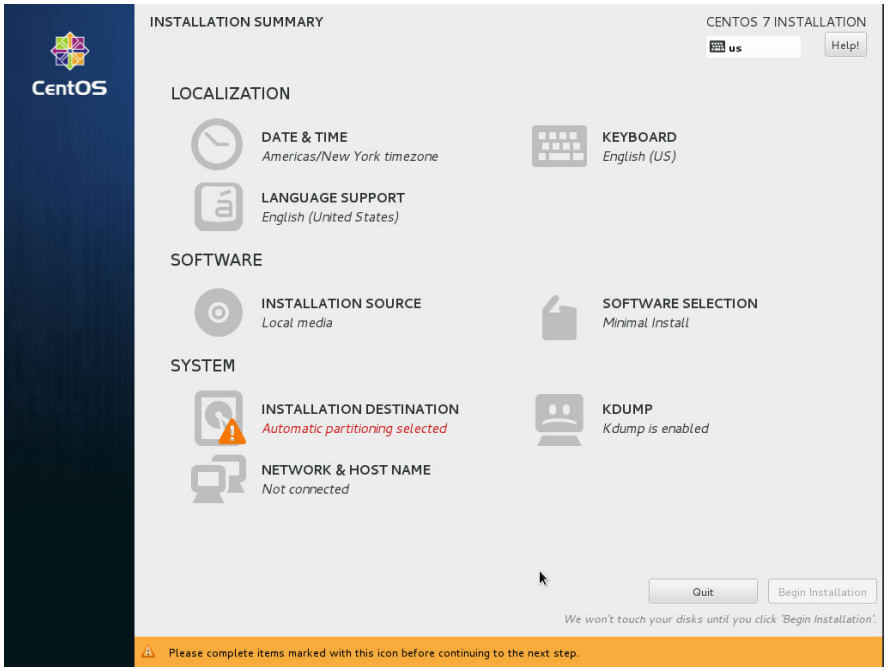
1. On the installation page, select the language and click **Continue**.

Figure 4-25 Installation page



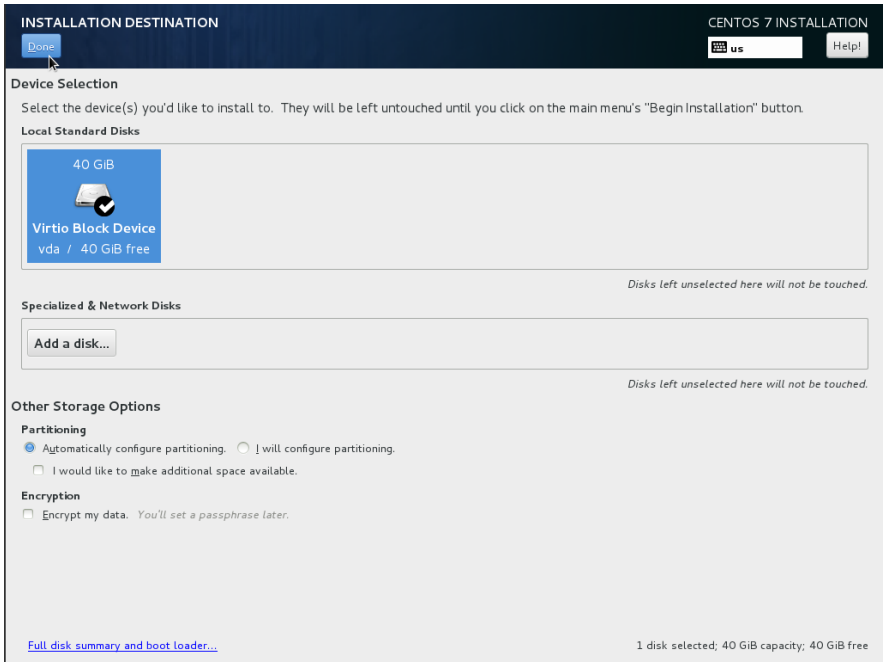
2. On the **INSTALLATION SUMMARY** page, choose **SYSTEM** > **INSTALLATION DESTINATION**.

Figure 4-26 INSTALLATION SUMMARY page



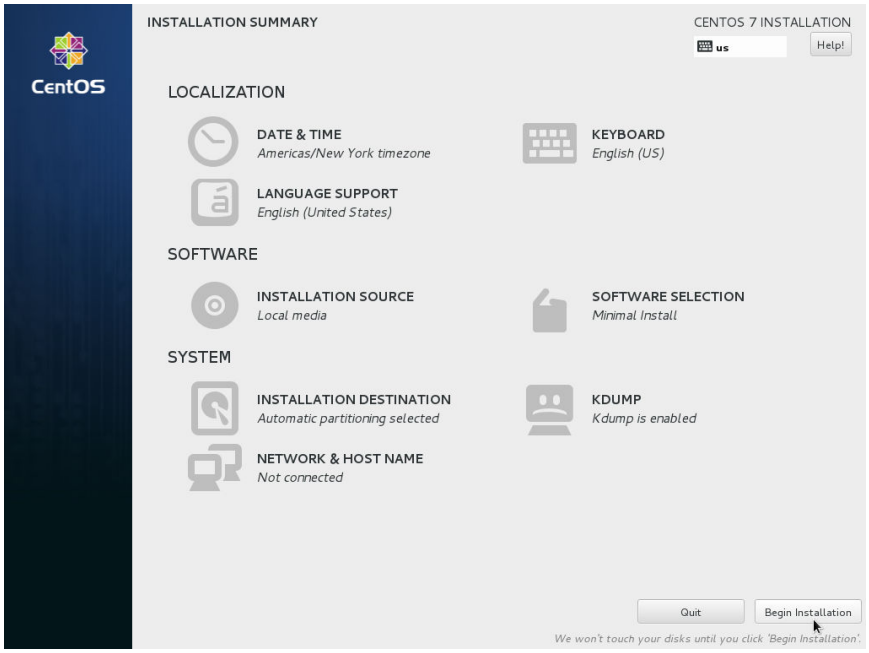
3. Select the target disk and click **Done**.

Figure 4-27 Installation location



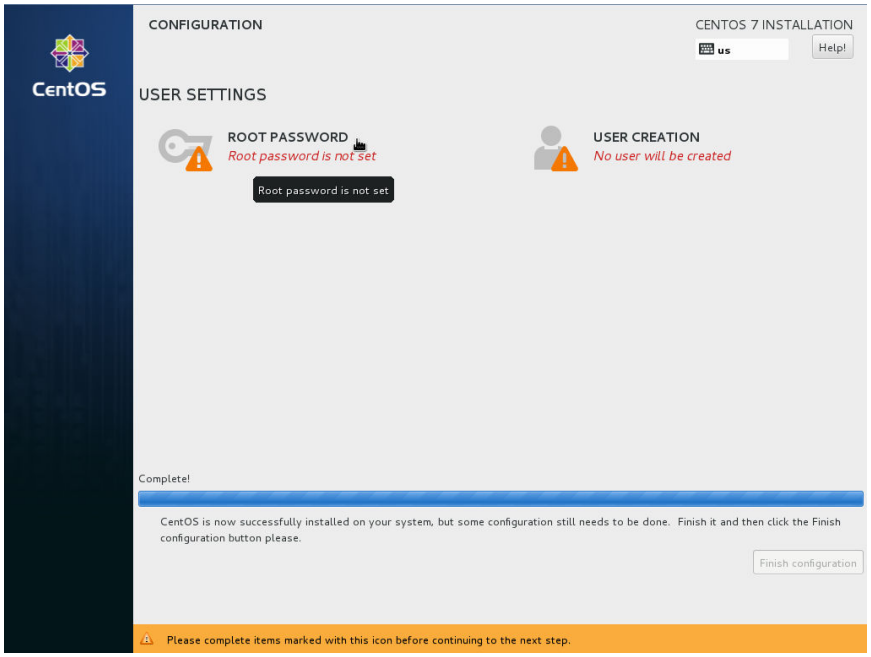
4. Click **Begin Installation**.

Figure 4-28 Starting installation



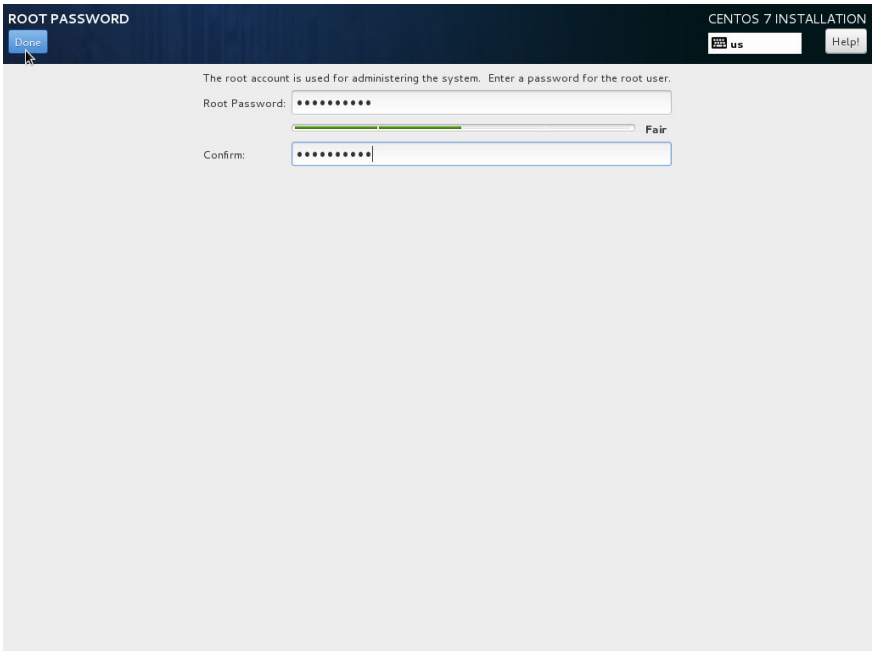
5. Wait for the automatic OS installation to complete. When the progress reaches 100%, CentOS is installed successfully.

Figure 4-29 Successful installation



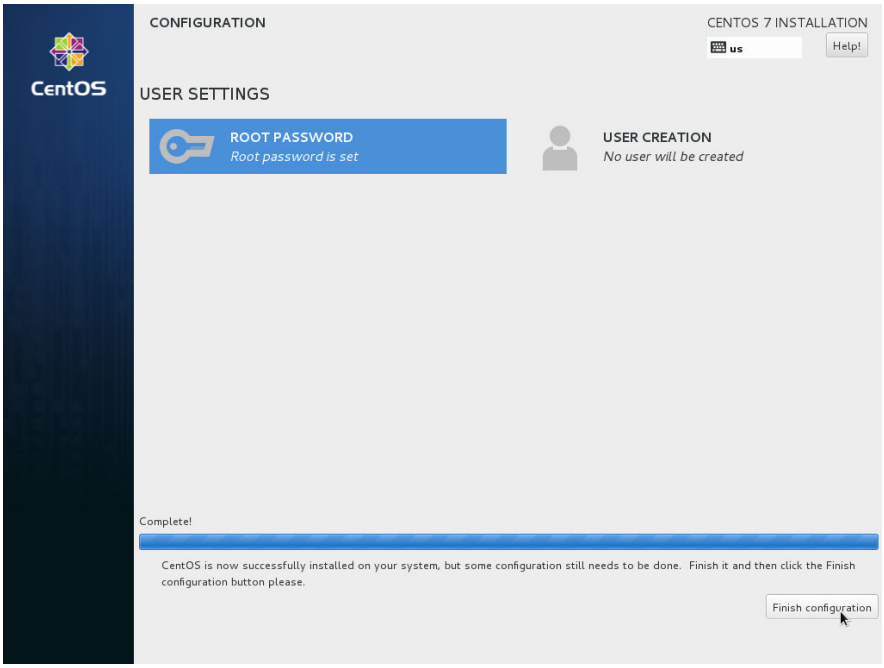
6. In the **USER SETTINGS** area, click **ROOT PASSWORD**.
   The **ROOT PASSWORD** page is displayed.
7. Set a password for user **root** as prompted and click **Done**.

Figure 4-30 Setting a password for user root



8. Click **Finish configuration**.

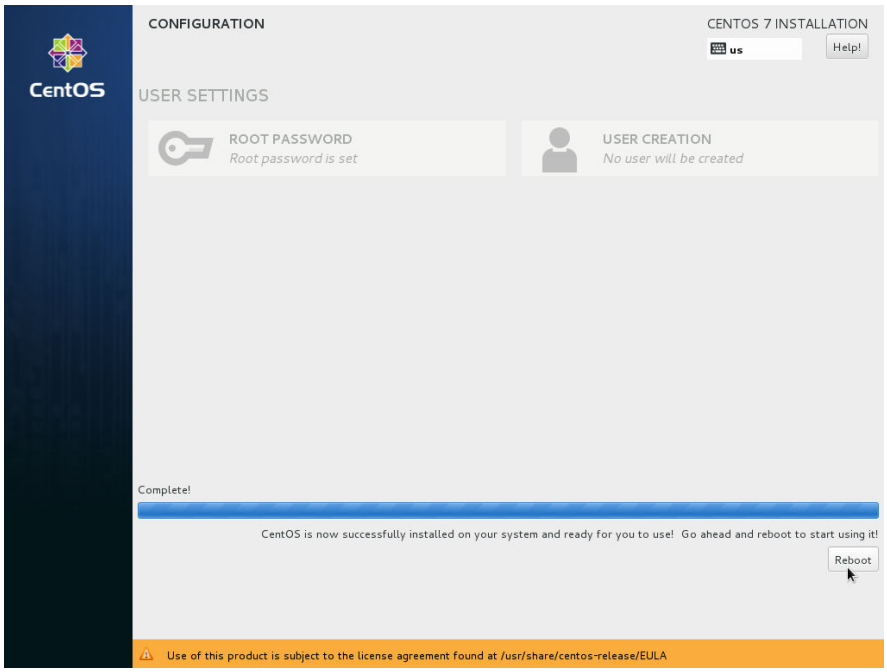
Figure 4-31 Completing configuration



9. Click **Reboot**.

   If you are prompted to install the OS again after the ECS is restarted, exit the VNC login page and restart the ECS on the console.

Figure 4-32 Restarting the ECS



4.5.5 Configuring the ECS and Creating a Linux System Disk Image

Scenarios

After installing an OS for the temporary ECS, configure the ECS and install Xen and KVM drivers to ensure that ECSs created from this temporary ECS can work properly.

This section describes how to configure a Linux ECS, install drivers, and create a Linux system disk image.

Procedure

Step 1 Configure the ECS.

1. Configure the network.
   - Run the **ifconfig** command to check whether the private IP address of the ECS is the same as that displayed on the console. If they are inconsistent, delete files from the network rule directory as instructed in **Deleting Files from the Network Rule Directory**.
   - Check whether DHCP is configured. If the ECS is configured with a static IP address, change its IP address assignment to DHCP as instructed in **Configuring DHCP**.
   - Run the **service sshd status** command to check whether SSH is enabled. If it is disabled, run the **service sshd start** command to enable it. Ensure that your ECS firewall, for example, Linux iptables, allows access to SSH.
2. Install drivers.

   To ensure that the network performance and basic functions of the ECSs created from the private image are normal, install native Xen and KVM drivers

on the ECS used to create the image. Before installing native Xen and KVM drivers, uninstall PV drivers.

NOTE

Disable your antivirus and intrusion detection software. You can enable them after the driver installation is complete.

- Uninstall PV drivers. For details, see **Uninstalling PV Drivers from a Linux ECS**.
- Install native Xen and KVM drivers. For details, see **How Do I Install Native Xen and KVM Drivers?**
- After the drivers are installed, you need to clear log files and historical records. For details, see **Clearing System Logs**.

3. Configure a file system.
   - Change disk identifiers in the GRUB file to UUID. For details, see **Changing Disk Identifiers in the GRUB File to UUID**.
   - Change disk identifiers in the fstab file to UUID. For details, see **Changing Disk Identifiers in the fstab File to UUID**.
   - Clear the automatic mount configuration of non-system disks in the **/etc/fstab** file. For details, see **Detaching Data Disks from an ECS**.
4. (Optional) Configure value-added functions.
   - Install and configure Cloud-Init. For details, see **(Optional) Installing and Configuring Cloud-Init**.
   - Enable NIC multi-queue. For details, see **How Do I Enable NIC Multi-Queue for an Image?**
   - Configure dynamic assignment of IPv6 addresses. For details, see **How Do I Configure a Cloud Server to Dynamically Acquire IPv6 Addresses?**

Step 2 Create a Linux system disk image.

For details, see **Creating a System Disk Image from an ECS**.

----End

Follow-up Procedure

After the system disk image is created, delete the temporary ECS in a timely manner to avoid generating any additional charges.

4.6 Fast Import of an Image File

4.6.1 Overview

If an image file is larger than 128 GB, you can import it using fast import.

Constraints

- The image file must be in RAW or ZVHD2 format.
- The image file size cannot exceed 1 TB.

Methods

You can import an image file in any of the following methods depending on the file format:

- ZVHD2
  a. Optimize the image file.
  b. Upload the image file to an OBS bucket.
  c. Register the image file on the cloud platform.
- RAW
  a. Optimize the image file.
  b. Generate a bitmap file for the image file.
  c. Upload the image file and bitmap file to an OBS bucket.
  d. Register the image file on the cloud platform.
- Others
  - If the file format is converted to ZVHD2:
    i. Optimize the image file.
    ii. Convert the image file format to ZVHD2.
    iii. Upload the image file to an OBS bucket.
    iv. Register the image file on the cloud platform.
  - If the file format is converted to RAW:
    i. Optimize the image file.
    ii. Convert the image file format to RAW and generate a bitmap file for the image file.
    iii. Upload the image file and bitmap file to an OBS bucket.
    iv. Register the image file on the cloud platform.

NOTE

- Fast import is used to quickly import large files. It depends on lazy loading which defers loading of file data until the data is needed. This reduces the initial loading time. However, RAW files do not support lazy loading. When you upload a RAW file, you need to upload its bitmap together.
- For details about the initial configuration required for an image file, see **Table 2-2**. Perform the configuration based on the OS in the image file.

Import Process

Assume that you need to convert the file format to ZVHD2 or RAW.

You can use **qemu-img-hw** or the open-source tool **qemu-img** to convert the image format. **qemu-img-hw** can only be used in Linux.

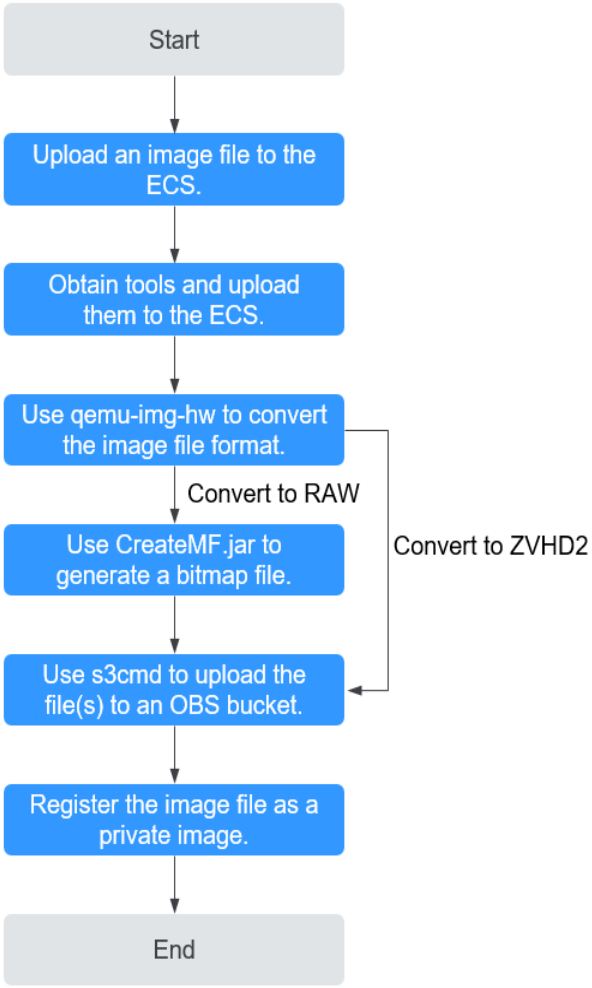
NOTE

The tool package contains **qemu-img-hw** (for converting image formats) and **CreateMF.jar** (for generating bitmap files).

- Linux

  You are advised to use a EulerOS ECS to convert the file format.

Figure 4-33 Import process (Linux)



For details, see **Fast Import of an Image File in Linux**.

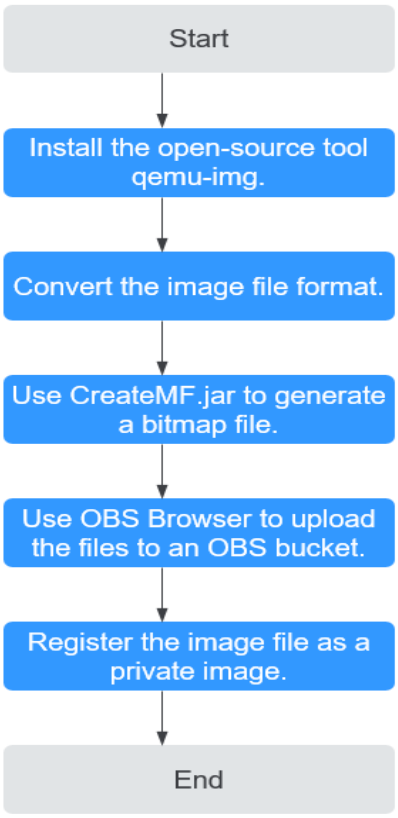
- Windows

  You are advised to use a local PC running Windows to convert the file format.

  NOTE

  qemu-img cannot convert image files to the ZVHD2 format. You need to convert an image file to the RAW format and then use **CreateMF.jar** to generate a bitmap file.

Figure 4-34 Import process (Windows)



For details, see **Fast Import of an Image File in Windows**.

4.6.2 Fast Import of an Image File in Linux

Scenarios

This section describes how to convert the format of a large image file on a Linux server and then quickly import it to the cloud platform. You are advised to use a EulerOS ECS for converting image file formats and generating bitmap files.

In Linux, you are advised to use **qemu-img-hw** to convert image formats.

Prerequisites

- The image file has been initially configured as instructed in **Table 2-2** based on the OS in the image file.
- You have created an ECS running EulerOS on the management console and bound an EIP to the ECS.
- An OBS bucket has been created on the management console.

Procedure

Step 1 Upload an image file.

- If the image file is uploaded from a Linux PC, run the **scp** command.

  For example, to upload **image01.qcow2** to the **/usr/** directory of the ECS, run the following command:

  scp /var/image01.qcow2 root@*xxx.xxx.xx.xxx***:/usr/**

  xxx.xxx.xx.xxx indicates the EIP bound to the ECS.
- If the image file is uploaded from a Windows PC, use a file transfer tool, such as WinSCP, to upload the image file.

Step 2 Obtain the image conversion tool (**qemu-img-hw.zip**) and bitmap file generation tool (**createMF.zip**), upload them to the ECS, and decompress the packages.

Table 4-4 Tool packages

Tool Package	How to Obtain
qemu-img-hw.zip	**https://cn-south-1-cloud-reset-pwd.obs.cn-south-1.myhuaweicloud.com/imageImportTools/qemu-img-hw.zip**
createMF.zip	**https://cn-south-1-cloud-reset-pwd.obs.cn-south-1.myhuaweicloud.com/imageImportTools/createMF.zip**

Step 3 Use **qemu-img-hw** to convert the image format.

1. Go to the directory where **qemu-img-hw** is stored, for example, **/usr/qemu-img-hw**.

   cd /usr/qemu-img-hw
2. Run the following command to make **qemu-img-hw** executable:

   chmod +x qemu-img-hw
3. Execute **qemu-img-hw** to convert the image file format to ZVHD2 (recommended) or RAW.

   Command format:

   ./qemu-img-hw convert -p -O *Target_image_format Source_image_file Target_image_file*

   For example, run the following command to convert an **image01.qcow2** file to an **image01.zvhd2** file:

   ./qemu-img-hw convert -p -O zvhd2 image01.qcow2 image01.zvhd2

   – If the image file is converted to the ZVHD2 format, go to **Step 5**.

   – If the image file is converted to the RAW format, go to **Step 4**.

Step 4 Use **CreateMF.jar** to generate a bitmap file.

1. Ensure that JDK has been installed on the ECS.

   Run the following commands to check whether JDK is installed:

   source /etc/profile

   java -version

   If a Java version is displayed, JDK has been installed.

2. Run the following command to enter the directory where **CreateMF.jar** is stored:

   cd /usr/createMF

3. Run the following command to generate a bitmap file:

   java -jar CreateMF.jar */Original RAW file path/Generated .mf file path*

   Example:

   java -jar CreateMF.jar image01.raw image01.mf

> **CAUTION**
>
> – The generated .mf bitmap file must have the same prefix as the RAW image file. For example, if the image file name is **image01.raw**, the generated bitmap file name is **image01.mf**.

Step 5 Use **s3cmd** to upload the file(s) to an OBS bucket.

1. Install **s3cmd** on the ECS.

   If **s3cmd** has been installed, skip this step.

   a. Run the following command to install setuptools:

      yum install python-setuptools

   b. Run the following command to install wget:

      yum install wget

   c. Run the following commands to obtain the **s3cmd** software package:

      wget https://github.com/s3tools/s3cmd/archive/master.zip

      mv master.zip s3cmd-master.zip

   d. Run the following commands to install **s3cmd**:

      unzip s3cmd-master.zip

      cd s3cmd-master

      python setup.py install

2. Configure **s3cmd**.

   Run the following command to configure **s3cmd**:

   s3cmd --configure
   Access Key: *Enter an AK.*
   Secret Key: *Enter an SK.*
   Default Region: *Enter the region where the bucket is located.*
   S3 Endpoint: *Refer to the OBS endpoint.*
   DNS-style bucket+hostname:port template for accessing a bucket: *Enter a server address with a bucket name, for example, mybucket.obs.myclouds.com.*
   Encryption password: *Press Enter.*
   Path to GPG program: *Press Enter.*
   Use HTTPS protocol: *Specifies whether to use HTTPS. The value can be Yes or No.*
   HTTP Proxy server name: *Specifies the proxy address used to connect the cloud from an external network. (If you do not need it, press Enter.)*
   HTTP Proxy server port: *Specifies the proxy port used to connect to the cloud from an external network (If you do not need it, press Enter.)*
   Test access with supplied credentials? y
   (If "Success. Your access key and secret key worked fine :-)" is displayed, the connection is successful.)
   Save settings? y *(Specifies whether to save the configurations. If you enter y, the configuration will be saved.)*

> **NOTE**
>
> The configurations will be stored in **/root/.s3cfg**. If you want to modify these configurations, run the **s3cmd --configure** command to configure the parameters or run the **vi .s3cfg** command to edit the **.s3cfg** file.

3. Run the following command to upload the ZVHD2 image file (or the RAW image file and its bitmap file) to an OBS bucket.

   s3cmd put *image01.zvhd2* **s3://***mybucket***/**

> **CAUTION**
>
> The .mf bitmap file must be in the same OBS bucket as the RAW image file.

Step 6 Register a private image.

You can register a private image using the converted ZVHD2 or RAW file on the console or using an API.

Method 1: Register a private image on the console.

1. Access the IMS console.
   a. Log in to the management console.
   b. Under **Compute**, click **Image Management Service**.
      The IMS console is displayed.
2. In the upper right corner, click **Create Image**.
3. In the **Image Type and Source** area, select **System disk image** or **Data disk image** for **Type**.
4. Select **Image File** for **Source**. Select the bucket storing the ZVHD2 or RAW image file and then select the image file.
5. Select **Enable Fast Create**, and select the sentence following **Image File Preparation**.
6. Set parameters as prompted.
   For details about the parameters, see **Register an Image File as a Private Image**.

> **CAUTION**
>
> - The OS must be the same as that in the image file.
> - The system disk capacity must be greater than that specified in the image file.
>
>   Run the following command to check the system disk capacity in the image file:
>
>   **qemu-img-hw info** *test.zvhd2*

Method 2: Register a private image using an API.

The API is POST /v2/cloudimages/quickimport/action.

For details about how to call this API, see **Importing an Image File Quickly**.

----End

Appendix 1: Common qemu-img-hw Commands

- Converting image file formats: **qemu-img-hw convert -p -O** *Target_image_format Source_image__file Target_image_file*

  The parameters are described as follows:

  -p: indicates the conversion progress.

  The part following **-O** (which must be in upper case) consists of the target image format, source image file, and target image file.

  For example, run the following command to convert a QCOW2 image file to a ZVHD2 file:

  qemu-img-hw convert -p -O zvhd2 test.qcow2 test.zvhd2
- Querying image file information: **qemu-img-hw info** *Source image file*

  An example command is **qemu-img-hw info test.zvhd2**.
- Viewing help information: **qemu-img-hw -help**

Appendix 2: Common Errors During qemu-img-hw Running

- Symptom:

  The following information is displayed when you run the **qemu-img-hw** command:

  ```
  ./qemu-img-hw: /lib64/libc.so.6: version `GLIBC_2.14' not found (required by ./qemu-img-hw)
  ```

  Solution:

  Run the **strings /lib64/libc.so.6 | grep glibc** command to check the glibc version. If the version is too early, install the latest version. Run the following commands in sequence:

  wget http://ftp.gnu.org/gnu/glibc/glibc-2.15.tar.gz

  wget http://ftp.gnu.org/gnu/glibc/glibc-ports-2.15.tar.gz

  tar -xvf glibc-2.15.tar.gz

  tar -xvf glibc-ports-2.15.tar.gz

  mv glibc-ports-2.15 glibc-2.15/ports

  mkdir glibc-build-2.15

  cd glibc-build-2.15

  ../glibc-2.15/configure --prefix=/usr --disable-profile --enable-add-ons --with-headers=/usr/include --with-binutils=/usr/bin

  NOTE

  If **configure: error: no acceptable C compiler found in $PATH** is displayed, run the **yum -y install gcc** command.

  make

  make install
- Symptom:

  The following information is displayed when you run the **qemu-img-hw** command:


```
./qemu-img-hw: error while loading shared libraries: libaio.so.1: cannot open shared object file: No such file or directory
```

Solution: Run the **yum install libaio** command first.

- Symptom:

  The following information is displayed when you run the **qemu-img-hw** command:

  ```
  ./qemu-img-hu: error while loading shared libraries: libcrypto.so.10: cannot open shared object file: No such file or directory
  ```

  Solution: Run **openssl version** to check whether the OpenSSL version is later than 1.0. If yes, install OpenSSL 1.0.

  Run the following commands to install OpenSSL 1.0:

  wget https://github.com/openssl/openssl/releases/download/OpenSSL_1_0_2k/openssl-1.0.2k.tar.gz

  tar -xvf openssl-1.0.2k.tar.gz

  cd openssl-1.0.2k

  ./config -d shared --prefix=/tmp/openssl (custom installation directory)

  make

  make install

  cp /tmp/openssl/lib/libcrypto.so.1.0.0 /usr/lib64/libcrypto.so.10

  Delete the **/usr/lib64/libcrypto.so.10** file if you do not need it any longer.

4.6.3 Fast Import of an Image File in Windows

Scenarios

This section describes how to convert the format of an image file on a Windows server and then quickly import it to the cloud platform. You are advised to use a local Windows PC for converting image formats and generating bitmap files.

In Windows, use the open-source tool **qemu-img** to convert image formats. **qemu-img** supports conversion between image files of the VHD, VMDK, QCOW2, RAW, VHDX, QCOW, VDI, and QED formats. Convert an image to the RAW format and then use the **CreateMF.jar** tool to generate a bitmap file.

Prerequisites

- The image file has been initially configured as instructed in **Table 2-2** based on the OS in the image file.
- An OBS bucket has been created on the management console, and OBS Browser+ has been ready.

Procedure

Step 1 Install the open-source image conversion tool **qemu-img**. For details, see **Converting the Image Format Using qemu-img**.

Step 2 Run the **cmd** command to go to the **qemu-img** installation directory and run the **qemu-img** command to convert the image file to the RAW format.

For example, run the following command to convert an **image.qcow2** file to an **image.raw** file:

qemu-img convert -p -O raw image.qcow2 image.raw

Step 3 Use **CreateMF.jar** to generate a bitmap file.

1. Obtain the **CreateMF.jar** package and decompress it.

   Table 4-5 CreateMF.jar package

Tool Package	How to Obtain
createMF.zip	**https://cn-south-1-cloud-reset-pwd.obs.cn-south-1.myhuaweicloud.com/imageImportTools/createMF.zip**

2. Ensure that JDK has been installed in the current environment.

   You can verify the installation by running **cmd.exe** and then **java -version**. If Java version information is displayed, JDK has been installed.

3. Go to the directory where **CreateMF.jar** is stored.

   For example, if you have downloaded **CreateMF.jar** to **D:/test**, run the following commands to access the directory:

   D:

   cd test

4. Run the following command to generate a bitmap file for the RAW image file:

   java -jar CreateMF.jar D:/image01.raw D:/image01.mf

   CAUTION

   - The generated .mf bitmap file must have the same prefix as the RAW image file. For example, if the image file name is **image01.raw**, the generated bitmap file name is **image01.mf**.

Step 4 Use OBS Browser+ to upload the converted image file and its bitmap file to an OBS bucket.

You must upload the RAW image file and its bitmap file to the same OBS bucket.

Step 5 Register a private image.

You can register a private image using the converted ZVHD2 or RAW file on the console or using an API.

Method 1: Register a private image on the console.

1. Access the IMS console.
   a. Log in to the console.
   b. Under **Compute**, click **Image Management Service**.
      The IMS console is displayed.
2. In the upper right corner, click **Create Image**.
3. In the **Image Type and Source** area, select **System disk image** or **Data disk image** for **Type**.

4. Select **Image File** for **Source**. Select the bucket storing the ZVHD2 or RAW image file and then select the image file. For the RAW format, you also need to upload a bitmap file with the same name as the image file.
5. Select **Enable Fast Create**, and select the sentence following **Image File Preparation**.
6. Set parameters as prompted.

   For details about the parameters, see **Register an Image File as a Private Image**.

   CAUTION

   - The OS must be the same as that in the image file.
   - The system disk capacity must be greater than that specified in the image file.

     Run the following command to check the system disk capacity in the image file:

     qemu-img-hw info *test.zvhd2*

Method 2: Register a private image using an API.

The API is POST /v2/cloudimages/quickimport/action.

For details about how to call this API, see **Importing an Image File Quickly**.

----End

5 Managing Private Images

5.1 Creating an ECS from an Image

Scenarios

You can use a public, private, or shared image to create an ECS.

- If you use a public image, the created ECS contains an OS and preinstalled public applications. You need to install other applications as needed.
- If you use a private or shared image, the created ECS contains an OS, preinstalled public applications, and a user's personal applications.

Procedure

1. Access the IMS console.
   a. Log in to the management console.
   b. Under **Compute**, click **Image Management Service**.
      The IMS console is displayed.
2. Click the **Public Images**, **Private Images**, or **Images Shared with Me** tab to display the image list.
3. Locate the row that contains your desired image and click **Apply for Server** in the **Operation** column.
4. For details about how to create an ECS, see **Purchasing an ECS in Custom Config Mode**.
   When you use a system disk image to create an ECS, you can set the ECS specifications and system disk type without considering those in the image, but the system disk capacity can only be larger than that in the image.
   When you use a full-ECS image to create an ECS, the system and data disk information defaulted by the image will be automatically displayed. You can increase the capacity of a system disk or data disks, but cannot decrease it.

   NOTE

   If a full-ECS image contains multiple data disks, it takes some time to load and display the disk information.

5.2 Modifying an Image

Scenarios

You can modify the following attributes of a private image:

- Name
- Description
- Minimum memory
- Maximum memory
- NIC multi-queue

  NIC multi-queue enables multiple CPUs to process NIC interrupts for load balancing. For details, see **How Do I Enable NIC Multi-Queue for an Image?**
- Boot mode

Constraints

- You can only modify a private image in the **Normal** state.

Procedure

Use any of the following methods to modify an image:

Method 1:

1. Access the IMS console.
   a. Log in to the management console.
   b. Under **Compute**, click **Image Management Service**.
      The IMS console is displayed.
2. Click the **Private Images** tab to display the image list.
3. Locate the row that contains the image and click **Modify** in the **Operation** column.
4. In the **Modify Image** dialog box, modify the image.

Figure 5-1 Modifying an image

Method 2:

1. Access the IMS console.
   a. Log in to the management console.
   b. Under **Compute**, click **Image Management Service**.
      The IMS console is displayed.
2. Click the **Private Images** tab to display the image list.
3. On the image list, click the name of the target image.
4. On the image details page, click **Modify** in the upper right corner. In the **Modify Image** dialog box, modify image attributes.

Method 3:

The system allows you to quickly change the name of a private image.

1. Access the IMS console.
   a. Log in to the management console.
   b. Under **Compute**, click **Image Management Service**.
      The IMS console is displayed.
2. Click the **Private Images** tab.
3. In the private image list, locate the target image and move the cursor to the **Name** column.
4. Click  to change the image name.
5. Click **OK**.

5.3 Exporting an Image

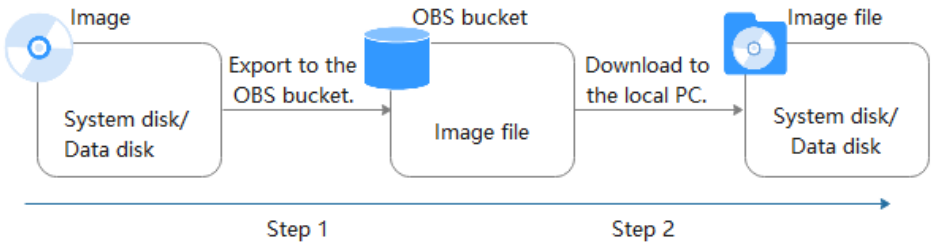
Scenarios

You can export a private image to a standard OBS bucket and then download it to your local PC.

Background

- You can export images of cloud servers from the cloud platform and then use the exported images to create cloud servers for use in on-premises clusters or private clouds. The following figure shows the process of exporting an image.

  Figure 5-2 Exporting an image

- The time required for exporting an image depends on the image size and the number of concurrent export tasks.
- You can export images in ZVHD2, QCOW2, VMDK, VHD, or ZVHD format. The default format of a private image is ZVHD2. Images exported in different formats may vary in size.
- For an image larger than 128 GB, enable **Fast Export** when exporting it to an OBS bucket. The image will be exported as a ZVHD2 file. You can convert the image format after it is exported.

  NOTE

  is unavailable for encrypted images. To export an encrypted image, decrypt it first.

Constraints

- An image can only be exported to a Standard bucket that is in the same region as the image.
- The following private images cannot be exported:
  - Full-ECS images
  - ISO images
  - Private images created from an Ubuntu public image
- The image size must be less than 1 TB. Images larger than 128 GB support only fast export.

Prerequisites

- You have Administrator permissions for OBS.
- An OBS bucket is available for storing the private image in the region where the private image is located.

  If no OBS bucket is available, create one by referring to **Creating a Bucket**. Select **Standard** for **Storage Class**.

NOTE

You will be charged for storing exported images in the OBS bucket. For details, see **OBS Pricing Details**.

Procedure

1. Access the IMS console.
   a. Log in to the management console.
   b. Under **Compute**, click **Image Management Service**.

      The IMS console is displayed.
2. Locate the row that contains the image to be exported, click **More** in the **Operation** column and select **Export**.
3. In the displayed **Export Image** dialog box, set the following parameters:
   - **Fast Export**: To export an image larger than 128 GB, you must enable fast export, and you cannot specify the format of the exported image (which can only be ZVHD2). After exporting the image, you can use **qemu-img-hw** to convert it to your desired format. For details, see **Converting the Image Format Using qemu-img-hw**.

     NOTE

     For details about the differences between standard and fast export, see **What Are the Differences Between Standard and Fast Import/Export?**
   - **Format**: Select one from **qcow2**, **vmdk**, **vhd**, and **zvhd** as you need.
   - **Name**: Enter a name that is easy to identify.
   - **Storage Path**: Click  to expand the bucket list and select an OBS bucket for storing the exported image.

     NOTE

     An image can only be exported to a Standard bucket that is in the same region as the image. So, only such buckets are listed.
4. Click **OK**.

   You can view the image export progress above the private image list.

Follow-up Procedure

After the image is exported, you can download it from the OBS bucket through the management console or OBS Browser+. For details, see **Downloading an Object**.

5.4 Exporting an Image List

Scenarios

You can export the public or private image list in the current region as a CSV file to your local PC.

- For public images, the file describes the image name, image status, OS, image type, image creation time, system disk, and minimum memory.
- For private images, the file describes the image name, image ID, image status, OS, image type, image creation time, disk capacities, shared disks, image size, and encryption.

Exporting Private Image Information

1. Access the IMS console.
   a. Log in to the management console.
   b. Under **Compute**, click **Image Management Service**.
      The IMS console is displayed.
2. On the **Private Images** tab, click **Export** above the image list and select what images to export.
   The system will automatically export the list of selected private images in the current region under your account to a local directory.

Exporting Public Image Information

1. Access the IMS console.
   a. Log in to the management console.
   b. Under **Compute**, click **Image Management Service**.
      The IMS console is displayed.
2. On the **Public Images** tab, click **Export** above the image list, and select **Export all data to an XLSX file**.
   The system will automatically export the list of all public images in the current region to a local directory.

5.5 Checking the Disk Capacity of an Image

Scenarios

You can check the disk capacity of a private image.

- To check the disk capacity of a system disk image, data disk image, or ISO image, see **Check the Disk Capacity of a System Disk Image, Data Disk Image, or ISO Image**.
- To check the disk capacity of a full-ECS image, see **Check the Disk Capacity of a Full-ECS Image**.

Check the Disk Capacity of a System Disk Image, Data Disk Image, or ISO Image

Check the disk capacity in the **Disk Capacity** column of the private image list.

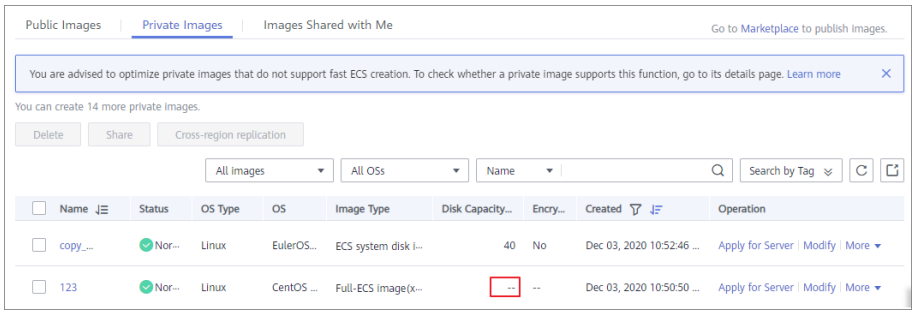
1. Access the IMS console.
   a. Log in to the management console.
   b. Under **Compute**, click **Image Management Service**.
      The IMS console is displayed.
2. Click the **Private Images** tab to display the image list.
3. Check the value in the **Disk Capacity** column. The unit is **GB**.

Check the Disk Capacity of a Full-ECS Image

The disk capacity of a full-ECS image is the sum of the system disk capacity and data disk capacity in the backup from which the full-ECS image is created.

1. Access the IMS console.
   a. Log in to the management console.
   b. Under **Compute**, click **Image Management Service**.
      The IMS console is displayed.
2. Click the **Private Images** tab to display the image list.
   The value in the **Disk Capacity** column is **--**.

   Figure 5-3 Checking the disk capacity of a full-ECS image



3. Click the full-ECS image name.
4. Click the **Backups** tab and view the capacities of the system disk and data disks in the backup.
   Disk capacity of a full-ECS image = Capacity of the system disk in the backup + Capacity of data disks in the backup
   For example:
   - If the system disk capacity is 40 GB and no data disk is attached, the capacity of the full-ECS image disk is 40 GB.
   - If the system disk capacity is 40 GB and data disk capacity is 40 GB, the full-ECS image disk capacity is 80 GB.

5.6 Deleting Images

Scenarios

You can delete private images that will no longer be used.

- Deleted private images cannot be retrieved. Perform this operation only when absolutely necessary.
- After a private image is deleted, it cannot be used to create ECSs or EVS disks.
- After a private image is deleted, ECSs created from the image can still be used and are still billed. However, the OS cannot be reinstalled for the ECSs and ECSs with the same configuration cannot be created.
- Deleting the source image of a replicated image has no effect on the replicated image. Similarly, deleting a replicated image has no effect on its source.
- If a full-ECS image is still being created when you delete it, some intermediate backups may fail to be deleted. To avoid generating any unnecessary expenditures, you can delete them on the CSBS or CBR console.

Constraints

- Private images that have been published in KooGallery cannot be deleted.

Procedure

1. Access the IMS console.
   a. Log in to the management console.
   b. Under **Compute**, click **Image Management Service**.
      The IMS console is displayed.
2. Click the **Private Images** tab to display the image list.
3. Locate the row that contains the image, choose **More** > **Delete** in the **Operation** column.

   NOTE

   To delete multiple images:
   1. Select the images you want to delete in the image list.
   2. Click **Delete** above the image list.
4. (Optional) Select **Delete CSBS backups or cloud server backups of the full-ECS images**.

   This parameter is available only when you have selected full-ECS images from the image list.

   If you select this option, the system will delete CSBS or CBR backups of the full-ECS images. After the CSBS backups or CBR backups are deleted, they are no longer billed.

NOTE

If CSBS or CBR backups are not deleted, they will continue to be billed. You can delete them later on the CSBS or CBR console.

5. Click **OK**. The images and associated resources (if any) are deleted immediately.

5.7 Sharing Images

5.7.1 Overview

You can share your private images with other tenants. The tenants who accept the shared images can use the images to create ECSs of the same specifications.

CAUTION

The cloud platform is not responsible for the integrity or security of shared images. When you use a shared image, ensure that the image is from a trusted sharer.

Constraints

- You can share images only within the region where they reside.
- A system disk image or data disk image can be shared with up to 128 tenants, and a full-ECS image can be shared with up to 10 tenants.
- A full-ECS image is shareable only when it is created from a CBR backup or from an ECS that has never had a CSBS backup.

Procedure

If you want to share a private image with another tenant, the procedure is as follows:

1. You obtain the project ID from the tenant.
2. You share an image with the tenant.
3. The tenant accepts the shared image.

   After accepting the image, the tenant can use it to create ECSs.

FAQ

If you have any questions, see **Image Sharing FAQ**.

5.7.2 Obtaining a Project ID

Scenarios

Before a tenant shares an image with you, you need to provide this tenant with your project ID.

Procedure

1. Access the IMS console.
   a. Log in to the management console.
   b. Under **Compute**, click **Image Management Service**.
      The IMS console is displayed.
2. Click the username in the upper right corner and select **My Credentials** from the drop-down list.
   On the **My Credentials** page, view the project ID.
   Images can only be shared within the region where they were created. So, obtain the project ID from the same region as the images.

5.7.3 Sharing Specified Images

Scenarios

After obtaining the project ID from a tenant, you can share specified private images with the tenant. You can share a single image or multiple images as needed.

Prerequisites

- You have obtained the project ID from the target tenant.
- Before sharing an image, ensure that any sensitive data has been deleted from the image.

Procedure

- Share multiple images.
  a. Access the IMS console.
     i. Log in to the management console.
     ii. Under **Compute**, click **Image Management Service**.
        The IMS console is displayed.
  b. Click the **Private Images** tab.
  c. Select the private images to share and click **Share** above the image list.
  d. In the **Share Image** dialog box, enter the project ID of the target tenant.
     To share images with more than one tenant, separate their project IDs with commas (,).

     NOTE

     - You can enter a maximum of 100 project IDs at a time.
     - You can share images only within the region where they reside.
     - If the target tenant is a multi-project user, you can share images to any project of the tenant.
  e. Click **OK**.
- Share a single image.

a. Access the IMS console.
   i. Log in to the management console.
   ii. Under **Compute**, click **Image Management Service**.
   The IMS console is displayed.
b. Click the **Private Images** tab.
c. Locate the row that contains the private image you are to share, click **More** in the **Operation** column, and select **Share** from the drop-down list.
d. In the **Share Image** dialog box, enter the project ID of the target tenant.
   To share an image with more than one tenant, separate their project IDs with commas (,).

   NOTE

   - You can enter a maximum of 100 project IDs at a time.
   - You can share images only within the region where they reside.
   - If the target tenant is a multi-project user, you can share images to any project of the tenant.
e. Click **OK**.

Related Operations

After you share images with a tenant, the tenant can accept the shared images on the **Images Shared with Me** page on the IMS console. For details, see **Accepting or Rejecting Shared Images**.

5.7.4 Accepting or Rejecting Shared Images

Scenarios

After another tenant shares images with you, you will receive a message. You can choose to accept or reject all or some of the shared images.

NOTE

- If you are not in the same region as the tenant sharing the images with you, you will not receive the message.

Prerequisites

- Another tenant has shared images with you.
- If the shared image is a full-ECS image, you need to create a server backup vault to store the full-ECS image and the backups of the full-ECS image before accepting the shared image. When creating a server backup vault, set **Protection Type** to **Backup**.

Procedure

1. Access the IMS console.
   a. Log in to the management console.

b. Under **Compute**, click **Image Management Service**.

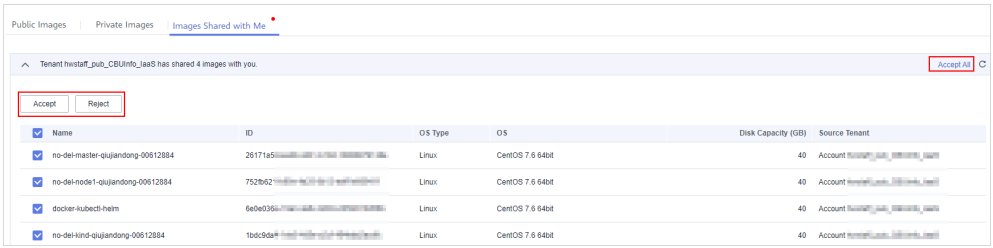
The IMS console is displayed.

2. In the upper left corner, switch to the region where the target project is and then select the project.
3. Click the **Images Shared with Me** tab.

A message is displayed above the image list asking you whether to accept the shared images.

- To accept all the shared images, click **Accept All** in the upper right corner.
- To accept some images, select the images and click **Accept**.
- To reject some images, select the images and click **Reject**.

Figure 5-4 Accepting or rejecting shared images



NOTE

If no message is displayed, check whether you have selected a correct region.

4. (Optional) In the **Accept Full-ECS Image** dialog box, select a server backup vault with the **Backup** protection type and click **OK**.

This dialog box is displayed when the shared image is a full-ECS image.

When accepting a full-ECS image, you must specify a vault for storing the CBR backups associated with the full-ECS image. The vault capacity must be no less than the total capacities of the system disk and data disk backups.

NOTE

For more information about server backup vaults, see **What Is CBR?**

Results

- **Pending**: If you do not immediately accept or reject a shared image, the image is in the **Pending** state.

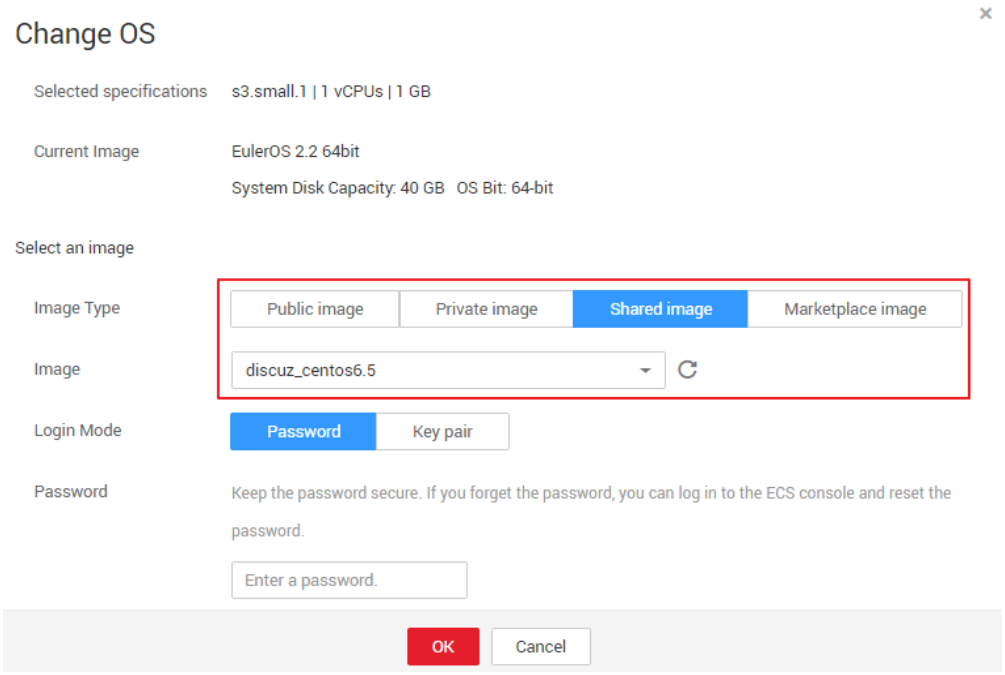
  A pending shared image is not displayed in the shared image list.
- **Accepted**: After an image is accepted, it is displayed in the shared image list. You can use the image to create ECSs.
- **Rejected**: After an image is rejected, it is not displayed in the shared image list. You can click **Rejected Images** to view the images you have rejected and you can still choose to accept them.

Follow-up Procedure

After accepting a system disk image shared by another tenant, you can:

- Use the image to create one or more ECSs (select **Shared Image** during ECS creation). For details, see **Purchasing an ECS in Custom Config Mode**.
- Use the image to change the OS of existing ECSs. For details, see **Changing the OS**.

Figure 5-5 Changing the OS



After accepting a data disk image shared by another tenant, you can use the image to create EVS disks (locate the row that contains the image and click **Create Data Disk** in the **Operation** column).

5.7.5 Rejecting Accepted Images

Scenarios

You can reject accepted images if you no longer need them.

After an image is rejected, it will not be displayed on the **Images Shared with Me** page.

Prerequisites

You have accepted images shared by other users.

Procedure

1. Access the IMS console.
   a. Log in to the management console.
   b. Under **Compute**, click **Image Management Service**.
      The IMS console is displayed.
2. Click the **Images Shared with Me** tab.

3. Determine the next step based on how many images you are to reject.
   - To reject multiple images: select the images to be rejected and click **Reject** above the image list. In the displayed dialog box, click **Yes**.
   - To reject a specific image: locate the image to be rejected and choose **More** > **Reject** in the **Operation** column. In the displayed dialog box, click **Yes**.

5.7.6 Accepting Rejected Images

Scenarios

If you want to use the shared images you have rejected, you can accept them from the list of rejected images.

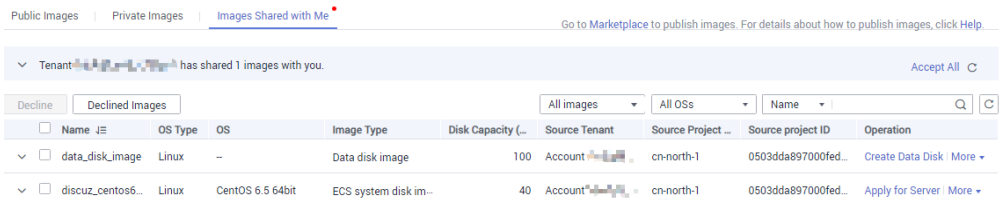
Prerequisites

- You have rejected the images shared by others.
- The image owners have not stopped sharing the images.

Procedure

1. Access the IMS console.
   a. Log in to the management console.
   b. Under **Compute**, click **Image Management Service**.
      The IMS console is displayed.
2. Click the **Images Shared with Me** tab.

   Figure 5-6 Images Shared with Me



3. Click **Rejected Images**. All the rejected images are displayed.
4. Select the images you want to accept and click **Accept**.
5. Check the accepted images in the shared image list.

5.7.7 Stopping Sharing Images

Scenarios

You can stop sharing images. After you stop sharing an image:

- The image will be invisible to the recipient on the management console and no data will be returned when the recipient query the image through an API.
- The recipient cannot use the image to create an ECS or EVS disk, or change the OS of an ECS.

- The recipient cannot reinstall the OS of the ECSs created from the shared image or create instances identical with these ECSs.

Prerequisites

You have shared private images with others.

Procedure

1. Access the IMS console.
   a. Log in to the management console.
   b. Under **Compute**, click **Image Management Service**.
      The IMS console is displayed.
2. Click the **Private Images** tab.
3. Locate the row that contains the private image that you no longer want to share, and choose **More** > **Share** in the **Operation** column.
4. In the **Share Image** dialog box, click the **Stop Sharing** tab.
5. Select the project for which you want to stop the image sharing and click **OK**.

5.7.8 Adding Tenants Who Can Use Shared Images

Scenarios

In addition to the tenants you have shared images with, you can add more tenants who can use the shared images.

Prerequisites

- You have shared private images.
- You have obtained the project IDs of the tenants to be added.

Procedure

1. Access the IMS console.
   a. Log in to the management console.
   b. Under **Compute**, click **Image Management Service**.
      The IMS console is displayed.
2. Click the **Private Images** tab.
3. Click the image name to view image details.
4. Click **Add Tenant**.
5. In the **Add Tenant** dialog box, enter the project ID of the tenant to be added, and click **OK**.
   To add multiple tenants, enter their project IDs and separate them with commas (,). Click **OK**.

NOTE

- You can share images only within the region where they reside.
- A project ID uniquely identifies a tenant in a specific region. If you enter a project ID that belongs to a different region from the images, a message will display indicating that the tenant cannot be found.

5.7.9 Deleting Image Recipients Who Can Use Shared Images

Scenarios

This section describes how to delete image recipients who can use shared images.

Prerequisites

- You have shared private images.
- You have obtained the project IDs of the image recipients.

Procedure

1. Access the IMS console.
   a. Log in to the management console.
   b. Under **Compute**, click **Image Management Service**.
      The IMS console is displayed.
2. Click the **Private Images** tab.
3. Click the image name to view image details.
4. View the tenants who can use shared image.
5. Delete one or all of the recipients:
   – To delete a single image recipient, locate the target recipient and click **Delete**.
   – To delete all image recipients, click **Delete All** above the image recipient list.
6. Click **Yes**.

5.7.10 Replicating a Shared Image

Scenarios

Replicate a private image that was shared with you. That image will be displayed in your private image list. You can export, share, and replicate this image, or use it to create ECSs.

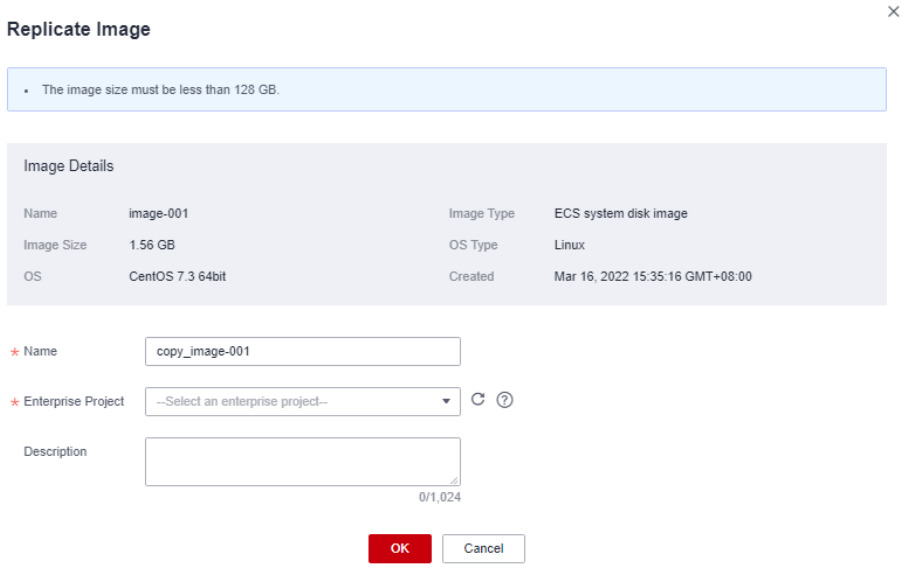
Constraints

- Currently, only system and data disk images can be replicated.
- Currently, shared images can only be replicated within a region.
- An image to be replicated cannot be larger than 128 GB.
- An image cannot be replicated to generate an encrypted image.

Procedure

1. Access the IMS console.
   a. Log in to the management console.
   b. Under **Compute**, click **Image Management Service**.
      The IMS console is displayed.
2. On the displayed IMS console, click the **Images Shared with Me** tab.
   Shared images that are accepted are displayed.
3. Locate a shared image, click **More** in the **Operation** column, and select **Replicate** from the drop-down list.

   Figure 5-7 Replicating an image



4. In the **Replicate Image** dialog box, specify **Name**, **Enterprise Project**, and **Description**.
5. Click **OK**.
   You can click the **Private Images** tab and view the creation progress of the image in the private image list. When the image status changes to **Normal**, the image creation is complete.

5.8 Encrypting an Image

You can create encrypted images to securely store data.

NOTE

- To use image encryption, you must apply for KMS Administrator permissions.
- An encrypted full-ECS image may contain multiple disks. The encryption status of each disk may be different. So, the encryption status of a full-ECS image is displayed as - in the image list.
- An encrypted full-ECS image inherits the encryption status of each disk of the ECS used to create the image. The inherited status cannot be changed.
- For how to check the encryption status of a disk in an encrypted full-ECS image, see

Constraints

- DEW must be enabled.
- An image encrypted using the default key cannot be shared with other users.
- Encrypted images cannot be published in KooGallery.
- The system disk of an ECS created from an encrypted image is also encrypted, and its key is the same as the image key.
- If an ECS has an encrypted system disk, private images created from the ECS are also encrypted.
- The key used for encrypting an image cannot be changed.
- If the key used for encrypting an image is disabled or deleted, the image is unavailable.
- Encrypted full-ECS images cannot be replicated across regions.

Introduction

You can create an encrypted image from an image file or an encrypted ECS.

- Create an encrypted image from an image file.

  When you register an image file as a private image, select **KMS encryption** and select a key. For details, see **Creating a System Disk Image from an Image File**.

- Create an encrypted image from an encrypted ECS.

  When you use an ECS to create a private image, if the system disk of the ECS is encrypted, the private image created from this ECS will also be encrypted. The key used for encrypting the image is the same as that used for encrypting the system disk. For details, see **Creating a System Disk Image from an ECS**.

5.8.1 Overview

IMS allows you to create encrypted images to ensure data security.

NOTE

- To use image encryption, you must apply for KMS Administrator permissions.
- An encrypted full-ECS image may contain multiple disks. The encryption status of each disk may be different. So, the encryption status of a full-ECS image is displayed as - in the image list.
- An encrypted full-ECS image inherits the encryption status of each disk of the ECS used to create the image. The inherited status cannot be changed.
- For how to check the encryption status of a disk in an encrypted full-ECS image, see

Constraints

- DEW must be enabled.
- An image encrypted using the default key cannot be shared with other users.
- Encrypted images cannot be published in KooGallery.
- The system disk of an ECS created from an encrypted image is also encrypted, and its key is the same as the image key.
- If an ECS has an encrypted system disk, private images created from the ECS are also encrypted.
- The key used for encrypting an image cannot be changed.
- If the key used for encrypting an image is disabled or deleted, the image is unavailable.
- Encrypted full-ECS images cannot be replicated across regions.

5.8.2 Creating an Encrypted Image

Introduction

You can create an encrypted image from an image file or an encrypted ECS.

- Create an encrypted image from an image file.

  When you register an image file as a private image, select **KMS encryption** and select a key. For details, see **Creating a System Disk Image from an Image File**.
- Create an encrypted image from an encrypted ECS.

  When you use an ECS to create a private image, if the system disk of the ECS is encrypted, the private image created from this ECS will also be encrypted. The key used for encrypting the image is the same as that used for encrypting the system disk. For details, see **Creating a System Disk Image from an ECS**.

5.9 Replicating Images Within a Region

Scenarios

You can convert encrypted and unencrypted images into each other or enable some advanced features (such as fast ECS creation from an image) using in-region image replication. You may need to replicate an image to:

- Replicate an encrypted image to an unencrypted one.

  Encrypted images cannot be shared with other tenants. If you want to share an encrypted image, you can replicate it to an unencrypted one.
- Replicate an encrypted image to an encrypted one.

  Keys for encrypting the images cannot be changed. If you want to change the key of an encrypted image, you can replicate this image to a new one and encrypt the new image using an encryption key.
- Replicate an unencrypted image to an encrypted one.

  If you want to store an unencrypted image in an encrypted way, you can replicate this image as a new one and encrypt the new image using a key.

- Optimize a system disk image so that it can be used for fast ECS creation.

  Fast Create greatly reduces the time required for creating ECSs from a system disk image. Currently, this feature is supported by all newly created system disk images by default. Existing system disk images may not support it. You can enable them to support this feature through in-region image replication. For example, if image A does not support fast ECS creation, you can replicate it to generate image copy_A that supports fast ECS creation.

Constraints

- Full-ECS images cannot be replicated within the same region.
- Private images created using ISO files do not support in-region replication.
- The size of an image to be replicated within a region cannot be greater than 128 GB.

Prerequisites

The images to be replicated are in the **Normal** state.

Procedure

1. Access the IMS console.
   a. Log in to the management console.
   b. Under **Compute**, click **Image Management Service**.

      The IMS console is displayed.
2. Locate the row that contains the image to be replicated, click **More** in the **Operation** column, and select **Replicate**.
3. In the displayed **Replicate Image** dialog box, set the following parameters:
   - **Name**: Enter a name that is easy to identify.
   - **Enterprise Project**: Select an enterprise project from the drop-down list. This parameter is available only if you have enabled enterprise projects or your account is an enterprise account. To enable this function, contact your customer manager.
   - (Optional) **Description**: Describe the replication.
   - **Encryption**: If you want to encrypt the image or change a key, select **KMS encryption** and select the key you want to use from the drop-down list.
4. Click **OK**.

   On the **Private Images** page, view the replication progress. If the status of the new image becomes **Normal**, the image replication is successful.

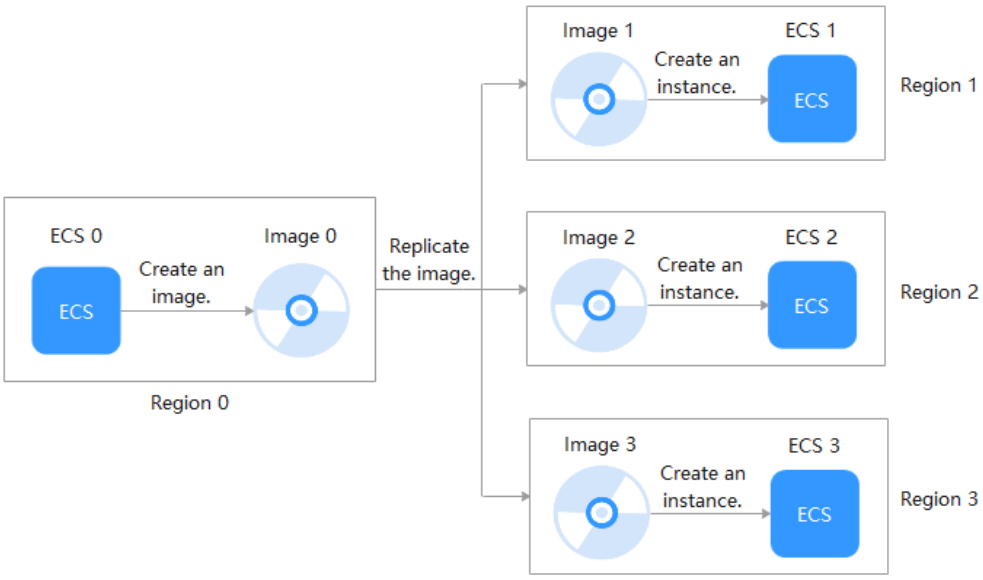
5.10 Replicating Images Across Regions

Scenarios

An image is a regional resource. If you want to use a private image in another region, you can replicate it to the target region.

Cross-region image replication is required for system HA typically when your system is deployed in multiple regions. In most cases, ECSs are deployed in multiple regions (including regions outside the Chinese mainland). If you want to clone an ECS across regions, you can replicate its image across the regions and then use the image to create identical ECSs in the target region.

Figure 5-8 Typical cross-region replication



Background

- Cross-region replication is applicable to cross-region server deployment or data backup. It is often used together with image sharing for cross-region, cross-account image replication. The following table describes image replication in different scenarios.

Scenario	Description	Procedure
Cross-region replication under the same account	After the replication is complete, a new image is generated in the target region. The new image has an ID that is different from the source image ID.	See this section.
Cross-region, cross-account replication	Replicate the image to the target region and share it with other accounts.	See this section and **Sharing Specified Images**.

Scenario	Description	Procedure
Cross-account replication in the same region	After the replication is complete, the image is shared with the target tenant. The target tenant can use the image (with the same ID as the source image) but the image owner is still the tenant who shared it.	See **Sharing Specified Images**.

- When a full-ECS image is replicated across regions, the associated CSBS or CBR backups will also be replicated. Therefore, you will be charged for these backups in the target region.
- It takes a while to complete a cross-region replication task. The time required for replicating an image across regions depends on the network speed, image size, and number of concurrent tasks.
- You can select multiple images for cross-region replication at a time. However, you are not allowed to select an ISO image, encrypted image, frozen image, or the image that is being created.
- An agency is required for cross-region image replication. This agency must have the permissions for cross-region image replication in the destination region.

  For example, if you want to replicate a system or data disk image from region A to region B, the agency must have the permissions of IMS CrossCopyAgencyPolicy in region B. For how to create an agency, see **Create an Agency**.

Constraints

- Cross-region replication of full-ECS images is only available for certain regions. You can see on the console if it is available for a given region.

  If a full-ECS image cannot be replicated to a different region, you can use it to create an ECS, use the ECS to create a system disk image and a data disk image, and replicate the images to the destination region.

  A full-ECS image created using an ECS backup can be replicated from the region where they reside to another region, but the replicated full-ECS image cannot be replicated across regions again.

  If cross-region replication of system and data disk images is not available in a region, cross-region replication of full-ECS images is not available in that region, either.
- You can replicate only private images across regions. If you want to replicate an image of another type (for example, a public image) across regions, you can use the image to create an ECS, use the ECS to create a private image, and then replicate the private image across regions.

  NOTE

  A private image cannot be replicated across regions after it is published in KooGallery.
- The size of each image to be replicated across regions cannot be larger than 128 GB.
- You can replicate only five images across regions at a time.

- ISO images and encrypted images cannot be replicated across regions.

Procedure

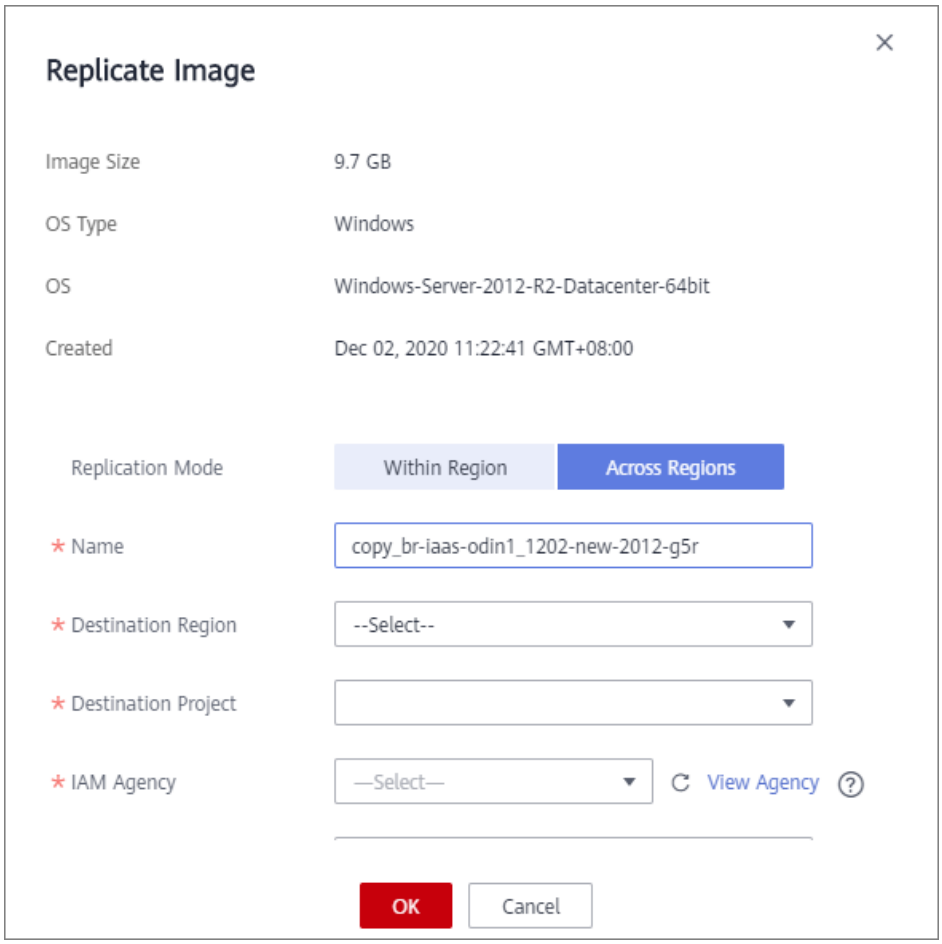
1. Log in to the management console.
2. Under **Compute**, click **Image Management Service**.

   The IMS console is displayed.
3. Locate the row that contains the image to be replicated, click **More** in the **Operation** column, and select **Replicate**.
4. In the displayed **Replicate Image** dialog box, set the following parameters.

   NOTE

   If the current region does not support cross-region replication, set the parameters by referring to **Replicating Images Within a Region**.

   Figure 5-9 Replicating an image across regions



   - **Replication Mode**: Select **Across Regions**.
   - **Name**: Enter a name that is easy to identify. The image name is in the following format: **copy**_*Name of the source region where the image is located*_*Source image name*.
   - **Destination Region**: Select the region where you want to use the image.

- **Destination Project**: Select a project in the destination region. After you select the destination region, the system automatically displays available projects.
- **Target Server Backup Vault**: This parameter is available only for full-ECS images created using CBR backups. Select a vault for storing backups.

  If no CBR backup vault is available in the destination region, click **Create Server Backup Vault** to create one. Ensure that you select **Replication** for **Protection Type**. For other parameters, see **Purchasing a Server Backup Vault**. After the vault is created, click to refresh the page and select the vault from the drop-down list box.
- **IAM Agency**: Select an IAM agency.
- (Optional) **Description**: Describe the replication.

5. Click **OK**.

   Switch to the destination region. If the image status becomes **Normal**, the image replication is successful.

   NOTE

   The time required for replicating an image across regions depends on the network speed, image size, and the number of concurrent tasks.

Create an Agency

1. Log in to the management console.
2. In the upper right corner of the page, click the username and select **Identity and Access Management**.
3. In the navigation pane, choose **Agencies**.
4. Click **Create Agency**.
5. On the **Create Agency** page, set the following parameters:
   - **Agency Name**: Enter an agency name, such as **ims_admin_agency**.
   - **Agency Type**: Select **Cloud service**.
   - **Cloud Service**: This parameter is available only if you select **Cloud service** for **Agency Type**. Select **Image Management Service (IMS)** from the drop-down list.
   - **Validity Period**: Select **Unlimited**.
   - **Description**: This parameter is optional. You can enter **Agency with IMS Administrator privileges**.
6. Click **Next**.
   - Select **Region-specific projects** for **Scope** and select one or more projects from the drop-down list.

     CAUTION

     Do not select **All projects**, or the created agency will be invalid.

   - Select **IMS Administrator** for **Permissions**.
7. Click **OK**.

6 Managing Public Images

6.1 Overview

Public images provided by the cloud platform can be used with ECSs or BMSs and come with a set of basic plug-ins preinstalled. These images are available to all users and cover most mainstream OSs. This section describes the types and characteristics of public images.

Public Image Types

Public images include Huawei-developed Huawei Cloud EulerOS and EulerOS images and third-party commercial images. Choose whichever public image best meeting your needs. If you have any OS issues, you can contact the OS vendor or go to the open-source community for technical support, but Huawei Cloud also provides technical assistance.

For more information, see **Differences Between openEuler, EulerOS, and Huawei Cloud EulerOS**.

Table 6-1 Public image types

Image Type	Description
Huawei Cloud EulerOS	Huawei Cloud EulerOS (HCE) is an openEuler-based cloud operating system. HCE provides a secure cloud native OS environment with high performance. It is easy to migrate from other OS to HCEOS. This accelerates service migration to the cloud and promotes application innovation. You can use it to replace operating systems such as CentOS and EulerOS.

Image Type	Description
EulerOS	EulerOS is an enterprise-class commercial Linux distribution. It features high security, scalability, and performance, meeting customers' requirements for IT infrastructure and cloud computing services. **NOTE** EulerOS is developed based on openEuler and is a Huawei internal OS.
Third-party commercial image	Third-party images have been rigorously tested and licensed before they are released on Huawei Cloud to ensure that they are highly secure and stable. Third-party public images include: Ubuntu and CentOS

NOTE

The available image OSs vary depending on server flavors:

- **OSs Supported by Different Types of ECSs**
- **OSs Supported by Different Types of BMSs**

Public Image Characteristics

- OS types: Linux OSs that are updated and maintained periodically
- Supported software: Public images contain some plug-ins on which server networks and basic functions depend.

  NOTE

  The plug-ins that come with public images are necessary for ECSs or BMSs to run properly. Do not delete or modify any of them. Otherwise, basic functions of your ECSs or BMSs will be affected.

Table 6-2 Supported software

Software	Description
Cloud-Init or Cloudbase-Init	Cloud-Init is an open-source cloud initialization tool. It is essentially a series of Python scripts and components. When creating a cloud server using an image that has Cloud-Init installed, you can inject custom details (such as the login password for the cloud server). You can also query and use metadata to configure and manage cloud servers. By default, Cloud-Init is installed for Linux public images.

Software	Description
One-click password reset plugin	ECS and BMS provide a one-click password reset function. If you forget the password of your ECS or BMS, or the password expires, you can set a new password from the management console using the one-click password reset plug-in. This plug-in is installed for public images by default.
NIC multi-queue plug-in	NIC multi-queue enables multiple vCPUs to process NIC interrupts, thereby improving network PPS and I/O performance. For details about the public images that support NIC multi-queue, see **How Do I Set NIC Multi-Queue for an Image?**

- Compatibility: Public images are compatible with different server hardware.
- Security: Public images are stable and licensed.

Differences Between openEuler, EulerOS, and Huawei Cloud EulerOS

- openEuler was initially developed by Huawei, but it was donated to the OpenAtom Foundation on November 9, 2021. Now, it is an open-source, free OS. The open-source community provides technical support for openEuler.
- EulerOS is a free enterprise-class Linux OS developed by Huawei. It will be replaced by Huawei Cloud EulerOS.
- Huawei Cloud EulerOS is developed based on openEuler. It was commercially released in 2022 and will replace CentOS and EulerOS. Currently, Huawei Cloud EulerOS images are free of charge.

6.2 Known Issues

This section describes known issues of public images. Private images also have these issues.

Network Disconnection Caused by a Windows Server DHCP Lease Longer Than 99 Days

Symptom:

If the DHCP lease is longer than 99 days, instance IP addresses cannot be automatically renewed. As a result, the instance network will be disconnected when the lease comes to an end.

Involved images:

Public and private images of Windows Server 2008, Windows Server 2012 R2, Windows Server 2016, and Windows Server 2019

Solutions:

1. Change the DHCP lease of the subnet where the instance is located to one day or unlimited.
2. Run the following command to make the change take effect:

   NOTE

   The following command will temporarily disconnect you from the network. Do it during off-peak hours.

   ipconfig /renew

Data Is Lost During Disk Reset Due to the Incompatibility Between Server Manager of Windows Server 2012 R2 and VMTools

Symptom:

A Windows Server 2012 R2 cloud server is configured with two data disks. When Windows Server Manager resets the second data disk, the first data disk is reset. As a result, the data of the first data disk is lost.

Involved images:

Windows Server 2012 R2 public image before 2019-02-19

Solutions:

Upgrade VMTools of involved cloud servers to 2.5.0.156 or later.

Occasional System Errors Triggered By Adding or Deleting NICs

Symptom:

After an ECS is started, adding or deleting a NIC or other equivalent actions may:

- Trigger a kernel panic, and the OS automatically restarts.
- Trigger frequent software interrupts, and the network may fail to receive or send packets.

Patch link: **https://git.kernel.org/pub/scm/linux/kernel/git/stable/linux-stable.git/commit/?id=f00e35e259948b995aa1f3ee7fddb05f34a50157**

Involved images:

CentOS 7 public and private images

Solutions:

Upgrade the kernel to 3.10.0-1160.25.1.e17.x86_64 of CentOS 7.

Kernels Are Occasionally Disconnected from the TCP Network

Symptom:

This issue is caused by the kernel vulnerability CVE-2019-11477 (TCP SACK). When the socket buffer is low, the network may be disconnected.

The involved images are listed in the following table.

Image Type	Kernel Version
CentOS 7 public images from 2019-06-26 to 2019-09-29	3.10.0-957.21.3.e17.x86_64
Ubuntu 16 and Ubuntu 18 public images from 2019-06-26 to 2019-10-15	Ubuntu 16.04: 4.4.0-151-generic Ubuntu 18.04: 4.15.0-52-generic
Debian 9.0 public images from 2019-06-26 to 2019-10-15	4.9.0-9-amd64
Fedora 29 and openSUSE 15.0 public images from 2019-06-27 to 2019-10-15	Fedora 29: 5.1.11-200.fc29.x86_64 openSUSE 15.0: 4.12.14-1p150.12.64-default

Solutions:

Upgrade the kernel to the latest version. Run the following commands to upgrade the kernel of each image type:

- CentOS/Fedora: **yum update kernel**
- Ubuntu: **apt-get update && apt-get install linux-image-generic**
- openSUSE: **zypper refresh && zypper install kernel-default**
- Debian: **apt-get update && apt search linux-image && apt-get install linux-image-***xxx*

  NOTE

  You can run the **apt search linux-image** command to query for the latest kernel version. The **apt-get install linux-image-***xxx* command is used to upgrade a kernel to the latest version.

OS Parameter Settings Do Not Take Effect

Symptom:

After **net.ipv4.tcp_max_tw_buckets** is configured in the **/etc/sysctl.conf** file, the check result of **sysctl -a** indicates that the configuration does not take effect. The configurations in **/etc/sysctl.d/huawei.conf** and **/etc/security/limits.d/huawei-nofile.conf** have been built in public images and these configurations have higher priorities than those in **/etc/sysctl.conf**. As a result, the configurations in **/etc/sysctl.conf** do not take effect.

The involved parameters are listed in the following table.

Parameter	Configuration File
vm.swappiness net.core.somaxconn net.ipv4.tcp_max_tw_buckets net.ipv4.tcp_max_syn_backlog	/etc/sysctl.d/huawei.conf

Parameter	Configuration File
* soft nofile 65535 * hard nofile 65535	/etc/security/limits.d/huawei-nofile.conf

Involved images:

- CentOS 7 public images from 2018-09-25 to 2019-09-29
- CentOS 6 public images from 2018-09-25 to 2019-10-10
- Ubuntu, openSUSE 15.0, Debian, and Fedora 29 public images from 2018-09-28 to 2019-10-15

Solutions:

1. Delete the built-in configuration files.

   rm -rf /etc/sysctl.d/huawei.conf

   rm -rf /etc/security/limits.d/huawei-nofile.conf
2. Modify the kernel parameter configuration files (**limits.conf** and **sysctl.conf**).

   cat >>/etc/security/limits.conf <<EOF

   root soft nofile 65535

   root hard nofile 65535

   *** soft nofile 65535**

   *** hard nofile 65535**

   EOF

   cat >>/etc/sysctl.conf <<EOF

   vm.swappiness=0

   net.core.somaxconn=1024

   net.ipv4.tcp_max_tw_buckets=5000

   net.ipv4.tcp_max_syn_backlog=1024

   EOF

1822 NIC-based Offloading Is Incompatible with the Linux 3.16.x Kernel

Symptom:

ECSs that use hardware offloading provided by Huawei-developed 25GE intelligent high-speed NICs may be incompatible with Linux 3.16.47 to 3.16.x, which may cause occasional network disconnections of ECSs. ECSs that have this issue include but are not limited to C3ne, M3ne, C6, M6, G5, P2v, G5r, P2vs, P2s, Pi2, FP1cn1, Ai1, e3.26xlarge.14, e3.52xlarge.14, e3.52xlarge.20, KC1, and KM1.

Involved images:

Debian 8.2.0 64bit and Debian 8.8.0 public images

Solutions:

Remove Debian 8 public images from flavors. Migrate services of ECSs using this offloading function to S3 and C3 ECSs as soon as possible.

Service Interruptions Caused By Lingering CLOSE_WAIT Connections

Symptom:

Some services are interrupted because a socket in a TCP connection created by the one-click password reset plug-in process stays in the **CLOSE_WAIT** state.

Involved images:

- CentOS and EulerOS public images issued before June 5, 2019
- Ubuntu and Debian public images issued before June 3, 2019

Solutions:

Update the one-click password reset plug-ins for the ECSs.

7 Managing Tags

Scenarios

You can use tags to classify images. You can add, modify, or delete image tags, or search for required images by tag in the image list.

NOTE

- When adding predefined tags to an image or searching for an image using predefined tags, you must have permission to access the Tag Management Service (TMS).

Constraints

An image can have a maximum of 10 tags.

Add, Delete, and Modify Image Tags

1. Access the IMS console.
   a. Log in to the management console.
   b. Under **Compute**, click **Image Management Service**.
      The IMS console is displayed.
2. Click the **Private Images** tab and click the image name to display the image details.
   - To modify an image tag, go to **3**.
   - To delete an image tag, go to **4**.
   - To add an image tag, go to **5**.
3. Click the **Tags** tab, locate the target tag, and click **Edit** in the **Operation** column. In the displayed dialog box, modify the tag.
4. Click the **Tags** tab, locate the target tag, and click **Delete** in the **Operation** column. In the displayed dialog box, click **Yes**.
5. Click the **Tags** tab and then **Add Tag**. In the displayed dialog box, add a tag.

Search for Private Images by Tag

1. Access the IMS console.

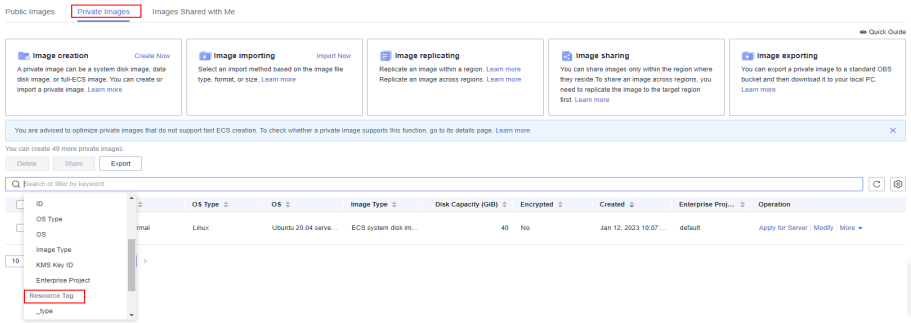
a. Log in to the management console.

b. Under **Compute**, click **Image Management Service**.

The IMS console is displayed.

2. Click the **Private Images** tab and click the search box above the private image list. Specify tag keys and values under **Resource Tag** to search for private images.

Figure 7-1 Searching for images by tag



NOTE

- Neither the tag key nor tag value can be empty. When the tag key and tag value are matched, the system automatically shows your desired private images.
- You can add multiple tags to search for shared images. The system will display private images that match all tags.

8 Managing Quotas

What Is Quota?

Quotas can limit the number or amount of resources available to users, such as the maximum number of ECS or EVS disks that can be created.

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

How Do I View My Quotas?

1. Log in to the **management console**.
2. Click  in the upper left corner and select the desired region and project.
3. In the upper right corner of the page, choose **Resources** > **My Quotas**.

   The **Quotas** page is displayed.
4. View the used and total quota of each type of resources on the displayed page.

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

How Do I Apply for a Higher Quota?

1. Log in to the **management console**.
2. In the upper right corner of the page, choose **Resources** > **My Quotas**.

   The **Quotas** page is displayed.
3. Click **Increase Quota** in the upper right corner of the page.
4. On the **Create Service Ticket** page, configure parameters as required.

   In the **Problem Description** area, fill in the content and reason for adjustment.
5. After all necessary parameters are configured, select **I have read and agree to the Ticket Service Protocol and Privacy Statement** and click **Submit**.

9 Auditing Key Operations

9.1 IMS Operations Audited by CTS

Scenarios

Cloud Trace Service (CTS) is a log audit service provided by Huawei Cloud and intended for cloud security. It allows you to collect, store, and query cloud resource operation records and use these records for security analysis, compliance auditing, resource tracking, and fault locating.

You can use CTS to record IMS operations for later querying, auditing, and backtracking.

Prerequisites

You need to enable CTS before using it. If it is not enabled, IMS operations cannot be recorded. After being enabled, CTS automatically creates a tracker to record all your operations. The tracker stores only the operations of the last seven days. To store the operations for a longer time, store trace files in OBS buckets.

IMS Operations Recorded by CTS

Table 9-1 IMS operations that can be recorded by CTS

Operation	Resource Type	Trace Name
Creating an image	ims	createImage
Modifying an image	ims	updateImage
Deleting images in a batch	ims	deleteImage
Replicating an image	ims	copyImage
Exporting an image	ims	exportImage

Operation	Resource Type	Trace Name
Adding a member	ims	addMember
Modifying members in a batch	ims	updateMember
Deleting members in a batch	ims	deleteMember

Table 9-2 Relationship between IMS operations and native OpenStack APIs

Operation	Trace Name	Service Type	Resource Type	OpenStack Component
Creating an Image	createImage	IMS	image	glance
Modifying/ Uploading an image	updateImage	IMS	image	glance
Deleting an image	deleteImage	IMS	image	glance
Tagging an image	addTag	IMS	image	glance
Deleting an image tag	deleteTag	IMS	image	glance
Adding a tenant that can use a shared image	addMember	IMS	image	glance
Modifying information about a tenant that can use a shared image	updateMember	IMS	image	glance
Deleting a tenant from the group where the members can use a shared image	deleteMember	IMS	image	glance

9.2 Viewing Traces

Scenarios

Cloud Trace Service (CTS) records operations performed on cloud service resources. A record contains information such as the user who performed the operation, IP address, operation content, and returned response message. These records facilitate security auditing, issue tracking, and resource locating. They also help you plan and use resources, and identify high-risk or non-compliant operations.

What Is a Trace?

A trace is an operation log for a cloud service resource, tracked and stored by CTS. Traces record operations such as adding, modifying, or deleting cloud service resources. You can view them to identify who performed operations and when for detailed tracking.

Constraints

- You can only query operation records of the last seven days on the CTS console. They are automatically deleted upon expiration and cannot be manually deleted. To store them for longer than seven days, configure transfer to Object Storage Service (OBS) or Log Tank Service (LTS) so that you can view them in OBS buckets or LTS log groups.
- After creating, modifying, or deleting a cloud service resource, you can query management traces on the CTS console 1 minute later and query data traces 5 minutes later.
- Data traces are not displayed in the trace list of the new version. To view them, you need to go to the old version.

Viewing Real-Time Traces in the Trace List of the New Edition

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

Step 2 In the navigation pane, choose **Trace List**.

Step 3 In the time range drop-down list above the trace list, select a desired query time range: **Last 1 hour**, **Last 1 day**, or **Last 1 week**. You can also select **Custom** to specify a custom time range within the last seven days.

Step 4 The search box above the trace list supports advanced queries. Combine one or more filters to refine your search.

Table 9-3 Trace filtering parameters

Parameter	Description
Trace Name	Name of a trace. The entered value is case-sensitive and requires an exact match. Fuzzy matching is not supported. For details about the operations that can be audited for each cloud service, see **Supported Services and Operations**. Example: **updateAlarm**
Trace Source	Cloud service name abbreviation. The entered value is case-sensitive and requires an exact match. Fuzzy matching is not supported. Example: **IAM**
Resource Name	Name of a cloud resource involved in a trace. The entered value is case-sensitive and requires an exact match. Fuzzy matching is not supported. If the cloud resource involved in the trace does not have a resource name or the corresponding API operation does not involve the resource name parameter, leave this field empty. Example: **ecs-name**
Resource ID	ID of a cloud resource involved in a trace. The entered value is case-sensitive and requires an exact match. Fuzzy matching is not supported. Leave this field empty if the resource has no resource ID or if resource creation failed. Example: *{VM ID}*
Trace ID	Value of the **trace_id** parameter for a trace reported to CTS. The entered value requires an exact match. Fuzzy matching is not supported. Example: **01d18a1b-56ee-11f0-ac81-******1e229**
Resource Type	Type of a resource involved in a trace. The entered value is case-sensitive and requires an exact match. Fuzzy matching is not supported. For details about the resource types of each cloud service, see **Supported Services and Operations**. Example: **user**
Operator	User who triggers a trace. Select one or more operators from the drop-down list. If the value of **trace_type** in a trace is **SystemAction**, the operation is triggered by the service and the trace's operator may be empty.

Parameter	Description
Trace Status	Select one of the following options from the drop-down list: • **normal**: The operation succeeded. • **warning**: The operation failed. • **incident**: The operation caused a fault that is more serious than a normal failure, for example, causing other faults.

Step 5 On the **Trace List** page, you can also export and refresh the trace list, and customize columns to display.

- Enter any keyword in the search box and press **Enter** to filter desired traces.
- Click **Export** to export all traces in the query result as an .xlsx file. The file can contain up to 5,000 records.
- Click to view the latest information about traces.
- Click to customize the information to be displayed in the trace list. If **Auto wrapping** is enabled ( ), excess text will move down to the next line; otherwise, the text will be truncated. By default, this function is disabled.

Step 6 (Optional) On the **Trace List** page of the new edition, click **Old Edition** in the upper right corner to switch to the **Trace List** page of the old edition.

----End

Viewing Traces in the Trace List of the Old Edition

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

Step 2 In the navigation pane, choose **Trace List**.

Step 3 Each time you log in to the CTS console, the new edition is displayed by default. Click **Old Edition** in the upper right corner to switch to the trace list of the old edition.

Step 4 In the upper right corner of the page, set a desired query time range: **Last 1 hour**, **Last 1 day**, or **Last 1 week**. You can also click **Customize** to specify a custom time range within the last seven days.

Step 5 Set filters to search for your desired traces.

Table 9-4 Trace filtering parameters

Parameter	Description
Trace Type	Select **Management** or **Data**. • Management traces record operations performed by users on cloud service resources, including creation, modification, and deletion. • Data traces are reported by OBS and record operations performed on data in OBS buckets, including uploads and downloads.

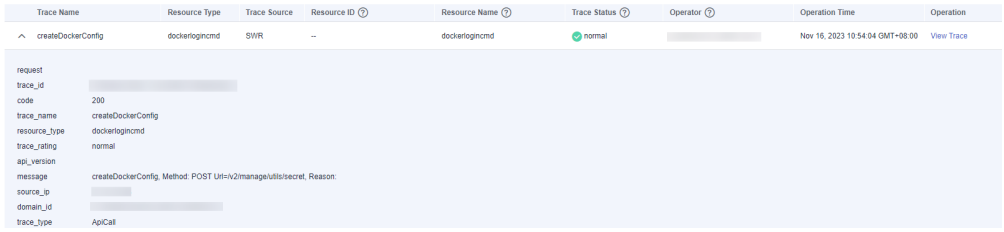
Parameter	Description
Trace Source	Select the name of the cloud service that triggers a trace from the drop-down list.
Resource type	Select the type of the resource involved in a trace from the drop-down list. For details about the resource types of each cloud service, see **Supported Services and Operations**.
Search By	Select one of the following options: • **Resource ID**: ID of the cloud resource involved in a trace. Leave this field empty if the resource has no resource ID or if resource creation failed. • **Trace name**: name of a trace. For details about the operations that can be audited for each cloud service, see **Supported Services and Operations**. • **Resource name**: name of the cloud resource involved in a trace. If the cloud resource involved in the trace does not have a resource name or the corresponding API operation does not involve the resource name parameter, leave this field empty.
Operator	User who triggers a trace. Select one or more operators from the drop-down list. If the value of **trace_type** in a trace is **SystemAction**, the operation is triggered by the service and the trace's operator may be empty.
Trace Status	Select one of the following options: • **Normal**: The operation succeeded. • **Warning**: The operation failed. • **Incident**: The operation caused a fault that is more serious than a normal failure, for example, causing other faults.

Step 6 Click **Query**.

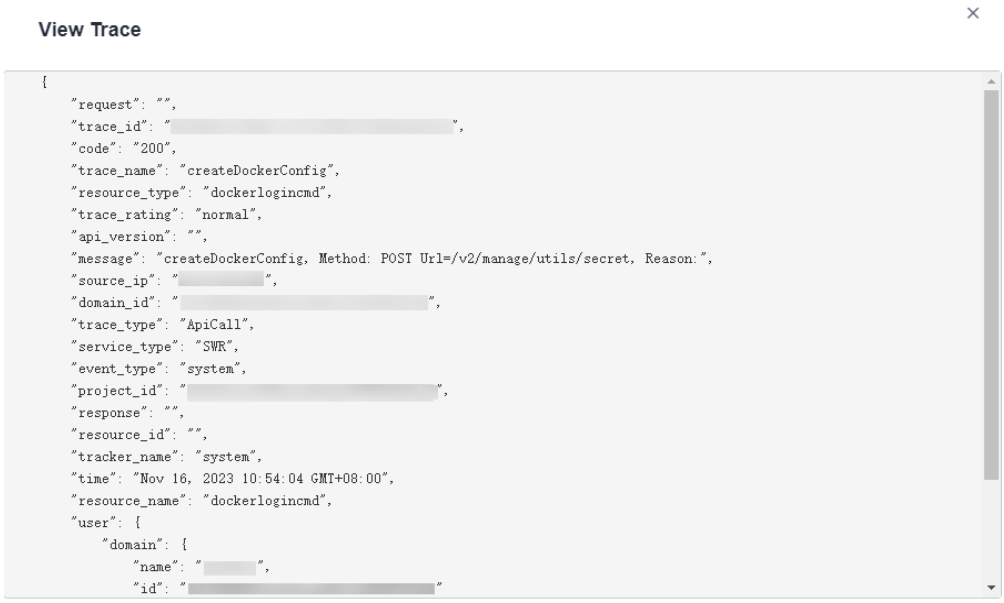
Step 7 On the **Trace List** page, you can also export and refresh the trace list.

- Click **Export** to export all traces in the query result as a CSV file. The file can contain up to 5,000 records.
- Click to view the latest information about traces.

Step 8 Click on the left of a trace to expand its details.



Step 9 Click **View Trace** in the **Operation** column. The trace details are displayed.



Step 10 (Optional) On the **Trace List** page of the old edition, click **New Edition** in the upper right corner to switch to the **Trace List** page of the new edition.

----End

Helpful Links

- For details about the key fields in the trace structure, see **Trace Structure** and **Example Traces**.

