

Elastic Cloud Server

User Guide

Issue 27
Date 2021-03-10



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1 Instances

1.1 Selecting an ECS Purchasing Option

1.1.1 Yearly/Monthly Pricing

Concept

A prepaid billing mode in which an ECS will be billed based on the service duration. This cost-effective mode is ideal when the duration of ECS usage is predictable.

Notes on Using Yearly/Monthly ECSs

1. A created yearly/monthly ECS cannot be deleted. If such an ECS is not required any more, unsubscribe it. To do so, switch to the **Elastic Cloud Server** page, locate the target ECS, click **More** in the **Operation** column, and select **Unsubscribe** from the drop-down list.
2. After detaching a system disk that is bought during ECS creation, you can only attach it to the original ECS if you want to use it as the system disk. If the disk is to be used as a data disk, you can attach it to any ECS.
3. After detaching a data disk that is bought during ECS creation, you can only attach it to the original ECS as a data disk.

Applicable Resources

Resources billed in yearly/monthly payments include:

- ECSs, including their vCPUs and memory
 - Images, including prepaid Marketplace images
 - EVS disks, including the system disk and data disks, purchased with a yearly/monthly ECS
 - Bandwidth purchased with a yearly/monthly ECS
- EIP and dedicated bandwidth are billed together. For details, see the pricing for dedicated bandwidths.

When purchasing a yearly/monthly ECS, the configuration price includes the fees of the preceding resources.

To learn ECS configuration prices, see [Price Calculator](#).

1.1.2 Pay-Per-Use Pricing

Concept

A postpaid billing mode in which an ECS will be billed based on usage frequency and duration. ECSs are billed by second. The system generates a bill every hour based on usage frequency and duration and deducts the billed amount from the account balance. A pay-per-use ECS can be provisioned and deleted at any time.

NOTE

If a pay-per-use ECS is stopped and then restarted, the startup may fail due to insufficient resources. In such a case, wait several minutes before attempting another restart or change the ECS flavor.

Billing Examples

In the pay-per-use billing mode, ECSs are billed by second. The price per second of each type of ECS can be obtained by dividing their hourly price by 3600. Obtain the hourly price on the [Product Pricing Details](#) page.

For example, the price of a pay-per-use ECS is \$0.68 USD/hour. If you purchase such an ECS, the ECS will be billed based on the service duration.

- If the service duration is 0.5 hours, the fee is \$0.34 USD ($0.68/3600 \times 30 \times 60$).
- If the service duration is 1 hour, the fee is \$0.68 USD (0.68×1).
- If the service duration is 1.5 hours, the fee is \$1.02 USD ($0.68/3600 \times 90 \times 60$).

Applicable Resources

Resources billed in pay-per-use payments include:

- ECSs, including their vCPUs and memory
- Images, including Marketplace images as well as shared or customized images based on Marketplace images
- EVS disks, including the system disk and data disks, purchased with a pay-per-use ECS
- Bandwidth purchased with a pay-per-use ECS

To learn ECS configuration prices, see [Price Calculator](#).

Resources Continue to Be Billed After the ECS Is Stopped

After a pay-per-use ECS is stopped, basic resources including vCPUs, memory, and image are not billed, but its system disk is billed based on the capacity you use. The resources associated with the ECS, such as EVS disks, EIP, and bandwidth, are separately billed.

 **NOTE**

If a pay-per-use ECS is stopped and then restarted, the startup may fail due to insufficient resources. In such a case, wait several minutes before attempting another restart or change the ECS flavor.

However, this function does not apply to the ECSs using local storage (such as disk-intensive, ultra-high I/O, H2, P1, or P2 ECSs) or FPGAs (such as FP1 or FP1C ECSs). Charges will continue to be incurred for the ECSs even after they are stopped. To stop the ECS from being billed, delete it.

1.1.3 Spot Pricing

1.1.3.1 Spot Pricing

Concept

HUAWEI CLOUD sells available computing resources at a discount. The price changes in real time depending on market demands. This is the spot price billing mode.

An ECS billed in spot price billing mode is a spot price ECS.

In spot price billing mode, you can purchase and use ECSs at a discount price. The performance of spot price ECSs is the same as that of the ECSs with the same specifications in other billing modes. However, when inventory resources are insufficient, or the market price increases and exceeds your expected price, the system will automatically release your ECS resources and reclaim the ECSs. Compared with pay-per-use and yearly/monthly ECSs, spot price ECSs offer the same level of performance while at lower costs.

Working Rules

The market price for the ECSs of a certain flavor fluctuates due to supply-and-demand changes. You can purchase and use spot price ECSs at a low market price to reduce computing costs.

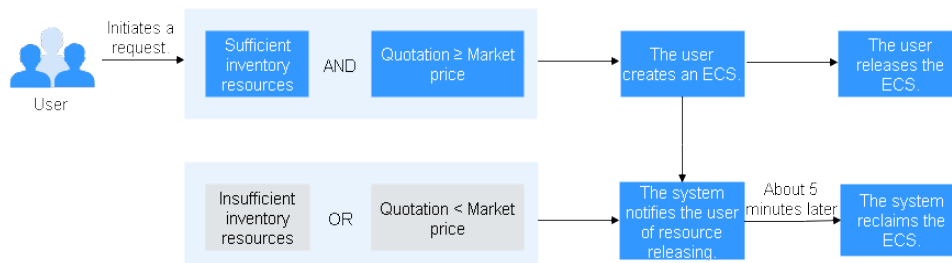
When purchasing a spot price ECS, you are required to set the maximum price you are willing to pay for a specified flavor. A higher price ensures a greater success rate for you to purchase such an ECS.

- If the maximum price is greater than or equal to the market price and the inventory resources are sufficient, the spot price ECS is purchased. The ECS is billed at the market price.
- If the maximum price is less than the market price, the spot price ECS cannot be purchased.

After purchasing a spot price ECS, you can use it like using the ECSs in other billing modes. However, the system will periodically compare the maximum price with the market price and check the inventory resources.

- If the maximum price is greater than or equal to the market price and the inventory resources are sufficient, you can continue using the ECS.

- If the maximum price is less than the market price or the inventory resources are insufficient, the system notifies you of releasing the ECS resources (notification is enabled) and automatically deletes the ECS in about 5 minutes.

Figure 1-1 Lifecycle of a spot price ECS

Application Scenarios

- What are supported?
Spot price ECSs are suitable for image rendering, stateless web service, gene sequencing, offline analysis, function calculation, batch calculation, sample analysis, CI/CD, and test.

NOTE

When the market price is higher than the maximum price you are willing to pay or the inventory resources are insufficient, the spot price ECSs will be reclaimed. Therefore, back up data when using such ECSs.

- What are not supported?
To prevent ECS reclamation from interrupting services, do not use spot price ECSs to run the services requiring long-time operations or high stability.

Notes

- Only KVM ECSs support spot price payments. For details about the ECS flavors, see the information displayed on the management console.
- The market prices of the ECSs of the same flavor may vary depending on AZs.
- Spot price ECSs do not support OS changing.
- Spot price ECSs do not support automatic recovery.
- Spot price ECSs do not support specifications modification.
- Spot price ECSs cannot be created using a Marketplace image.
- Spot price ECSs cannot be switched to yearly/monthly ECSs.
- When a spot price ECS is being reclaimed,
 - It cannot be used to create system disk images and full-ECS images. However, data disks of the ECS can be used to create data disk images.
 - It cannot be deleted.

Billing Rules

For details, see [Billing](#).

Billing Examples

- **Example 1: If the market price is higher than the maximum price you set, the spot price ECS is released. The unit price is based on the market price when the ECS was purchased.**

At 08:30, the market price is \$0.02 USD/hour, and the maximum price is \$0.04 USD/hour. Then, the ECS is billed at \$0.02 USD/hour.

At 09:00, the market price is \$0.03 USD/hour.

At 10:00, the market price is \$0.04 USD/hour.

At 10:30, the market price is \$0.05 USD/hour, which is higher than the maximum price. Then, the system notifies the user of ECS releasing.

This ECS is billed in three billing periods.

During 08:30-09:00, the ECS had been running for 30 minutes and it is billed on second: $0.02/3600 \times 30 \times 60 = \0.01 USD

During 09:00-10:00, the ECS had been running for 1 hour and it is billed at the transaction price at 09:00, which is \$0.03 USD/hour.

During 10:00-10:30, the ECS had been running for 30 minutes and it is billed on second: $0.04/3600 \times 30 \times 60 = \0.02 USD

The total price is \$0.06 USD for the running duration of 2 hours.

- **Example 2: If inventory resources are insufficient, the system releases a spot price ECS and bills it on second based on the service duration and the market price when the ECS was purchased.**

At 08:30, the market price is \$0.02 USD/hour, and the maximum price is \$0.06 USD/hour. Then, the ECS is billed at \$0.02 USD/hour.

At 09:00, the market price is \$0.03 USD/hour.

At 10:00, the market price is \$0.04 USD/hour.

At 10:30, the market price is \$0.05 USD/hour. Although the market price is lower than the maximum price, the system releases this ECS due to insufficient inventory resources.

This ECS is billed in three billing periods.

During 08:30-09:00, the ECS had been running for 30 minutes and it is billed on second: $0.02/3600 \times 30 \times 60 = \0.01 USD

During 09:00-10:00, the ECS had been running for 1 hour and it is billed at the transaction price at 09:00, which is \$0.03 USD/hour.

During 10:00-10:30, the ECS had been running for 30 minutes and it is billed on second: $0.04/3600 \times 30 \times 60 = \0.02 USD

The total price is \$0.06 USD for the running duration of 2 hours.

Purchasing a Spot Price ECS

You can purchase a spot price ECS on the management console or by calling APIs.

- For instructions about how to purchase a spot price ECS on the management console, see [Purchasing a Spot Price ECS](#).
- For instructions about how to purchase a spot price ECS by calling APIs, see "[Creating an ECS](#)" in *Elastic Cloud Server API Reference*.

Reclaiming an ECS

HUAWEI CLOUD may reclaim and terminate your spot price ECS at any time. A spot price ECS that is being reclaimed cannot be used to create images.

The reclamation may be due to:

- Higher market price than the maximum price you are willing to pay
- Insufficient inventory resources

NOTE

- If a spot price ECS is reclaimed within the first hour after it is provisioned, the spot price ECS is not billed.
- In the first settlement period (in hours) of a spot price ECS, the spot price ECS is billed, regardless of whether it runs.
- The time required for reclaiming a spot price ECS is 5 minutes. During the reclaiming, if the sharp clock is exceeded, the spot price ECS is billed at the market price for the time after the sharp clock.
- During the running of a spot price ECS, its price is updated once an hour. After a spot price ECS is restarted, or it is stopped and then started, it is billed at the market price when the ECS starts.

Back up data on spot price ECSs. Before the system reclaims your spot price ECS, it will notify you of resource releasing if notification is enabled. Use either of the following methods to enable notification:

- Method 1: Use the spot metadata. For details, see [Obtaining Metadata](#).
- Method 2: Use Cloud Trace Service (CTS) and Simple Message Notification (SMN) provided on the public cloud. For details, see [Purchasing a Spot Price ECS](#).

FAQs

See [FAQs](#).

1.1.3.2 Purchasing a Spot Price ECS

Scenarios

A spot price ECS is billed in spot price mode. You can purchase and use such ECSs at a discount price. The performance of spot price ECSs is the same as that of the ECSs with the same specifications in other billing modes. However, when inventory resources are insufficient, or the market price increases and exceeds your expected price, the system will automatically release your ECS resources and reclaim the ECSs.

Compared with pay-per-use and yearly/monthly ECSs, spot price ECSs offer the same level of performance while at lower costs. For more information about the spot price payments, see [Spot Pricing](#).

How to Purchase a Spot Price ECS

Follow the instructions provided in [Purchasing an ECS](#) and [Logging In to an ECS](#) to buy and log in to spot price ECSs. Pay attention to the following settings:

When purchasing a spot price ECS, pay attention to the following settings:

- Set **Billing Mode** to **Spot price**.
In **Spot price** billing mode, your purchased ECS is billed based on the service duration at a lower price than that of a pay-per-use ECS with the same specifications. However, a spot price ECS may be reclaimed at any time based on the market price or changes in supply and demand.
- Set **Maximum Price**, which can be **Automatic** or **Manual**.
 - **Automatic** is recommended, which uses the pay-per-use price as the highest price you are willing to pay for a spot price ECS.
 - **Manual** requires you to set the upper price limit for a spot price ECS. The upper limit must be greater than or equal to the market price and less than or equal to the pay-per-use price.
- Click **Next**, confirm that the specifications and price are correct, agree to the service agreement, and click **Submit**.

NOTE

A spot price ECS may be reclaimed by the system. Therefore, back up your data.

Constraints

- Only KVM ECSs support spot price payments. For details about the ECS flavors, see the information displayed on the management console.
- The market prices of the ECSs of the same flavor may vary depending on AZs.
- Spot price ECSs do not support OS changing.
- Spot price ECSs do not support automatic recovery.
- Spot price ECSs do not support specifications modification.
- Spot price ECSs cannot be created using a Marketplace image.
- Spot price ECSs cannot be switched to yearly/monthly ECSs.
- When a spot price ECS is being reclaimed,
 - It cannot be used to create system disk images and full-ECS images. However, data disks of the ECS can be used to create data disk images.
 - It cannot be deleted.

(Optional) How to Enable Reclaim Notification

After purchasing a spot price ECS, you can use it like using the ECSs in other billing modes. However, a spot price ECS may be reclaimed at any time based on the market price or changes in supply and demand.

If the maximum price you are willing to pay is less than the market price or the inventory resources are insufficient, the system notifies you of releasing the ECS resources and reclaims the ECS in about 5 minutes if notification is enabled. Use either of the following methods to enable notification:

Method 1: Use the spot metadata. For details, see [Obtaining ECS Metadata](#).

Method 2: Use Cloud Trace Service (CTS) and Simple Message Notification (SMN) provided on the public cloud. For details, see [Cloud Trace Service User Guide](#).

Step 1 Enable CTS. For details, see [Enabling CTS](#).

Once you enable CTS, the system automatically identifies cloud services enabled on the cloud platform, obtains key operations on the services, and reports traces of these operations to CTS.

Step 2 Configure reclaim notification.

You can configure key event notification on CTS so that SMN sends messages to notify you of some key operations. This function is triggered by CTS, but notifications are sent by SMN.


1. Log in to management console.
2. Click  in the upper left corner and select your region and project.
3. Under **Management & Deployment**, click **Cloud Trace Service**.
4. In the navigation pane on the left, choose **Key Event Notifications**.
5. Click **Create Key Event Notification** in the upper right corner of the page and set parameters listed in [Table 1-1](#).

Table 1-1 Parameters for configuring key event notification

Type	Parameter	Configuration
Basic Information	Notification Name	The value is user-defined, for example, spottest .
Operation	Operation Type	Select Custom .
	Operation List	Choose ECS > server > interruptServer and click Add .
User	Specified users	If you do not specify users, CTS notifies all users when key operations are initiated.
Topic	Send Notification	Select Yes .
	SMN Topic	Select a topic from the drop-down list. If there is no proper SMN topic, create one. <ol style="list-style-type: none">1. Click Topic to switch to the Topics page.2. Click Create Topic and set parameters as prompted. For details, see Creating a Topic.3. Click More in the Operation column of the newly added topic and select Add Subscription from the drop-down list. Then, you can receive notifications sent for the topic. For details, see Adding a Subscription.

After the configuration, you will receive a notification from HUAWEI CLOUD 5 minutes before your spot price ECS is deleted.

Step 3 (Optional) View reclaimed spot price ECSs.

1. Under **Management & Deployment**, click **Cloud Trace Service**.
2. In the navigation pane on the left, choose **Trace List**.
3. Search for traces as needed. To do so, click **Filter** and specify filter criteria listed in [Table 1-2](#).

Table 1-2 Setting filter criteria to search for reclaimed ECSs

Parameter	Configuration
Trace Source	ECS
Resource Type	server
Search By	Trace name > interruptServer
Operator	All operators
Trace Status	All trace statuses

4. Locate the target trace and expand the trace details.
5. Click **View Trace** in the **Operation** column for details.

----End

1.1.4 Reserved Instances

1.1.4.1 Reserved Instance Overview

Concept

A reserved instance (RI) is not an actual instance, but a billing discount that can be applied to the use of pay-per-use ECSs in your account. When the attributes of your pay-per-use ECSs **match** those of an RI, the RI billing benefit automatically applies to your ECSs. The combination of RIs and pay-per-use payments fully utilizes the flexibility of pay-per-use resources at lower costs.

 **NOTE**

- RIs are in OBT phase.
- A purchased RI is billed according to standard pricing, regardless of whether it is used or not.
- RIs cannot be used on the ECSs running Microsoft SQL Server.

Table 1-3 Comparison between RI, pay-per-use ECS, and yearly/monthly ECS

Item	What It is	How to Use
RI	A billing discount applied to pay-per-use ECSs.	When the attributes of your pay-per-use ECSs match those of an RI, the RI billing benefit automatically applies to your ECSs.
Pay-per-use ECS	ECS billed based on usage frequency and duration. Such an ECS can be created or deleted at any time.	A pay-per-use ECS is a basic computing unit that consists of vCPUs, memory, OS, and EVS disks. After purchasing such an ECS, you can use it on the cloud.
Yearly/ Monthly ECS	ECS billed based on the service duration. This mode is ideal when the duration of ECS usage is predictable.	A yearly/monthly ECS is a basic computing unit that consists of vCPUs, memory, OS, and EVS disks. After purchasing such an ECS, you can use it on the cloud.
Spot price ECS	ECS billed in spot price billing mode.	A spot price ECS is a basic computing unit that consists of vCPUs, memory, OS, and EVS disks. After purchasing such an ECS, you can use it on the cloud.

- For instructions about how to purchase an RI, see [Purchasing an RI](#).
- For instructions about how to modify an RI, see [Modifying RI Attributes](#).

What Is Attribute Mapping Between an RI and a Pay-per-Use ECS?

A regional RI is purchased within a region and without an AZ specified. A zonal RI is purchased within an AZ.

- Attribute mapping of a regional RI: indicates whether the region, OS type, ECS series, and vCPU/memory ratio of a pay-per-use ECS are the same as those specified in a regional RI.
- Attribute mapping of a zonal RI: indicates whether the AZ, OS type, flavor of a pay-per-use ECS are the same as those specified in a zonal RI.

Application Scenarios

If your ECSs are to be used in a short term, it is a good practice to use pay-per-use rates. If you plan to use ECSs for one or three years, it is a good practice to use RIs. RIs offer discounts for pay-per-use ECSs with matched attributes.

For example, after you purchase two s3.2xlarge Linux RIs with a one-year term in AZ 1, the billing benefit of the RIs is immediately applied to up to two pay-per-use s3.2xlarge Linux ECSs running in AZ 1.

Working Rules

For example, you have a running pay-per-use ECS in your account. After you purchase an RI that matches the attributes of this ECS, the billing benefit of the RI is automatically applied to your ECS when the RI takes effect. A purchased RI takes effect at the next hour.

Table 1-4 lists RI attributes. Based on these attributes, you can select your desired RIs.

Table 1-4 RI attributes

Parameter	Description
Region or AZ	<ul style="list-style-type: none">Regional RI: indicates an RI purchased in a region, without an AZ specified. Capacity reservations are not supported for regional RIs.Zonal RI: indicates an RI purchased with an AZ specified. Capacity reservations are supported for zonal RIs.
Flavor	<ul style="list-style-type: none">When purchasing a regional RI, ensure that the ECS series and vCPU/memory ratio specified in the RI are the same as those of the target pay-per-use ECS.When purchasing a zonal ECS, ensure that the flavor specified in the RI is the same as that of the target pay-per-use ECS.
OS	Specifies the OS of the ECS to be bought, which must match the OS specified in your RI. For example, if you want to use a Linux RI, select a Linux public or private image when purchasing an ECS.
Term	Specifies the service duration of an RI. A year is defined as 31,536,000 seconds (365 days).
Offering Class	Standard: Certain attributes, such as the ECS size can be modified during the term. However, the ECS type cannot be changed.
Payment Option	No upfront

Zonal RIs

A zonal RI, which is purchased within a specified AZ, offers a billing discount for the ECSs with the same OS and flavor as the RI in that AZ.

For example, after you purchase two c3.xlarge.2 Linux RIs with a one-year term in AZ 1, the billing benefit of the RIs is immediately applied to up to two pay-per-use c3.xlarge.2 Linux ECSs running in AZ 1.

Regional RIs

A regional RI, which is purchased within a specified region, has the following attributes:

- **AZ flexibility:** The RI discount applies to pay-per-use ECS usage in any AZ in a region.
- **ECS size flexibility:** The RI discount applies to pay-per-use ECS usage when the ECS OS, ECS series, and vCPU/memory ratio of the target ECS are the same as those specified in the regional RI. ECS size flexibility is determined based on the normalization factor of the ECS size. ECS size flexibility does not apply to zonal RIs.

ECS size flexibility is applied from the smallest to the largest ECS size within the ECS series based on the normalization factor. [Table 1-5](#) describes ECS size within an ECS type and corresponding normalization factor per hour.

NOTE

An ECS automatically benefits from the billing discount offered by a regional RI only when the ECS series and vCPU/memory ratio are the same as those specified in the RI.

For example, a regional c3.large.4 RI cannot be used on a c3.large.2 ECS because their vCPU/memory ratios are different.

Table 1-5 Normalization factors

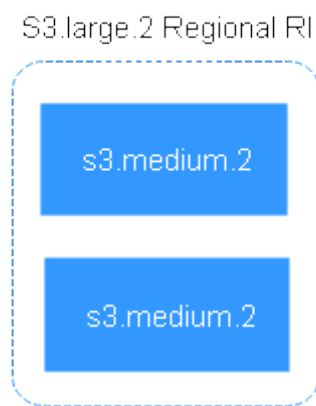
ECS Size	Normalization Factor
small	1
medium	1
large	2
xlarge	4
2xlarge	8
4xlarge	16
6xlarge	24
7xlarge	28
8xlarge	32
9xlarge	36
12xlarge	48
14xlarge	56
15xlarge	60
16xlarge	64
26xlarge	104
52xlarge	208

ECS Size	Normalization Factor
n.xlarge	n x 4

For example, an s3.large.2 ECS has a normalization factor of 2. You purchase an s3.large.2 Linux RI for the AP-Hong-Kong region of HUAWEI CLOUD with a one-year term.

- If you have two running s3.medium.2 pay-per-use Linux ECSs in this region, the billing benefit is fully applied to both ECSs.

Figure 1-2 Example RI 1



- If you have one running s3.xlarge.2 pay-per-use Linux ECS with a normalization factor of 4 in this region, the billing benefit is applied to 50% of the usage of the ECS.

Figure 1-3 Example RI 2

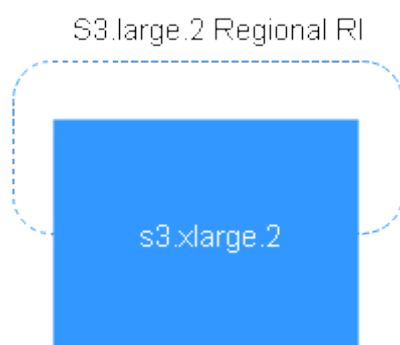


Table 1-6 Comparison between regional and zonal RIs

RI Type	AZ Flexibility	ECS Size Flexibility	Capacity Reservation
Regional RI	Supported A regional RI applies to any AZ in the region.	Supported A regional RI applies when the ECS series and vCPU/memory ratio of the target ECS are the same as those specified in the RI.	Not supported When available resources cannot meet service requirements of a pay-per-use ECS, creating the ECS failed.
Zonal RI	Not supported A zonal RI applies only in a specified AZ.	Not supported A zonal RI applies only when the flavor of the target ECS is the same as that specified in the RI.	Supported Desired resources can be reserved for creating a pay-per-use ECS.

Use Cases

You are running the following pay-per-use ECSs in account A:

- Five s3.large.2 Windows ECSs in AZ 1
- Three m3.xlarge.2 Windows ECSs in AZ 2
- One c3.xlarge.2 Windows ECS in AZ 3

You purchase the following RIs in region A:

- Five s3.large.2 Windows RIs with a one-year term in AZ 1
- Six m3.large.2 Windows RIs with a one-year term in region A
- One c3.large.2 Windows RI with a one-year term in region A

The RI benefits are applied as follows:

- The discount of the five s3.large.2 zonal RIs is used by the five s3.large.2 ECSs because the attributes (AZ, OS, and ECS type) between them match.
- The m3.large.2 regional RIs offer AZ flexibility and ECS size flexibility.
An m3.large.2 RI is equivalent to two normalization factors. The six m3.large.2 regional RIs are equal to 12 normalization factors (6 x 2). In account A, there are three running m3.xlarge.2 ECSs, which are equivalent to 12 normalization factors (3 x 4). In this case, the six m3.large.2 regional RIs are equivalent to three m3.xlarge.2 ECSs.
- The c3.large.2 regional RI offers AZ flexibility and ECS size flexibility and can be applied to c3.xlarge.2 ECSs.
A c3.large.2 RI is equivalent to two normalization factors (1 x 2). A c3.xlarge.2 ECS requires an RI with four normalization factors (1 x 4). Therefore, the c3.large.2 RI billing discount applies to 50% of c3.xlarge.2 usage. The remaining c3.xlarge.2 usage is billed at the pay-per-use rate.

1.1.4.2 Purchasing an RI

A reserved instance (RI) is not an actual instance, but a billing discount that can be applied to the use of pay-per-use ECSs in your account. When the attributes of your pay-per-use ECSs match those of an RI, the RI's discount rate automatically applies to your ECSs.

RIs apply if a resource utilization period is predictable.

NOTE

RIs are in OBT phase.

- For more information about RIs, see [Reserved Instance Overview](#).
- For instructions about how to modify an RI, see [Modifying RI Attributes](#).

Quota Constraints


- The quota for the number of RIs that you can purchase in the current region is displayed in the upper left area of the **Reserved Instance** page. The quota for the number of RIs that can be purchased by a user in each region is 20.
- The quota for the number of RIs is automatically reset every month.
- The remaining quota for the number of RIs (Remaining quota = Total quota – Used quota) is reduced only after more RIs are purchased. It remains unchanged if RIs are modified, split, combined, or unsubscribed.

What Is Attribute Mapping Between an RI and a Pay-per-Use ECS?

A regional RI is purchased within a region and without an AZ specified. A zonal RI is purchased within an AZ.

- Attribute mapping of a regional RI: indicates whether the region, OS type, ECS series, and vCPU/memory ratio of a pay-per-use ECS are the same as those specified in a regional RI.
- Attribute mapping of a zonal RI: indicates whether the AZ, OS type, flavor of a pay-per-use ECS are the same as those specified in a zonal RI.

Procedure

1. Log in to the management console.
2. Click  in the upper left corner and select your region and project.
3. Under **Computing**, click **Elastic Cloud Server**.
4. In the navigation pane on the left, choose **Reserved Instance**.
5. Click **Buy RI**.
The **Buy RI** page is displayed.
6. Confirm the region.
If the RIs in the selected region do not meet your requirements, select another region.
7. (Optional) Select **Show offerings that reserve capacity** for the display of AZs that support capacity reservations.

- Capacity reservations are supported for RIs with an AZ specified.
 - Capacity reservations are not supported for RIs without an AZ specified in a region.
8. (Optional) Select an AZ for capacity reservations.
Perform this operation only when you purchase RIs for a specified AZ.
 9. Select an RI type.
The public cloud platform provides various RI types for you to select. Select an RI type based on application scenarios.
 10. Filter for RI specifications.
Set flavor, OS, term, offering class, and payment option to search for the target RI specifications.

Table 1-7 shows specifications parameters.

Table 1-7 RI attributes

Parameter	Description
Region or AZ	<ul style="list-style-type: none">• Regional RI: indicates an RI purchased in a region, without an AZ specified. Capacity reservations are not supported for regional RIs.• Zonal RI: indicates an RI purchased with an AZ specified. Capacity reservations are supported for zonal RIs.
Flavor	<ul style="list-style-type: none">• When purchasing a regional RI, ensure that the ECS series and vCPU/memory ratio specified in the RI are the same as those of the target pay-per-use ECS.• When purchasing a zonal ECS, ensure that the flavor specified in the RI is the same as that of the target pay-per-use ECS.
OS	Specifies the OS of the ECS to be bought, which must match the OS specified in your RI. For example, if you want to use a Linux RI, select a Linux public or private image when purchasing an ECS.
Term	Specifies the service duration of an RI. A year is defined as 31,536,000 seconds (365 days).
Offering Class	Standard: Certain attributes, such as the ECS size can be modified during the term. However, the ECS type cannot be changed.
Payment Option	All upfront

11. Select specifications.
The public cloud platform provides various RI types for you to select. Select RI specifications based on application scenarios. On the **Buy RI** page, view released RI types and specifications.
Effective Rate: unit price per hour of a pay-per-use ECS within the entire term based on the total cost of the RI (Total price of the RI/Term per hour).

Upfront Price: fee that needs to be paid before you purchase an RI.

Hourly Rate: unit price per hour of a pay-per-use ECS within the entire term based on the difference between the total cost of the RI and the upfront price [(Total price of the RI – Upfront price)/Term per hour].

12. Specify an RI name.

The name can be customized but must comply with the following naming rules: It contains 1 to 128 characters, which can only be letters, digits, underscores (_), and hyphens (-).

13. Set the number of RIs to be purchased.

- **Quantity:** The system displays the number of RIs that you can purchase.
- **Total Normalization Factors:** measures ECS size flexibility. The value is determined based on the specifications of the RI to be purchased.
- **Total Upfront Price + Pay-per-use Price:** The price to be paid for consists of the total upfront price and the pay-per-use price. The total upfront price is a product of the upfront fee per RI and the number of RIs. The pay-per-use price is a product of the pay-per-use fee per RI and the number of RIs.

For details, click **Pricing details**.

14. Click **Next**.

To learn more about the price, click **Pricing details**.

15. On the page for you to confirm RI specifications, view details about the request and submit the request.

After verifying the configurations and price, click **Submit** and pay for the order as prompted.

16. Return to the RI list as prompted and view the purchased RI.

Follow-up Operations

- **Purchase a pay-per-use ECS that matches an RI.**

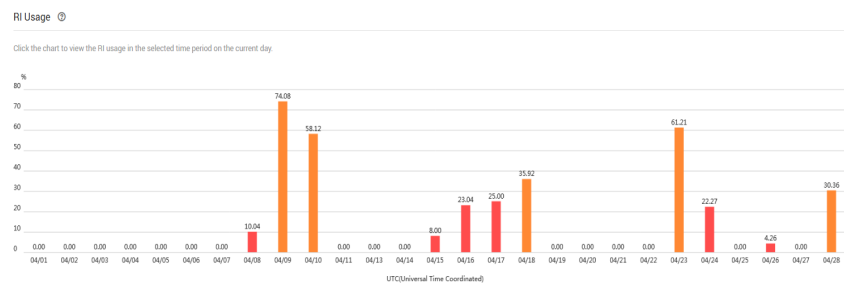
Locate the target RI and click **Buy ECS** in the **Operation** column. The system automatically switches to the page for purchasing an ECS, and the specifications of the ECS selected by default are the same as those specified in the RI.

NOTE

- If the OS of the target ECS does not match that specified in the RI, or the target ECS is not in pay-per-use payments, the RI cannot be used. When the attributes of the ECS match those of the RI, including the ECS series and vCPU/memory ratio, the ECS automatically benefits from the billing discount offered by the RI.
- **Check the usage of RIs.**

On the **Reserved Instance** page, click the name of the target RI. In the lower part of the page providing details about the RI, view the usage of the RI.

As shown in **Figure 1-4**, the horizontal coordinate indicates the number of in-service days, and the vertical coordinate indicates the usage of RI on the current day. Click the chart to view the RI usage in the selected time period on the current day.

Figure 1-4 Viewing RI usage

1.1.4.3 Modifying RI Attributes

Scenarios

If an RI type cannot meet your computing requirements, you can modify the RI attributes and then apply it to your pay-per-use ECSs.

A standard RI supports the modification of its AZ, scope, and ECS size.

- For more information about RIs, see [Reserved Instance Overview](#).
- For instructions about how to purchase an RI, see [Purchasing an RI](#).

Constraints

- RIs can be combined only when their attributes, including the OS, payment option, offering class, term, expiration time, region, instance series, vCPU/memory ratio, and discount are the same.
- The total normalization factors must be the same before and after the modification.
- A maximum of five RIs can be modified in a batch.
- One RI can be split to multiple ones, while multiple RIs can only be combined into one.

Procedure


1. Log in to the management console.
2. Click  in the upper left corner and select your region and project.
3. Under **Computing**, click **Elastic Cloud Server**.
4. On the **Reserved Instance** page, select the target RI and click **Modify RI** in the upper left corner of the list.
5. Modify the RI attributes as required.

Table 1-8 Common operations for modifying an RI

Allowed Operation	Description
Splitting an RI or combining RIs	For example, there are six s3.xlarge.2 RIs in an account, and an s3.xlarge.2 RI has a normalization factor of 4. Then, the six s3.xlarge.2 RIs are equivalent to 24 normalization factors. Then, these RIs can be combined into three s3.2xlarge.2 RIs or split to 24 s3.medium.2 RIs.
Changing a regional RI to a zonal one	A regional RI can be changed to a zonal RI.

NOTICE

Total normalization factors are the number of RIs multiplied by the normalization factor of such an RI. The total normalization factors must be the same before and after the modification.

For example, there are six s3.large.4 RIs with the total normalization factors of 12 (6 x 2) before the modification. These RIs can be split to two s3.xlarge.4 RIs and four s3.medium.4 RIs. After the modification, the total normalization factors are still 12 (2 x 4 + 4 x 1).

6. Verify the modified RI attributes and click **Submit**.

1.1.5 Changing Pay-per-Use to Yearly/Monthly

- **Pay-per-use:** a postpaid billing mode, in which an ECS is billed by usage duration. You can provision or delete such an ECS at any time.
- **Yearly/Monthly:** a prepaid billing mode, in which an ECS is billed based on the purchase period. This mode is more cost-effective than the pay-per-use mode and applies if the resource usage period can be estimated.

NOTE


Yearly/monthly ECSs are periodically paid.

If you want to use an ECS for a long time, you can change its billing mode from pay-per-use to yearly/monthly to reduce cost. For details about the operations, see this section.

Prerequisites

The target ECS is billed in pay-per-use mode.

Procedure

1. Log in to the management console.
2. Click  in the upper left corner and select your region and project.

3. Under **Computing**, click **Elastic Cloud Server**.
4. On the **Elastic Cloud Server** page, select the target ECS.
5. Click **More** in the **Operation** column and select **Change Billing Mode** from the drop-down list.

 **NOTE**

The billing mode of multiple ECSs can be changed in a batch. To do so, perform the following operations:

1. Select the target ECSs.
 2. Click **More** on the top of the ECS list and select **Change Billing Mode** from the drop-down list.
6. Confirm the target ECS, specify the service duration, and pay for the order as prompted.

1.1.6 Changing Yearly/Monthly to Pay-per-Use

Scenarios

Yearly/Monthly is a prepaid billing mode in which your ECS will be billed based on service duration. This cost-effective mode is ideal when the duration of ECS usage is predictable.

If you require a more flexible billing mode, in which your ECS will be billed based on usage frequency and duration, you can change the billing mode from yearly/monthly to pay-per-use.

NOTICE

After the billing mode is changed from yearly/monthly to pay-per-use, the new billing mode takes effect only after the yearly/monthly subscription has expired.

Prerequisites

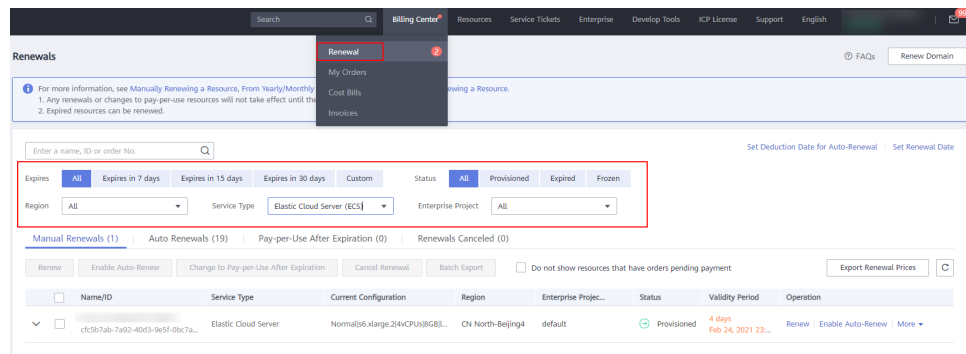
- You have passed real-name authentication.
- The billing mode of only the ECSs in **Provisioned** state on the **Renewals** page can be changed from yearly/monthly to pay-per-use.
- A yearly/monthly subscription can be changed to pay-per-use before its expiration date. However, the change takes effect only after the subscription has expired.
- The billing mode of solution portfolio products cannot be changed from yearly/monthly to pay-per-use.

Procedure

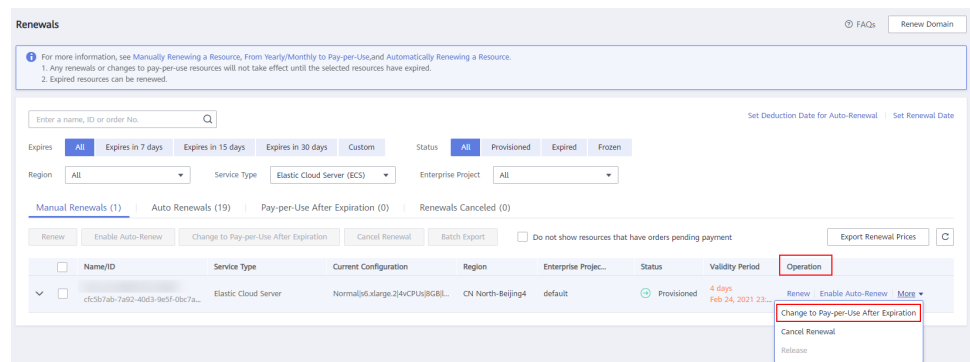
1. Log in to the management console.
2. Click **Billing** on the top of the management console and select **Renewal** from the drop-down list.

The **Renewals** page is displayed.

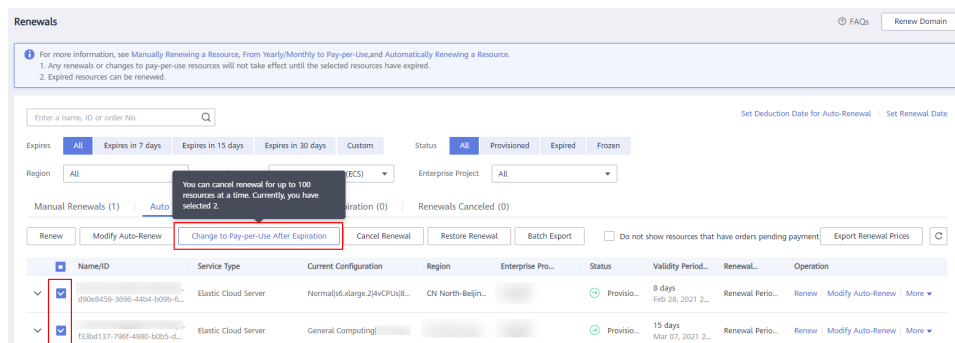
3. Customize search criteria.
 - Under the **Pay-per-Use After Expiration** tab, you can search for the ECSs with billing mode set to be pay-per-use upon expiration.
 - Under the **Manual Renewals**, **Auto Renewals**, and **Renewals Canceled** tabs, you can also change the billing mode of the ECSs to be pay-per-use upon expiration.

Figure 1-5 Renewals

4. Change the billing mode of ECSs from yearly/monthly to pay-per-use after expiration.
 - Single ECS: Select the ECS for which you want to change the billing mode, and choose **More > Change to Pay-per-Use After Expiration** in the **Operation** column.

Figure 1-6 Changing the billing mode of a single ECS from yearly/monthly to pay-per-use after expiration

- Multiple ECSs: Select the ECSs for which you want to change the billing mode, and click **Change to Pay-per-Use After Expiration** above the ECS list.

Figure 1-7 Batch changing the billing mode of ECSs from yearly/monthly to pay-per-use after expiration

5. Confirm the change details and click **Change to Pay-per-Use**.

1.2 Purchasing an ECS

1.2.1 Purchasing the Same ECS

Scenarios

If you have bought an ECS and want to buy new ones with the same configuration, it is a good practice to use "Buy Same ECS" provided on the public cloud platform to rapidly buy the new ones.

Notes

Large-memory ECSs and the ECSs bought using full-ECS images do not support "Buy Same ECS".

Procedure


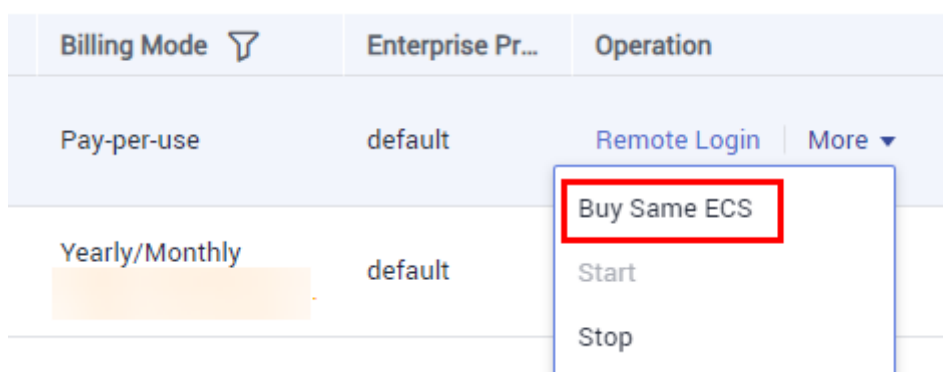
1. Log in to the management console.
2. Click  in the upper left corner and select your region and project.
3. Under **Computing**, click **Elastic Cloud Server**.
4. Select the target ECS, click **More** in the **Operation** column, and select **Buy Same ECS**.

Figure 1-8 Buy Same ECS

5. The system switches to the **Buy ECS** page and automatically copies the parameter settings of the selected ECS. Adjust the parameter settings of the new ECSs as required, confirm the configuration, and click **Next**.

NOTE

For security purposes, you must manually configure some of the settings for the new ECSs, including:

- Manually add data disks if the quantity of data disks needed exceeds 10.
- Manually add NICs if the quantity of NICs needed exceeds 5.
- Manually add security groups if the quantity of security groups needed exceeds 5.
- Select a new data disk image if the disks of the source ECS are created using a data disk image.
- Select **Encryption** if the disks of the source ECS have been encrypted.
- Configure the functions in **Advanced Options**.
- Configure **EIP** if required because it is set to **Not required** by default.


1.3 Viewing ECS Information

1.3.1 Viewing ECS Creation Statuses

Scenarios

After submitting the request for creating an ECS, you can view the creation status. This section describes how to view the creation status of an ECS.

Procedure

1. Log in to the management console.
2. Click  in the upper left corner and select your region and project.
3. Under **Computing**, click **Elastic Cloud Server**.
4. After purchasing an ECS, view the creation status in the task status area on the right side of common operations (**Start**, **Stop**, **Reset Password**, and **More**).
5. Click the number displayed above **Creating** and view details about the tasks.

NOTE

- An ECS that is being created is in one of the following states:
 - **Creating**: The ECS is being created.
 - **Failures**: Creating the ECS failed. In such a case, the system automatically rolls the task back and displays an error code on the GUI, for example, **Ecs.0013 Insufficient EIP quota**.
 - **Running**: The request of creating the ECS has been processed, and the ECS is running properly. An ECS in this state can provide services for you.
- If you find that the task status area shows an ECS creation failure but the ECS list displays the created ECS, see [Why Does the Failures Area Show an ECS Creation Failure But the ECS List Displays the Created ECS?](#)

1.3.2 Viewing Failures

Scenarios

The **Failures** area shows the tasks that failed to process due to an error, including the task name and status. **Failures** is displayed on the management console if a task failed. This section describes how to view failures.

Failure Types

Table 1-9 lists the types of failures that can be recorded in the **Failures** area.

Table 1-9 Failure types

Failure Type	Description
Creation failures	A task failed to process. For a failed task, the system rolls back and displays an error code, for example, Ecs.0013 Insufficient EIP quota .
Operation failures	<ul style="list-style-type: none">Modifying ECS specifications If an ECS specifications modification failed, this operation is recorded in Failures .

Procedure


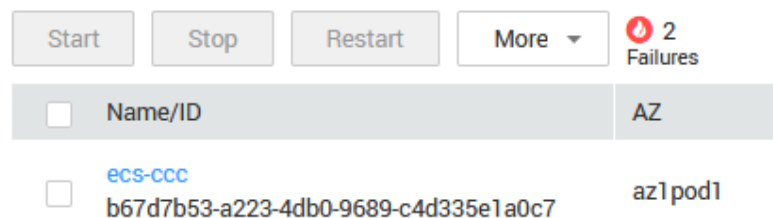
- Log in to the management console.
- Click  in the upper left corner and select your region and project.
- Under **Computing**, click **Elastic Cloud Server**.
- View **Failures** on the right side of common operations.

Figure 1-9 Failures



- Click the number displayed in the **Failures** area to view details about the tasks.
 - Creation Failures:** show the tasks that are being created and those failed to create.
 - Operation Failures:** show the tasks with errors, including the operations performed on the tasks and error codes. Such information can be used for rapid fault locating.



1.3.3 Viewing Details About an ECS

Scenarios

After obtaining ECSs, you can view and manage them on the management console. This section describes how to view detailed ECS configurations, including its name, image, system disk, data disks, VPC, NIC, security group, and EIP.

To view the private IP address of an ECS, view it on the **Elastic Cloud Server** page.

Procedure



1. Log in to the management console.
2. Click  in the upper left corner and select your region and project.
3. Under **Computing**, click **Elastic Cloud Server**.
The **Elastic Cloud Server** page is displayed. On this page, you can view your ECSs and the basic information about the ECSs, such as their private IP addresses.
4. In the search box above the ECS list, enter the ECS name, IP address, or ID, and click  for search.
5. Click the name of the target ECS.
The page providing details about the ECS is displayed.
6. View the ECS details.
You can modify ECS configurations, for example, change its security group, add a NIC to it, or bind an EIP to it, by clicking corresponding links or buttons.

1.3.4 Exporting ECS Information


Scenarios

The information of all ECSs under your account can be exported in CSV format to a local directory. The file records the IDs, private IP addresses, and EIPs of your ECSs.

Procedure

1. Log in to the management console.
2. Click  in the upper left corner and select your region and project.
3. Under **Computing**, click **Elastic Cloud Server**.
4. In the upper right corner of the ECS list, click .
The system will automatically export all ECSs in the current region under your account to a local directory.

 NOTE

To export certain ECSs, select the target ECSs and click  in the upper right corner of the page.

5. In the lower left corner of your local computer desktop, obtain the exported file **servers.csv**.

1.4 Logging In to a Windows ECS

1.4.1 Login Overview

Constraints

- Only a running ECS can be logged in.
- The username for logging in to a Windows ECS is **Administrator**.
- If the login password is forgotten, use the password reset function available on the management console to reset the password.
To reset a password, locate the row containing the target ECS and click **Reset Password** in the **Operation** column.
- If an ECS uses key pair authentication, use the password obtaining function available on the management console to decrypt the private key used during ECS creation to obtain a password.
- Certain G series of ECSs do not support remote login provided by the public cloud platform. If you need to remotely log in to the ECSs, install the VNC server on them. For details, see [GPU-accelerated ECSs](#). You are suggested to log in to the ECSs using MSTSC.
- If you log in to a GPU-accelerated ECS using MSTSC, GPU acceleration will fail. This is because MSTSC replaces the WDDM GPU driver with a non-accelerated remote desktop display driver. In such a case, you must use other methods to log in to the ECS, such as VNC. If the remote login function available on the management console fails to meet your service requirements, you must install a suitable remote login tool on the ECS, such as TightVNC.
To download TightVNC, log in at <https://www.tightvnc.com/download.php>.

Login Modes

Select a login mode as required and log in to the target ECS.

Table 1-10 Windows login modes

ECS OS	Local OS	Connection Method	Requirement
Windows	Windows	Use MSTSC. Click Start on the local computer. In the Search programs and files text box, enter mstsc to open the Remote Desktop Connection dialog box. For details, see Login Using MSTSC .	The target ECS has had an EIP bound. (If you log in to an ECS through an intranet, for example, through VPN or Direct Connect, the ECS does not require an EIP.)
	Linux	Install a remote connection tool, for example, rdesktop. For details, see Logging In to a Windows ECS from a Linux Computer .	
	Mac	Install a remote connection tool, for example, Microsoft Remote Desktop for Mac. For details, see Logging In to Windows ECS from a Mac .	
	Mobile terminal	Install a remote connection tool, for example, Microsoft Remote Desktop. For details, see Logging In to a Windows ECS from a Mobile Terminal .	
	Windows	Through the management console. For details, see Login Using VNC .	No EIP is required.

Helpful Links

- [What Should I Do If My Remote Login Password Was Forgotten?](#)
- [Multi-user Login Issues](#)
- [What Should I Do If I Cannot Log In to My Windows ECS?](#)

1.4.2 Login Using VNC

Scenarios

This section describes how to use VNC provided on the management console to log in to an ECS.

Prerequisites

If an ECS uses key pair authentication, make sure that the key file has been used to resolve the login password before logging in to the ECS. For details, see [Obtaining the Password for Logging In to a Windows ECS](#).

Logging In to a Windows ECS


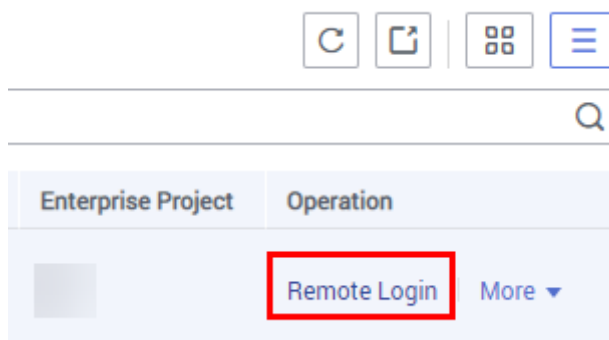
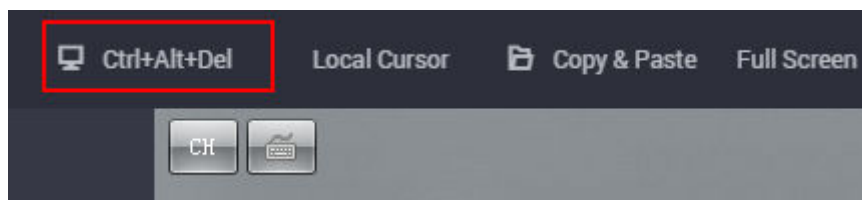
1. Log in to the management console.
2. Click  in the upper left corner and select your region and project.
3. Under **Computing**, click **Elastic Cloud Server**.
4. Obtain the password for logging in to the ECS.
Before logging in to the ECS, you must have the login password.
 - If your ECS uses password authentication, log in to the ECS using the password configured when you created this ECS.
 - If your ECS uses key pair authentication, obtain the password by following the instructions provided in [Obtaining the Password for Logging In to a Windows ECS](#).
5. In the **Operation** column of the target ECS, click **Remote Login**.

Figure 1-10 Remote Login



6. (Optional) When the system displays "Press CTRL+ALT+DELETE to log on", click **Ctrl+Alt+Del** in the upper part of the remote login page to log in to the ECS.

Figure 1-11 Ctrl+Alt+Del



7. Enter the ECS password as prompted.

Helpful Links

- [What Should I Do If My Remote Login Password Was Forgotten?](#)

- [Multi-user Login Issues](#)
- [What Should I Do If I Cannot Log In to My Windows ECS?](#)

1.4.3 Login Using MSTSC

Scenarios

This section describes how to use the remote login tool MSTSC to log in to a Windows ECS from a local computer.

Prerequisites

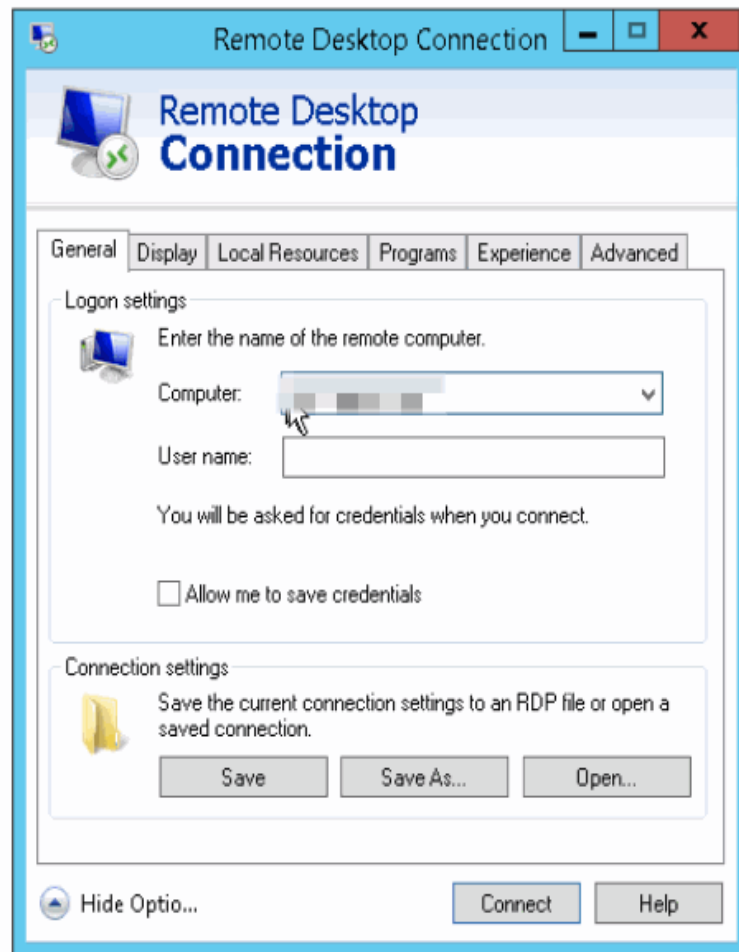
- The target ECS is running.
- If your ECS uses key pair authentication, you have obtained the password for logging in to the Windows ECS. For details, see [Obtaining the Password for Logging In to a Windows ECS](#).
- You have bound an EIP to the ECS. For details, see [Binding an EIP](#).
When logging in to an ECS through an intranet using MSTSC, for example, through VPN or Direct Connect, you do not need to bind an EIP to the ECS.
- Access to port 3389 is allowed in the inbound direction of the security group to which the ECS belongs. For details, see [Configuring Security Group Rules](#).
- The network connection between the login tool and the target ECS is normal. For example, the default port 3389 is not blocked by the firewall.
- RDP has been enabled on the target ECS. By default, RDP has been enabled on the ECSs created using a public image. For instructions about how to enable RDP, see [Enabling RDP](#).

Logging In to a Windows ECS Using MSTSC

If your local server runs Windows, you can use the remote desktop connection tool MSTSC delivered with the Windows OS to log in to a Windows ECS.

The following section describes how to use MSTSC to log in to the Windows Server 2012 ECS.

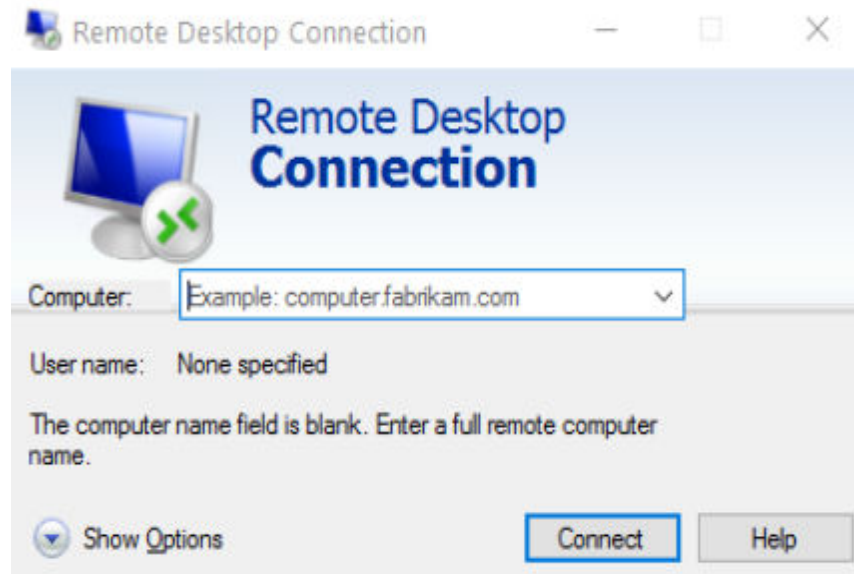
Figure 1-12 Logging in to an ECS using MSTSC



For details, see the following procedure:

1. Click the start menu on the local server.
2. In the **Search programs and files** text box, enter **mstsc**.
3. In the **Remote Desktop Connection** dialog box, click **Show Options**.

Figure 1-13 Show Options

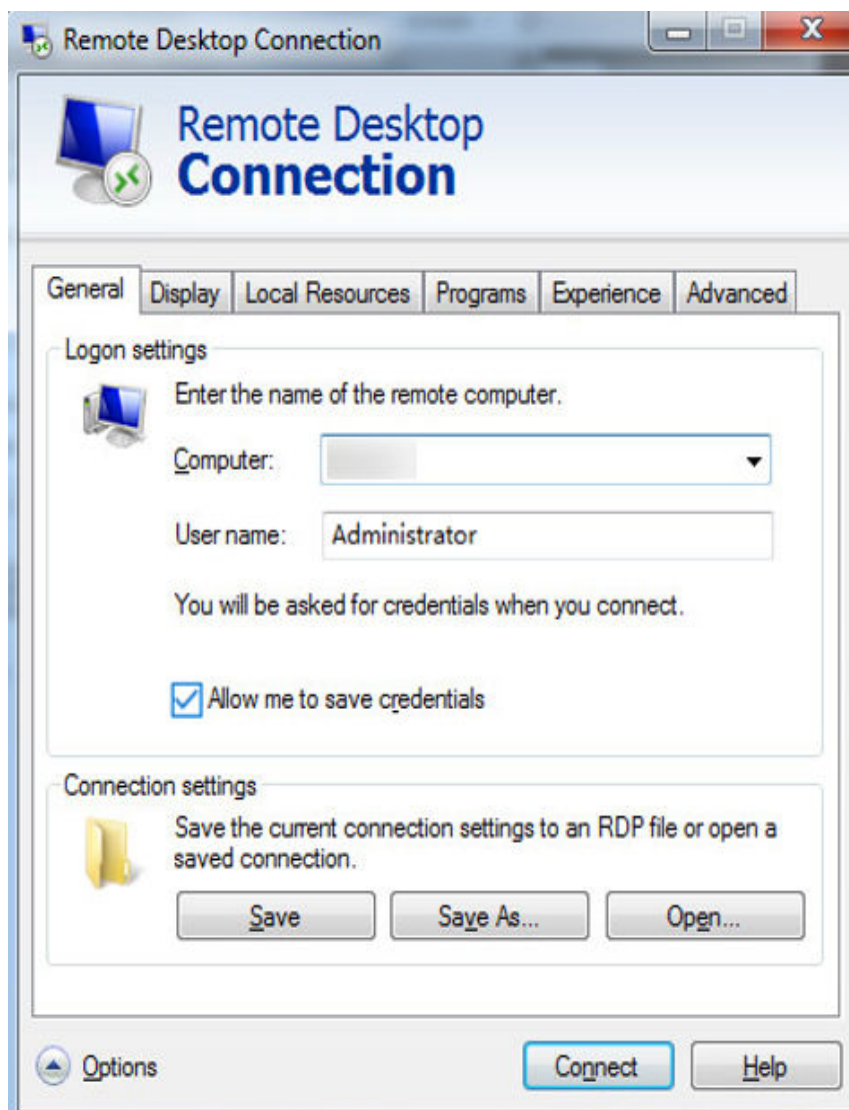


4. Enter the EIP and username (**Administrator** by default) of the target ECS.

NOTE

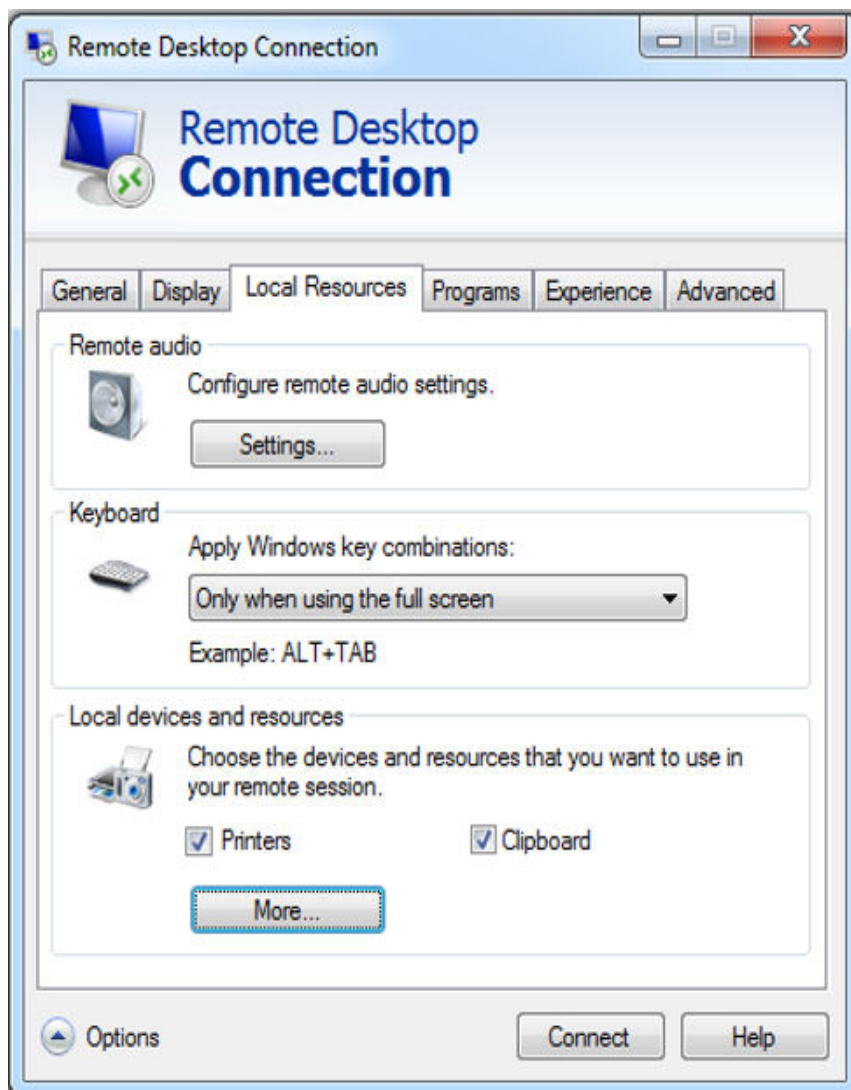
If you do not want to enter the username and password in follow-up logins, select **Allow me to save credentials**.

Figure 1-14 Remote Desktop Connection



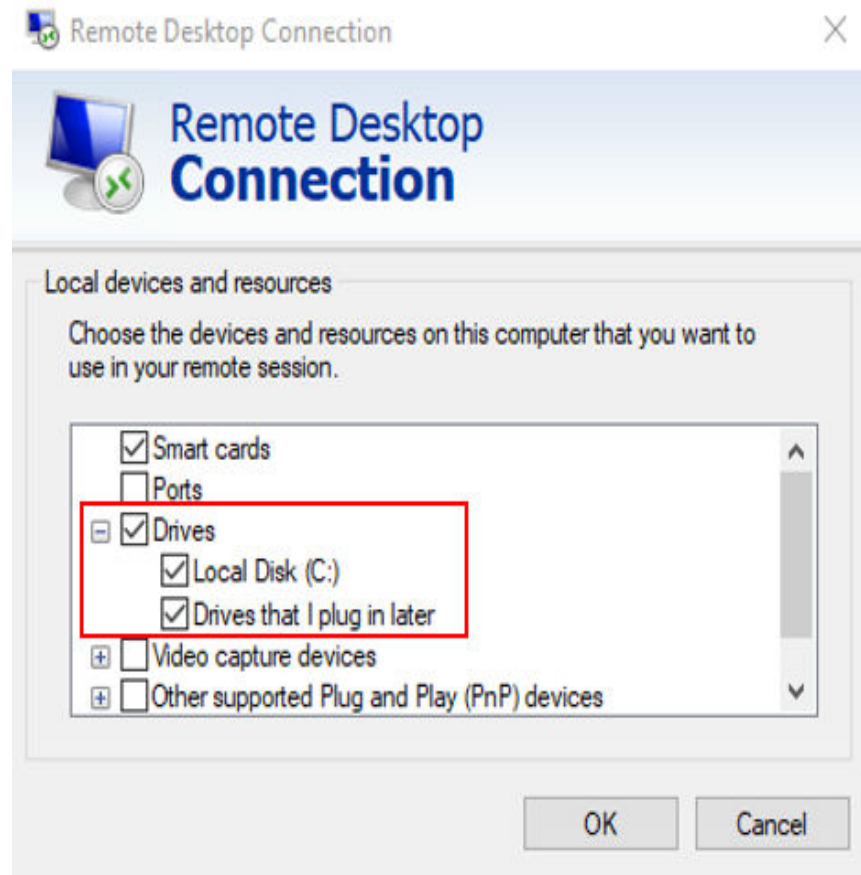
5. (Optional) To use local server resources in a remote session, configure parameters on the **Local Resources** tab.
 - To copy data from the local server to your ECS, select **Clipboard**.

Figure 1-15 Clipboard

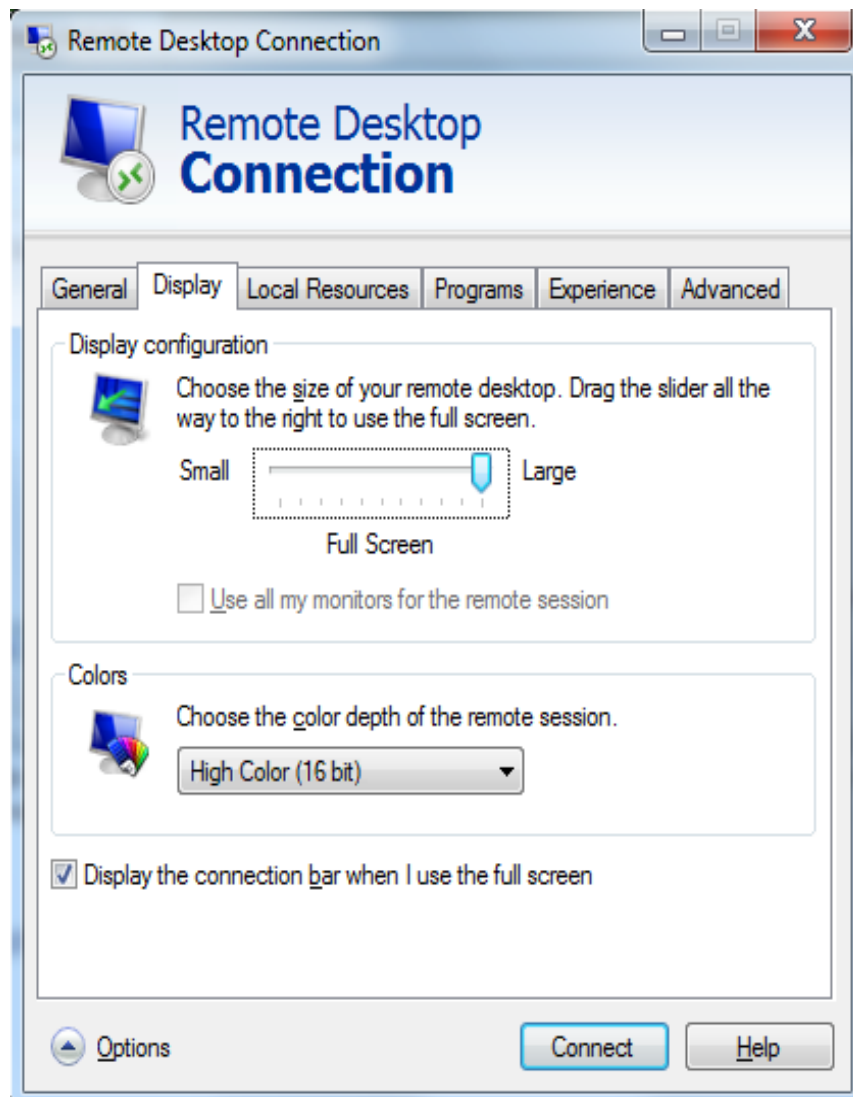


- To copy files from the local server to your ECS, click **More** and select your desired disks.

Figure 1-16 Drives



6. (Optional) Click the **Display** tab and then adjust the size of the remote desktop.

Figure 1-17 Adjusting the size of the desktop

7. Click **OK** and enter the login password as prompted to log in to the ECS.
To ensure system security, change the login password after you log in to the ECS for the first time.
8. (Optional) After logging in to the ECS using RDP, handle the issue that local files larger than 2 GB cannot be copied to a remote Windows ECS.
For details, see [troubleshooting cases](#).

Enabling RDP

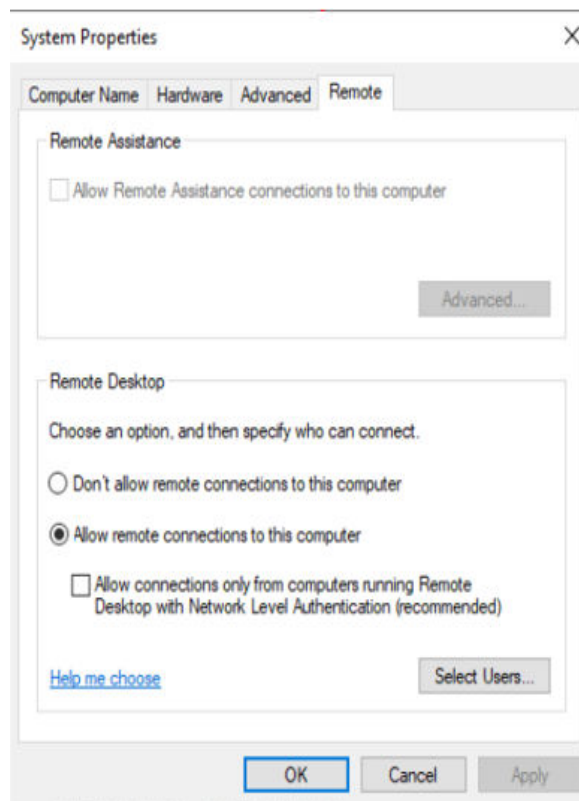
When you log in to an ECS for the first time, log in to it using VNC, enable RDP, and access the ECS using MSTSC.

NOTE

By default, RDP has been enabled on the ECSs created using a public image.

1. Log in to the Windows ECS using VNC.
For details, see [Login Using VNC](#).

2. Click **Start** in the task bar and choose **Control Panel > System and Security > System > Remote settings**.
The **System Properties** dialog box is displayed.

Figure 1-18 System Properties

3. Click the **Remote** tab and select **Allow connections from computers running any version of Remote Desktop (less secure)**.
4. Click **OK**.

Helpful Links

- [What Should I Do If My Remote Login Password Was Forgotten?](#)
- [Multi-user Login Issues](#)
- [What Should I Do If I Cannot Log In to My Windows ECS?](#)

1.4.4 Logging In to a Windows ECS from a Linux Computer

Scenarios

This section describes how to log in to a Windows ECS from a Linux computer.

Prerequisites

- The target ECS is running.
- You have bound an EIP to the ECS.

When logging in to an ECS through an intranet using MSTSC, for example, through VPN or Direct Connect, you do not need to bind an EIP to the ECS.

- Access to port 3389 is allowed in the inbound direction of the security group to which the ECS belongs.
- Data can be exchanged between the login tool and the target ECS. For example, the default port 3389 is not blocked by the firewall.
- RDP has been enabled on the target ECS. By default, RDP has been enabled on the ECSs created using a public image. For instructions about how to enable RDP, see [Enabling RDP](#).

Procedure

To log in to a Windows ECS from a local Linux computer, use a remote access tool, such as rdesktop.

1. Run the following command to check whether rdesktop has been installed on the ECS:

rdesktop

If the message "command not found" is displayed, rdesktop is not installed. In such a case, obtain the rdesktop installation package at the [official rdesktop website](#).

2. Run the following command to log in to the ECS:

```
rdesktop -u Username -p Password -g Resolution EIP
```

For example, run **rdesktop -u administrator -p password -g 1024*720 121.xx.xx.xx**.

Table 1-11 Parameters in the remote login command

Parameter	Description
-u	Username, which defaults to Administrator for Windows ECSs
-p	Password for logging in to the Windows ECS
-f	Full screen by default, which can be switched using Ctrl+Alt+Enter
-g	Resolution, which uses an asterisk (*) to separate numbers. This parameter is optional. If it is not specified, the remote desktop is displayed in full screen by default, for example, 1024*720 .
EIP	EIP of the Windows ECS to be remotely logged in. Replace it with the EIP bound to your Windows ECS.

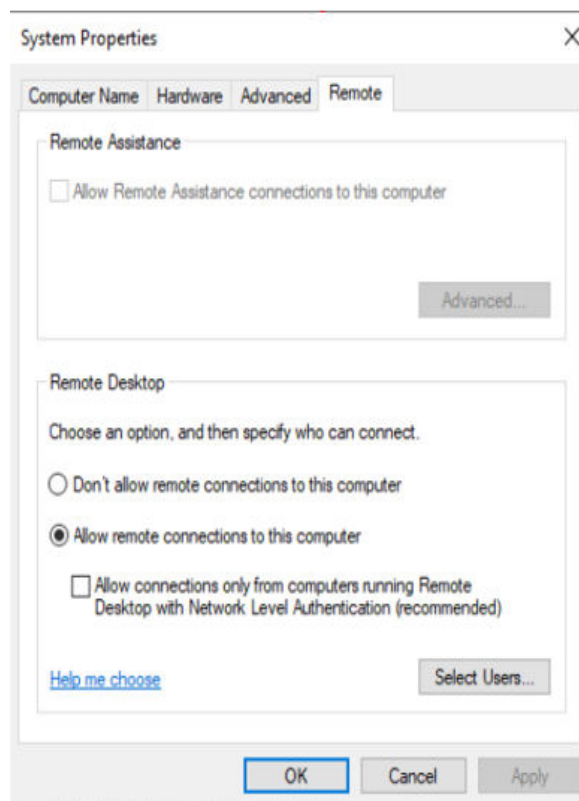
Enabling RDP

When you log in to an ECS for the first time, log in to it using VNC, enable RDP, and access the ECS using MSTSC.

NOTE

By default, RDP has been enabled on the ECSs created using a public image.

1. Log in to the Windows ECS using VNC.
For details, see [Login Using VNC](#).
2. Click **Start** in the task bar and choose **Control Panel > System and Security > System > Remote settings**.
The **System Properties** dialog box is displayed.

Figure 1-19 System Properties

3. Click the **Remote** tab and select **Allow connections from computers running any version of Remote Desktop (less secure)**.
4. Click **OK**.

1.4.5 Logging In to a Windows ECS from a Mobile Terminal

Scenarios

This section describes how to log in to an ECS running Windows Server 2012 R2 DataCenter 64bit from the Microsoft Remote Desktop client.

Prerequisites

- The target ECS is running.
- You have obtained the username and password for logging in to the ECS. If the password is unavailable, reset the password by following the instructions provided in [Resetting the Password for Logging In to an ECS on the Management Console](#).
- You have bound an EIP to the ECS. For details, see [Binding an EIP](#).

- Access to port 3389 is allowed in the inbound direction of the security group to which the ECS belongs. For details, see [Configuring Security Group Rules](#).
- Microsoft Remote Desktop has been installed on the mobile terminal.

Procedure


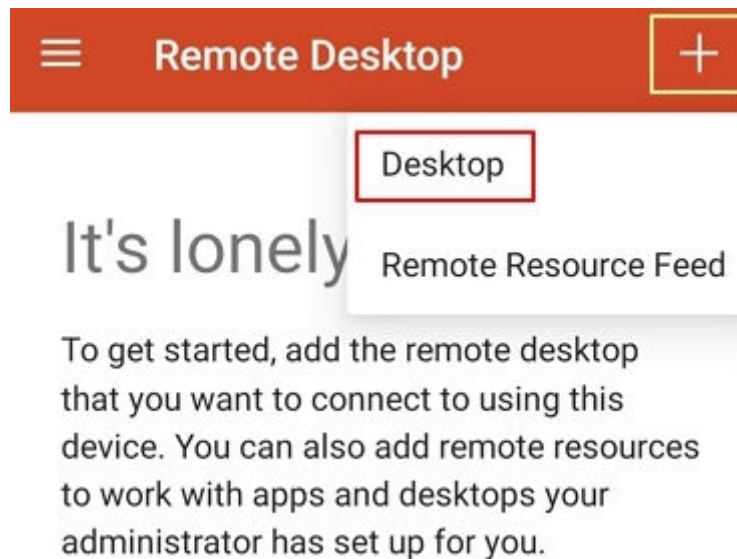
1. Start the Microsoft Remote Desktop client.
2. In the upper right corner of the **Remote Desktop** page, tap  and select **Desktop**.

Figure 1-20 Remote Desktop



3. On the **Add desktop** page, set login information and tap **SAVE**.
 - **PC name:** Enter the EIP bound to the target Windows ECS.
 - Perform the following operations to set **User name:**
 - i. Tap **User name** and select **Add user account** from the drop-down list.
The **Add user account** dialog box is displayed.
 - ii. Enter username **administrator** and password for logging in to the Windows ECS and tap **SAVE**.

Figure 1-21 Setting the login information

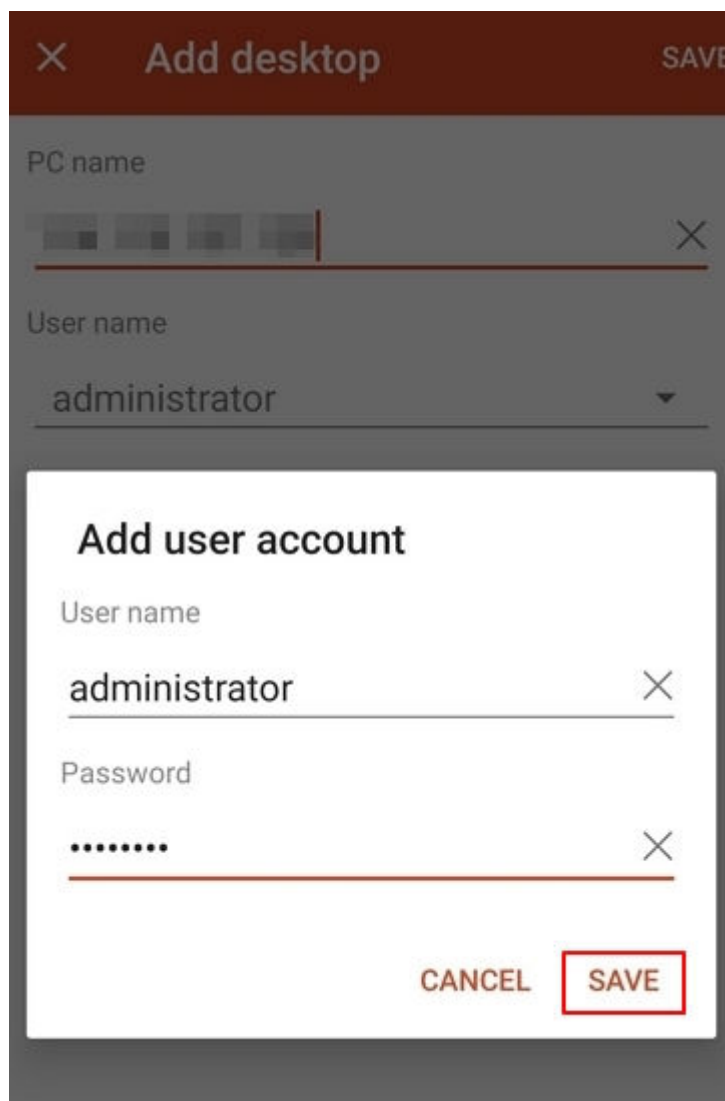
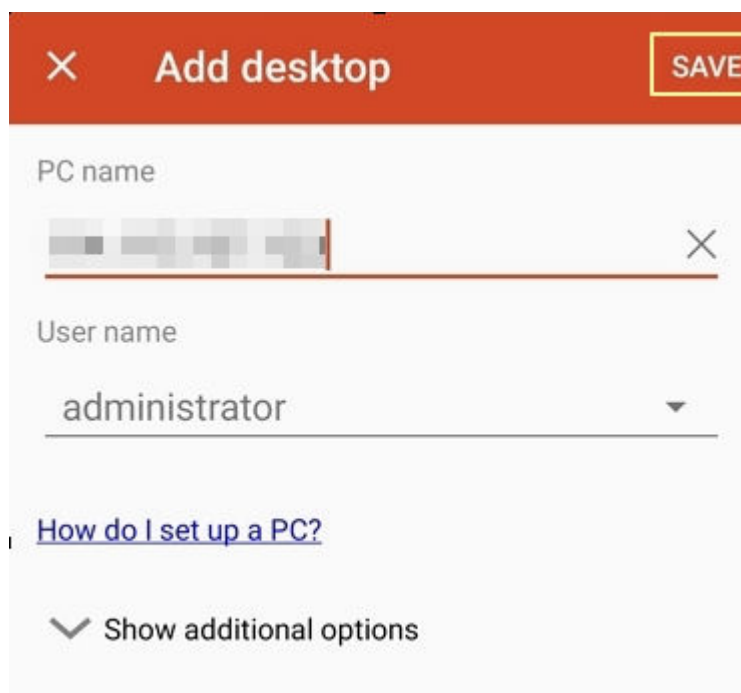


Figure 1-22 Saving the settings



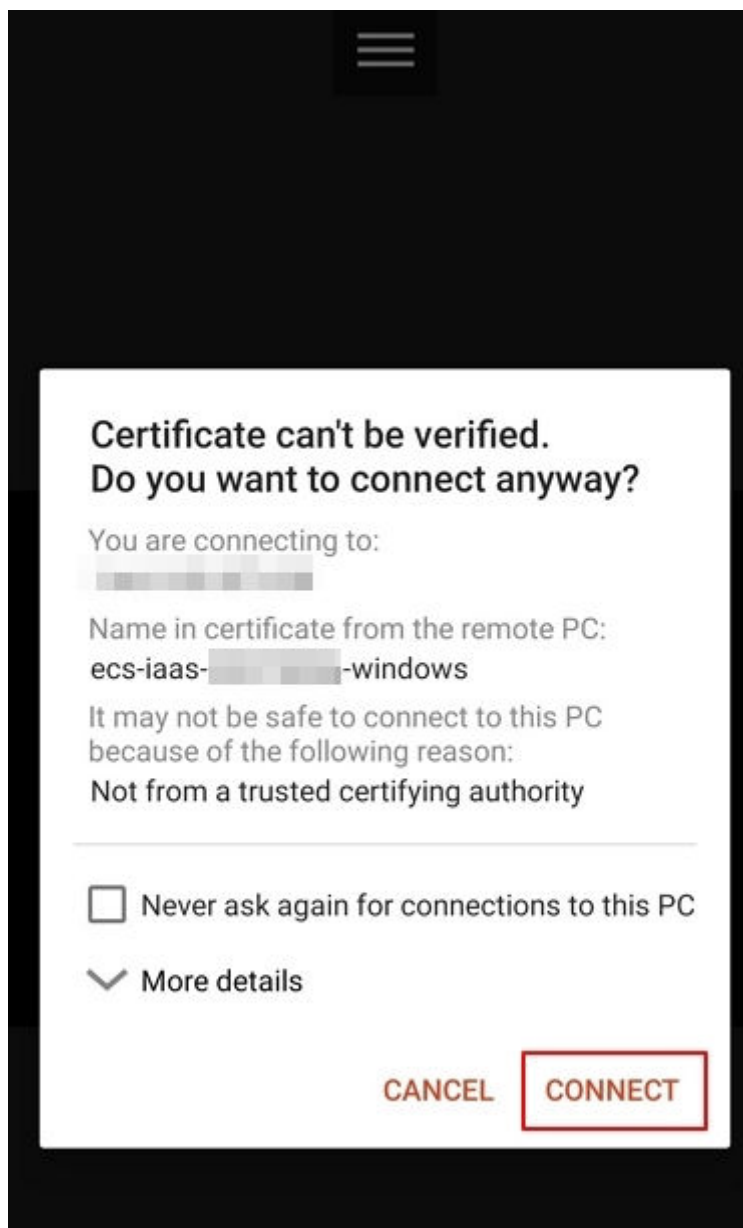
4. On the **Remote Desktop** page, tap the icon of the target Windows ECS.

Figure 1-23 Logging in to the Windows ECS

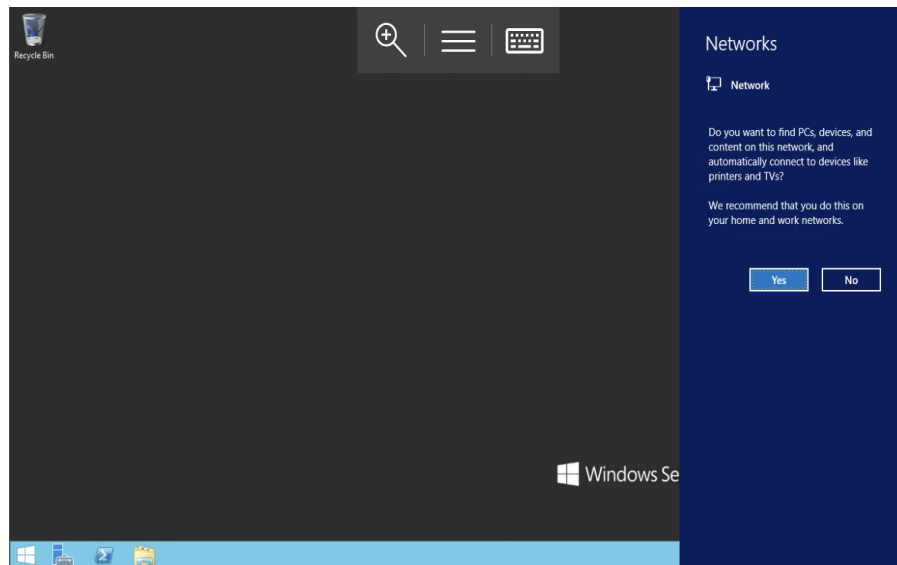


5. Confirm the information and tap **CONNECT**.

Figure 1-24 CONNECT



You have logged in to the Windows ECS.

Figure 1-25 Successful login

1.4.6 Logging In to Windows ECS from a Mac

Scenarios

This section describes how to use a remote login tool to log in to a Windows ECS from a Mac. In this section, the remote login tool Microsoft Remote Desktop for Mac and the ECS running Windows Server 2012 R2 Data Center 64bit are used as an example.

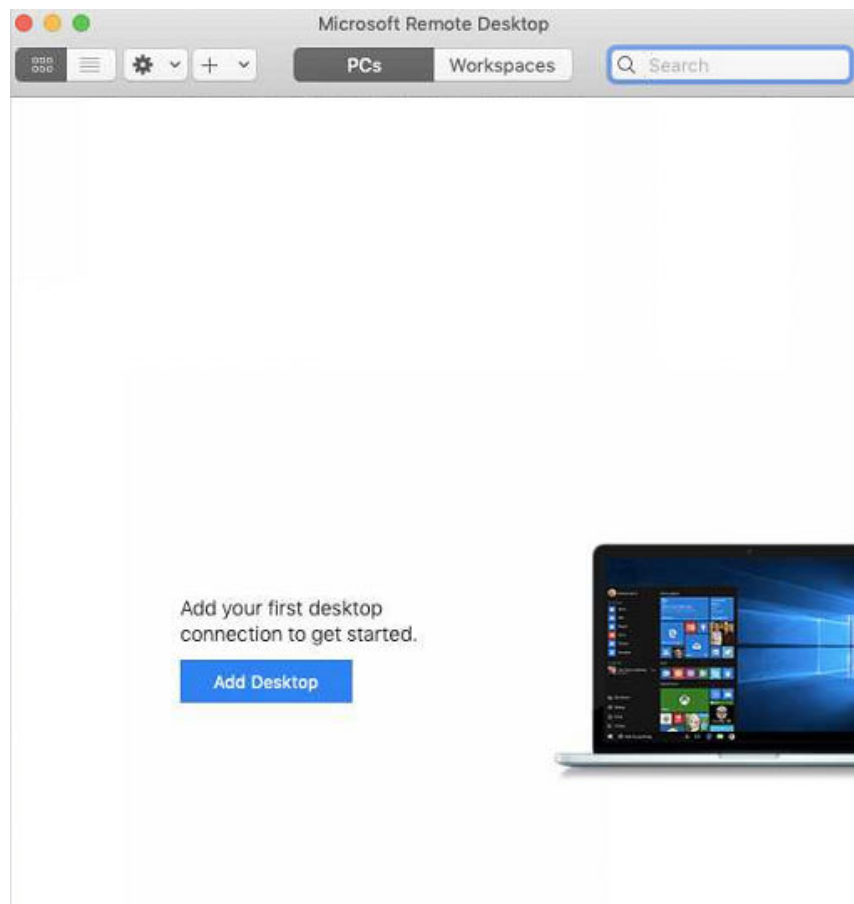
Prerequisites

- The target ECS is running.
- You have obtained the username and password for logging in to the ECS. If the password is unavailable, reset the password by following the instructions provided in [Resetting the Password for Logging In to an ECS on the Management Console](#).
- You have bound an EIP to the ECS. For details, see [Binding an EIP](#).
- Access to port 3389 is allowed in the inbound direction of the security group to which the ECS belongs. For details, see [Configuring Security Group Rules](#).
- The remote access tool supported by Mac, such as Microsoft Remote Desktop for Mac has been installed. For details, see [Download Microsoft Remote Desktop for Mac](#).

Procedure

1. Start Microsoft Remote Desktop.
2. Click **Add Desktop**.

Figure 1-26 Add Desktop



3. On the **Add PC** page, set login information.
 - **PC name:** Enter the EIP bound to the target Windows ECS.
 - **User account:** Select **Add user account** from the drop-down list. The **Add user account** dialog box is displayed.
 - i. Enter username **administrator** and password for logging in to the Windows ECS and click **Add**.

Figure 1-27 Add user account

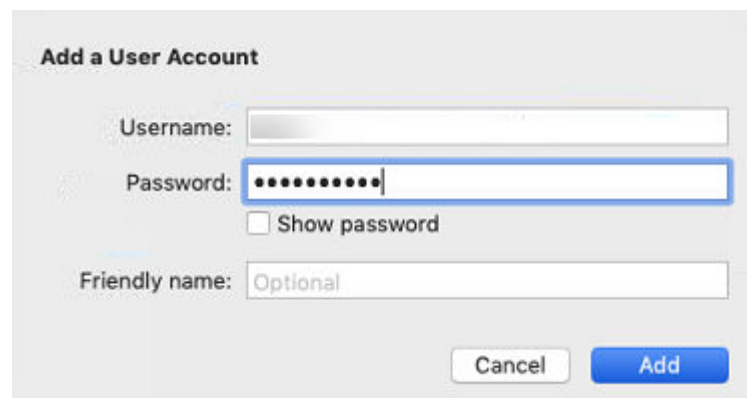
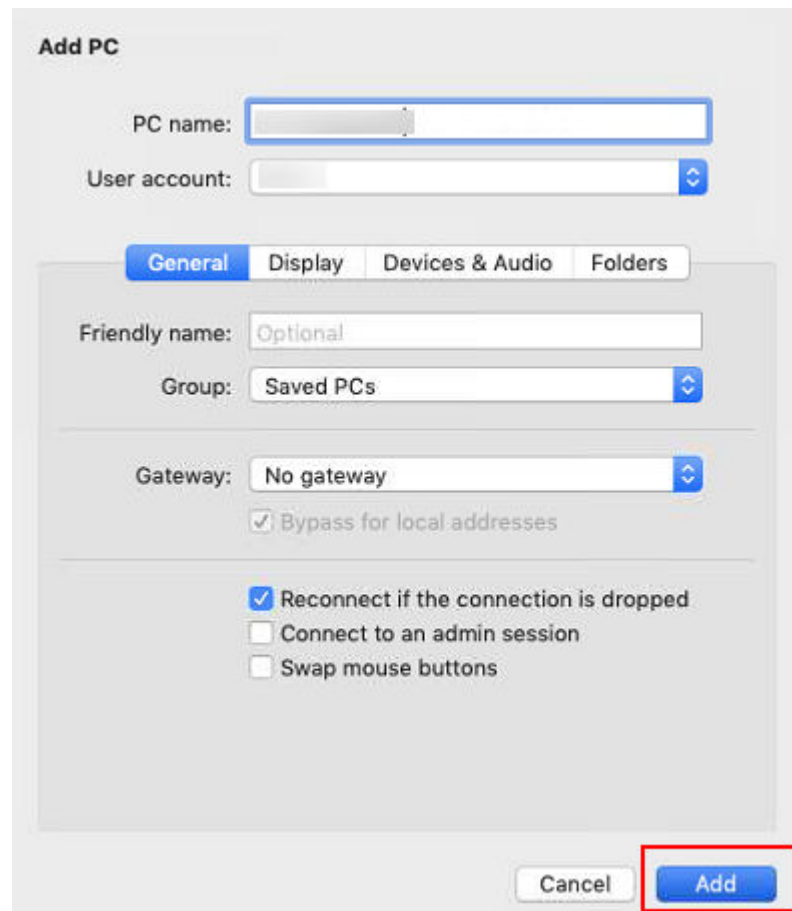
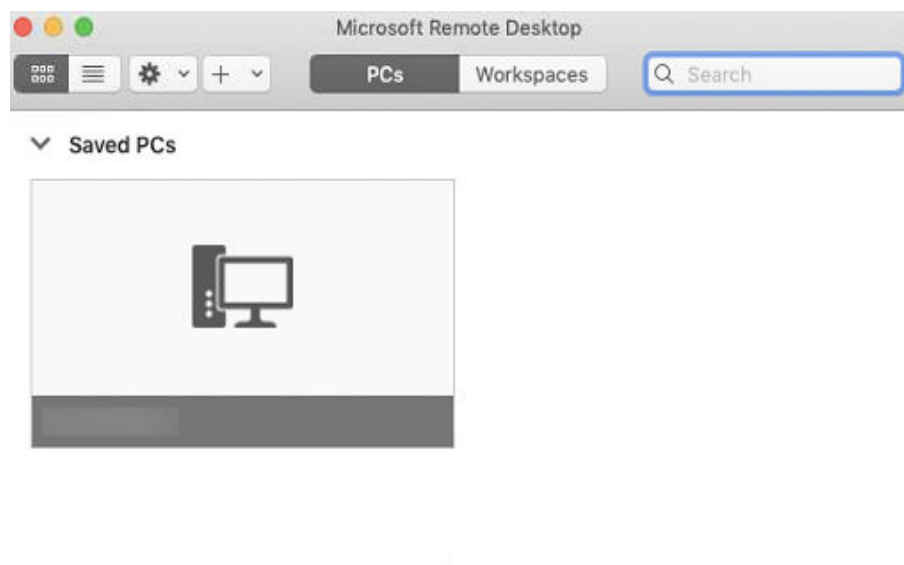


Figure 1-28 Add PC



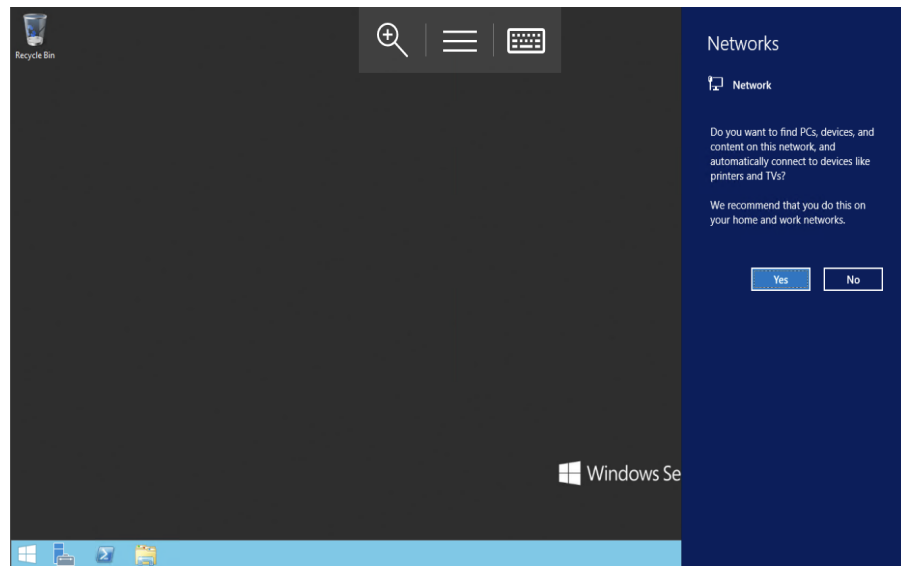
4. On the **Remote Desktop** page, double-click the icon of the target Windows ECS.

Figure 1-29 Double-click for login



5. Confirm the information and click **Continue**.
You have logged in to the Windows ECS.

Figure 1-30 Successful login



1.5 Logging In to a Linux ECS

1.5.1 Login Overview

Constraints

- Only a running ECS can be logged in.
- The username for logging in to a Linux ECS is **root**.
- If the login password is forgotten, use the password reset function available on the management console to reset the password.

To reset a password, locate the row containing the target ECS, click **More** in the **Operation** column, and select **Reset Password** from the drop-down list.

Login Modes

Select a login mode as required and log in to the target ECS.

Table 1-12 Linux ECS login modes

ECS OS	Local OS	Connection Method	Requirement
Linux	Windows	Use a remote login tool, such as PuTTY or Xshell. <ul style="list-style-type: none"> • Password-authenticated: Logging In to the Linux ECS from Local Windows • Key-pair-authenticated: Logging In to the Linux ECS from Local Windows 	The target ECS has had an EIP bound. (If you log in to an ECS through an intranet, for example, through VPN or Direct Connect, the ECS does not require an EIP.)

ECS OS	Local OS	Connection Method	Requirement
	Linux	Run commands. <ul style="list-style-type: none">• Password-authenticated: Logging In to the Linux ECS from Local Linux• Key-pair-authenticated: Logging In to the Linux ECS from Local Linux	
	Mobile terminal	Use an SSH client tool, such as Termius or JuiceSSH, to log in to the ECS. Logging In to a Linux ECS from a Mobile Terminal	
	Windows	Use the remote login function available on the management console. For details, see Login Using VNC .	No EIP is required.

Helpful Links

- [What Should I Do If My Remote Login Password Was Forgotten?](#)
- [What Should I Do If I Cannot Log In to My Linux ECS?](#)

1.5.2 Login Using VNC

Scenarios

This section describes how to use VNC provided on the management console to log in to an ECS.

For instructions about how to copy and paste data on VNC pages after the ECS login, see [Follow-up Procedure](#).

NOTE

Before using remote login (VNC) provided on the management console to log in to a Linux ECS authenticated using a key pair, log in to the ECS [using an SSH key](#) and set a login password.

Prerequisites

- You have used an SSH key to log in to the Linux ECS authenticated using a key pair and set a login password.
- An EIP has been bound to the ECS.

Procedure

1. Log in to the management console.


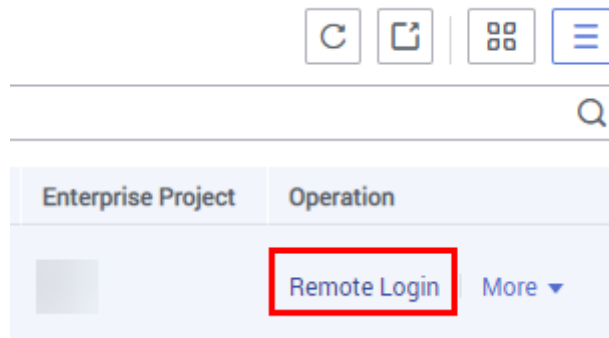
2. Click  in the upper left corner and select your region and project.
3. Under **Computing**, click **Elastic Cloud Server**.
4. In the **Operation** column of the target ECS, click **Remote Login**.

Figure 1-31 Remote Login



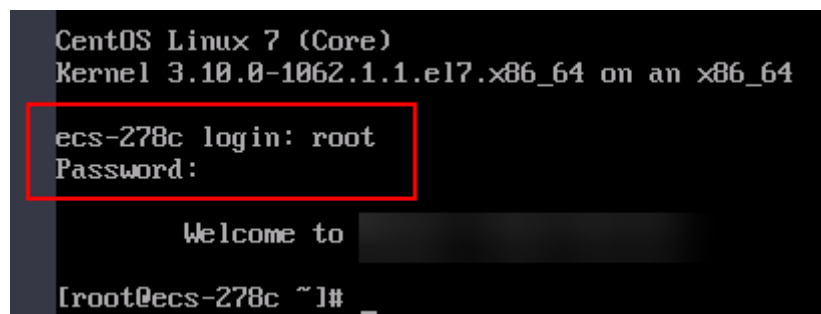
5. (Optional) When the system displays "Press CTRL+ALT+DELETE to log on", click **Ctrl+Alt+Del** in the upper part of the remote login page to log in to the ECS.

 **NOTE**

Do not press **CTRL+ALT+DELETE** on the physical keyboard because this operation does not take effect.

6. Enter the ECS password as prompted.

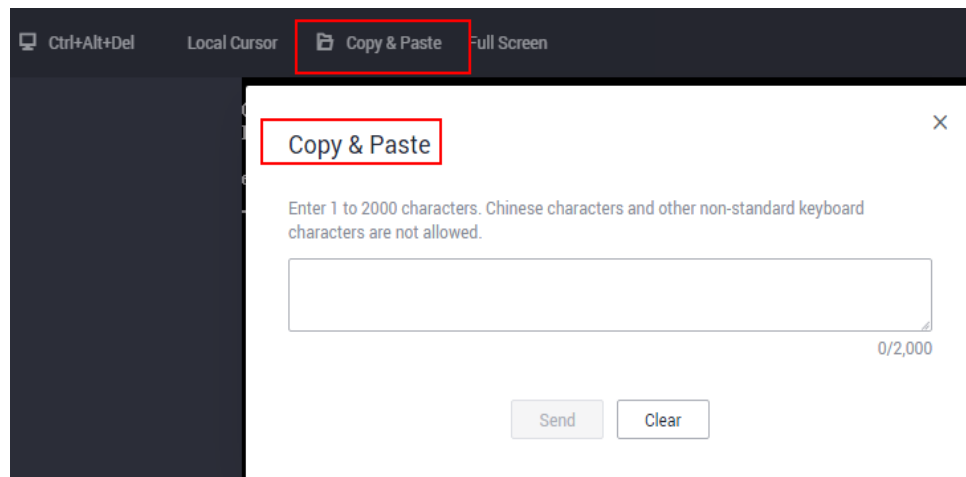
Figure 1-32 Username (root as an example) and password



Follow-up Procedure

Local commands can be copied to an ECS. To do so, perform the following operations:

1. Log in to the ECS using VNC.
2. Click **Input Commands** in the upper right corner of the page.

Figure 1-33 Copy & Paste

3. Press **Ctrl+C** to copy data from the local computer.
4. Press **Ctrl+V** to paste the local data to the **Copy Commands** window.
5. Click **Send**.
Send the copied data to the CLI.

NOTE

There is a low probability that data is lost when you use Input Commands on the VNC page of a GUI-based Linux ECS. This is because the number of ECS vCPUs fails to meet GUI requirements. In such a case, it is a good practice to send a maximum of 5 characters at a time or switch from GUI to CLI (also called text interface), and then use the command input function.

Helpful Links

- [What Should I Do If My Remote Login Password Was Forgotten?](#)
- [What Should I Do If I Cannot Log In to My Linux ECS?](#)

1.5.3 Login Using an SSH Key

Scenarios

This section describes how to remotely log in to a Linux ECS using an SSH key pair from Windows and Linux, respectively.

Prerequisites

- You have obtained the private key file used during ECS creation.
- You have bound an EIP to the ECS. For details, see [Viewing Details About an ECS](#).
- You have configured the inbound rules of the security group. For details, see [Configuring Security Group Rules](#).
- The network connection between the login tool (PuTTY) and the target ECS is normal. For example, the default port 22 is not blocked by the firewall.

Logging In to the Linux ECS from Local Windows

To log in to the Linux ECS from local Windows, perform the operations described in this section.

Method 1: Use PuTTY to log in to the ECS.

The following example shows how to convert the format of a private key file and use an SSH key to access a Linux ECS.

Figure 1-34 Accessing a Linux ECS using an SSH key



The following operations use PuTTY as an example. Before logging in to the ECS using PuTTY, make sure that the private key file has been converted to .ppk format.

1. Check whether the private key file has been converted to .ppk format.
 - If yes, go to step 7.
 - If no, go to step 2.
2. Visit the following website and download PuTTY and PuTTYgen:
<https://www.chiark.greenend.org.uk/~sgtatham/putty/latest.html>

NOTE

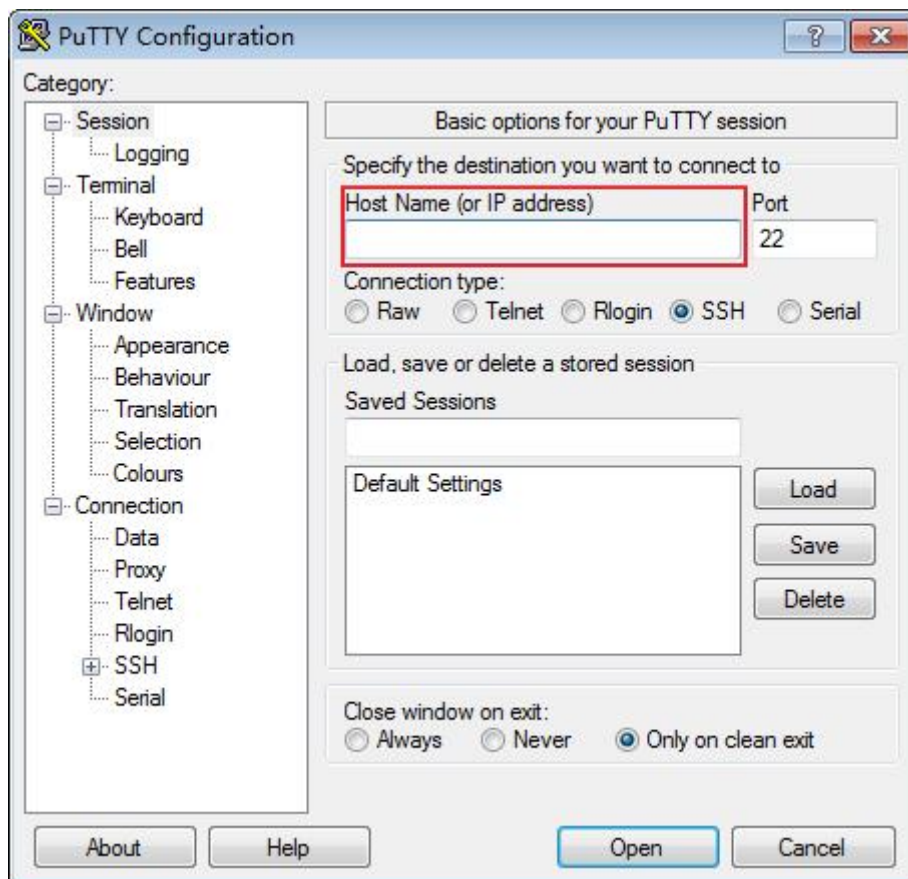
PuTTYgen is a key generator, which is used to create a key pair that consists of a public key and a private key for PuTTY.

3. Run PuTTYgen.
4. In the **Actions** pane, click **Load** and import the private key file that you stored during ECS creation.

Ensure that the format of **All files (*.*)** is selected.

5. Click **Save private key**.
6. Save the converted private key, for example, **kp-123.ppk**, to the local computer.
7. Double-click **PuTTY.EXE**. The **PuTTY Configuration** page is displayed.
8. Choose **Session** and enter the EIP of the ECS under **Host Name (or IP address)**.

Figure 1-35 Configuring the EIP



9. Choose **Connection > Data**. Enter the image username in **Auto-login username**.

NOTE

When you log in to an ECS using an SSH key:

- The image username is **core** for a CoreOS public image.
- The image username is **root** for a non-CoreOS public image.

10. Choose **Connection > SSH > Auth**. In the last configuration item **Private key file for authentication**, click **Browse** and select the private key converted in step 6.
11. Click **Open**.
Log in to the ECS.

Method 2: Use Xshell to log in to the ECS.

1. Start the Xshell tool.

2. Run the following command using the EIP to remotely log in to the ECS through SSH:

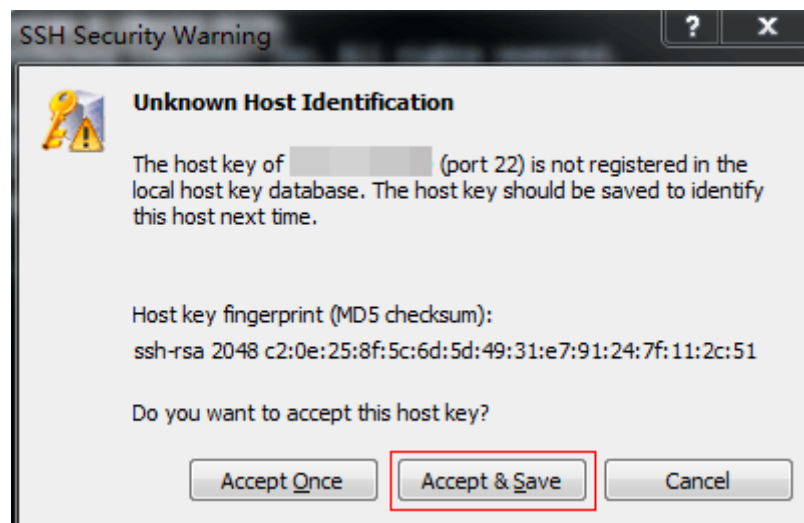
```
ssh Username@EIP
```

 NOTE

When you log in to an ECS using an SSH key:

- The image username is **core** for a CoreOS public image.
 - The image username is **root** for a non-CoreOS public image.
3. (Optional) If the system displays the **SSH Security Warning** dialog box, click **Accept & Save**.

Figure 1-36 SSH Security Warning



4. Select **Public Key** and click **Browse** beside the user key text box.
5. In the user key dialog box, click **Import**.
6. Select the locally stored key file and click **Open**.
7. Click **OK** to log in to the ECS.

Logging In to the Linux ECS from Local Linux

To log in to the Linux ECS from local Linux, perform the operations described in this section. The following operations use private key file **kp-123.pem** as an example to log in to the ECS. The name of your private key file may differ.

1. On the Linux CLI, run the following command to change operation permissions:

```
chmod 400 /path/kp-123.pem
```

 NOTE

In the preceding command, *path* refers to the path where the key file is saved.

2. Run the following command to log in to the ECS:

```
ssh -i /path/kp-123.pem Default_username@EIP
```

For example, if the default username is **linux** and the EIP is **123.123.123.123**, run the following command:

```
ssh -i /path/kp-123.pem linux@123.123.123.123
```

NOTE

In the preceding command:

- *path* refers to the path under which the key file is stored.
- *EIP* is the EIP bound to the ECS.

Follow-up Procedure

- After logging in to the ECS using the SSH key, you can set a password to log in to the ECS using VNC.

Helpful Links

- [What Should I Do If My Remote Login Password Was Forgotten?](#)
- [What Should I Do If I Cannot Log In to My Linux ECS?](#)

1.5.4 Login Using an SSH Password

Scenarios

This section describes how to remotely log in to a Linux ECS using an SSH password from Windows and Linux, respectively.

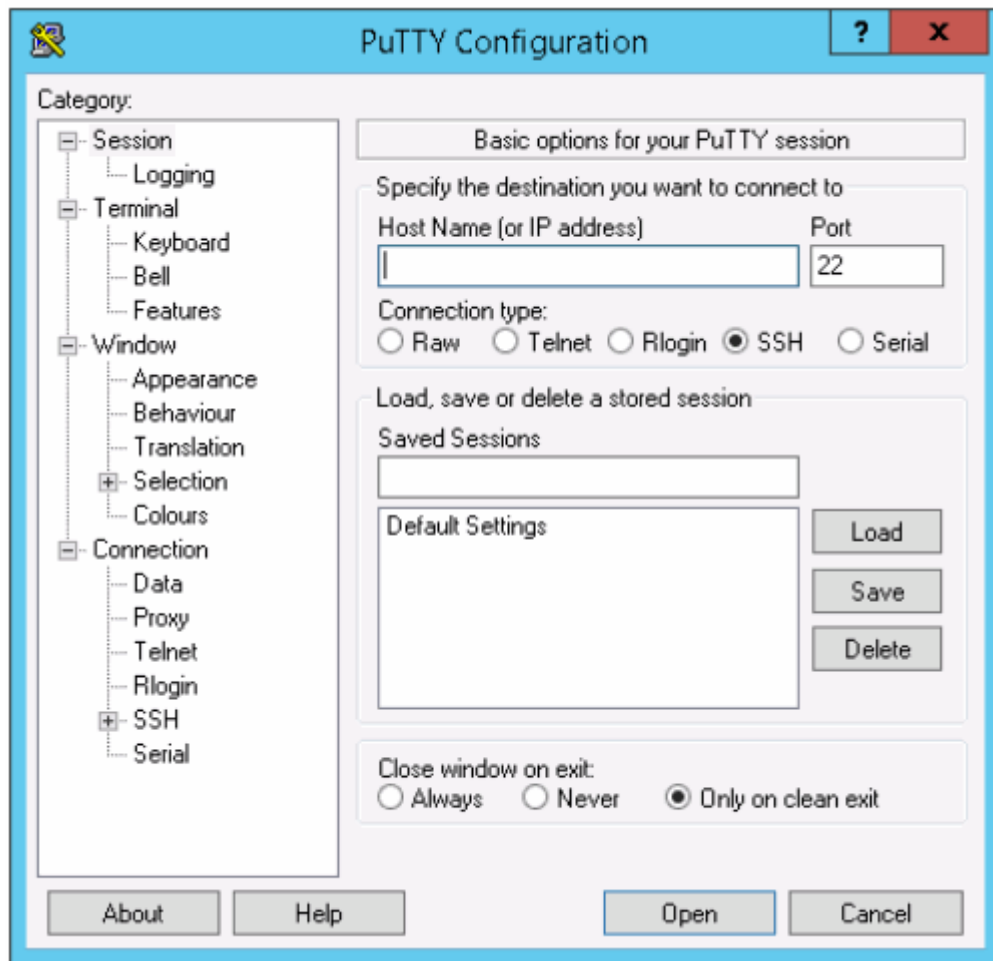
Prerequisites

- The target ECS is running.
- You have bound an EIP to the ECS. For details, see [Binding an EIP](#).
- Access to port 22 is allowed in the inbound direction of the security group to which the ECS belongs. For details, see [Configuring Security Group Rules](#).
- The network connection between the login tool (PuTTY) and the target ECS is normal. For example, the default port 22 is not blocked by the firewall.

Logging In to the Linux ECS from Local Windows

To log in to the Linux ECS from local Windows, perform the operations described in this section.

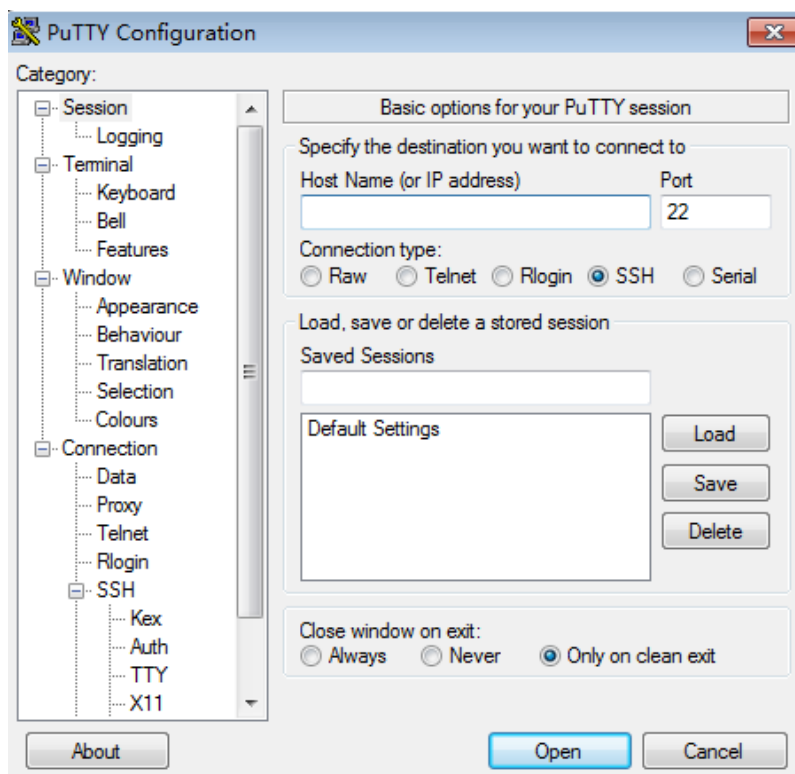
The following example shows how to access a Linux ECS using an SSH password.

Figure 1-37 Accessing a Linux ECS using an SSH password

The following operations use PuTTY as an example to log in to the ECS.

1. Visit the following website and download PuTTY and PuTTYgen:
<https://www.chiark.greenend.org.uk/~sgtatham/putty/latest.html>
2. Run PuTTY.
3. Click **Session**.
 - a. **Host Name (or IP address)**: EIP bound to the ECS
 - b. **Port**: 22
 - c. **Connection type**: SSH
 - d. **Saved Sessions**: Task name, which can be clicked for remote connection when you use PuTTY next time

Figure 1-38 Session



4. Click **Window**. Then, select **UTF-8** for **Received data assumed to be in which character set:** in **Translation**.
5. Click **Open**.

If you log in to the ECS for the first time, PuTTY displays a security warning dialog box, asking you whether to accept the ECS security certificate. Click **Yes** to save the certificate to your local registry.

6. After the SSH connection to the ECS is set up, enter the username and password as prompted to log in to the ECS.

NOTE

The username and password for the first login to the ECS created using a public image (including CoreOS) are as follows:

- Username: **root**
- Password: the one you set when you purchased the ECS

Logging In to the Linux ECS from Local Linux

To log in to the Linux ECS from local Linux, run the following command:

```
ssh EIP bound to the ECS
```

Helpful Links

- [What Should I Do If My Remote Login Password Was Forgotten?](#)
- [What Should I Do If I Cannot Log In to My Linux ECS?](#)

1.5.5 Logging In to a Linux ECS from a Mobile Terminal

Scenarios

This section describes how to access a Linux ECS from a mobile terminal.

- For instructions about how to log in to a Linux ECS from an iOS terminal through iTerminal-SSH Telnet, see [Logging In to a Linux ECS from an iOS Terminal](#).
- For instructions about how to log in to a Linux ECS from an Android terminal through JuiceSSH, see [Logging In to a Linux ECS from an Android Terminal](#).

Prerequisites

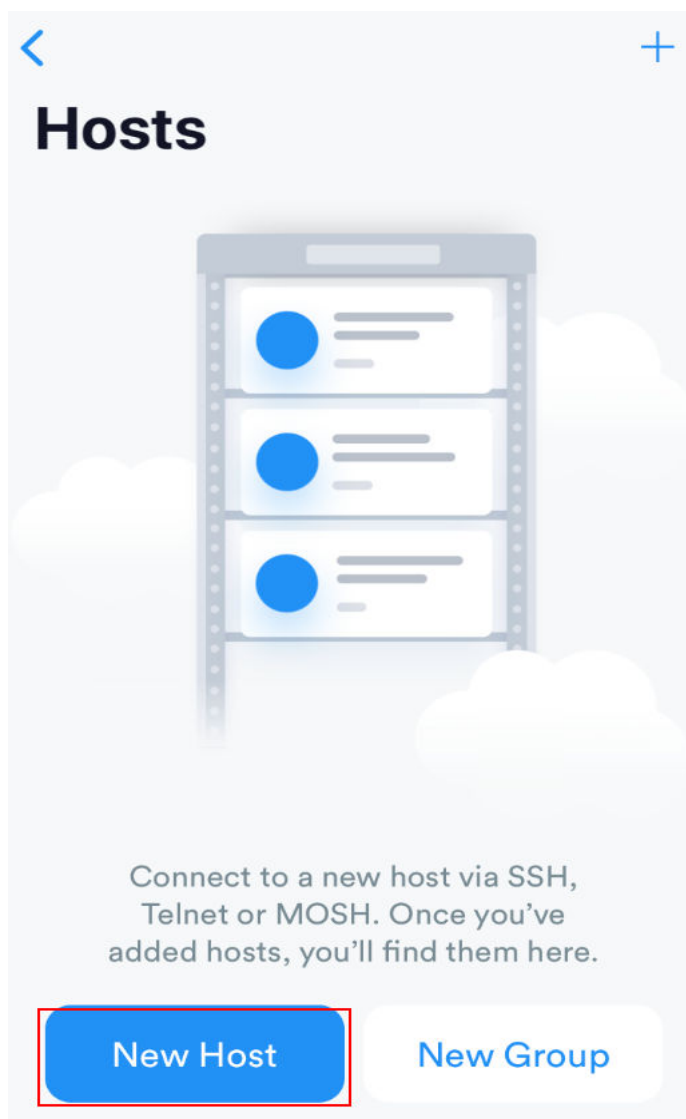
- The target ECS is running.
- You have obtained the username and password for logging in to the ECS. If the password is unavailable, reset the password by following the instructions provided in [Resetting the Password for Logging In to an ECS on the Management Console](#).
- You have bound an EIP to the ECS. For details, see [Binding an EIP](#).
- Access to port 22 is allowed in the inbound direction of the security group to which the ECS belongs. For details, see [Configuring Security Group Rules](#).

Logging In to a Linux ECS from an iOS Terminal

Before performing the operation, make sure that you have installed an SSH client tool, taking Termius as an example, on the iOS terminal. In this example, the Linux ECS runs CentOS 7.6, and it is authenticated using a username and password.

1. Start Termius and tap **New Host**.

Figure 1-39 New Host



2. On the **New Host** page, set the following parameters:
 - **Alias:** Enter the hostname. In this example, set this parameter to **ecs01**.
 - **Hostname:** Enter the EIP bound to the target ECS.
 - **Use SSH:** Enable it.
 - **Host:** Enter the EIP bound to the target ECS.
 - **Port:** Enter port number **22**.
 - **Username:** Enter **root**.
 - **Password:** Enter the login password.

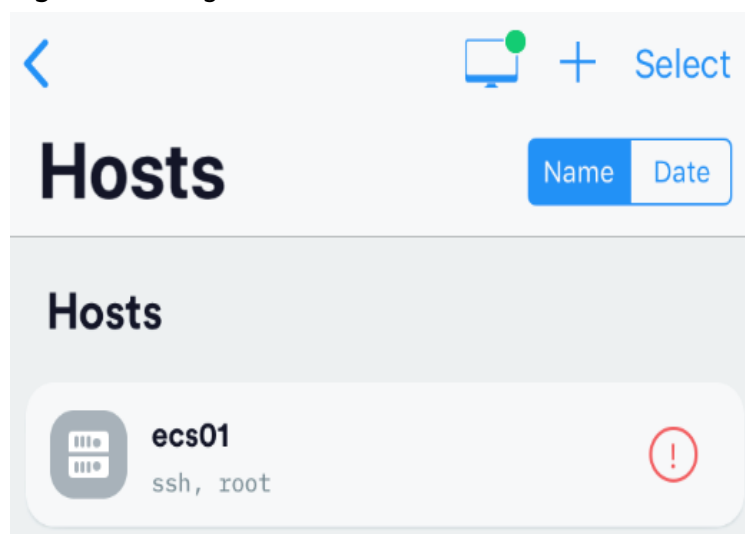
Figure 1-40 Setting parameters

The screenshot shows the 'New Host' configuration interface. At the top, there are three buttons: 'Cancel', 'New Host', and 'Save'. Below these are several configuration rows:

- 1** Alias: A text input field.
- 2** Hostname: A text input field with a greyed-out area to its right.
- Group: A row with a blue chevron arrow pointing right.
- Tags: A row with a blue chevron arrow pointing right.
- Backspace as CTRL+H: A row with a toggle switch.
- SSH / MOSH: A section header.
- 3** Use SSH: A row with a blue toggle switch.
- Use Mosh (Beta): A row with a greyed-out toggle switch.
- 4** Port: A text input field with the value '22' and the label 'Default' to its right.
- 5** Username: A text input field with the value 'root' and a user icon to its right.
- 6** Password: A text input field with a masked password represented by ten dots.

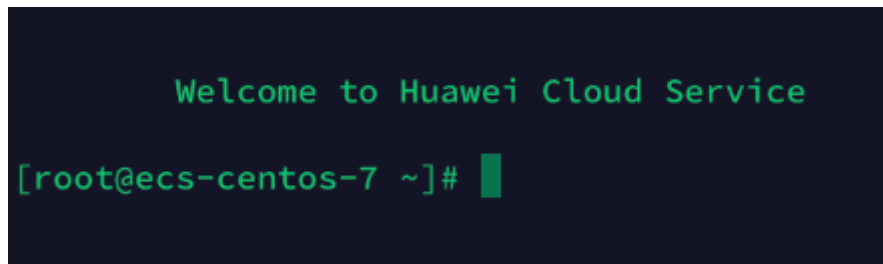
3. Tap **Save** in the upper right corner of the page to save the login settings. On the **Hosts** page, tap the name of the connection.

Figure 1-41 Login information



If the following page is displayed, you have connected to the Linux ECS.

Figure 1-42 Connected

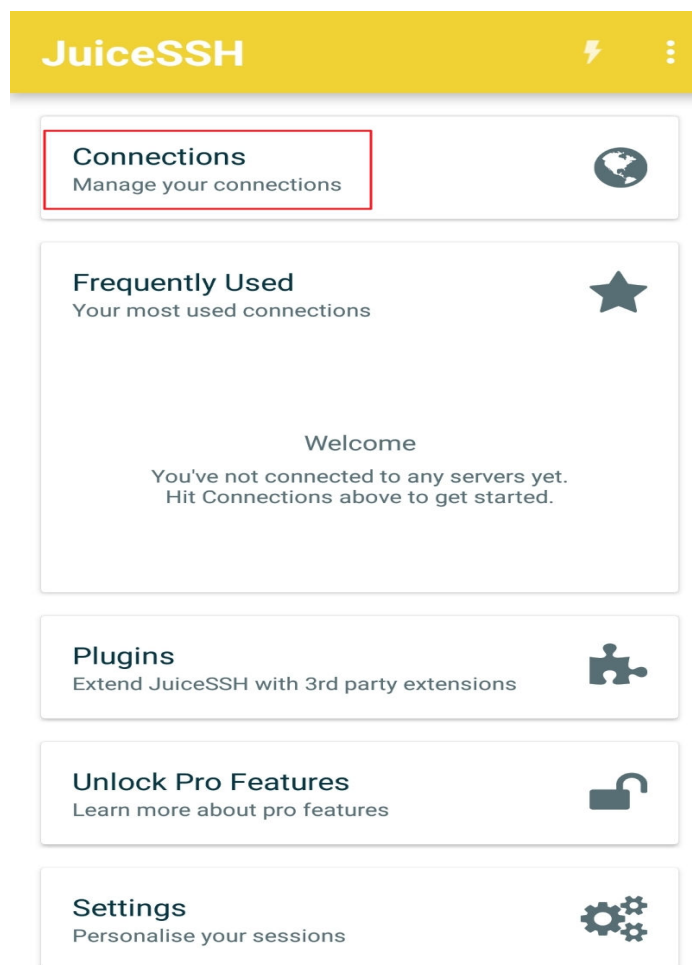


Logging In to a Linux ECS from an Android Terminal

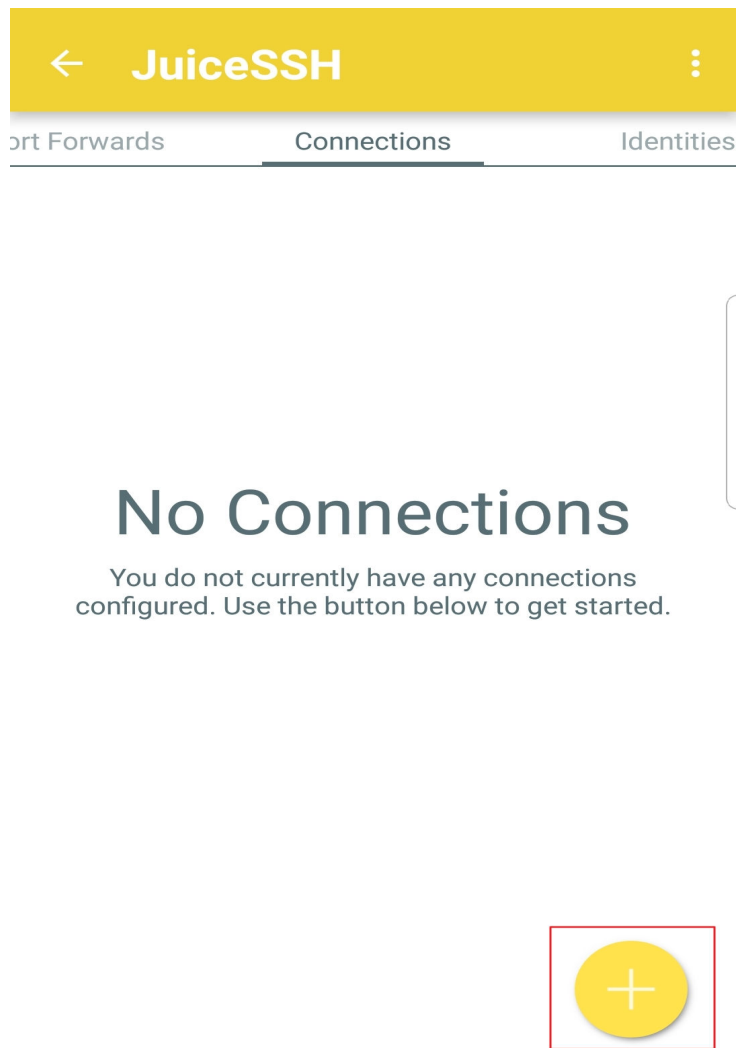
Before performing the operation, make sure that you have installed JuiceSSH on the Android terminal. In this example, the Linux ECS runs CentOS 7.6, and it is authenticated using a username and password.

1. Start JuiceSSH and tap **Connections**.

Figure 1-43 Starting JuiceSSH



2. On the **Connections** page, tap .

Figure 1-44 Connections


3. On the **New Connection** page, add basic and advanced settings and save the settings. The parameters are as follows:
 - **Nickname:** Set the name of the login session. In this example, set this parameter to **linux_test**.
 - **Type:** Retain the default value **SSH**.
 - **Address:** Enter the EIP bound to the target Linux ECS.
 - Perform the following operations to set **Identity**:
 - i. Tap **Identity** and choose **New** from the drop-down list.
 - ii. On the **New Identity** page, set the following parameters and tap .
 - o **Nickname:** Set an identity name as required to facilitate subsequent management. This parameter is optional. In this example, set it to **linux_test**.
 - o **Username:** Enter **root**.
 - o **Password:** Tap **SET (OPTIONAL)**, enter the login password, and tap **OK**.

Figure 1-45 New Identity

← New Identity ✓

IDENTITY

Nickname: linux_test

Username: root

Password: SET (OPTIONAL)

Private Key: SET (OPTIONAL)

SNIPPET

JuiceSSH Pro users can take advantage of an automatically generated snippet to add a public key to a servers `~/.ssh/authorized_keys` file and set the correct permissions.

GENERATE SNIPPET

- **Port:** Enter port number **22**.

Figure 1-46 Port number

← **New Connection** ✓

BASIC SETTINGS

Nickname: linux_test

Type: **SSH** ▼

Address: [REDACTED]

Identity: **linux_test** ▼

ADVANCED SETTINGS

Port: 22

Connect Via: (Optional) ▼

Run Snippet: (Optional) ▼

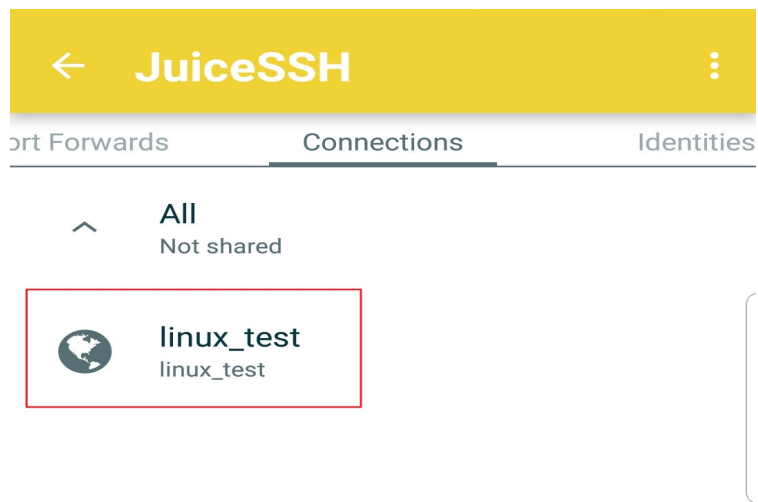
Backspace: **Default (sends DEL)** ▼

GROUPS

ADD TO GROUP

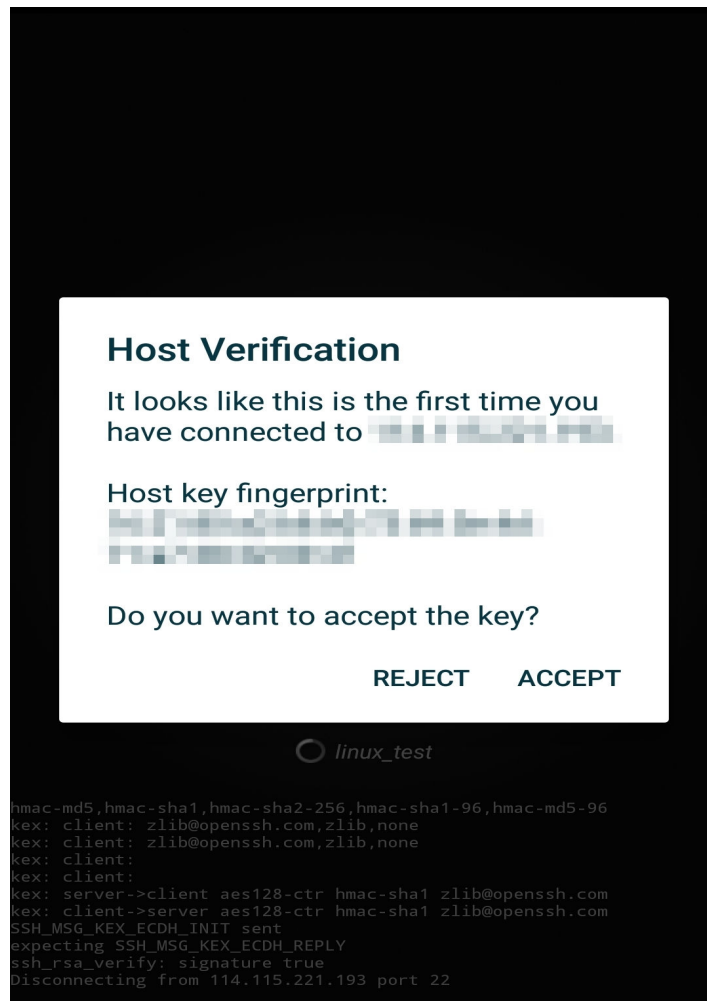
4. On the **Connections** page, tap the created connection.

Figure 1-47 Connection



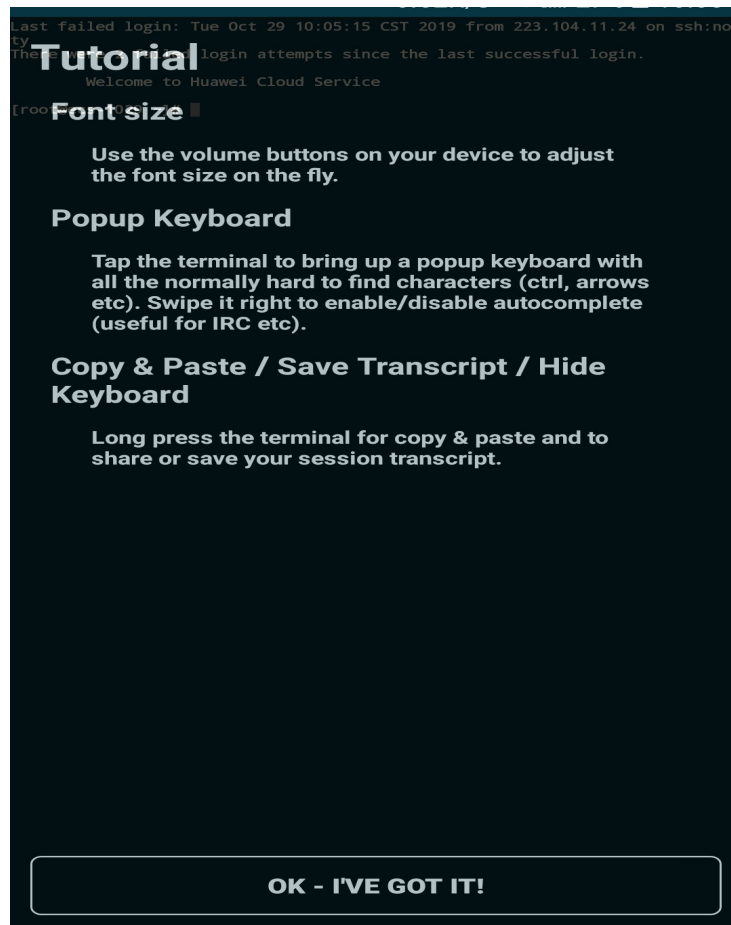
5. Confirm the information that is displayed and tap **ACCEPT**.

Figure 1-48 Confirming the information



6. (Optional) When you log in to the ECS for the first time, JuiceSSH displays a tutorial for you, including setting the font size and popping up the keyboard. Confirm the information and click **OK - I'VE GOT IT**.

Figure 1-49 Tutorial



You have logged in to the Linux ECS.

Figure 1-50 Successful login



1.6 Managing ECSs



1.6.1 Changing an ECS Name

Scenarios

The name of a created ECS can be changed to meet your service requirements.

Multiple ECS names can be changed in a batch. After the change, the ECS names are the same.


Procedure for a Single ECS

1. Log in to the management console.
2. Click  in the upper left corner and select your region and project.
3. Under **Computing**, click **Elastic Cloud Server**.
4. Click the name of the target ECS.
5. On the page providing details about the ECS, click  following the ECS name. Then, change the name as prompted.

Allow duplicate ECS name: allows ECS names to be duplicate. If **Allow duplicate ECS name** is not selected and the target name is the same as an existing ECS name, the system displays a message indicating that the name has been used and you need to change another name.

6. Click **OK**.

Procedure for Batch Operations

1. Log in to the management console.
2. Click  in the upper left corner and select your region and project.
3. Under **Computing**, click **Elastic Cloud Server**.
4. Select the target ECSs.
5. Click **More** in the upper part of the ECS list and select **Change ECS Name** from the drop-down list.
6. Enter the new name.
7. Click **OK**.

If you change ECS names in a batch, the new ECS names are the same, for example, all are **ecs-test**.

1.6.2 Reinstalling the OS

Scenarios

If the OS of an ECS fails to start or requires optimization, reinstall the OS.

Notes

- After the OS is reinstalled, the IP and MAC addresses of the ECS remain unchanged.
- Reinstalling the OS clears the data in all partitions of the EVS system disk, including the system partition. Therefore, back up data before reinstalling the OS.
- Reinstalling the OS does not affect data disks.
- Do not perform any operations on the ECS immediately after its OS is reinstalled. Wait for several minutes until the system successfully injects the password or key. Otherwise, the injection may fail, and the ECS cannot be logged in to.

Constraints

- The EVS disk quota must be greater than 0.
- If the target ECS is created using a private image, ensure that the private image is available.
- If the target ECS is billed on demand, ensure that your account has sufficient balance.
- H2 ECSs do not support OS reinstallation.

Prerequisites

- The target ECS has a system disk attached.

Procedure


1. Log in to the management console.
2. Click  in the upper left corner and select your region and project.
3. Under **Computing**, click **Elastic Cloud Server**.
4. Locate the row containing the target ECS. Click **More** in the **Operation** column and select **Manage Image/Disk > Reinstall OS**.
Before reinstalling the OS, stop the ECS or select **Automatically stop the ECSs and reinstall their OSs**.
5. Configure the login mode.
If the target ECS uses key pair authentication, you can replace the original key pair.

Figure 1-51 Reinstall OS

✕

Reinstall OS

Note the following points before you reinstall the OS:

1. This operation will reinstall the original OS image on the ECS and will delete data on all system disk partitions. Back up important data before continuing.
2. After the OS is reinstalled, the ECS will be automatically started.
3. The password reset plug-in can now be installed after creating an ECS. [Click here for more details.](#)
4. Once an OS is reinstalled, customized settings, such as DNS and hostname are reset, so they require reconfiguration.

The ECSs must be stopped before their OSs can be reinstalled. If you have not stopped the ECSs, select the following option to automatically stop the ECSs.

Automatically stop the ECSs and reinstall their OSs

Image CentOS 8.0 64bit
System Disk Capacity: 40 GB OS Architecture: 64-bit

Login Mode Password Key pair

Password Keep the password secure. If you forget the password, you can log in to the ECS console and change it.

Confirm Password

OK Cancel

6. Click **OK**.
7. On the **ECS OS Reinstallation** page, confirm the specifications, select **I have read and agree to the Huawei Image Disclaimer**, and click **Submit**.

After the request is submitted, the ECS status changes to **Reinstalling**. The reinstallation has been completed when the ECS status changes to **Running**.

NOTE

A temporary ECS is created during the reinstallation process. After reinstallation, this ECS will be automatically deleted. Do not perform any operation on the temporary ECS during the reinstallation process.

Follow-up Procedure

If the reinstallation is unsuccessful, perform steps **3** to **7** again to retry reinstalling the OS again.

If the second reinstallation attempt is unsuccessful, contact customer service for manual recovery at the backend.

1.6.3 Changing the OS

Scenarios

Changing an ECS OS will change the system disk attached to the ECS. After the changing, the system disk ID of the ECS will be changed, and the original system disk will be deleted.

If the OS running on an ECS cannot meet service requirements, change the ECS OS.

The public cloud supports changing between image types (public images, private images, and shared images) and between OSs. You can change your OS to the one of a different image type.

The public cloud supports the following OS changes:

- Change between the same OS type
For example:
 - From CentOS 7.2 to CentOS 8.0
 - From CentOS 7.2 to Ubuntu 18.04
 - From Windows Server 2012 R2 Standard Edition (64-bit, English) to Windows Server 2012 R2 Standard Edition (64-bit, Chinese)
- Change between different OS types: OS change between Windows and Linux is only supported in regions in Chinese mainland.

For details about the change between different OSs, see [Notes on Change Between Different OSs](#).

For example:

- From CentOS 7.2 to Windows Server 2016 Standard Edition (64-bit, English)
- From Windows Server 2016 Standard Edition (64-bit, English) to CentOS 8.0

Constraints

- After the OS of a yearly/monthly ECS is changed, the system disk capacity may be insufficient because the image after the change may be different. In such a case, detach the system disk for capacity expansion and then change the OS.
- The free OS of a yearly/monthly ECS can only be changed to another free OS.
- The EVS disk quota must be greater than 0.
- H2 ECSs do not support OS change.
- OS change between Windows and Linux is only supported in regions in Chinese mainland.
- Switching between the ECSs in BIOS boot mode and in UEFI boot mode is not allowed.

Notes

- After the OS is changed, the original OS is not retained, and the original system disk is deleted, including the data in all partitions of the system disk.

- Back up data before changing the OS. For details, see *Cloud Backup and Recovery User Guide* [Cloud Backup and Recovery User Guide](#).
- Changing the OS does not affect data in data disks.
- After the OS is changed, your service running environment must be deployed in the new OS again.
- After the OS is changed, the ECS will be automatically started.
- After the OS is changed, the system disk type of the ECS cannot be changed.
- After the OS is changed, the IP and MAC addresses of the ECS remain unchanged.
- After the OS is changed, customized configurations, such as DNS and hostname of the original OS will be reset and require reconfiguration.
- It takes about 10 to 20 minutes to change the OS. During this process, the ECS is in **Changing OS** state.
- Do not perform any operations on the ECS immediately after its OS is changed. Wait for several minutes until the system successfully injects the password or key. Otherwise, the injection may fail, and the ECS cannot be logged in to.

Billing Rules

- After the OS of a pay-per-use ECS is changed, its fees may be different because the system disk capacity specified by the image of the changed OS may increase.

Notes on Change Between Different OSs

Change between different OSs indicates that the OS is changed between Windows and Linux.

- To change Windows to Linux, install an NTFS partition tool, such as NTFS-3G for data reading and writing on the Windows ECS.
- To change Linux to Windows, install software, such as Ext2Read or Ext2Fsd to identify ext3 or ext4.

NOTE


You are not advised to change Linux to Window on the cloud platform. The reason is as follows: If there are LVM partitions on the Linux ECS, these partitions may fail after the OS is changed to Windows.

Prerequisites

- The target ECS has a system disk attached.
- Necessary data has been backed up. (Changing the OS clears the data in all partitions of the system disk, including the system partition.)
- If the original ECS uses password authentication while the new ECS uses key pair authentication, ensure that a key pair is available.
- If a private image is required for changing the ECS OS, create the desired private image by following the instructions provided in *Image Management Service User Guide*.
 - If an ECS image is required, make sure that a private image has been created using the ECS.

- If a local image file is required, make sure that the image file has been imported to the cloud platform and registered as a private image.
- If a private image from another region is required, make sure that the image has been copied.
- If a private image from another user account is required, make sure that the image has been shared with you.

Procedure

1. Log in to the management console.
2. Click  in the upper left corner and select your region and project.
3. Under **Computing**, click **Elastic Cloud Server**.
4. Locate the row containing the target ECS. Click **More** in the **Operation** column and select **Manage Image/Disk > Change OS**.

Before changing the OS, stop the ECS or select **Automatically stop the ECSs and change their OSs**.

5. Modify related ECS parameters, such as **Image Type** and **Image**, based on service requirements.

NOTE

For a yearly/monthly ECS, if the system disk capacity is less than the size of your image, you must detach the system disk, expand its capacity, and attach it to the original ECS before changing the OS.

For instructions about how to expand the system disk capacity, see [Disk Capacity Expansion](#).

Figure 1-52 Change OS

Change OS ×

The ECSs must be stopped before their OSs can be changed. If you have not stopped the ECSs, select the following option to automatically stop the ECSs.

Automatically stop the ECSs and change their OSs

Specifications c6.large.2 | 2 vCPUs | 4 GB

Current Image CentOS 8.0 64bit

System Disk Capacity: 40 GB OS Architecture: 64-bit

Select image

Image Type **Public Image** Private image Shared image Marketplace image

Image ↻

Login Mode **Password** Key pair

OK Cancel

6. Configure the login mode.

If the target ECS uses key pair authentication, you can replace the original key pair.

7. Click **OK**.

8. On the **Change OS** page, confirm the specifications, select **I have read and agree to the Huawei Image Disclaimer**, and click **Submit**.

After the application is submitted, the ECS status changes to **Changing OS**. The OS changing has been completed when **Changing OS** disappears.

NOTE

A temporary ECS is created during the OS changing process. After the process is complete, this ECS will be automatically deleted.

Follow-up Procedure

- If the OSs before and after the OS change are both Linux, and automatic partition mounting upon system startup has been enabled for the data disk, the data disk partition mounting information will be lost after the OS is changed. In such a case, you need to update the **/etc/fstab** configuration.

a. Write the new partition information into **/etc/fstab**.

It is a good practice to back up the **/etc/fstab** file before writing data into it.

To enable automatic partition mounting upon system startup, see [Initializing a Linux Data Disk \(fdisk\)](#).

- b. Mount the partition so that you can use the data disk.
mount *Disk partition Device name*
 - c. Check the mount result.
df -TH
- If the OS change is unsuccessful, perform steps **3** to **8** again to retry changing the OS again.
 - If the second OS change attempt is unsuccessful, contact customer service for manual recovery at the backend.

1.6.4 Managing ECS Groups

Scenarios

An ECS group logically groups ECSs. The ECSs in an ECS group comply with the same policy associated with the ECS group.

Only the anti-affinity policy is supported. ECSs in the same ECS group are deployed on different hosts, improving service reliability.

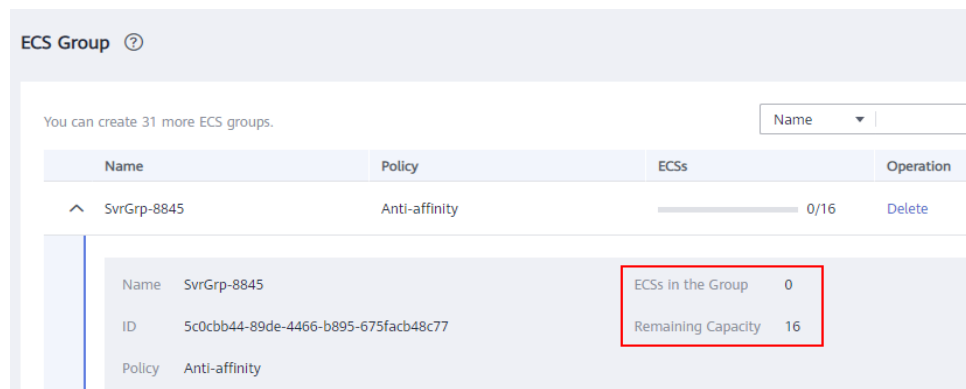
You can use an ECS group to deploy target ECSs on different physical servers to ensure high service availability and underlying DR capabilities.

An ECS group supports the following functions:

- [Creating an ECS Group](#)
- [Adding an ECS to an ECS Group](#)
 - Add an ECS to an ECS group during ECS creation.
 - Add a created ECS to an ECS group.
- [Removing an ECS from an ECS Group](#)
- [Deleting an ECS Group](#)


Constraints

- ECS groups support the anti-affinity policy only.
- Target ECSs must be deployed on physical servers.
- The maximum number of ECS groups that can be created is adjustable. Contact customer service to increase the quota.
- The maximum number of ECSs that can be added to an ECS group varies depending on the region. You can view the number on the **Elastic Cloud Server** page, as shown in [Figure 1-53](#).

Figure 1-53 Maximum number of ECSs that can be added to an ECS group

Creating an ECS Group


Create an ECS group to apply the same policy to all group members. ECS groups are independent from each other.

1. Log in to the management console.
2. Click  in the upper left corner and select your region and project.
3. Under **Computing**, click **Elastic Cloud Server**.
4. In the navigation pane on the left, choose **ECS Group**.
5. On the **ECS Group** page, click **Create ECS Group**.
6. Enter an ECS group name.
The **Anti-affinity** policy is used by default.
7. Click **OK**.

Adding an ECS to an ECS Group

After an ECS is added to an ECS group, it can be deployed on a physical server different from the physical servers accommodating other ECSs in the same ECS group.


NOTE

- The ECS to be added must be stopped.
 - After an ECS is added to an ECS group, the system reallocates the physical server accommodating the ECS so that the ECS and other ECSs in the ECS group are deployed on different physical servers. However, when the ECS is restarted, the startup may fail due to insufficient resources. In such a case, remove the ECS from the ECS group and restart the ECS.
 - An ECS with local disks attached cannot be added to an ECS group after the ECS is created. To use ECS group functions, select an ECS group during ECS creation.
 - An existing ECS cannot be added to an ECS group if it has a local disk attached (for example, a disk-intensive, H2, P1, or P2 ECS), a local NVMe SSD disk attached (for example, of the ultra-high I/O type), a GPU attached (for example, a G3 ECS), or an FPGA attached (for example, an FP1 or FP1c ECS). To use ECS group functions on such ECSs, select an ECS group when creating the ECS.
1. Log in to the management console.
 2. Click  in the upper left corner and select your region and project.

3. Under **Computing**, click **Elastic Cloud Server**.
4. In the navigation pane on the left, choose **ECS Group**.
5. Click **Add ECS** in the **Operation** column.
6. On the **Add ECS** page, select the ECS to be added.
7. Click **OK**.

Removing an ECS from an ECS Group


After an ECS is removed from an ECS group, the ECS does not comply with the anti-affinity policy anymore.

1. Log in to the management console.
2. Click  in the upper left corner and select your region and project.
3. Under **Computing**, click **Elastic Cloud Server**.
4. In the navigation pane on the left, choose **ECS Group**.
5. Expand the ECS group information and view the ECSs in the ECS group.
6. Click **Remove** in the **Operation** column of the target ECS.
7. Click **OK**.

The ECS is removed from the ECS group.

Deleting an ECS Group

After an ECS group is deleted, the policy does not apply to the ECSs in the ECS group anymore.

1. Log in to the management console.
2. Click  in the upper left corner and select your region and project.
3. Under **Computing**, click **Elastic Cloud Server**.
4. In the navigation pane on the left, choose **ECS Group**.
5. Click **Delete** in the **Operation** column of the target ECS group.
6. Click **OK**.


1.6.5 Backing Up ECS Data

Scenarios


Cloud Backup and Recovery (CBR) backs up data for EVS disks and ECSs, and uses snapshot backups to restore the EVS disks and ECSs. In addition, CBR supports synchronizing backup data in the on-premises backup software OceanStor BCManager to the cloud. In this way, you can manage backup data on the cloud and restore data to other ECSs using the backup data. CBR maximizes the security and accuracy of your data to ensure service security.

CBR enhances data integrity and service continuity. For example, if an ECS or disk is faulty or a misoperation causes data loss, you can use backups to quickly restore data.

CSBS Backup Procedure

1. Log in to the management console.
2. Click  in the upper left corner and select your region and project.
3. Choose **Storage > Cloud Backup and Recovery > Cloud Server Backup**.
4. Click **Buy Server Backup Vault**.
For details, see [Purchase a Vault](#).
5. After a server backup vault is created, associate servers with the vault for backup.
For details, see [Associate a Resource with the Vault](#).
6. Create a backup.
For details, see [Create a Backup](#).

VBS Backup Procedure

1. Log in to the management console.
2. Click  in the upper left corner and select your region and project.
3. Choose **Storage > Cloud Backup and Recovery > Cloud Disk Backup**.
4. Click **Buy Disk Backup Vault**.
For details, see [Purchase a Vault](#).
5. After a disk backup vault is created, associate disks with the vault for backup.
For details, see [Associate a Resource with the Vault](#).
6. Create a backup.
For details, see [Create a Backup](#).

1.6.6 Changing the Time Zone for an ECS

Scenarios

The default time zone for an ECS is the one you selected when creating the image that was used to create the ECS. This section describes how to change the time zone for an ECS to the local one or to another time zone in your network.

After you log in to your ECS, if you find that the time on the ECS is different from the local time, change the time zone for the ECS so that the time on the ECS is the same as the local time.

For Linux

The process of changing the time zone for a Linux ECS depends on the OS. In this section, the CentOS 6.x 64bit OS is used to demonstrate how to change the time zone for a Linux ECS.

1. Log in to the ECS.
2. Run the following command to switch to user **root**:
su - root

3. Run the following command to obtain the time zones supported by the ECS:
ls /usr/share/zoneinfo/
In the terminal display, the **/usr/share/zoneinfo** directory contains a hierarchy of time zone data files. Use the directory structure to obtain your desired time zone file.
The directory structure shown in **/usr/share/zoneinfo** includes both time zones and directories. The directories contain time zone files for specific cities. Locate the time zone for the city in which the ECS is located.
For example:
 - If you are to use the time zone for Shanghai, China, run the **ls /usr/share/zoneinfo/Asia** command to obtain the directory **/usr/share/zoneinfo/Asia/Shanghai**.
 - If you are to use the time zone for Paris, France, run the **ls /usr/share/zoneinfo/Europe** command to obtain the directory **/usr/share/zoneinfo/Europe/Paris**.
4. Set the target time zone.
 - a. Run the following command to open the **/etc/sysconfig/clock** file:
vim /etc/sysconfig/clock
 - b. Locate the **ZONE** entry and change its value to the name of the desired time zone file.
For example:
 - If the target time zone is for Shanghai, China, change the **ZONE** entry value as follows:
ZONE="Asia/Shanghai"
 - If the target time zone is for Paris, France, change the **ZONE** entry value as follows:
ZONE="Europe/Paris"
5. Press **Esc**. Then, run the following command to save and exit the **/etc/sysconfig/clock** file:
:wq
6. Run the following command to check whether the **/etc/localtime** file is available on the ECS:
ls /etc/localtime
 - If the file is available, go to step 7.
 - If the file is not available, go to step 8.
7. Run the following command to delete the existing **/etc/localtime** file:
rm /etc/localtime
8. Run the following command to create a symbolic link between **/etc/localtime** and your time zone file so that the ECS can find this time zone file when it references the local time:
ln -sf /usr/share/zoneinfo/Asia/Shanghai /etc/localtime
9. Run the following command to restart the ECS so that all services and applications running on the ECS use the new time zone:
reboot

10. Log in to the ECS again and run the following command as user **root** to check whether the time zone has been changed:

ls -lh /etc/localtime

The following information is displayed:

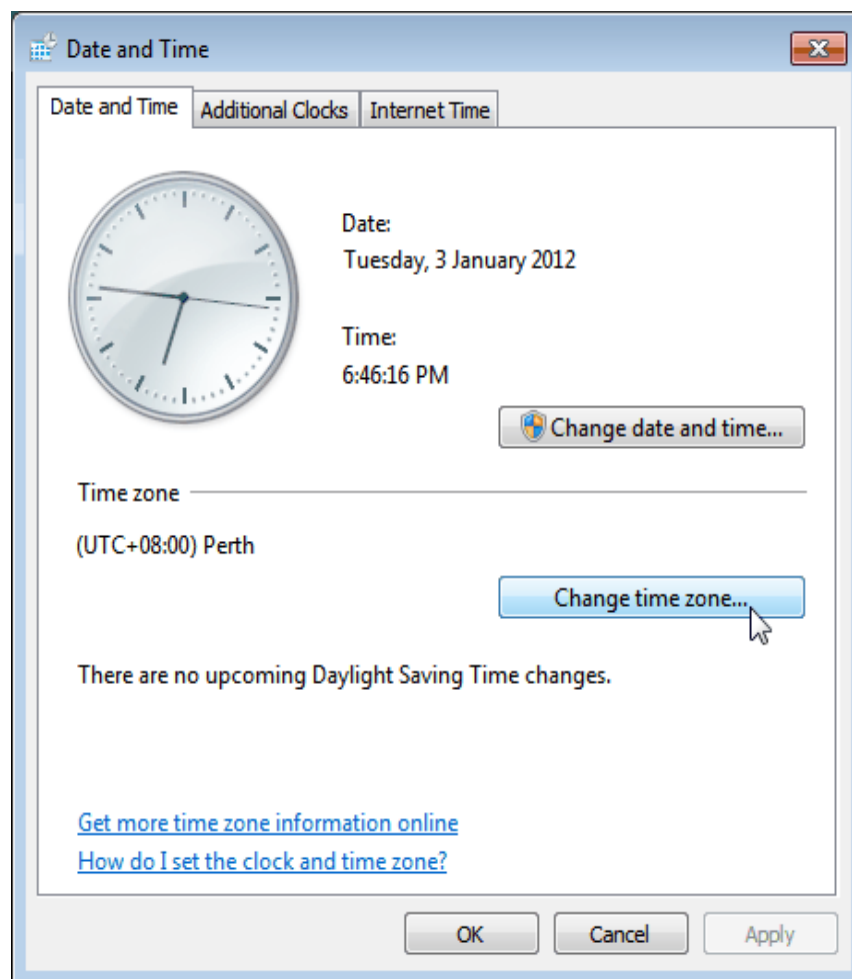
```
# ls -lh /etc/localtime  
lrwxrwxrwx 1 root root 33 Nov 27 11:01 /etc/localtime -> /usr/share/zoneinfo/Asia/Shanghai
```

For Windows

1. Log in to the ECS.
2. Click the time display on the far right side of the task bar located at the bottom of your screen. In the dialog box that is displayed, click **Change date and time settings**.

The **Date and Time** page is displayed.

Figure 1-54 Date and Time



3. Click **Change time zone**.
The **Time Zone Settings** page is displayed.
4. In the **Set the time zone** pane, choose the target time zone from the **Time zone** drop-down list.
5. Click **OK**.

1.7 Modifying ECS vCPU and Memory Specifications

1.7.1 General Operations for Modifying Specifications

Scenarios

If ECS specifications do not meet service requirements, you can modify the ECS specifications, including vCPUs and memory. Certain ECSs allow you to change their types when you modify their specifications.

- Before changing a Xen ECS to a KVM ECS, manually install required drivers on the ECS. Otherwise, the ECS will be unavailable after the modification. For example, starting the OS may fail. The following section describes how to change a Xen ECS to a KVM ECS. For Linux, you are recommended to use a script to automatically change a Xen ECS to a KVM ECS.
 - [Changing a Xen ECS to a KVM ECS \(Windows\)](#)
 - [Automatically Changing a Xen ECS to a KVM ECS \(Linux\)](#)
 - [Manually Changing a Xen ECS to a KVM ECS \(Linux\)](#)

NOTE

- Xen ECSs include S1, C1, C2, and M1 ECSs.
- To obtain KVM ECSs, see the **Virtualization Type** column in [ECS Specifications](#).

Notes

- When modifying the specifications of an ECS, you are not allowed to select sold-out CPU and memory resources.
- If ECS specifications are downgraded, the ECS performance will deteriorate.
- Certain ECSs do not support specifications modification currently. For details about available ECS types as well as their functions and usage, see "Notes" in [ECS Types](#).
- When the disk status is **Expanding**, you are not allowed to modify the specifications of the ECS where the disk is attached.
- Before modifying the specifications of a Windows ECS, modify the SAN policy by following the instructions provided in [What Should I Do If a Disk Is Offline?](#) to prevent disks from going offline after the specifications are modified.

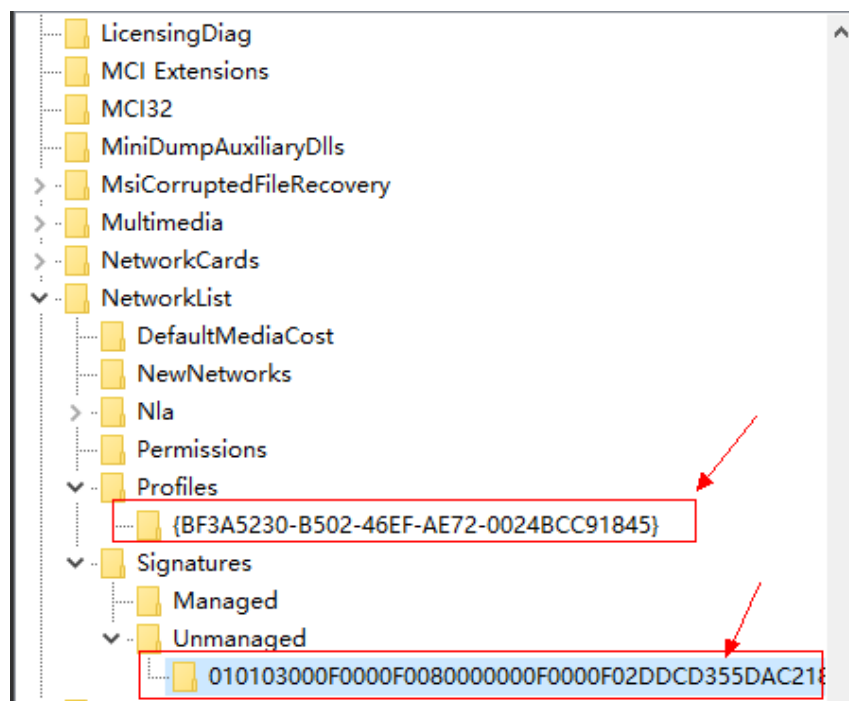
Fees Description

Modifying specifications will lead to fee changes. For details, see [Pricing of a Changed Specification](#).

Preparations

After ECS specifications are modified, NIC flapping may occur. To prevent NIC flapping from affecting dependency configurations, perform the following operations before modifying the specifications:

- Linux
Run the following commands on the ECS to delete the files with **persistent** and **net** included in their names in the network rule directory:
rm -fr /etc/udev/rules.d/*net*persistent*.rules
rm -fr /etc/udev/rules.d/*persistent*net*.rules
- Windows
Delete the following directories in the registry on the ECS:
HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows NT\CurrentVersion
\NetworkList\Profiles
HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows NT\CurrentVersion
\NetworkList\Signatures\Unmanaged

Figure 1-55 Registry

Step 1: Modify Specifications


1. Log in to the management console.
2. Click  in the upper left corner and select your region and project.
3. Under **Computing**, click **Elastic Cloud Server**.
4. Click **More** in the **Operation** column and select **Modify Specifications**.
The **Modify ECS Specifications** page is displayed.
5. Select the new ECS type, vCPUs, and memory as prompted.
Before modifying the specifications, stop the ECS or select **Automatically stop the ECSs and then modify specifications**.

Figure 1-56 Modifying specifications

Modify ECS Specifications

Note: The ECS you are modifying is a pay-per-use ECS, so the price for vCPUs and memory may change. Do not perform other operations after you click Submit. Otherwise, ECS services may be interrupted. [Learn how](#) about modifying ECS specifications. Modifying ECS specifications will not affect data in system and data disks.

Current Configuration

The ECSs must be stopped before their specifications can be modified. If you have not stopped the ECSs, select the following option to automatically stop the ECSs.

Automatically stop the ECSs and then modify specifications

ECS Name: [Redacted] ID: e9bfdc3b-6b55-490d-a279-a86d36200401

Specifications: General computing-plus | c6.large.2 | 2 vCPUs | 4 GB Billing Mode: Pay-per-use

Image: Windows Server 2019 Datacenter 64bit Region: [Redacted]

Latest generation vCPUs: All Memory: All Flavor Name: [Search]

General computing-plus General computing Memory-optimized General computing-basic

Flavor Name	vCPUs Memory	CPU	Assured / Maximum Bandwidth	Packets Per Second (PPS)	Estimated Price
<input type="radio"/> c6.large.2	2 vCPUs 4 GB	Intel Cascade Lake 3.0GHz	1.2/4 Gbit/s	400,000	/hour
<input checked="" type="radio"/> c6.large.4	2 vCPUs 8 GB	Intel Cascade Lake 3.0GHz	1.2/4 Gbit/s	400,000	/hour
<input type="radio"/> c6.xlarge.2	4 vCPUs 8 GB	Intel Cascade Lake 3.0GHz	2.4/8 Gbit/s	800,000	/hour
<input type="radio"/> c6.xlarge.4	4 vCPUs 16 GB	Intel Cascade Lake 3.0GHz	2.4/8 Gbit/s	800,000	/hour
<input type="radio"/> c6.2xlarge.2	8 vCPUs 16 GB	Intel Cascade Lake 3.0GHz	4.5/15 Gbit/s	1,500,000	/hour

New Specifications: General computing-plus | c6.large.4 | 2 vCPUs | 8 GB

ECS Price: [Redacted] **Next**

6. Click **Next**.
7. Confirm the modified configuration. Read and select the service agreement, and then click **Submit**.
8. Check whether the specifications have been modified.
After modifying the specifications, you can check whether the specifications have been modified in **Failures**.
 - a. Check whether **Failures** is displayed on the management console. For details, see [Viewing Failures](#).
 - If yes, go to step **8.b**.
 - If no, the specifications have been modified.
 - b. Click **Failures**. Then, in the **Failures** dialog box, click **Operation Failures** and check whether the task is contained in the list by **Name/ID**, **Operated At**, or **Task**.
 - If yes, the specifications modification failed. See [Follow-up Procedure](#) for failure causes.
 - If no, the specifications have been modified.

Step 2: Check Disk Attachment

After specifications are modified, disk attachment may fail. Therefore, check disk attachment after specifications modification. If disks are properly attached, the specifications modification is successful.

- Windows ECS
For details, see [What Should I Do If the Disk of a Windows ECS Becomes Offline After the ECS Specifications Are Modified?](#)
- Linux ECS
For details, see [What Should I Do If the Disk of a Linux ECS Becomes Offline After the ECS Specifications Are Modified?](#)

Follow-up Procedure

Perform the following operations in the event of a specifications modification failure:

1. Log in to the management console.
2. Under **Management & Deployment**, click **Cloud Trace Service**.
3. In the navigation pane on the left, choose **Trace List**.
4. In the **Trace Name** column, locate the **resizeServer** event by resource ID.
The resource ID is the ID of the ECS on which the specifications modification failed.
5. Click **View Trace** in the **Operation** column to view the failure cause.
If the fault cannot be rectified based on logs, contact customer service.

1.7.2 Changing a Xen ECS to a KVM ECS (Windows)

Scenarios

Before changing a Xen ECS that runs Windows to a KVM ECS, make sure that PV driver and UVP VMTools have been installed on the Windows ECS.

This section describes how to install the PV driver and UVP VMTools and change Xen to KVM.

NOTE

- Xen ECSs include S1, C1, C2, and M1 ECSs.
- To obtain KVM ECSs, see the **Virtualization Type** column in [ECS Specifications](#).

Constraints

- If a Windows ECS is attached with a cross-region disk, the ECS specifications cannot be modified. Otherwise, ECS data may be lost.
- A Xen ECS with more than 24 VBD disks attached cannot be changed to a KVM ECS.
- A Xen ECS can be changed to a KVM ECS, but a KVM ECS cannot be changed to a Xen ECS.

Procedure

[Figure 1-57](#) shows the flowchart for changing a Xen ECS to a KVM ECS.

Figure 1-57 Flowchart for changing a Xen ECS to a KVM ECS

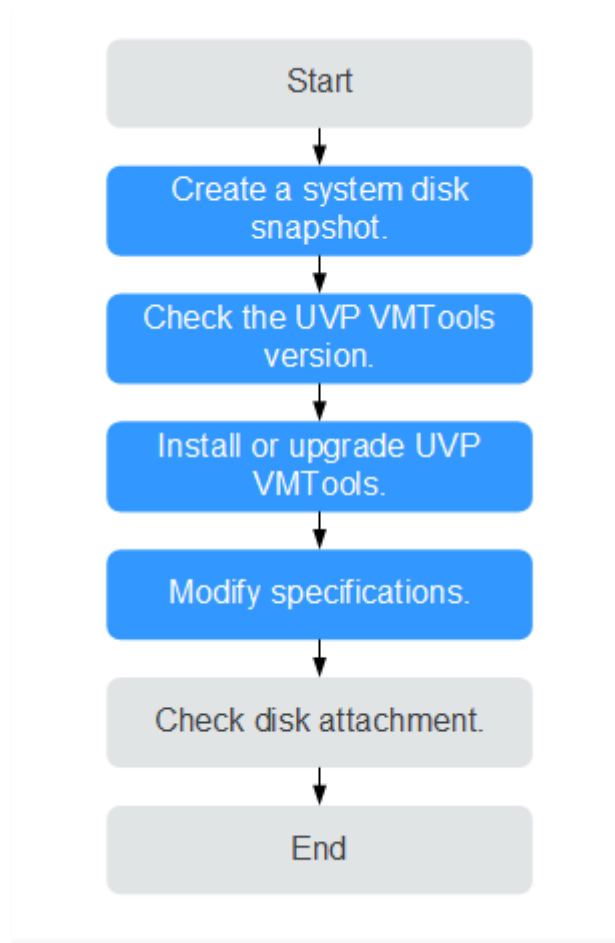


Table 1-13 describes the operations for changing a Xen ECS to a KVM ECS.

Table 1-13 Procedure for changing a Xen ECS to a KVM ECS

Step	Operation
1	Step 1: Create a System Disk Snapshot
2	Step 2: Check the UVP VMTools Version
3	Step 3: Install or Upgrade UVP VMTools
4	Step 4: Modify Specifications
5	(Optional) Step 5: Check Disk Attachment

Step 1: Create a System Disk Snapshot

Before modifying the specifications, back up the system disk by creating a system disk snapshot and install drivers on the ECS. Otherwise, once the ECS becomes unavailable after the modification, the data in the system disk may be lost.

For instructions about how to create a system disk snapshot, see [Creating a Snapshot](#) in *Elastic Volume Service User Guide*.

 **NOTE**

After the specifications are modified, manually delete the snapshot on the snapshot page if you verify that services have been recovered.

Step 2: Check the UVP VMTools Version

Before modifying specifications, check the UVP VMTools version.

1. Log in to the ECS.

2. Download the driver check script.

Execute the script as the administrator and wait for the check result.

URL for downloading the script: https://latin-server-resize.obs.na-mexico-1.myhuaweicloud.com/windows/server_resize/check_kvm_drivers.vbs

After checking that the required driver has been installed, the system automatically tags the ECS. The specifications of only the ECSs with such a tag can be modified.

- If the check result is "Check version successes!", the driver version meets service requirements and the ECS is tagged. Then, go to [Step 4: Modify Specifications](#).
- If the check result is "Check version success but set metadata failed! Please run this script again later.", the driver version meets service requirements but tagging the ECS failed. In such a case, try again later.
- If the check result is "Check version failed! Please install drivers at first.", the driver version does not meet service requirements. In such a case, install or upgrade UVP VMTools by following the instructions provided in [Step 3: Install or Upgrade UVP VMTools](#).

Step 3: Install or Upgrade UVP VMTools

When you install or upgrade UVP VMTools, if the PV driver has been installed on the ECS, the system will check the PV driver version. Ensure that the PV driver version meets service requirements. Otherwise, installing UVP VMTools will fail on the ECS. This section describes how to check the installation of the PV driver and UVP VMTools.

 **CAUTION**

Before installing the PV driver or UVP VMTools, ensure that the ECS meets the following requirements:

- Ensure that the available system disk size of the ECS is greater than 2 GB.
 - To prevent a driver installation failure, uninstall third-party virtualization platform tools, such as Citrix Xen Tools and VMware Tools, before installing the driver. For instructions about how to uninstall the tools, see the official documents of the tools.
 - Disable antivirus software or intrusion detection software. Enable them after installing the driver.
-

1. Check whether the PV driver version meets the UVP VMTools dependency requirements.

Switch to the **C:\Program Files (x86)\Xen PV Drivers\bin** directory, open the **version.ini** file, and view the PV driver version.

```
pvdriverVersion=5.0.104.010
```

- If the directory is available and the driver version is 5.0 or later, the PV driver meeting service requirements has been installed. In such a case, go to step 6 to install UVP VMTools.
- If the directory is unavailable or the driver version is earlier than 5.0, the PV driver has not been properly installed or the version does not meet service requirements. Then, go to the next step to uninstall the PV driver and install a new one.

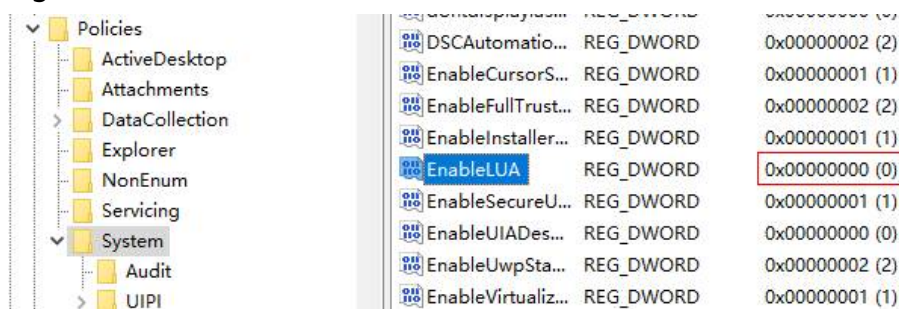
2. Record the User Account Control (UAC) configuration of the ECS.

NOTE

If the PV driver version is earlier than 5.0, DisableLUA is added to the registry during PV driver installation to prevent too many pop-up windows during driver upgrade, and EnableLUA is added to the registry during PV driver uninstallation (this has been resolved in PV driver 5.0 and later versions). To prevent adverse impact on your services, if the PV driver version is earlier than 5.0, record the UAC configuration before uninstalling the PV driver, and check and restore the EnableLUA configuration in the registry after installing the PV driver of the new version. For details about UAC configurations, see [official Microsoft documents](#).

- a. In the **Run** dialog box, enter **regedit** and click **OK** to open the registry editor.
- b. Record the **HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows\CurrentVersion\Policies\System\EnableLUA** value.


Figure 1-58 EnableLUA



3. Uninstall the PV driver of the old version.
 - a. On the ECS OS, choose **Start > Control Panel**.
 - b. Click **Uninstall a program**.
 - c. Uninstall **GPL PV Drivers for Windows x.x.x.xx** as prompted.
 - d. Restart the ECS on the management console.
4. Install the PV driver of the new version.
 - a. Download the PV driver installation package.
Download PV driver at:
 - LA-Mexico City1: <https://mx-latam-images.obs.na-mexico-1.myhuaweicloud.com/pvdriver-windows.zip>

- LA-Sao Paulo1: <https://br-latam-images.obs.sa-brazil-1.myhuaweicloud.com/pvdriver-windows.zip>
 - LA-Buenos Aires1: <https://ar-latam-images.obs.sa-argentina-1.myhuaweicloud.com/pvdriver-windows.zip>
 - LA-Lima1: <https://pe-latam-images.obs.sa-peru-1.myhuaweicloud.com/pvdriver-windows.zip>
- b. Decompress the PV driver software package.
 - c. Run **Setup.exe** and install the PV driver as prompted.
Wait until the driver installation is complete. Do not click **Setup.exe** during the installation.
 - d. Restart the ECS as prompted for the PV driver to take effect.
5. Check and restore the UAC configuration.
 - a. In the **Run** dialog box, enter **regedit** and click **OK** to open the registry editor.
 - b. Check the **HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows\CurrentVersion\Policies\System\EnableLUA** value and compare it with the value recorded before the PV driver is uninstalled. If they are different, change the value to the one recorded in step 2.
 6. Install or upgrade UVP VMTools.
 - a. Download the UVP VMTools installation package.
Download UVP VMTools at:
 - LA-Mexico City1: <https://mx-latam-images.obs.na-mexico-1.myhuaweicloud.com/vmtools-windows.zip>
 - LA-Sao Paulo1: <https://br-latam-images.obs.sa-brazil-1.myhuaweicloud.com/vmtools-windows.zip>
 - LA-Buenos Aires1: <https://ar-latam-images.obs.sa-argentina-1.myhuaweicloud.com/vmtools-windows.zip>
 - LA-Lima1: <https://pe-latam-images.obs.sa-peru-1.myhuaweicloud.com/vmtools-windows.zip>
 - b. Decompress the UVP VMTools installation package.
 - c. Double-click **vmtools-windows.iso**.
 - d. Run **Setup.exe** and install UVP VMTools as prompted.
The installation program will automatically adapt to the OS version and identify whether UVP VMTools is newly installed or upgraded.
Wait until the installation is complete. Do not click **Setup.exe** during the installation.
 - e. Restart the ECS as prompted for UVP VMTools to take effect.
 - f. Check whether UVP VMTools has been installed. For details, see [Step 2: Check the UVP VMTools Version](#).

Step 4: Modify Specifications

1. Log in to management console.
2. Click  in the upper left corner and select your region and project.
3. Under **Computing**, click **Elastic Cloud Server**.
4. On the **Elastic Cloud Server** page, view the status of the target ECS.
If the ECS is not in **Stopped** state, click **More** in the **Operation** column and select **Stop**.
5. Click **More** in the **Operation** column and select **Modify Specifications**.
The **Modify ECS Specifications** page is displayed.
6. Select the new ECS type, vCPUs, and memory as prompted.
7. (Optional) Set **DeH**.
If the ECS is created on a DeH, the system allows you to change the DeH.
To do so, select the target DeH from the drop-down list. If no DeH is available in the drop-down list, remaining DeH resources are insufficient and cannot be used to create the ECS with specifications modified.
8. Select the check box to confirm that step [Step 3: Install or Upgrade UVP VMTools](#) has been performed.
9. Click **OK**.

NOTE

- The cloud platform automatically creates a system disk snapshot for you. After the specifications are modified, manually delete the snapshot on the snapshot page if you verify that services have been recovered.
- If modifying the ECS specifications failed and the ECS becomes unavailable, reinstall the OS to recover the ECS. However, this operation will clear the system disk data, and data disks will be retained.

(Optional) Step 5: Check Disk Attachment

After a Xen ECS is changed to a KVM ECS, disk attachment may fail. Therefore, check disk attachment after specifications modification. If disks are properly attached, the specifications modification is successful.

- Windows ECS

For details, see [What Should I Do If the Disk of a Windows ECS Becomes Offline After the ECS Specifications Are Modified?](#)

Follow-up Procedure

If the ECS with specifications modified is displayed in the ECS list, but its OS cannot be started after the ECS is remotely logged in, contact customer service or reinstall the ECS OS to rectify this fault. For details, see [Reinstalling the OS](#).

NOTE

Reinstalling the OS will clear the system disk, but not affecting data disks.

After the specifications are modified, manually delete the snapshot on the snapshot page if you verify that services have been recovered.

1.7.3 Automatically Changing a Xen ECS to a KVM ECS (Linux)

Scenarios

Before changing a Xen ECS that runs Linux to a KVM ECS, make sure that the required drivers have been installed and configured on the ECS.

This section describes how to use a script to automatically install drivers on the ECS, configure the device name, and change Xen to KVM.

NOTE

- Xen ECSs include S1, C1, C2, and M1 ECSs.
- To obtain KVM ECSs, see the **Virtualization Type** column in [ECS Specifications](#).
- To support both Xen and KVM, Linux ECSs require the xen-pv and virtio drivers. Before changing a Xen ECS to a KVM ECS, make sure that the Linux ECS has been configured, including installing drivers and configuring automatic disk attachment.

Constraints

- If a Linux ECS is attached with a logical LVM disk or a RAID disk array consisting of multiple physical disks, the ECS specifications cannot be modified. Otherwise, data may be lost.
- A Xen ECS with more than 24 VBD disks attached cannot be changed to a KVM ECS.
- A Xen ECS can be changed to a KVM ECS, but a KVM ECS cannot be changed to a Xen ECS.

Procedure

[Figure 1-59](#) shows the flowchart for automatically changing a Xen ECS to a KVM ECS.

Figure 1-59 Flowchart for automatically changing a Xen ECS to a KVM ECS

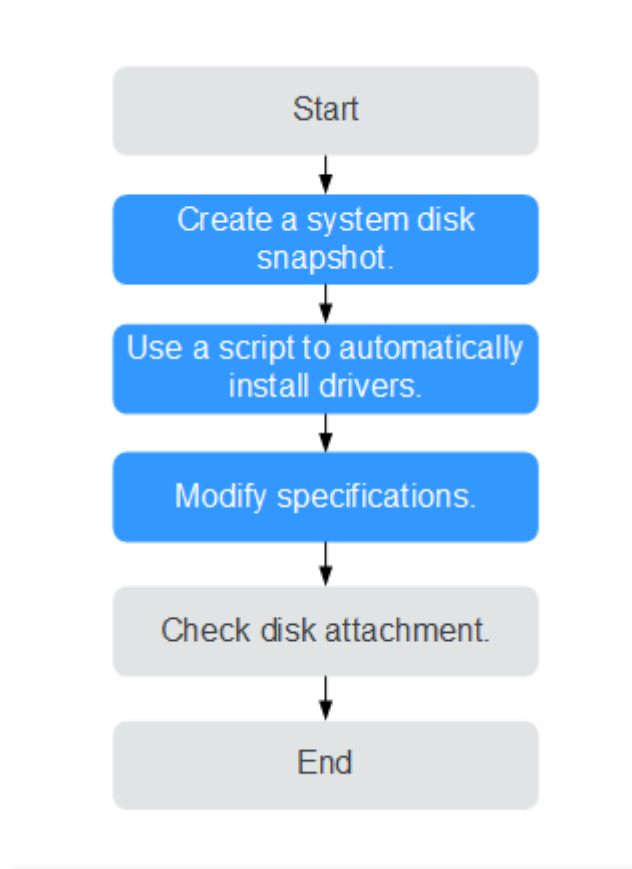


Table 1-14 describes the operations for automatically changing a Xen ECS to a KVM ECS using a script.

Table 1-14 Procedure for automatically changing a Xen ECS to a KVM ECS using a script

Step	Operation
1	Step 1: Create a System Disk Snapshot
2	Step 2: Using a Script to Automatically Install Drivers
3	Step 3: Modify Specifications
4	(Optional) Step 4: Check Disk Attachment

Step 1: Create a System Disk Snapshot

Before modifying the specifications, back up the system disk by creating a system disk snapshot and install drivers on the ECS. Otherwise, once the ECS becomes unavailable after the modification, the data in the system disk may be lost.

For instructions about how to create a system disk snapshot, see [Creating a Snapshot](#) in *Elastic Volume Service User Guide*.

 NOTE

After the specifications are modified, manually delete the snapshot on the snapshot page if you verify that services have been recovered.

Step 2: Using a Script to Automatically Install Drivers

Perform the operations described in this section if your ECS supports the configuration using a script. If your ECS does not support this mode, manually configure it. For details, see [Manually Changing a Xen ECS to a KVM ECS \(Linux\)](#).

1. Log in to the ECS.
2. Run the following command to download the driver installation script to the **root** directory:

```
curl URL > ~/resize_ecs_modify_linux.sh
```

In the preceding command, *URL* is the address for downloading the specifications modification script.

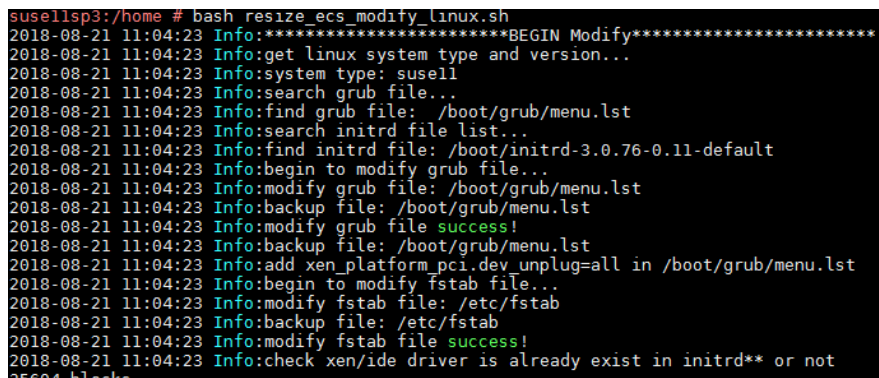
Select an address for downloading the optimization script based on the region where the ECS is located:

URL for Latin America: https://latin-server-resize.obs.na-mexico-1.myhuaweicloud.com/linux/server_resize/resize_ecs_modify_linux.sh

3. Run the following command to execute the script which automatically checks and installs the native Xen PV driver and virtio driver:

```
bash resize_ecs_modify_linux.sh
```

Figure 1-60 Executing the script



```
suse11sp3:/home # bash resize_ecs_modify_linux.sh
2018-08-21 11:04:23 Info:*****BEGIN Modify*****
2018-08-21 11:04:23 Info:get linux system type and version...
2018-08-21 11:04:23 Info:system type: suse11
2018-08-21 11:04:23 Info:search grub file...
2018-08-21 11:04:23 Info:find grub file: /boot/grub/menu.lst
2018-08-21 11:04:23 Info:search initrd file list...
2018-08-21 11:04:23 Info:find initrd file: /boot/initrd-3.0.76-0.11-default
2018-08-21 11:04:23 Info:begin to modify grub file...
2018-08-21 11:04:23 Info:modify grub file: /boot/grub/menu.lst
2018-08-21 11:04:23 Info:backup file: /boot/grub/menu.lst
2018-08-21 11:04:23 Info:modify grub file success!
2018-08-21 11:04:23 Info:backup file: /boot/grub/menu.lst
2018-08-21 11:04:23 Info:add xen_platform_pci.dev_unplug=all in /boot/grub/menu.lst
2018-08-21 11:04:23 Info:begin to modify fstab file...
2018-08-21 11:04:23 Info:modify fstab file: /etc/fstab
2018-08-21 11:04:23 Info:backup file: /etc/fstab
2018-08-21 11:04:23 Info:modify fstab file success!
2018-08-21 11:04:23 Info:check xen/ide driver is already exist in initrd** or not
```

4. Wait until the script is executed.

After checking that the required driver has been installed, the system automatically tags the ECS. The specifications of only the ECSs with such a tag can be modified.

If the check result is "{*Image name*} already contain xen and virtio driver", the driver has been installed.

- If the check result is "Success to set kvm meta!" or "this server already has kvm meta.", the ECS has been tagged. Then, go to [Step 3: Modify Specifications](#).
- If the check result is "Failed to set metadata, please try again.", tagging the ECS failed. In such a case, try again later.

If the installation failed, manually configure the ECS by following the instructions provided in [Manually Changing a Xen ECS to a KVM ECS \(Linux\)](#) or contact customer service.


Figure 1-61 Successful script execution

```
161.548762] device-mapper: uevent: version 1.0.3
161.551753] device-mapper: ioctl: 4.37.1-ioctl (2010-04-03) initialised: dm-devel@redhat.com
generating grub configuration file ...
found linux image: /boot/vmlinuz-3.10.0-1062.12.1.el7.x86_64
found initrd image: /boot/initramfs-3.10.0-1062.12.1.el7.x86_64.img
found linux image: /boot/vmlinuz-3.10.0-957.el7.x86_64
found initrd image: /boot/initramfs-3.10.0-957.el7.x86_64.img
found linux image: /boot/vmlinuz-0-rescue-8f5b018f6eb344909f6cfec5ad0839ef
found initrd image: /boot/initramfs-0-rescue-8f5b018f6eb344909f6cfec5ad0839ef.img
162.148361] Set XFS with ACLs, security attributes, no debug enabled
162.189514] xor: automatically using best checksumming function:
162.202066]   avx      : 22448.000 MB/sec
162.233066] raid6: sse2x1   gen() 7382 MB/s
162.277075] raid6: sse2x2   gen() 8589 MB/s
162.297084] raid6: sse2x4   gen() 10273 MB/s
162.318073] raid6: avx2x1   gen() 13410 MB/s
162.337070] raid6: avx2x2   gen() 16503 MB/s
162.356066] raid6: avx2x4   gen() 18976 MB/s
162.358393] raid6: using algorithm avx2x4 gen() (18976 MB/s)
162.361600] raid6: using avx2x2 recovery algorithm
162.431572] Btrfs loaded, crc32c=crc32c-intel
162.446525] fuse init (API version 7.23)
done
2020-09-24 15:12:13 Info:check xen/ide driver is already exist in /boot/initramfs-0-rescue-8f5b018f6eb344909f6cfec5ad0839ef.img or not
2020-09-24 15:12:23 Info:xen driver:yes
2020-09-24 15:12:23 Info:ide driver:no
2020-09-24 15:12:23 Info:check virtio driver is already exist in /boot/initramfs-0-rescue-8f5b018f6eb344909f6cfec5ad0839ef.img or not
2020-09-24 15:12:41 Info:virtio driver:yes
2020-09-24 15:12:41 Info:check xen/ide driver is already exist in /boot/initramfs-3.10.0-1062.12.1.el7.x86_64.img or not
2020-09-24 15:12:45 Info:xen driver:yes
2020-09-24 15:12:45 Info:ide driver:no
2020-09-24 15:12:45 Info:check virtio driver is already exist in /boot/initramfs-3.10.0-1062.12.1.el7.x86_64.img or not
2020-09-24 15:12:52 Info:virtio driver:yes
2020-09-24 15:12:52 Info:check xen/ide driver is already exist in /boot/initramfs-3.10.0-957.el7.x86_64.img or not
2020-09-24 15:12:55 Info:xen driver:yes
2020-09-24 15:12:55 Info:ide driver:no
2020-09-24 15:12:55 Info:check virtio driver is already exist in /boot/initramfs-3.10.0-957.el7.x86_64.img or not
2020-09-24 15:13:03 Info:virtio driver:yes
2020-09-24 15:13:03 Info:centos7 already contain xen and virtio driver
% Total    % Received % Xferd  Average Speed   Time    Time     Time  Current
           Dload  Upload   Total   Spent    Left   Speed
  00    30    0    0  100    30    0    0    0     0      0      0      0    711  --:--:-- --:--:-- --:--:--    714
2020-09-24 15:13:03 Info:Success to set kvm meta!
```

NOTE

- Make sure that the ECS has been configured successfully. Otherwise, the ECS will be unavailable after the modification is performed. If the operation failed, follow the instructions provided in [Manually Changing a Xen ECS to a KVM ECS \(Linux\)](#) for manual operations.
- FAQs related to a script installation failure:
 - [What Should I Do If Executing a Driver Installation Script Failed on an ECS Running CentOS 5?](#)
 - [What Should I Do If Executing a Driver Installation Script Failed When I Attempted to Modify the Specifications of a Linux ECS?](#)

Step 3: Modify Specifications

1. Log in to management console.
2. Click  in the upper left corner and select your region and project.
3. Under **Computing**, click **Elastic Cloud Server**.
4. On the **Elastic Cloud Server** page, view the status of the target ECS.
If the ECS is not in **Stopped** state, click **More** in the **Operation** column and select **Stop**.
5. Click **More** in the **Operation** column and select **Modify Specifications**.
The **Modify ECS Specifications** page is displayed.
6. Select the new ECS type, vCPUs, and memory as prompted.

7. (Optional) Set **DeH**.

If the ECS is created on a DeH, the system allows you to change the DeH.

To do so, select the target DeH from the drop-down list. If no DeH is available in the drop-down list, remaining DeH resources are insufficient and cannot be used to create the ECS with specifications modified.

8. Select the check box to confirm the ECS configuration.
9. Click **OK**.

(Optional) Step 4: Check Disk Attachment

After a Xen ECS is changed to a KVM ECS, disk attachment may fail. Therefore, check disk attachment after specifications modification. If disks are properly attached, the specifications modification is successful.

- Linux ECS

For details, see [What Should I Do If the Disk of a Linux ECS Becomes Offline After the ECS Specifications Are Modified?](#)

Follow-up Procedure

If the ECS with specifications modified is displayed in the ECS list, but its OS cannot be started after the ECS is remotely logged in, contact customer service or reinstall the ECS OS to rectify this fault. For details, see [Reinstalling the OS](#).

NOTE

Reinstalling the OS will clear the system disk, but not affecting data disks.

After the specifications are modified, manually delete the snapshot on the snapshot page if you verify that services have been recovered.

1.7.4 Manually Changing a Xen ECS to a KVM ECS (Linux)

Scenarios

Before changing a Xen ECS that runs Linux to a KVM ECS, install and configure required drivers.

This section describes how to manually install drivers on a Linux ECS, configure automatic disk attachment, and change Xen to KVM.

For instructions about how to use a script to automatically install drivers, see [Automatically Changing a Xen ECS to a KVM ECS \(Linux\)](#).

NOTE

- Xen ECSs include S1, C1, C2, and M1 ECSs.
- To obtain KVM ECSs, see the **Virtualization Type** column in [ECS Specifications](#).
- To support both Xen and KVM, Linux ECSs require the xen-pv and virtio drivers. Before changing a Xen ECS to a KVM ECS, make sure that the Linux ECS has been configured, including installing drivers and configuring automatic disk attachment.

Constraints

- If a Linux ECS is attached with a logical LVM disk or a RAID disk array consisting of multiple physical disks, the ECS specifications cannot be modified. Otherwise, data may be lost.
- A Xen ECS with more than 24 VBD disks attached cannot be changed to a KVM ECS.
- A Xen ECS can be changed to a KVM ECS, but a KVM ECS cannot be changed to a Xen ECS.

Procedure

[Figure 1-62](#) shows the flowchart for manually changing a Xen ECS to a KVM ECS.

Figure 1-62 Flowchart for manually changing a Xen ECS to a KVM ECS

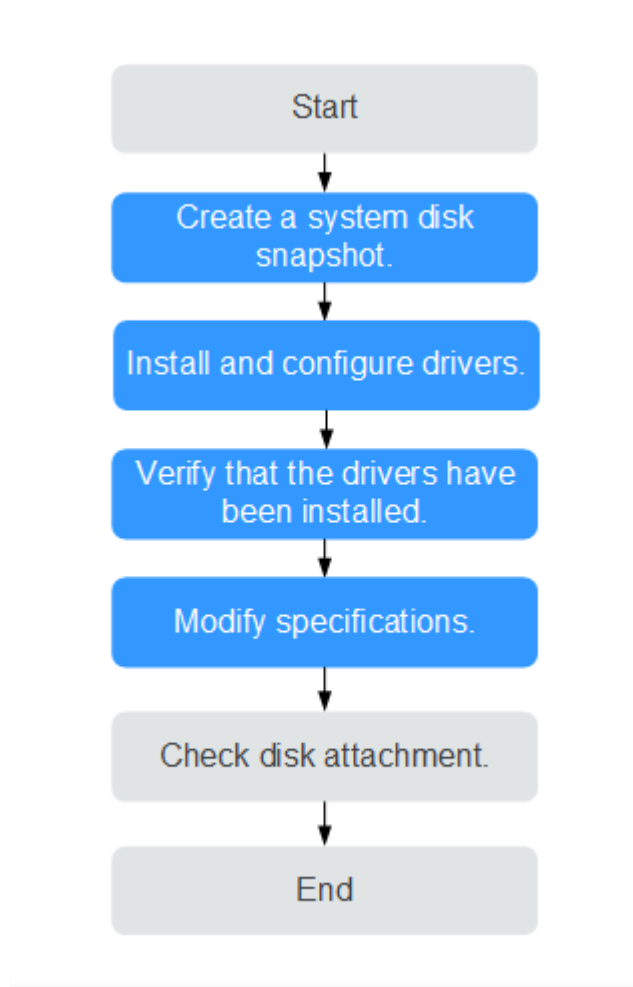


Table 1-15 Procedure for manually changing a Xen ECS to a KVM ECS

Step	Task
1	Step 1: Create a System Disk Snapshot

Step	Task
2	Step 2: Install Drivers
3	Step 3: Check Whether the ECS Is Configured Correctly
4	Step 4: Modify Specifications
5	(Optional) Step 5: Check Disk Attachment

Step 1: Create a System Disk Snapshot

Before modifying the specifications, back up the system disk by creating a system disk snapshot and install drivers on the ECS. Otherwise, once the ECS becomes unavailable after the modification, the data in the system disk may be lost.

For instructions about how to create a system disk snapshot, see [Creating a Snapshot](#) in *Elastic Volume Service User Guide*.

NOTE

After the specifications are modified, manually delete the snapshot on the snapshot page if you verify that services have been recovered.

Step 2: Install Drivers

Perform the operations described in this section if your ECS does not support the configuration using a script.

1. Log in to the ECS.
2. Uninstall tools from the ECS.
For details, see [Uninstalling the PV Driver from a Linux ECS](#).
3. Change the GRUB disk ID to UUID.
For details, see [Changing the Disk Identifier in the GRUB Configuration File to UUID](#).
4. Change the fstab disk ID to UUID.
For details, see [Changing the Disk Identifier in the fstab File to UUID](#).
5. Install native Xen and KVM drivers.
For details, see [Installing Native Xen and KVM Drivers](#).

Step 3: Check Whether the ECS Is Configured Correctly

Perform the following operations to check whether the drivers have been installed and the configuration files have been modified.

NOTICE

Before manually configuring an ECS, perform the following operations to check existing ECS configurations.

1. Log in to the ECS.
2. Run the following command to check whether the root partition is in UUID format:

cat /boot/grub/grub.cfg

- If yes, the disk ID in the GRUB configuration file has been changed to UUID.
- If no, the modification failed. In such a case, change the GRUB disk ID to UUID again.

```
...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
}
```

 **NOTE**

The path in which the GRUB configuration file is stored varies depending on the OS. For example, the path can be **/boot/grub/menu.lst**, **/boot/grub/grub.cfg**, **/boot/grub2/grub.cfg**, or **/boot/grub/grub.conf**.

3. Run the following command to check whether the disk ID in the fstab configuration file is UUID:

cat /etc/fstab

- If yes, the disk ID has been changed to UUID.
- If no, the modification failed. In such a case, change the fstab disk ID to UUID again.

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

4. Check whether the native Xen and KVM drivers have been installed.
 - If the boot virtual file system is initramfs, run the following commands:
lsinitrd /boot/initramfs-`uname -r`.img | grep `uname -r` | grep xen
lsinitrd /boot/initramfs-`uname -r`.img | grep `uname -r` | grep virtio
 - If the boot virtual file system is initrd, run the following commands:
lsinitrd /boot/initrd-`uname -r` | grep `uname -r` | grep xen
lsinitrd /boot/initrd-`uname -r` | grep `uname -r` | grep virtio

If the names of the native Xen and KVM drivers are displayed in the command output, the drivers have been installed.

```
[root@CTU10000xxxx home]# lsinitrd /boot/initramfs-`uname -r`.img | grep `uname -r` | 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 `uname -r` | 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
```

NOTICE

Make sure that the ECS has been configured successfully. Otherwise, the ECS will be unavailable after the modification is performed.

Step 4: Modify Specifications

1. Log in to management console.
2. Click  in the upper left corner and select your region and project.
3. Under **Computing**, click **Elastic Cloud Server**.
4. On the **Elastic Cloud Server** page, view the status of the target ECS.
If the ECS is not in **Stopped** state, click **More** in the **Operation** column and select **Stop**.
5. Click **More** in the **Operation** column and select **Modify Specifications**.
The **Modify ECS Specifications** page is displayed.
6. Select the new ECS type, vCPUs, and memory as prompted.
7. (Optional) Set **DeH**.
If the ECS is created on a DeH, the system allows you to change the DeH.
To do so, select the target DeH from the drop-down list. If no DeH is available in the drop-down list, remaining DeH resources are insufficient and cannot be used to create the ECS with specifications modified.
8. Select the check box to confirm the ECS configuration.
9. Click **OK**.

(Optional) Step 5: Check Disk Attachment

After a Xen ECS is changed to a KVM ECS, disk attachment may fail. Therefore, check disk attachment after specifications modification. If disks are properly attached, the specifications modification is successful.

- Linux ECS
For details, see [What Should I Do If the Disk of a Linux ECS Becomes Offline After the ECS Specifications Are Modified?](#)

Follow-up Procedure

If the ECS with specifications modified is displayed in the ECS list, but its OS cannot be started after the ECS is remotely logged in, contact customer service or reinstall the ECS OS to rectify this fault. For details, see [Reinstalling the OS](#).

NOTE

Reinstalling the OS will clear the system disk, but not affecting data disks.

After the specifications are modified, manually delete the snapshot on the snapshot page if you verify that services have been recovered.

1.8 Using User Data and Metadata

1.8.1 Obtaining Metadata

Scenarios

ECS metadata includes basic information of an ECS on the cloud platform, such as the ECS ID, hostname, and network information. ECS metadata can be obtained using either OpenStack or EC2 compatible APIs, as shown in [Table 1-16](#). The following describes the URI and methods of using the supported ECS metadata.

Notes

If the metadata contains sensitive data, take appropriate measures to protect the sensitive data, for example, controlling access permissions and encrypting the data.

Perform the following configuration on the firewall:

- Windows

If you need to assign permissions to only the administrator to access custom data, enable the firewall as an administrator and run the following commands in PowerShell:

```
PS C:\>$RejectPrincipal = New-Object -TypeName  
System.Security.Principal.NTAccount ("Everyone")
```

```
PS C:\>$RejectPrincipalSID =  
$RejectPrincipal.Translate([System.Security.Principal.SecurityIdentifier]).  
Value
```

```
PS C:\>$ExceptPrincipal = New-Object -TypeName  
System.Security.Principal.NTAccount ("Administrator")
```

```
PS C:\>$ExceptPrincipalSID =  
$ExceptPrincipal.Translate([System.Security.Principal.SecurityIdentifier]).  
Value
```

```
PS C:\>$PrincipalSDDL = "O:LSD:(D;;CC;;;$ExceptPrincipalSID)(A;;CC;;;  
$RejectPrincipalSID)"
```

```
PS C:\>New-NetFirewallRule -DisplayName "Reject metadata service for $  
($RejectPrincipal.Value), exception: $($ExceptPrincipal.Value)" -Action
```

```
block -Direction out -Protocol TCP -RemoteAddress 169.254.169.254 -  
LocalUser $PrincipalSDDL
```

- Linux

If you need to assign permissions to only user **root** to access custom data, run the following command as user **root**:

```
iptables --append OUTPUT --proto tcp --destination 169.254.169.254 --  
match owner ! --uid-owner root --jump REJECT
```

ECS Metadata Types

Table 1-16 ECS metadata types

Metadata Type	Metadata Item	Description
OpenStack	/meta_data.json	Displays ECS metadata. For the key fields in the ECS metadata, see Table 1-17 .
OpenStack	/password	Displays the password for logging in to an ECS. This metadata is used by Cloudbase-Init to store ciphertext passwords during initialization of key-pair-authenticated Windows ECSs.
OpenStack	/user_data	Displays ECS user data. This metadata allows you to specify scripts and configuration files for initializing ECSs. For details, see Injecting User Data into ECSs . For password-authenticated Linux ECSs, this metadata is used to save password injection scripts.
OpenStack	/network_data.json	Displays ECS network information.
OpenStack	/securitykey	Obtains temporary AKs and SKs. Before enabling an ECS to obtain a temporary AK and SK, make sure that the op_svc_ecs account has been authorized on IAM and that the desired ECS resources have been authorized for management.

Metadata Type	Metadata Item	Description
EC2	/meta-data/ hostname	Displays the name of the host accommodating an ECS. To remove the suffix .novalocal from an ECS, see: Is an ECS Hostname with Suffix .novalocal Normal?
EC2	/meta-data/ instance-type	Displays an ECS flavor.
EC2	/meta-data/ local-ipv4	Displays the fixed IP address of an ECS. If there are multiple NICs, only the IP address of the primary NIC is displayed.
EC2	/meta-data/ placement/ availability-zone	Displays the AZ accommodating an ECS.
EC2	/meta-data/ public-ipv4	Displays the EIP bound to an ECS. If there are multiple NICs, only the EIP of the primary NIC is displayed.
EC2	/meta-data/ public-keys/0/ openssh-key	Displays the public key of an ECS.
EC2	/user-data	Displays ECS user data.
EC2	/meta-data/ security-groups	Displays the security group to which an ECS belongs.

Table 1-17 Metadata key fields

Parameter	Type	Description
uuid	String	Specifies an ECS ID.
availability_zone	String	Specifies the AZ where an ECS locates.
meta	Dict	Specifies the metadata information, including the image name, image ID, and VPC ID.
hostname	String	Specifies the name of the host accommodating an ECS. To remove the suffix .novalocal from an ECS, see: Is an ECS Hostname with Suffix .novalocal Normal?

Parameter	Type	Description
enterprise_project_id	String	Specifies the ID of the enterprise project accommodating an ECS.

Prerequisites

- The target ECS has been logged in.
- Security group rules in the outbound direction meet the following requirements:
 - **Protocol: TCP**
 - **Port: 80**
 - **Destination: 169.254.0.0/16**

NOTE

If you use the default security group rules for the outbound direction, the preceding requirements are met. Then, the metadata can be accessed. Default security group rules for the outbound direction are as follows:

- **Protocol: All**
- **Port: All**
- **Destination: 0.0.0.0/0**

Metadata (OpenStack Metadata API)

Displays ECS metadata.

- **URI**
`/169.254.169.254/openstack/latest/meta_data.json`
- **Usage method**
Supports GET requests.
- **Example**

To use cURL to view Linux ECS metadata, run the following command:

```
curl http://169.254.169.254/openstack/latest/meta_data.json
```

To use Invoke-RestMethod to view Windows ECS metadata, run the following command:

```
Invoke-RestMethod http://169.254.169.254/openstack/latest/meta_data.json | ConvertTo-Json
```

```
{
  "random_seed": "rEocCViRS+dNwlYdGlxJHUp+00poeUsAdBFkbPbYQTmpNwpoEb43k9z+96TyrekNKS
+iLYDdRny4kKGoNPEVBCC05Hg1TcDbLAPfJwgJS1okqEtlcofUhKml3K0fto
+5KXEDU3GNuGwyZXjdVb9HQWU+E1jztAJjqsahnU+g/tawABTVySLBKlAT8fMGax1mTGgArucn/
WzDcy19DGioKPE7F8LtSQ4Ww3VCLK5VYB/h0x+4r7IVHrPmYX/
bi1Yhm3Dc4rRYNaTjdOV5gUOsbO3oAeQkmKwQ/
NO0N8qw5Ya4l8ZUW4tMav4mOsRySOOB35v0bvaJc6p
+50DTbWNeX5A2MLiEhTP3vsPrmvk4LRF7CLz2J2TGIM14OoVBw7LARwmv9cz532zHki/c8tlhRzLmOTXh/
wL36zFW10DeuReUGmxth7IGNmRMQKV6+mil78jm/KMPpgAdK3vwYF/
GcelOFJD2HghMUUCeMbwYnvijLTejuBpwhJMNIHA/NvlEsxJDxqBCoss/Jfe+yCmUFyxov/
+L8oNktZkmtCNzw3Ra0hiKchGhqK3BleToV/kVx5DdF081xrEA
+qyoM6CVyftEoz1zLRRyoo9bJ65Eg6JJd8dj1UCVsDqRY1pljgzE/
Mzsw6AaaCVhaMJL7u7YmVdyKzA6z65Xtvujz0Vo=",
  "uuid": "ca9e8b7c-f2be-4b6d-a639-f10b4d994d04",
```

```
"availability_zone": "lt-test-1c",
"hostname": "ecs-ddd4-l00349281.novalocal",
"launch_index": 0,
"meta": {
  "metering.image_id": "3a64bd37-955e-40cd-ab9e-129db56bc05d",
  "metering.imagetype": "gold",
  "metering.resourcespeccode": "s3.medium.1.linux",
  "image_name": "CentOS 7.6 64bit",
  "os_bit": "64",
  "vpc_id": "3b6c201f-aeb3-4bce-b841-64756e66cb49",
  "metering.resourcetype": "1",
  "cascaded.instance_extrainfo": "pcibridge:2",
  "os_type": "Linux",
  "enterprise_project_id": "0",
  "charging_mode": "0"
},
"project_id": "6e8b0c94265645f39c5abbe63c4113c6",
"name": "ecs-ddd4-l00349281"
}
```

User Data (OpenStack Metadata API)

Displays ECS user data. The value is configured only when you create an ECS. It cannot be changed after the configuration.

- URI
`/169.254.169.254/openstack/latest/user_data`
- Usage method
Supports GET requests.
- Example

Linux:

```
curl http://169.254.169.254/openstack/latest/user_data
```

Windows:

```
Invoke-RestMethod http://169.254.169.254/openstack/latest/user_data
```

```
ICAgICAgDQoiQSBjbG91ZCBkb2VzIG5vdCBrbm93IHdoeSBpdCBtb3ZlcyBpbiBqdXN0IHN1Y2ggYSBkaXJlY
3Rpb24gYW5kIGF0IHN1Y2ggYSBzcGVlZC4uLkI0IGZlZWxzIGFuIGltcHVsc2lvbi4uLnRoaXMgaXMgdGhllH
BsYWNlIHVlIGdvlG5vdy4gQnV0IHRob3R0ZSBza3kga25vd3MgdGhllHJlYXNvbnMgYW5kIHRob3R0ZSBwYXR0Z
cyBiZlZWhpbmQgYWxslGNsb3VkcycgYW5kIHlvdSB3aVxslGtub3csIHRob3R0ZSBwYXR0ZSBwYXR0ZSBwYXR0Z
Vyc2VsZiBoaWdoIGVub3VnaCB0byBzZWUgYmV5b25kIGhvcml6b25zLiINCg0KLVJpY2hhcmQgQmFjaA=
```

NOTE

If user data was not injected during ECS creation, the query result is 404.

Figure 1-63 404 Not Found

```
[root@python3dktempest--server-1519783681 ~]# curl http://169.254.169.254/openstack/latest/user_data
<html>
<head>
<title>404 Not Found</title>
</head>
<body>
<h1>404 Not Found</h1>
The resource could not be found.<br /><br />
</body>
</html>
```

Network Data (OpenStack Metadata API)

Displays ECS network information.

- URI
/openstack/latest/network_data.json
- Usage method
Supports GET requests.
- Example

NOTE

instance_max_bandwidth and **instance_min_bandwidth** are in the unit of Mbit/s. If the value is -1, the bandwidth is not limited.

Linux:

```
curl http://169.254.169.254/openstack/latest/network_data.json
```

Windows:

```
Invoke-RestMethod http://169.254.169.254/openstack/latest/  
network_data.json | ConvertTo-Json
```

```
{  
  "services": [{  
    "type": "dns",  
    "address": "xxx.xx.x.x"  
  },  
  {  
    "type": "dns",  
    "address": "100.1  
25.21.250"  
  }  
],  
  "networks": [{  
    "network_id": "67dc10ce-441f-4592-9a80-cc709f6436e7",  
    "type": "i  
pv4_dhcp",  
    "link": "tap68a9272d-71",  
    "id": "network0"  
  }  
],  
  "links": [{  
    "type": "cascading",  
    "vi  
f_id": "68a9272d-7152-4ae7-a138-3ef53af669e7",  
    "ethernet_mac_address": "fa:16:3e:f7:c1:47",  
    "id": "tap68a9272d-71",  
    "mtu": null  
  }  
],  
  "qos": {  
    "instance_max_bandwidth": 1200,  
    "instance_min_bandwidth": 4000  
  }  
}
```

Security Key (OpenStack Metadata API)

Obtains temporary AKs and SKs.

NOTE

- Before enabling an ECS to obtain a temporary AK and SK, make sure that the ECS has been authorized on IAM and that the desired ECS resources have been authorized for management.
- The validity period of a temporary AK and SK is one hour. The temporary AK and SK are updated 10 minutes ahead of the expiration time. During the 10 minutes, both the new and old temporary AKs and SKs can be used.
- When using temporary AKs and SKs, add '**X-Security-Token**:{**securitytoken**}' in the message header. **securitytoken** is the value returned when a call is made to the API.

- URI
`/openstack/latest/securitykey`
- Usage method
Supports GET requests.
- Examples
Linux:
curl `http://169.254.169.254/openstack/latest/securitykey`
Windows:
Invoke-RestMethod `http://169.254.169.254/openstack/latest/securitykey`

User Data (EC2 Compatible API)

Displays ECS user data. The value is configured only when you create an ECS. It cannot be changed after the configuration.

- URI
`/169.254.169.254/latest/user-data`
- Usage method
Supports GET requests.
- Example
Linux:
curl `http://169.254.169.254/latest/user-data`
Windows:
Invoke-RestMethod `http://169.254.169.254/latest/user-data`

```
ICAgICAgDQoiQSBjbG91ZCBkb2VzIG5vdCBBrm93IHdoeSBpdCBtb3ZlcyBpbiBqdXN0IHN1Y2ggYSBkaXJlY3Rpb24gYW5kIGF0IHN1Y2ggYSBzcGVlZC4uLkl0IGZlZWxzIGFuIGltcHVsc2lvbi4uLnRoaXMgaXMgdGhllHBsYWNIHRvIGdvlG5vdy4gQnV0IHRoZSBza3kga25vd3MgdGhllHJlYXNvbnMgYW5kIHRoZSBwYXR0ZXJucyBiZWphbmQgYWxslGNsb3VkcycgYW5kIHlvdSB3aWxslGtub3csIHRvbywgd2hbiB5b3UgbGlmdCB5b3Vyc2VsZiBoaWdoIGVub3VnaCB0byBzZWUgYmV5b25kIGhvcml6b25zLiINCg0KLVJpY2hpcmQgQmFjaA=
```

Hostname (EC2 Compatible API)

Displays the name of the host accommodating an ECS. The `.novalocal` suffix will be added later.

- URI
`/169.254.169.254/latest/meta-data/hostname`
- Usage method
Supports GET requests.
- Example
Linux:
curl `http://169.254.169.254/latest/meta-data/hostname`
Windows:
Invoke-RestMethod `http://169.254.169.254/latest/meta-data/hostname`
`vm-test.novalocal`

Instance Type (EC2 Compatible API)

Displays an ECS flavor.

- URI
`/169.254.169.254/latest/meta-data/instance-type`
- Usage method
Supports GET requests.
- Example
Linux:
curl http://169.254.169.254/latest/meta-data/instance-type
Windows:
Invoke-RestMethod http://169.254.169.254/latest/meta-data/instance-type
s3.medium.1

Local IPv4 (EC2 Compatible API)

Displays the fixed IP address of an ECS. If there are multiple NICs, only the IP address of the primary NIC is displayed.

- URI
`/169.254.169.254/latest/meta-data/local-ipv4`
- Usage method
Supports GET requests.
- Example
Linux:
curl http://169.254.169.254/latest/meta-data/local-ipv4
Windows:
Invoke-RestMethod http://169.254.169.254/latest/meta-data/local-ipv4
192.1.1.2

Availability Zone (EC2 Compatible API)

Displays the AZ accommodating an ECS.

- URI
`/169.254.169.254/latest/meta-data/placement/availability-zone`
- Usage method
Supports GET requests.
- Example
Linux:
curl http://169.254.169.254/latest/meta-data/placement/availability-zone
Windows:
Invoke-RestMethod http://169.254.169.254/latest/meta-data/placement/availability-zone
az1.dc1

Public IPv4 (EC2 Compatible API)

Displays the EIP bound to an ECS. If there are multiple NICs, only the EIP of the primary NIC is displayed.

- URI
`/169.254.169.254/latest/meta-data/public-ipv4`
- Usage method
Supports GET requests.
- Example
Linux:
curl http://169.254.169.254/latest/meta-data/public-ipv4
Windows:
Invoke-RestMethod http://169.254.169.254/latest/meta-data/public-ipv4
46.1.1.2

Public Keys (EC2 Compatible API)

Displays the public key of an ECS.

- URI
`/169.254.169.254/latest/meta-data/public-keys/0/openssh-key`
- Usage method
Supports GET requests.
- Example
Linux:
curl http://169.254.169.254/latest/meta-data/public-keys/0/openssh-key
Windows:
Invoke-RestMethod http://169.254.169.254/latest/meta-data/public-keys/0/openssh-key

```
ssh-rsa AAAAB3NzaC1yc2EAAAADAQABAAQADI5Fw5k8Fgzajn1zJwLoV3+wMP+6CyvsSilc/hioggSnYu/AD0Yqm8vVO0kWlun1rFbdO+QUZKyVr/OPUjQSw4SRh4qsTKf/+eFoWTjplFvd1WCBZzS/WRenxIwR00KkczHSJro763+wYcwKieb4eKRxaQoQvoFgVjLBULXajH4eKoKTVNtMXAvPP9aMy2SLgsJntMb9ArfziAiblQynq7UifLnN3VclzPeiWrqtzjyOp6CPUXnL0lVPTvbLe8sUteBsJZwL6K4i+Y0lf3ryqnmQgC21yW4Dzu+kwk8FVT2MgWkCwiZd8gQ/+uJzrJFyMfUOBikIOBfuUENIJUuABGenerated-by-Nova
```

Helpful Links

[Why My Linux ECS Cannot Obtain Metadata?](#)

1.8.2 Injecting User Data into ECSs

Scenarios

Use the user data injection function to inject user data into ECSs to:

- Simplify ECS configuration.
- Initialize the ECS OS configuration.

- Upload your scripts to ECSs during ECS creation.
- Perform other tasks using scripts.

Use Restrictions

- Linux
 - The image that is used to create ECSs must have Cloud-Init installed.
 - The user data to be injected must be less than or equal to 32 KB.
 - If user data is uploaded as text, the data can contain only ASCII characters. If user data is uploaded using a file, the file can contain any characters and the file size cannot exceed 32 KB.
 - The image that is used to create ECSs must be a public image, a private image created based on a public image, or a private image with Cloud-Init installed.
 - The format of the customized scripts must be supported by Linux ECSs.
 - DHCP must be enabled on the VPC network, and port 80 must be enabled for the security group in the outbound direction.
 - When the password login mode is selected, user data injection is not supported.
- Windows
 - The image that is used to create ECSs must have Cloudbase-Init installed.
 - The user data to be injected must be less than or equal to 32 KB.
 - User data uploaded as text can contain only ASCII characters. User data uploaded as a file can contain any characters, and the file size must be less than or equal to 32 KB.
 - The image that is used to create ECSs must be a public image, a private image created based on a public image, or a private image with Cloudbase-Init installed.
 - DHCP must be enabled on the VPC network, and port 80 must be enabled for the security group in the outbound direction.

Injecting User Data

1. Create a user data script, the format of which complies with user data script specifications. For details, see [Helpful Links](#).
2. When creating an ECS, set **Advanced Options** to **Configure now**, and paste the content of the user data script to the **User Data Injection** text box or upload the user data file.

NOTE

User data can be injected as either text or a file.

Text: Copy the content of the user data script to the text box.

File: Save the user data script to a text file and then upload the file.

3. The created ECS automatically runs Cloud-Init/Cloudbase-Init and reads the user data script upon startup.

User Data Scripts of Linux ECSs

Customized user data scripts of Linux ECSs are based on the open-source Cloud-Init architecture. This architecture uses ECS metadata as the data source for automatically configuring the ECSs. The customized script types are compatible with open-source Cloud-Init. For details about Cloud-Init, see <http://cloudinit.readthedocs.io/en/latest/topics/format.html>.

- Script execution time: A customized user data script is executed after the time when the status of the target ECS changes to **Running** and before the time when **/etc/init** is executed.

NOTE

By default, the scripts are executed as user **root**.

- Script type: Both user-data scripts and Cloud-Config data scripts are supported.

Table 1-18 Linux ECS script types

-	User-Data Script	Cloud-Config Data Script
Description	Scripts, such as Shell and Python scripts, are used for custom configurations.	Methods pre-defined in Cloud-Init, such as the Yum source and SSH key, are used for configuring certain ECS applications.
Format	A script must be started with #! , for example, #!/bin/bash and #!/usr/bin/env python . When a script is started for the first time, it will be executed at the rc.local-like level, indicating a low priority in the boot sequence.	The first line must be #cloud-config , and no space is allowed in front of it.
Constraint	Before Base64 encoding, the size of the script, including the first line, cannot exceed 32 KB.	Before Base64 encoding, the size of the script, including the first line, cannot exceed 32 KB.
Frequency	The script is executed only once when the ECS is started for the first time.	The execution frequency varies according to the applications configured on the ECS.

- How can I view the customized user data injected into a Linux ECS?
 - a. Log in to the ECS.
 - b. Run the following command to view the customized user data as user **root**:
curl http://169.254.169.254/openstack/latest/user_data

- Script usage examples

This section describes how to inject scripts in different formats into Linux ECSs and view script execution results.

Example 1: Inject a user-data script.

When creating an ECS, set **User Data Injection** to **As text** and enter the customized user data script.

```
#!/bin/bash
echo "Hello, the time is now $(date -R)" | tee /root/output.txt
```

After the ECS is created, start it and run the **cat [file]** command to check the script execution result.

```
[root@XXXXXXXX ~]# cat /root/output.txt
Hello, the time is now Mon, 16 Jul 2016 16:03:18+0800
```

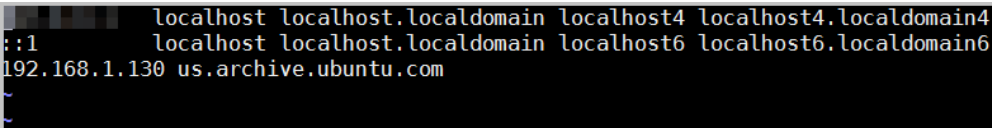
Example 2: Inject a Cloud-Config data script.

When creating an ECS, set **User Data Injection** to **As text** and enter the customized user data script.

```
#cloud-config
bootcmd:
- echo 192.168.1.130 us.archive.ubuntu.com >> /etc/hosts
```

After the ECS is created, start it and run the **cat /etc/hosts** command to check the script execution result.

Figure 1-64 Viewing operating results



```
localhost localhost.localdomain localhost4 localhost4.localdomain4
::1 localhost localhost.localdomain localhost6 localhost6.localdomain6
192.168.1.130 us.archive.ubuntu.com
```

User Data Scripts of Windows ECSs

Customized user data scripts of Windows ECSs are based on the open-source Cloudbase-Init architecture. This architecture uses ECS metadata as the data source for initializing and automatically configuring the ECSs. The customized script types are compatible with open-source Cloudbase-Init. For details about Cloudbase-Init, see <https://cloudbase-init.readthedocs.io/en/latest/userdata.html>.

- Script type: Both batch-processing program scripts and PowerShell scripts are supported.

Table 1-19 Windows ECS script types

-	Batch-Processing Program Script	PowerShell Script
Format	The script must be started with rem cmd , which is the first line of the script. No space is allowed at the beginning of the first line.	The script must be started with #ps1 , which is the first line of the script. No space is allowed at the beginning of the first line.

-	Batch-Processing Program Script	PowerShell Script
Constraint	Before Base64 encoding, the size of the script, including the first line, cannot exceed 32 KB.	Before Base64 encoding, the size of the script, including the first line, cannot exceed 32 KB.

- How can I view the customized user data injected into a Windows ECS?
 - a. Log in to the ECS.
 - b. Access the following URL in the address box of the browser and view the injected user data:
http://169.254.169.254/openstack/latest/user_data
- Script usage examples

This section describes how to inject scripts in different formats into Windows ECSs and view script execution results.

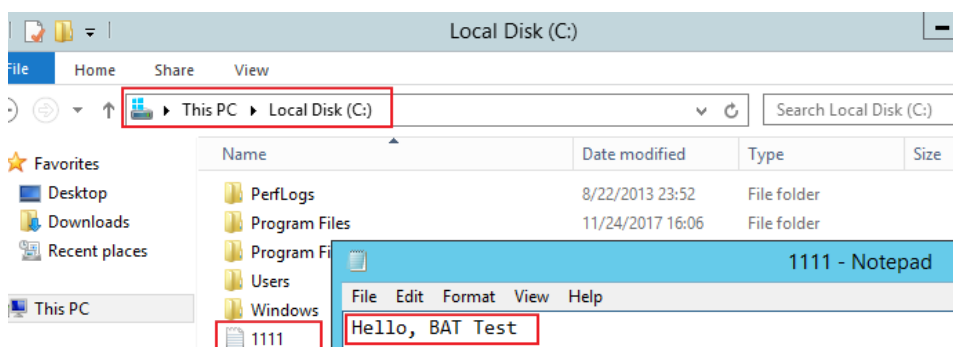
Example 1: Inject a batch-processing program script.

When creating an ECS, set **User Data Injection** to **As text** and enter the customized user data script.

```
rem cmd
echo "Hello, BAT Test" > C:\1111.txt
```

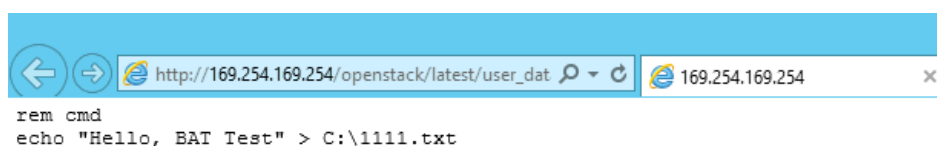
After the ECS is created, start it and check the script execution result. In this example, a text file named **1111** is added to disk C:\.

Figure 1-65 Creating text file (Batch)



To view the user data injected into the Windows ECS, log in at http://169.254.169.254/openstack/latest/user_data.

Figure 1-66 Viewing user data (Batch)



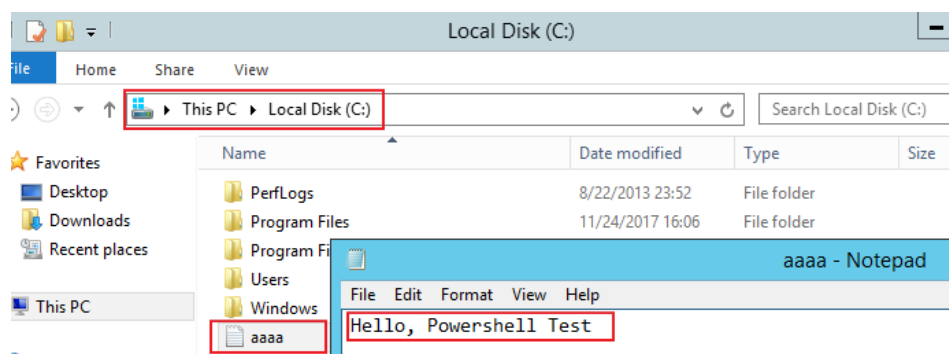
Example 2: Inject a PowerShell script.

When creating an ECS, set **User Data Injection** to **As text** and enter the customized user data script.

```
#ps1  
echo "Hello, Powershell Test" > C:\aaaa.txt
```

After the ECS is created, start it and check the script execution result. In this example, a text file named **aaaa** is added to disk C:\.

Figure 1-67 Creating text file (PowerShell)



To view the user data injected into the Windows ECS, log in at http://169.254.169.254/openstack/latest/user_data.

Figure 1-68 Viewing user data (PowerShell)



Case 1

This case illustrates how to use the user data injection function to simplify Linux ECS configuration.

In this example, vim is configured to enable syntax highlighting, display line numbers, and set the tab stop to **4**. The **.vimrc** configuration file is created and injected into the **/root/.vimrc** directory during ECS creation. After the ECS is created, vim is automatically configured based on your requirements. This improves ECS configuration efficiency, especially in batch ECS creation scenarios.

The content of the script file to be injected is as follows:

```
#cloud-config  
write_files:  
- path: /root/.vimrc  
  content: |  
    syntax on  
    set tabstop=4  
    set number
```

Case 2

This case illustrates how to use the user data injection function to set the password for logging in to a Linux ECS.

 NOTE

The new password must meet the password complexity requirements listed in [Table 1-20](#).

Table 1-20 Password complexity requirements

Parameter	Requirement	Example Value
Password	<ul style="list-style-type: none"> • Consists of 8 characters to 26 characters. • Contains at least three of the following character types: <ul style="list-style-type: none"> - Uppercase letters - Lowercase letters - Digits - Special characters for Windows: \$!@%-_+=[:./,;? - Special characters for Linux: !@%-_+=[:./^,{}? • Cannot contain the username or the username spelled backwards. • Cannot contain more than two characters in the same sequence as they appear in the username. (This requirement applies only to Windows ECSs.) 	YNbUwp! dUc9MClNv NOTE The example password is generated randomly. Do not copy this example password.

The content of the script file to be injected is as follows:

- Using a ciphertext password (recommended)

```
#!/bin/bash
echo 'root:$6$V6azyelwcd3CHlpY$BN3VVq18fmCkj66B4zdHLWevqcxlig' | chpasswd -e;
```

In the preceding command output, **\$6\$V6azyelwcd3CHlpY\$BN3VVq18fmCkj66B4zdHLWevqcxlig** is the ciphertext password, which can be generated as follows:

- a. Run the following command to generate an encrypted ciphertext value:

```
python -c "import crypt, getpass, pwd;print crypt.mksalt()"
```

The following information is displayed:

```
$6$V6azyelwcd3CHlpY
```

- b. Run the following command to generate a ciphertext password based on the salt value:

```
python -c "import crypt, getpass, pwd;print crypt.crypt('Cloud.1234','\ $6$V6azyelwcd3CHlpY')"
```

The following information is displayed:

```
$6$V6azyelwcd3CHlpY$BN3VVq18fmCkj66B4zdHLWevqcxlig
```

After the ECS is created, you can use the password to log in to it.

Case 3

This case illustrates how to use the user data injection function to reset the password for logging in to a Linux ECS.

In this example, the password of user **root** is reset to *********.

 **NOTE**

The new password must meet the password complexity requirements listed in [Table 1-21](#).

Table 1-21 Password complexity requirements

Parameter	Requirement	Example Value
Password	<ul style="list-style-type: none">• Consists of 8 characters to 26 characters.• Contains at least three of the following character types:<ul style="list-style-type: none">- Uppercase letters- Lowercase letters- Digits- Special characters for Windows: \$!@%-_+=[:./,?- Special characters for Linux: !@%-_+=[:./^,{}?• Cannot contain the username or the username spelled backwards.• Cannot contain more than two characters in the same sequence as they appear in the username. (This requirement applies only to Windows ECSs.)	YNbUwp! dUc9MClnv NOTE The example password is generated randomly. Do not copy this example password.

The content of the script file to be injected is as follows (Retain the indentation in the following script):

```
#cloud-config
chpasswd:
  list: |
    root:*****
  expire: False
```

After the ECS is created, you can use the reset password to log in to it. To ensure system security, change the password of user **root** after logging in to the ECS for the first time.

Case 4

This case illustrates how to use the user data injection function to create a user on a Windows ECS and configure the password for the user.

In this example, the user's username is **abc**, its password is *********, and the user is added to the **administrators** user group.

 NOTE

The new password must meet the password complexity requirements listed in [Table 1-21](#).

The content of the script file to be injected is as follows:

```
rem cmd
net user abc ***** /add
net localgroup administrators abc /add
```

After the ECS is created, you can use the created username and password to log in to it.

Case 5

This case illustrates how to use the user data injection function to update system software packages for a Linux ECS and enable the HTTPd service. After the user data is injected, you can use the HTTPd service.

The content of the script file to be injected is as follows:

```
#!/bin/bash
yum update -y
service httpd start
chkconfig httpd on
```

Case 6

This case illustrates how to use the user data injection function to assign user **root** permission for remotely logging in to a Linux ECS. After injecting the file, you can log in to the ECS as user **root** using SSH key pair authentication.

The content of the script file to be injected is as follows:

```
#cloud-config
disable_root: false
runcmd:
- sed -i 's/^\^PermitRootLogin.*$/PermitRootLogin without-password/' /etc/ssh/sshd_config
- sed -i '/^\^KexAlgorithms.*$/d' /etc/ssh/sshd_config
- service sshd restart
```

Helpful Links

For more information about user data injection cases, visit the official Cloud-init/Cloudbase-init website:

- <https://cloudinit.readthedocs.io/en/latest/>
- <https://cloudbase-init.readthedocs.io/en/latest/>

1.9 (Optional) Configuring Mapping Between Hostnames and IP Addresses

ECSs in the same VPC can communicate with each other using hostnames. In such a case, you are required to configure the mapping between hostnames and IP addresses. The communication using hostnames is more convenient than that using IP addresses.

Constraints

This method applies only to Linux ECSs.

Procedure

For example, there are two ECSs in a VPC, ecs-01 and ecs-02. Perform the following operations to enable communication using hostnames between ecs-01 and ecs-02:

Step 1 Log in to ecs-01 and ecs-02 and obtain their private IP addresses.

1. Log in to the management console.
2. Under **Computing**, click **Elastic Cloud Server**.
3. On the **Elastic Cloud Server** page, obtain the private IP address in the **IP Address** column.

For example, the obtained private IP addresses are as follows:

ecs-01: 192.168.0.1

ecs-02: 192.168.0.2

Step 2 Obtain the hostnames for the two ECSs.

1. Log in to an ECS.
2. Run the following command to view the ECS hostname:

```
sudo hostname
```

For example, the obtained hostnames are as follows:

ecs-01: hostname01

ecs-02: hostname02

Step 3 Create mapping between the hostnames and IP addresses and add information about other ECSs in the same VPC.

1. Log in to ecs-01.
 2. Run the following command to switch to user **root**:
- ```
sudo su -
```
3. Run the following command to edit the hosts configuration file:
- ```
vi /etc/hosts
```
4. Press **i** to enter editing mode.
 5. Add the statement in the following format to set up the mapping:

Private IP address hostname

For example, add the following statement:

```
192.168.0.1 hostname01
```

```
192.168.0.2 hostname02
```

6. Press **Esc** to exit editing mode.
 7. Run the following command to save the configuration and exit:
- ```
:wq
```
8. Log in to ecs-02.
  9. Repeat [Step 3.2](#) to [Step 3.7](#).



**Step 4** Check whether the ECSs can communicate with each other using hostnames.

Log in to an ECS in the same VPC, run the following command to ping the added host, and check whether the operation is successful:

```
ping Hostname
```

```
----End
```

## 1.10 (Optional) Installing a Driver and Toolkit

### 1.10.1 GPU Driver

#### Overview

Before using a GPU-accelerated ECS, make sure that a GPU driver has been installed on the ECS for GPU acceleration.

GPU-accelerated ECSs support GRID and Tesla drivers.

- To use graphics acceleration, such as OpenGL, DirectX, or Vulkan, install a GRID driver and separately purchase and configure a GRID license. The GRID driver with a vDWS license also supports CUDA for both computing and graphics acceleration.
  - A graphics-accelerated (G series) ECS created using a public image has had a GRID driver of a specified version installed by default, but the GRID license must be purchased and configured separately. Before using such an ECS, check whether the desired driver has been installed on it and whether the version of the installed driver meets service requirements.
  - To install a GRID driver on a GPU-accelerated ECS created using a private image, see [Installing a GRID Driver on a GPU-accelerated ECS](#).
- To use computing acceleration, install a Tesla driver.
  - A computing-accelerated (P series) ECS created using a public image has had a Tesla driver of a specified version installed by default.
  - To install a Tesla driver on a GPU-accelerated ECS created using a private image, see [Installing a Tesla Driver and CUDA Toolkit on a GPU-accelerated ECS](#).

**Table 1-22** Acceleration supported by GPU drivers

| Driver | License      | CUDA      | OpenGL        | DirectX       | Vulcan        | Application Scenario                                        | Description                                                                                                                        |
|--------|--------------|-----------|---------------|---------------|---------------|-------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|
| GRID   | Required     | Supported | Supported     | Supported     | Supported     | 3D rendering, graphics workstation, and game acceleration   | The GRID driver must be paid and requires a license to accelerate graphics and image applications.                                 |
| Tesla  | Not required | Supported | Not supported | Not supported | Not supported | Scientific computing, deep learning training, and inference | The Tesla driver is downloaded free of charge and usually used with NVIDIA CUDA SDKs to accelerate general computing applications. |

## 1.10.2 Installing a GRID Driver on a GPU-accelerated ECS

### Scenarios

To use graphics acceleration, such as OpenGL, DirectX, or Vulkan, install a GRID driver and separately purchase and configure a GRID license. The GRID driver with a vDWS license also supports CUDA for both computing and graphics acceleration.

- A graphics-accelerated (G series) ECS created using a public image has had a GRID driver of a specified version installed by default, but the GRID license must be purchased and configured separately.
- If a GPU-accelerated ECS is created using a private image, install a GRID driver and separately purchase and configure a GRID license.

This section describes how to install a GRID driver, purchase or apply for a GRID license, and configure the license server.

Process of installing a GRID driver:

1. [Purchasing a GRID License](#)
2. [Downloading GRID Driver and Software License Packages](#)
3. [Deploying and Configuring the License Server](#)
4. [Installing the GRID Driver and Configuring the License](#)

**NOTE**

- NVIDIA allows you to apply for a 90-day trial license.
- For details about GPU-accelerated ECSs with different specifications and application scenarios, see [GPU-accelerated ECSs](#).

## Purchasing a GRID License

- Purchase a license.

To obtain an official license, contact NVIDIA or their NVIDIA agent in your local country or region.

- Apply for a trial license.

Log in at the [official NVIDIA website](#) and enter desired information.

For details about how to register an account and apply for a trial license, see [official NVIDIA help page](#).

**NOTE**

The method of using a trial license is the same as that of using an official license. You can use an official license to activate an account with a trial license to prevent repetitive registration. The trial license has a validity period of 90 days. After the trial license expires, it cannot be used anymore. Purchase an official license then.

**Figure 1-69** Applying for a trial license

**START YOUR 90-DAY TRIAL**

Please register with your corporate email address.  
Personal email addresses or extensions will not be approved.  
If already registered, [click here](#).  
If you need assistance, please review [FAQ](#).

|                 |                         |                  |                                                   |
|-----------------|-------------------------|------------------|---------------------------------------------------|
| * First name    | <input type="text"/>    | * Last name      | <input type="text"/>                              |
| * Email address | <input type="text"/>    | * Phone          | <input type="text" value="Ex : +1-222-333-4444"/> |
| * Company       | <input type="text"/>    | * Industry       | -- Please Choose One --                           |
| * Job role      | -- Please Choose One -- | * Location       | -- Please Choose One --                           |
| * Street 1      | <input type="text"/>    | Street 2         | <input type="text"/>                              |
| * City          | <input type="text"/>    | * State/Province | -- Please Choose One --                           |
| * Postal Code   | <input type="text"/>    |                  |                                                   |

|                        |                         |                  |                         |
|------------------------|-------------------------|------------------|-------------------------|
| * Certified Server     | Other                   | * NVIDIA GPUs    | V100                    |
| Certified Server Other | <input type="text"/>    | * VDI Hypervisor | RedHat Virtualization   |
| * VDI Remoting Client  | Other                   | * VDI Seats      | -- Please Choose One -- |
| * Primary Application  | -- Please Choose One -- |                  |                         |

Send me the latest enterprise news, announcements, and more from NVIDIA. I can unsubscribe at any time.

\* Required Fields

By registering, you agree to [NVIDIA Account Terms and Conditions & Privacy Policy](#).

## Downloading GRID Driver and Software License Packages

1. Obtain the driver installation package required for an OS. For details, see [Table 1-23](#).

For more information about the GRID driver, see [NVIDIA vGPU Software Documentation](#).

 **NOTE**

For a GPU passthrough ECS, select a GRID driver version as required.

For a GPU virtualization ECS, select a driver version based on the following table.

**Table 1-23** GRID driver versions supported by GPU-accelerated ECSs

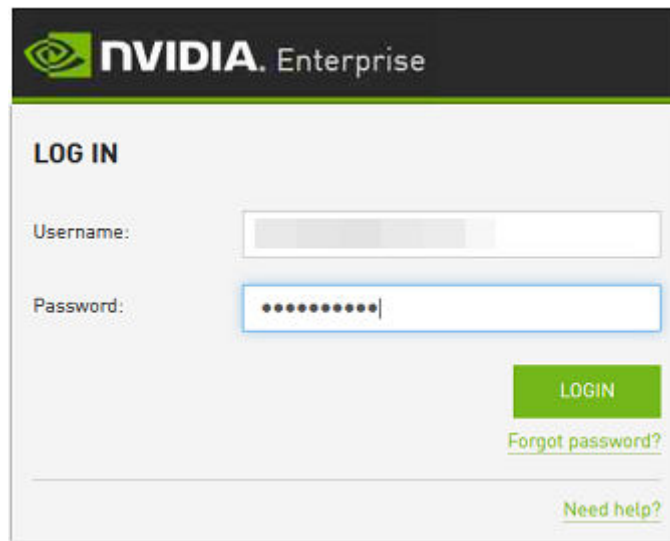
| ECS Type | GPU Attachment  | OS                                                                                                                                                                                                                    | Driver Version                | CPU Architecture |
|----------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|------------------|
| G5       | GPU passthrough | <ul style="list-style-type: none"><li>Windows Server 2016 Standard 64bit</li><li>Windows Server 2012 R2 Standard 64bit</li><li>CentOS 7.5 64bit</li></ul>                                                             | Select a version as required. | x86_64           |
| P2v      | GPU passthrough | <ul style="list-style-type: none"><li>Windows Server 2016 Standard 64bit</li><li>Windows Server 2012 R2 Standard 64bit</li><li>Ubuntu Server 16.04 64bit</li><li>CentOS 7.7 64bit</li><li>EulerOS 2.5 64bit</li></ul> | Select a version as required. | x86_64           |
| PI2      | GPU passthrough | <ul style="list-style-type: none"><li>Windows Server 2016 Standard 64bit</li><li>Ubuntu Server 16.04 64bit</li><li>CentOS 7.5 64bit</li></ul>                                                                         | Select a version as required. | x86_64           |
| PI1      | GPU passthrough | <ul style="list-style-type: none"><li>Ubuntu Server 16.04 64bit</li><li>Ubuntu Server 14.04 64bit</li><li>CentOS 7.3 64bit</li></ul>                                                                                  | Select a version as required. | x86_64           |

2. After the registration, log in at the [official NVIDIA website](#) and enter the account.
3. Check whether NVIDIA is used for the first time.
  - a. If yes, go to step [4](#).



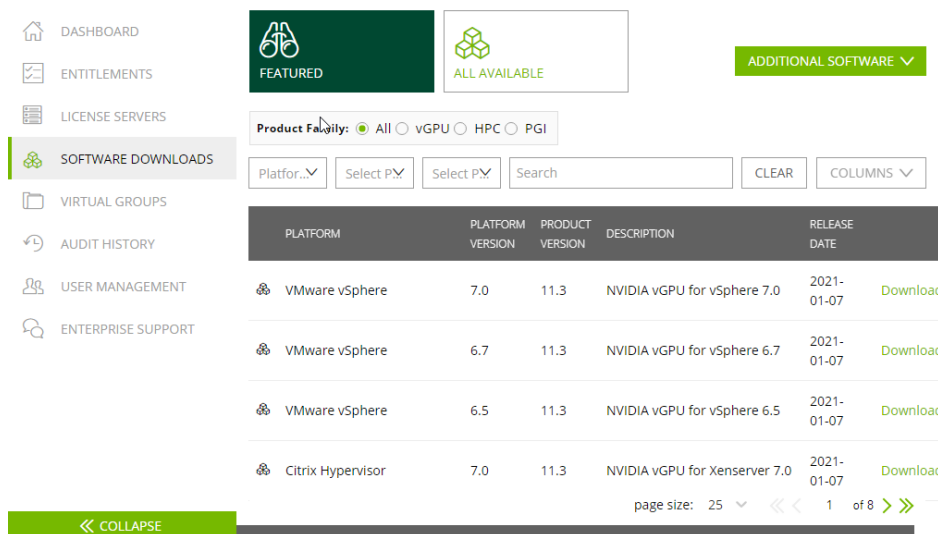
- Specify **Username** and **Password** and click **LOGIN**.

**Figure 1-72** Logging in to the official NVIDIA website

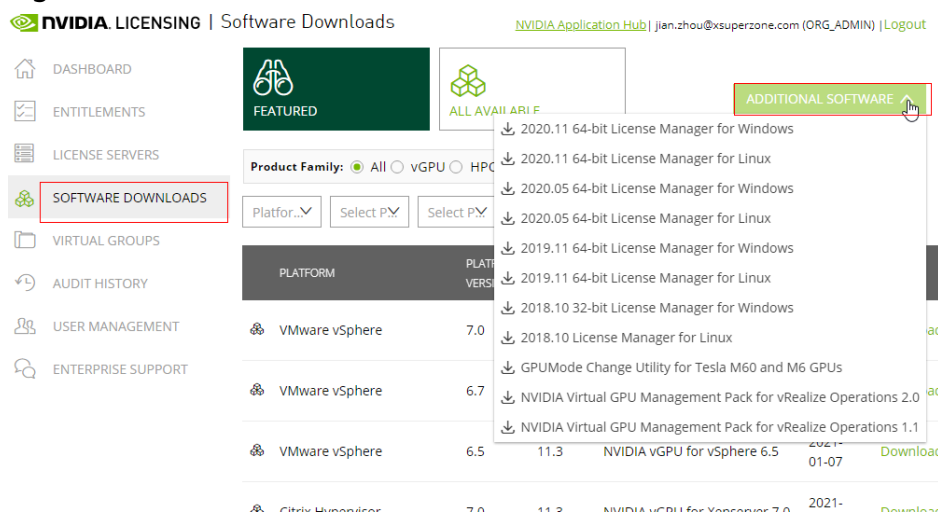


- Log in at the official NVIDIA website as prompted and select **SOFTWARE DOWNLOADS**.

**Figure 1-73** SOFTWARE DOWNLOADS page



- Download the GRID driver of the required version. For details, see [Table 1-23](#).
- Decompress the GRID driver installation package and install the driver that matches your ECS OS.
- On the **SOFTWARE DOWNLOADS** page, click **ADDITIONAL SOFTWARE** to download the license software package.

**Figure 1-74** ADDITIONAL SOFTWARE

## Deploying and Configuring the License Server

The following uses an ECS running CentOS 7.5 as an example to describe how to deploy and configure the license server on the ECS.

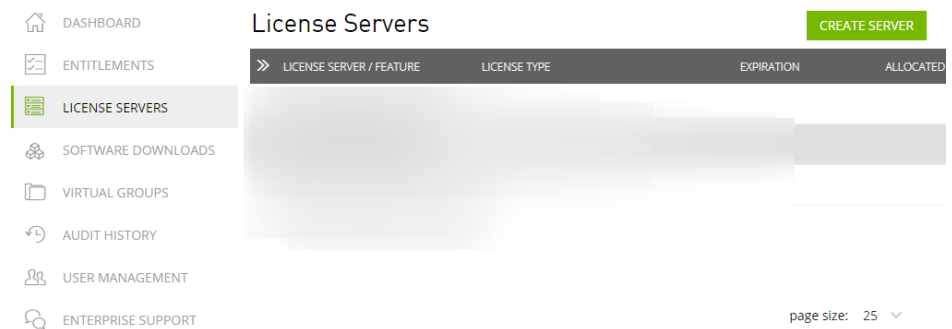
### NOTE

- The target ECS must have at least 2 vCPUs and 4 GiB of memory.
- Ensure that the MAC address of the target ECS has been recorded.
- If the license server is used in the production environment, deploy it in high availability mode. For details, see [official NVIDIA documentation for license server high availability](#).

1. Configure the network.
  - If the license server is to be accessed using the VPC, ensure that the license server and the GPU-accelerated ECS with the GRID driver installed are in the same VPC subnet.
  - If the license server is to be accessed using a public IP address, configure the security group to which license server belongs and add inbound rules for TCP 7070 and TCP 8080.
2. Install the license server.

For details, see the [official NVIDIA documentation for installing the license server](#).
3. Obtain the license file.
  - a. Log in to the [NVIDIA website](#) on a new tab and select **LICENSE SERVERS**.

**Figure 1-75 LICENSE SERVERS**

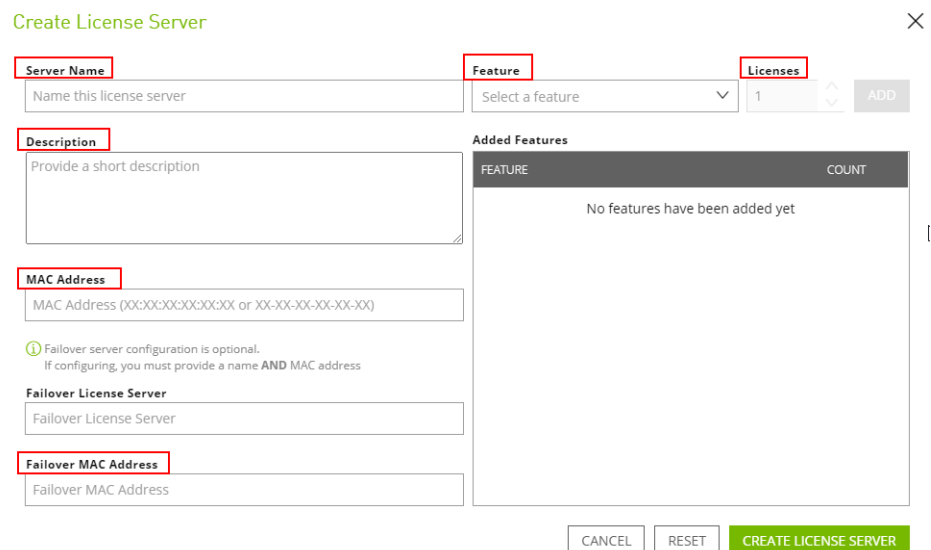


- b. Click **CREATE SERVER**.
- c. Set **Server Name**, **Description**, and **MAC Address** (MAC address of the license server).
- d. Select **Feature**, enter the number of required licenses in the **Licenses** text box, and click **ADD**.

In active/standby deployment, enter the name of the standby server in **Failover License Server** and enter the MAC address in **Failover MAC Address**.

- e. Click **CREATE LICENSE SERVER**.

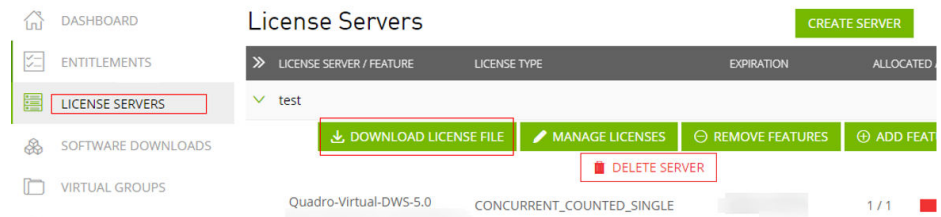
**Figure 1-76 Create License Server**



- f. Download the license file.

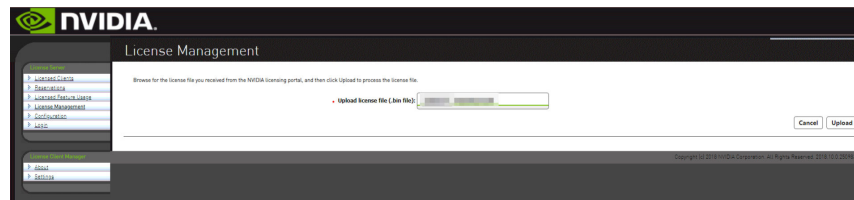


**Figure 1-77** Downloading the license file



4. In the web browser, access the homepage of the license server management page using the link configured during the installation.  
Default URL: `http://IP address of the EIP.8080/licserver`
5. Choose **License Server > License Management**, select the .bin license file to be uploaded, and click **Upload**.

**Figure 1-78** Uploading a license file



## Installing the GRID Driver and Configuring the License

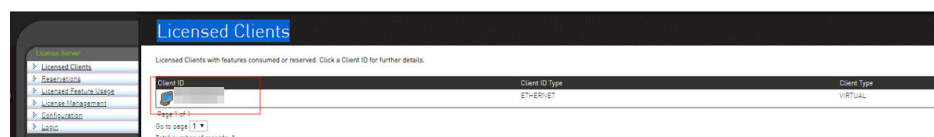
1. Install the GRID driver of a desired version, for example, on a GPU-accelerated Windows ECS.

### NOTE

Microsoft remote login protocols do not support GPU 3D hardware acceleration. To use this function, install third-party desktop protocol-compliant software, such as VNC, PCoIP, or NICE DCV, and access the ECS through the client.

2. Open the NVIDIA control panel on the Windows control panel.
3. Enter the IP address and port number of the deployed license server in the level-1 license server, and then click **Apply**. If the message indicating that you have obtained a GRID license, the installation is successful. Additionally, the MAC address of the GPU-accelerated ECS with the GRID driver installed is displayed on the **Licensed Clients** page of the license server management console.

**Figure 1-79** License server management console



## 1.10.3 Installing a NVIDIA GPU Driver and CUDA Toolkit (Recommended)

### Scenarios

When using a P1, P2v, or PI1 ECS, make sure that the GPU driver and CUDA toolkit have been installed on the ECS. Otherwise, computing acceleration will not take effect.

- An ECS is available.
- If the ECS is created using a public image, the GPU driver and CUDA toolkit have been installed by default.
- If the ECS is created using a private image, check whether the GPU driver and CUDA toolkit have been installed. For details, see [Checking Whether the GPU Driver and CUDA Toolkit Have Been Installed](#).

If the GPU driver and CUDA toolkit have not been installed on the target image, you can manually install them after the ECS is created. For details, see [Installation Instructions](#).

Reading this section, you will learn:

- How can I check whether the GPU driver and CUDA toolkit have been installed?
- Have the GPU driver and CUDA toolkit been installed on an ECS?
- How can I manually install the desired GPU driver and CUDA toolkit?

### Notes

- The operations described in this section apply only to P1, P2v, and PI1 ECSs.

### Installation Instructions

**Step 1** Check whether the GPU driver and CUDA toolkit have been installed on your ECS. For details, see [Checking Whether the GPU Driver and CUDA Toolkit Have Been Installed](#).

- If they have been installed, no further action is required.
- If no, go to [Step 2](#).

**Step 2** Install the GPU driver and CUDA toolkit.

The installation method varies depending on the ECS OS. For details, see [Table 1-24](#).

**Table 1-24** Instructions to install the GPU driver and CUDA toolkit

| OS      | Instruction                                                           |
|---------|-----------------------------------------------------------------------|
| Windows | For details, see <a href="#">Installation Procedure for Windows</a> . |

| OS                                                                                                                         | Instruction                                                                                         |
|----------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"><li>CentOS 7.x</li><li>Red Hat Enterprise Linux (RHEL) 7.x</li><li>EulerOS 2.x</li></ul> | For details, see <a href="#">Installation Procedure for CentOS 7.x, RHEL 7.x, and EulerOS 2.x</a> . |
| <ul style="list-style-type: none"><li>CentOS 6.x</li><li>RHEL 6.x</li></ul>                                                | For details, see <a href="#">Installation Procedure for CentOS 6.x and RHEL 6.x</a> .               |
| OpenSUSE 42.x                                                                                                              | For details, see <a href="#">Installation Procedure for OpenSUSE 42.x</a> .                         |

----End

## Checking Whether the GPU Driver and CUDA Toolkit Have Been Installed

Perform the operations described in this section to check whether GPU driver and CUDA toolkit have been installed on an existing ECS. This method can also be used to check whether the installation of the GPU driver and CUDA toolkit is successful on an ECS with **Automatically install GPU driver** selected during the ECS creation.

- Windows  
Check the `C:\nvidia_install_log.txt` file. If the installation failed, manually install the GPU driver and CUDA toolkit specified in the file.
- Linux  
Check the `/var/log/nvidia_install_log.txt` file. If the installation failed, manually install the GPU driver and CUDA toolkit specified in the file.

## Installation Procedure for Windows

- Download the GPU driver and CUDA toolkit installation packages required by the Windows ECS.

URL: <http://mirrors.myhuaweicloud.com/ecs/windows/exe/>

### NOTE

Visit the preceding URL on the ECS.

In the preceding URL, there are three folders, **win2008r2**, **win2012r2**, and **win2016**. Each folder consists of the **cuda** and **driver** installation packages.

Obtain your desired installation packages according to the OS running on your ECS.

An example is provided as follows:

If your ECS runs Windows Server 2016, perform the following operations to obtain your desired GPU driver and CUDA toolkit:

- Visit <http://mirrors.myhuaweicloud.com/ecs/windows/exe/>.

 NOTE

Visit the preceding URL on the ECS.

The **win2008r2**, **win2012r2**, and **win2016** folders are displayed.

- b. Open folder **win2016**.

The **cuda** and **driver** folders are displayed.

- c. Select your desired GPU driver and CUDA toolkit versions.

CUDA toolkit: **cuda\_9.0.176\_windows.exe**

GPU driver: **385.08-tesla-desktop-winsrvr-international.exe**

2. Install the GPU driver and CUDA toolkit.

Double-click .exe and install them as prompted.

## Installation Procedure for CentOS 7.x, RHEL 7.x, and EulerOS 2.x

The operations described in this section apply to the ECSs running the following OSs:

- CentOS 7.x series
- Red Hat Enterprise Linux 7.x series
- EulerOS 2.x series

For a Linux ECS, it is a good practice to use Repo for installation.

### Step 1 Configure CUDA Repo for the CentOS 7.x, RHEL 7.x, or EulerOS 2.x ECS.

1. (Optional) Run the following command to clear Repo files on the CentOS 7.x or EulerOS 2.x ECS:

```
mv /etc/yum.repos.d/* /tmp/
```

2. Run the following command to create a **nvidia-centos7.repo** file:

```
vi /etc/yum.repos.d/nvidia-centos7.repo
```

3. Add the following content to the file:

```
[ecs-cuda]
name=ecs-cuda-$basearch
baseurl=http://mirrors.myhuaweicloud.com/ecs/linux/rpm/cuda/7/$basearch
enabled=1
gpgcheck=0
[ecs-driver]
name=ecs-driver-$basearch
baseurl=http://mirrors.myhuaweicloud.com/ecs/linux/rpm/driver/7/$basearch
enabled=1
gpgcheck=0
[ecs-package]
name=ecs-package-$basearch
baseurl=http://mirrors.myhuaweicloud.com/ecs/linux/rpm/package/7/$basearch
enabled=1
gpgcheck=0
```

4. Run the following command to install the desired Repo file:  
**yum install http://mirrors.myhuaweicloud.com/epel/epel-release-latest-7.noarch.rpm -y**
5. Run the following command to clear useless Repo files:  
**rm -rf epel-testing.repo**
6. Run the following command to update the epel-7 Repo file:

```
curl -o /etc/yum.repos.d/epel.repo http://mirrors.myhuaweicloud.com/repo/epel-7.repo
```

7. Update the Repo file on the CentOS ECS.
  - For the CentOS 7 system software repository

```
curl -o /etc/yum.repos.d/CentOS-Base.repo http://mirrors.myhuaweicloud.com/repo/CentOS-Base-7.repo
```
  - For the EulerOS system software repository

```
curl -o /etc/yum.repos.d/EulerOS-Base.repo http://mirrors.myhuaweicloud.com/repo/euler/EulerOS_2_2_base.repo
```

```
curl -o /etc/yum.repos.d/EulerOS-Base.repo http://mirrors.myhuaweicloud.com/repo/euler/EulerOS_2_3_base.repo
```
  - RHUI system software repository has been available for RHEL ECSs.

**Step 2** Install CUDA on the CentOS 7.x, RHEL 7.x, or EulerOS 2.x ECS.

1. Run the following command to install the kernel-devel that matches the kernel version:

```
yum install -y kernel-devel-`uname -r`
```
2. (Optional) For a CentOS ECS, run the following command to install DKMS:

```
yum install -y dkms
```
3. Run the following command to obtain the driver version:

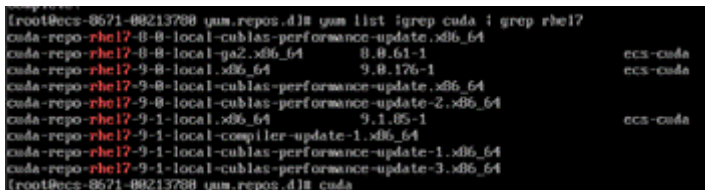
```
yum list | grep nvidia | grep driver | grep rhel7
```
4. Run the following command to install the Repo file required by the driver version:

```
yum install -y nvidia-diag-driver-local-repo-rhel7-*.x86_64
```
5. Run the following command to install the driver:

```
yum install -y cuda-drivers
```
6. Run the following command to obtain the CUDA version:

```
yum list | grep cuda | grep rhel7
```

**Figure 1-80** Obtaining the CUDA version



```
[root@ecs-8671-00213788 yum.repos.d]# yum list | grep cuda | grep rhel7
cuda-repo-rhel7-8-8-local-cublas-performance-update.x86_64
cuda-repo-rhel7-8-8-local-ga2.x86_64 8.8.61-1 ecs-cuda
cuda-repo-rhel7-9-8-local.x86_64 9.8.176-1 ecs-cuda
cuda-repo-rhel7-9-8-local-cublas-performance-update.x86_64
cuda-repo-rhel7-9-8-local-cublas-performance-update-2.x86_64
cuda-repo-rhel7-9-1-local.x86_64 9.1.05-1 ecs-cuda
cuda-repo-rhel7-9-1-local-compiler-update-1.x86_64
cuda-repo-rhel7-9-1-local-cublas-performance-update-1.x86_64
cuda-repo-rhel7-9-1-local-cublas-performance-update-3.x86_64
[root@ecs-8671-00213788 yum.repos.d]#
```

7. Run the following command to install CUDA Repo:

```
yum install -y cuda-repo-rhel*
```

In the preceding command, \* indicates the CUDA version obtained in [Step 2.6](#). All the files in the target version must be installed.
8. Run the following command to install CUDA:

```
yum install -y cuda
```
9. Run the following command to restart the ECS:

```
reboot
```

----End

## Installation Procedure for CentOS 6.x and RHEL 6.x

The operations described in this section apply to the ECSs running the following OSs:

- CentOS 6.x series
- Red Hat Enterprise Linux 6.x series

For a Linux ECS, it is a good practice to use Repo for installation.

### Step 1 Configure CUDA Repo for the CentOS 6.x or RHEL 6.x ECS.

1. (Optional) Run the following command to clear Repo files on the CentOS 6.x ECS:

```
mv /etc/yum.repos.d/* /tmp/
```

2. Run the following command to create a **nvidia-centos6.repo** file:

```
vi /etc/yum.repos.d/nvidia-centos6.repo
```

3. Add the following content to the file:

```
[ecs-cuda]
name=ecs-cuda-$basearch
baseurl=http://mirrors.myhuaweicloud.com/ecs/linux/rpm/cuda/6/$basearch
enabled=1
gpgcheck=0
[ecs-driver]
name=ecs-driver-$basearch
baseurl=http://mirrors.myhuaweicloud.com/ecs/linux/rpm/driver/6/$basearch
enabled=1
gpgcheck=0
[ecs-package]
name=ecs-package-$basearch
baseurl=http://mirrors.myhuaweicloud.com/ecs/linux/rpm/package/6/$basearch
enabled=1
gpgcheck=0
```

4. Run the following command to install the desired Repo file:  
**yum install http://mirrors.myhuaweicloud.com/epel/epel-release-latest-6.noarch.rpm -y**
5. Run the following command to clear useless Repo files:  
**rm -rf epel-testing.repo**
6. Run the following command to update the epel-6 Repo file:  
**curl -o /etc/yum.repos.d/epel.repo http://mirrors.myhuaweicloud.com/repo/epel-6.repo**
7. Update the Repo file on the CentOS ECS.
  - For the CentOS 6 system software repository  
**curl -o /etc/yum.repos.d/CentOS-Base.repo http://mirrors.myhuaweicloud.com/repo/CentOS-Base-6.repo**
  - RHUI system software repository has been available for RHEL ECSs.

### Step 2 Install CUDA on the CentOS 6.x or RHEL 6.x ECS.

1. Run the following command to install the kernel-devel that matches the kernel version:

```
yum install -y kernel-devel-`uname -r`
```

2. Run the following command to obtain the driver version:

```
yum list | grep nvidia | grep driver | grep rhel6
```

3. Run the following command to obtain the Repo file version required by the driver:

**Figure 1-81** Obtaining the Repo file version

```
[root@sluo-ecs-e9bd ~]# yum list | grep nvidia | grep driver | grep rhel6
nvidia-diag-driver-local-repo-rhel6-398.46.x86_64
nvidia-diag-driver-local-repo-rhel6-384.111.x86_64
nvidia-diag-driver-local-repo-rhel6-384.125.x86_64
nvidia-diag-driver-local-repo-rhel6-384.66.x86_64
[root@sluo-ecs-e9bd ~]# yum install nvidia-diag-driver-local-rhel6-398.46.x86_64
```

4. Run the following command to install the desired Repo file version:  
**yum install nvidia-diag-driver-local-repo-rhel6-\*.x86\_64**  
In the preceding command, \* indicates the Repo file version obtained in [Step 2.3](#).
5. Run the following command to install the driver:  
**yum install -y cuda-drivers**
6. Run the following command to obtain the CUDA version:  
**yum list | grep cuda | grep rhel6**

**Figure 1-82** Obtaining the CUDA version

```
[root@sluo-ecs-e9bd ~]# yum list | grep cuda | grep rhel6 | grep cuda
cuda-repo-rhel6-9-8-local.x86_64 9.8.176-1 @ecs-cu
da
cuda-repo-rhel6-9-8-local-cublas-performance-update.x86_64
cuda-repo-rhel6-9-8-local-cublas-performance-update-2.x86_64
cuda-repo-rhel6-8-8-local-cublas-performance-update.x86_64
cuda-repo-rhel6-8-8-local-ga2.x86_64 8.8.61-1 ecs-cud
a
cuda-repo-rhel6-9-1-local.x86_64 9.1.85-1 ecs-cud
a
cuda-repo-rhel6-9-1-local-compiler-update-1.x86_64
cuda-repo-rhel6-9-1-local-cublas-performance-update-1.x86_64
cuda-repo-rhel6-9-1-local-cublas-performance-update-3.x86_64
[root@sluo-ecs-e9bd ~]#
```

7. Run the following command to install CUDA Repo:  
**yum install cuda-repo-rhel\***  
In the preceding command, \* indicates the CUDA version obtained in [Step 2.6](#). All the files in the target version must be installed.
8. Run the following command to install CUDA:  
**yum install -y cuda**
9. Run the following command to restart the ECS:  
**reboot**

----End

## Installation Procedure for Ubuntu 14.04 and Ubuntu 16.04

The operations described in this section apply to the ECSs running the following OSs:

- Ubuntu 14.04
- Ubuntu 16.04

For a Linux ECS, it is a good practice to use Repo for installation.

### Step 1 Configure Repo on the Ubuntu 14.04 or Ubuntu 16.04 ECS.

- Configure Repo on the Ubuntu 14.04 ECS.

```
cp -fp /etc/apt/sources.list /etc/apt/sources.list.back
cat > /etc/apt/sources.list <<EOF
deb http://mirrors.myhuaweicloud.com/ubuntu/ trusty main restricted universe multiverse
deb http://mirrors.myhuaweicloud.com/ubuntu/ trusty-security main restricted universe multiverse
deb http://mirrors.myhuaweicloud.com/ubuntu/ trusty-updates main restricted universe multiverse
deb http://mirrors.myhuaweicloud.com/ubuntu/ trusty-proposed main restricted universe multiverse
deb http://mirrors.myhuaweicloud.com/ubuntu/ trusty-backports main restricted universe multiverse
deb-src http://mirrors.myhuaweicloud.com/ubuntu/ trusty main restricted universe multiverse
deb-src http://mirrors.myhuaweicloud.com/ubuntu/ trusty-security main restricted universe multiverse
deb-src http://mirrors.myhuaweicloud.com/ubuntu/ trusty-updates main restricted universe multiverse
deb-src http://mirrors.myhuaweicloud.com/ubuntu/ trusty-proposed main restricted universe
multiverse
deb-src http://mirrors.myhuaweicloud.com/ubuntu/ trusty-backports main restricted universe
multiverse
deb http://mirrors.myhuaweicloud.com/ecs/linux/apt ecs cuda
deb http://mirrors.myhuaweicloud.com/ecs/linux/apt ecs driver
EOF
apt-get update --fix-missing
wget -O - http://mirrors.myhuaweicloud.com/ecs/linux/apt/huaweicloud.ubuntu.gpg.key | apt-key add
-
apt update
```

- Configure Repo on the Ubuntu 16.04 ECS.

```
cp -fp /etc/apt/sources.list /etc/apt/sources.list.back
cat > /etc/apt/sources.list <<EOF
deb http://mirrors.myhuaweicloud.com/ubuntu/ xenial main restricted universe multiverse
deb http://mirrors.myhuaweicloud.com/ubuntu/ xenial-security main restricted universe multiverse
deb http://mirrors.myhuaweicloud.com/ubuntu/ xenial-updates main restricted universe multiverse
deb http://mirrors.myhuaweicloud.com/ubuntu/ xenial-proposed main restricted universe multiverse
deb http://mirrors.myhuaweicloud.com/ubuntu/ xenial-backports main restricted universe multiverse
deb-src http://mirrors.myhuaweicloud.com/ubuntu/ xenial main restricted universe multiverse
deb-src http://mirrors.myhuaweicloud.com/ubuntu/ xenial-security main restricted universe multiverse
deb-src http://mirrors.myhuaweicloud.com/ubuntu/ xenial-updates main restricted universe multiverse
deb-src http://mirrors.myhuaweicloud.com/ubuntu/ xenial-proposed main restricted universe
multiverse
deb-src http://mirrors.myhuaweicloud.com/ubuntu/ xenial-backports main restricted universe
multiverse
deb http://mirrors.myhuaweicloud.com/ecs/linux/apt ecs cuda
deb http://mirrors.myhuaweicloud.com/ecs/linux/apt ecs driver
EOF
apt-get update --fix-missing
wget -O -
http://mirrors.myhuaweicloud.com/ecs/linux/apt/huaweicloud.ubuntu.gpg.key |
apt-key add -
apt update
```

## Step 2 Install CUDA on the Ubuntu 14.04 or Ubuntu 16.04 ECS.

1. Run the following command to install the kernel-level that matches the kernel version:  
**apt-get install -y --allow-unauthenticated linux-headers-`uname -r`**
2. Run the following command to obtain the driver version:  
**apt-cache search nvidia | grep driver | grep ubuntu**

Figure 1-83 Obtaining the driver version



```
root@ecs-36b4-60213789:/etc/apt# apt-cache search nvidia | grep driver | grep ubuntu
nvidia-diag-driver-local-repo-ubuntu1404-384.111 - nvidia-diag-driver-local repository configuration files
nvidia-diag-driver-local-repo-ubuntu1404-384.66 - nvidia-diag-driver-local repository configuration files
nvidia-diag-driver-local-repo-ubuntu1604-384.111 - nvidia-diag-driver-local repository configuration files
nvidia-diag-driver-local-repo-ubuntu1604-384.125 - nvidia-diag-driver-local repository configuration files
nvidia-diag-driver-local-repo-ubuntu1604-384.66 - nvidia-diag-driver-local repository configuration files
nvidia-diag-driver-local-repo-ubuntu1604-390.46 - nvidia-diag-driver-local repository configuration files
root@ecs-36b4-60213789:/etc/apt# apt-cache search nvidia | grep driver | grep ubuntu
nvidia-diag-driver-local-repo-ubuntu1404-384.111 - nvidia-diag-driver-local repository configuration files
nvidia-diag-driver-local-repo-ubuntu1404-384.66 - nvidia-diag-driver-local repository configuration files
nvidia-diag-driver-local-repo-ubuntu1604-384.111 - nvidia-diag-driver-local repository configuration files
nvidia-diag-driver-local-repo-ubuntu1604-384.125 - nvidia-diag-driver-local repository configuration files
nvidia-diag-driver-local-repo-ubuntu1604-384.66 - nvidia-diag-driver-local repository configuration files
nvidia-diag-driver-local-repo-ubuntu1604-390.46 - nvidia-diag-driver-local repository configuration files
root@ecs-36b4-60213789:/etc/apt#
```

3. Run the following command to install the desired Repo file:  
**apt-get install -y nvidia-diag-driver-local-repo-ubuntu\***



In the preceding command, \* indicates the driver version obtained in [Step 2.2](#). Only one specified version can be installed.

4. Run the following command to install the driver:  
**apt-get update && apt-get install -y --allow-unauthenticated cuda-drivers**
5. Run the following command to check the CUDA version:  
**apt-cache search cuda | grep ubuntu**

Figure 1-84 Checking the CUDA version

```
root@ecs-41c:~# apt-cache search cuda | grep ubuntu
cuda-repo-ubuntu1404-8-0-local-cublas-performance-update - cuda repository configuration files
cuda-repo-ubuntu1404-8-0-local-ga2 - cuda repository configuration files
cuda-repo-ubuntu1604-8-0-local-cublas-performance-update - cuda repository configuration files
cuda-repo-ubuntu1604-8-0-local-ga2 - cuda repository configuration files
cuda-repo-ubuntu1604-9-0-local - cuda repository configuration files
cuda-repo-ubuntu1604-9-0-local-cublas-performance-update - cuda repository configuration files
cuda-repo-ubuntu1604-9-0-local-cublas-performance-update-2 - cuda repository configuration files
cuda-repo-ubuntu1604-9-1-local - cuda repository configuration files
cuda-repo-ubuntu1604-9-1-local-compiler-update-1 - cuda repository configuration files
cuda-repo-ubuntu1604-9-1-local-cublas-performance-update-1 - cuda repository configuration files
cuda-repo-ubuntu1604-9-1-local-cublas-performance-update-3 - cuda repository configuration files
root@ecs-41c:~#
```

6. Run the following command to install the desired CUDA Repo file:  
**apt-get install -y cuda-repo-ubuntu\***  
In the preceding command, \* indicates the driver version obtained in [Step 2.7](#). All the files in the target version must be installed.
  7. Run the following command to install CUDA:  
**pt-get update && apt-get install -y --allow-unauthenticated cuda**
- End

## Installation Procedure for OpenSUSE 42.x

The operations described in this section apply to the ECSs running the following OSs:

- OpenSUSE 42.x series

- Step 1** Run the following command to configure the opensuse\_source4202 system software repository:

```
mv /etc/zypp/repos.d/* /tmp/
sudo zypper ar -fcg
http://mirrors.myhuaweicloud.com/opensuse/distribution/leap/42.2/repo/oss
HWCloud:42.2:OSS
sudo zypper ar -fcg
http://mirrors.myhuaweicloud.com/opensuse/distribution/leap/42.2/repo/non-oss
HWCloud:42.3:NON-OSS
sudo zypper ar -fcg
http://mirrors.myhuaweicloud.com/opensuse/update/leap/42.2/oss
HWCloud:42.2:UPDATE-OSS
sudo zypper ar -fcg
http://mirrors.myhuaweicloud.com/opensuse/update/leap/42.2/non-oss
HWCloud:42.2:UPDATE-NON-OSS
```

- Step 2** Configure CUDA Repo.

1. Run the following command to create an **HWnvidia-cudo.repo** file:  
**vi /etc/zypp/repos.d/HWnvidia-cudo.repo**
2. Add the following content to the file:

```
[HWnvidia-cuda]
enabled=1
autorefresh=1
baseurl=http://mirrors.myhuaweicloud.com/ecs/linux/zypper/opensuse422/cuda
type=rpm-md
gpgcheck=0
```

- Run the following command to create an **HWnvidia-driver.repo** file:
- Add the following content to the file:

```
[HWnvidia-driver]
enabled=1
autorefresh=1
baseurl=http://mirrors.myhuaweicloud.com/ecs/linux/zypper/opensuse422/driver
type=rpm-md
gpgcheck=0
```

### Step 3 Install CUDA.

- Run the following command to install kernel-devel:  
**zypper install -y kernel-default-devel=`uname -r|awk -F' ' '{print \$1}'`**
- Run the following command to obtain the driver version:  
**zypper se nvidia | grep driver | grep opensuse**

Figure 1-85 Obtaining the driver version



```
ecs-abc8-@bun:/etc/zypp/repos.d # zypper se nvidia | grep driver | grep opensuse
nvidia-diag-driver-local-repo-opensuse422-384.145 | nvidia-diag-driver-local repository configuration files | package
nvidia-diag-driver-local-repo-opensuse422-384.66 | nvidia-diag-driver-local repository configuration files | package
ecs-abc8-@bun:/etc/zypp/repos.d #
```

- Run the following command to install the desired driver Repo:  
**zypper install -y nvidia-diag-driver-local-repo-opensuse422-\***
- Run the following command to install the driver:  
**zypper --gpg-auto-import-keys refresh && zypper install -y cuda-drivers**
- Run the following command to check the CUDA version:  
**zypper se cuda | grep opensuse**

Figure 1-86 Checking the CUDA version



```
ecs-9b52-@bun:/etc/zypp/repos.d # zypper se cuda | grep opensuse
cuda-repo-opensuse422-9-0-176-local-patch-4 | cuda repository configuration files | package
cuda-repo-opensuse422-9-0-local | cuda repository configuration files | package
cuda-repo-opensuse422-9-0-local-cublas-performance-update | cuda repository configuration files | package
cuda-repo-opensuse422-9-0-local-cublas-performance-update-2 | cuda repository configuration files | package
cuda-repo-opensuse422-9-0-local-cublas-performance-update-3 | cuda repository configuration files | package
ecs-9b52-@bun:/etc/zypp/repos.d #
```

- Run the following command to install the desired CUDA Repo file:  
**zypper --no-gpg-checks install -y cuda-repo-opensuse\***  
In the preceding command, \* indicates the CUDA version.
- Run the following command to install CUDA:  
**zypper --gpg-auto-import-keys refresh && zypper install -y cuda**

----End

## 1.10.4 Obtaining a Tesla Driver and CUDA Toolkit

### Scenarios

Before using a GPU-accelerated EIP, make sure that the desired Tesla driver and CUDA toolkit have been installed on the EIP. Otherwise, computing acceleration

will not take effect. This section describes how to obtain a Tesla driver and CUDA toolkit. Select a driver version based on your ECS type.

For instructions about how to install the Tesla driver and CUDA toolkit, see [Installing a Tesla Driver and CUDA Toolkit on a GPU-accelerated ECS](#).

## Downloading a Tesla Driver

[Download a driver](#) based on your ECS type.

**Table 1-25** Mapping between Tesla drivers and ECS types

| ECS Type | Driver | Product Series | Product |
|----------|--------|----------------|---------|
| P2v      | Tesla  | V              | V100    |
| PI2      | Tesla  | T              | T4      |
| PI1      | Tesla  | P              | P4      |

## Downloading a CUDA Toolkit

**Table 1-26** Path in which the CUDA toolkit is downloaded for P2v ECSs

| ECS Type   | OS                 | CUDA Version                                                                                                        | How to Obtain                                                                                                                                                                                                                                                                                       | CPU Architecture |
|------------|--------------------|---------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| P2v (V100) | CentOS 7.7 64bit   | 9.2/10.1<br>If the kernel version is 3.10.0-957.5.1.e17.x86_64 or earlier, install the CUDA toolkit of version 9.2. | Version 9.2: <a href="https://developer.nvidia.com/cuda-92-download-archive">https://developer.nvidia.com/cuda-92-download-archive</a><br><br>Version 10.1: <a href="https://developer.nvidia.com/cuda-10.1-download-archive-base">https://developer.nvidia.com/cuda-10.1-download-archive-base</a> | x86_64           |
| P2v (V100) | EulerOS 2.5 64bit  | 9.2                                                                                                                 |                                                                                                                                                                                                                                                                                                     | x86_64           |
| P2v (V100) | Ubuntu 16.04 64bit | 9.2/10.1<br>If the kernel version is 4.4.0-141-generic or earlier, install the CUDA toolkit of version 9.2.         |                                                                                                                                                                                                                                                                                                     | x86_64           |

| ECS Type   | OS                                    | CUDA Version | How to Obtain | CPU Architecture |
|------------|---------------------------------------|--------------|---------------|------------------|
| P2v (V100) | Windows Server 2019 Standard 64bit    | 9.2/10.1     |               | x86_64           |
| P2v (V100) | Windows Server 2016 Standard 64bit    | 9.2/10.1     |               | x86_64           |
| P2v (V100) | Windows Server 2012 R2 Standard 64bit | 9.2/10.1     |               | x86_64           |

**Table 1-27** Path in which the CUDA toolkit is downloaded for P12 ECSs

| ECS Type | OS                                 | CUDA Version | How to Obtain                                                                                                                                          | CPU Architecture |
|----------|------------------------------------|--------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| P12 (T4) | CentOS 7.5 64bit                   | 10.1         | <a href="https://developer.nvidia.com/cuda-10.1-download-archive-base">https://<br/>developer.nvidia.com/<br/>cuda-10.1-download-<br/>archive-base</a> | x86_64           |
| P12 (T4) | Ubuntu 16.04 64bit                 | 10.1         |                                                                                                                                                        | x86_64           |
| P12 (T4) | Windows Server 2016 Standard 64bit | 10.1         |                                                                                                                                                        | x86_64           |

**Table 1-28** Path in which the CUDA toolkit is downloaded for P11 ECSs

| ECS Type | OS                 | CUDA Version | How to Obtain                                                                                                                            | CPU Architecture |
|----------|--------------------|--------------|------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| P11 (P4) | CentOS 7.3 64bit   | 9            | <a href="https://developer.nvidia.com/cuda-90-download-archive">https://<br/>developer.nvidia.com/<br/>cuda-90-download-<br/>archive</a> | x86_64           |
| P11 (P4) | Ubuntu 16.04 64bit | 9            |                                                                                                                                          | x86_64           |

## 1.10.5 Installing a Tesla Driver and CUDA Toolkit on a GPU-accelerated ECS

### Scenarios

Before using a GPU-accelerated ECS, make sure that the desired Tesla driver and CUDA toolkit have been installed on the ECS for computing acceleration.

- A computing-accelerated (P series) ECS created using a public image has had a Tesla driver of a specified version installed by default.
- After a GPU-accelerated ECS is created using a private image, it must have a Tesla driver installed. Otherwise, computing acceleration will not take effect.

This section describes how to install a Tesla driver and CUDA toolkit on a GPU-accelerated ECS.

### Notes

- The target ECS has had an EIP bound.
- The Tesla driver and CUDA toolkit have not been installed on the ECS.

#### NOTE

- Download the CUDA toolkit from the official NVIDIA website and install it. A Tesla driver matching the CUDA version will be automatically installed then.
- If the target ECS is to be used for production, download the desired Tesla driver from the official NVIDIA website and install it. Then, install the CUDA toolkit.
- If a Tesla driver has been installed on the ECS, check the driver version. Before installing a new driver version, uninstall the original Tesla driver to prevent an installation failure due to driver conflicts.

Installation process:

- [Obtaining a Tesla Driver and CUDA Toolkit](#)
- Installing a Tesla Driver
  - [Installing a Tesla Driver on a Linux ECS](#)
  - [Installing a Tesla Driver on a Windows ECS](#)
- Installing a CUDA Toolkit
  - [Installing the CUDA Toolkit on a Linux ECS](#)
  - [Installing the CUDA Toolkit on a Windows ECS](#)

### Installing a Tesla Driver on a Linux ECS

The following uses Ubuntu 16.04 64bit as an example to describe how to install the Tesla driver matching CUDA 10.1 on a GPU-accelerated ECS.

**NOTE**

The Linux kernel version is compatible with the driver version. If installing the driver failed, check the driver installation log, which is generally stored in `/var/log/nvidia-installer.log`. If the log shows that the failure was caused by a driver compilation error, for example, the `get_user_pages` parameter setting is incorrect, the kernel version is incompatible with the driver version. In such a case, select the desired kernel version and driver version and reinstall them. It is recommended that the release time of the kernel version and driver version be the same.

1. Log in to the ECS.
2. Update the system software based on the OS.
  - Ubuntu  
Update the software installation source: **`apt-get -y update`**  
Install necessary programs: **`apt-get install gcc g++ make`**
  - CentOS  
Update the software installation source: **`yum -y update --exclude=kernel* --exclude=centos-release* --exclude=initscripts*`**  
Install the desired program: **`yum install -y kernel-devel `uname -r` gcc gcc-c++`**
3. Download the NVIDIA driver package.  
Select a driver version at [NVIDIA Driver Downloads](#) based on the ECS type.  
Click **SEARCH**.

**Figure 1-87** Selecting a NVIDIA driver version

### NVIDIA Driver Downloads

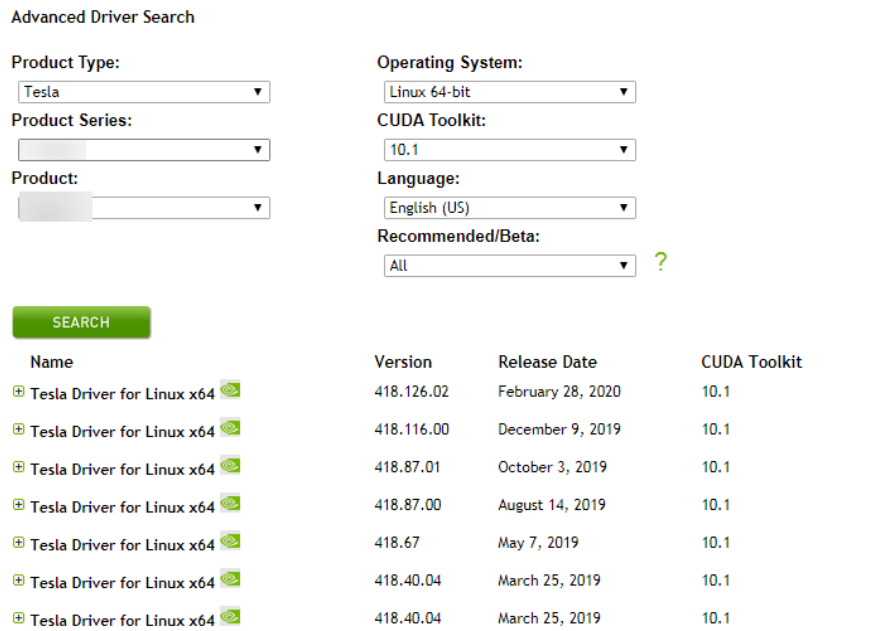
#### Advanced Driver Search

|                                    |                                           |
|------------------------------------|-------------------------------------------|
| Product Type:                      | Operating System:                         |
| <input type="text" value="Tesla"/> | <input type="text" value="Linux 64-bit"/> |
| Product Series:                    | CUDA Toolkit:                             |
| <input type="text"/>               | <input type="text" value="10.1"/>         |
| Product:                           | Language:                                 |
| <input type="text"/>               | <input type="text" value="English (US)"/> |
|                                    | Recommended/Beta:                         |
|                                    | <input type="text" value="All"/> ?        |

4. Select a driver version as required. The following uses Tesla 418.67 as an example.

**Figure 1-88** Selecting a driver version

### NVIDIA Driver Downloads



5. Click the driver to be downloaded. On the **TESLA DRIVER FOR LINUX X64** page that is displayed, click **DOWNLOAD**.
6. Copy the download link.

**Figure 1-89** Copying the download link

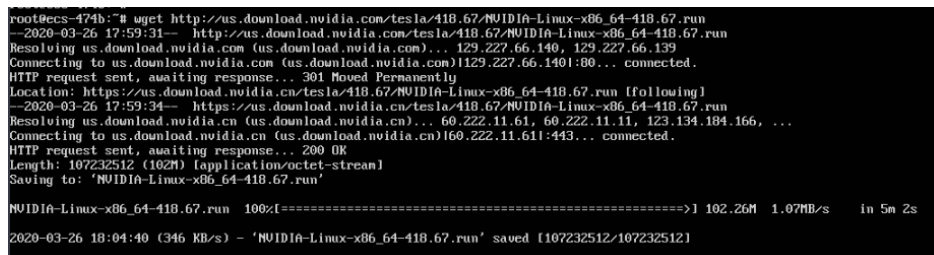
### Download

By clicking the "Agree & Download" button below, you are confirming that you have read and agree to be bound by the [License For Customer Use of NVIDIA Software](#) for use of the driver. The driver will begin downloading immediately after clicking on the "Agree & Download" button below. NVIDIA recommends users update to the latest driver version. Please review [NVIDIA Product Security](#) for more information.



7. Run the following command on the ECS to download the driver:  
**wget Copied link**  
For example, **wget http://us.download.nvidia.com/tesla/418.67/NVIDIA-Linux-x86\_64-418.67.run**

**Figure 1-90** Obtaining the installation package

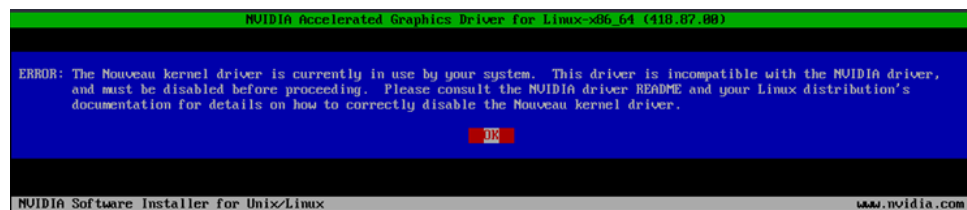


8. Run the following command to install the driver:

```
sh NVIDIA-Linux-x86_64-418.67.run
```

9. (Optional) If the following information is displayed after the command for installing the driver is executed, disable the Nouveau driver.

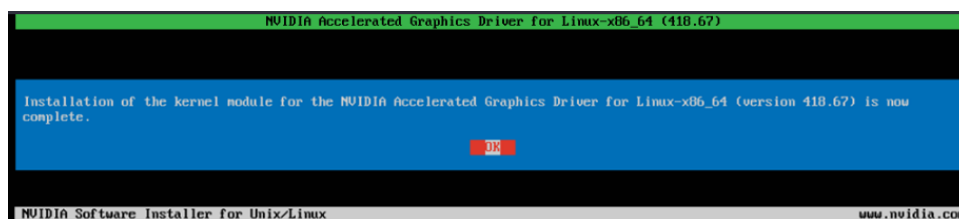
**Figure 1-91** Disabling the Nouveau driver



- a. Run the following command to check whether the Nouveau driver has been installed:  
**lsmod | grep nouveau**
    - If the command output contains information about the Nouveau driver, the Nouveau driver has been installed and must be disabled. Then, go to step [9.b](#).
    - If the command output does not contain information about the Nouveau driver, the Nouveau driver has been disabled. Then, go to step [9.4](#).
  - b. Edit the **blacklist.conf** file.  
If the **/etc/modprobe.d/blacklist.conf** file is unavailable, create it.  
**vi /etc/modprobe.d/blacklist.conf**  
Add the following statement to the end of the file:

```
blacklist nouveau
options nouveau modeset=0
```
  - c. Run the following command to back up and create an initramfs application:
    - Ubuntu  
**sudo update-initramfs -u**
    - CentOS:  
**mv /boot/initramfs-\$(uname -r).img /boot/initramfs-\$(uname -r).img.bak**  
**dracut -v /boot/initramfs-\$(uname -r).img \$(uname -r)**
  - d. Restart the ECS:  
**reboot**
10. Select **OK** for three consecutive times as prompted to complete the driver installation.



**Figure 1-92** Completing the NVIDIA driver installation

11. Run the following command to set systemd:  
**systemctl set-default multi-user.target**
12. Run the **reboot** command to restart the ECS.
13. Log in to the ECS and run the **nvidia-smi** command. If the command output contains the installed driver version, the driver has been installed.

**Figure 1-93** Viewing the NVIDIA driver version

```
root@ecs-474b:~# nvidia-smi
Thu Mar 26 20:05:17 2020

+-----+
| NVIDIA-SMI 418.67 Driver Version: 418.67 CUDA Version: 10.1 |
+-----+
| GPU Name Persistence-M| Bus-Id Disp.A | Volatile Uncorr. ECC |
| Fan Temp Perf Pur:Usage/Cap| Memory-Usage | GPU-Util Compute M. |
+-----+-----+
| 0 Tesla Off | 00000000:21:01.0 Off | 0 |
| N/A 52C P0 29W / 70W | 0MiB / 15079MiB | 0% Default |
+-----+-----+

+-----+
| Processes: GPU Memory |
| GPU PID Type Process name Usage |
+-----+-----+
| No running processes found |
+-----+

root@ecs-474b:~#
```

## Installing a Tesla Driver on a Windows ECS

The following uses Windows Server 2016 Standard 64bit as an example to describe how to install a Tesla driver on a GPU-accelerated ECS.

1. Log in to the ECS.
2. Download the NVIDIA driver package.  
Select a driver version at [NVIDIA Driver Downloads](#) based on the ECS type.

**Figure 1-94** Selecting a driver type (Windows)

Advanced Driver Search

|                                                     |                                                                       |
|-----------------------------------------------------|-----------------------------------------------------------------------|
| Product Type:<br><input type="text" value="Tesla"/> | Operating System:<br><input type="text" value="Windows Server 2016"/> |
| Product Series:<br><input type="text"/>             | CUDA Toolkit:<br><input type="text" value="10.1"/>                    |
| Product:<br><input type="text"/>                    | Language:<br><input type="text" value="English (US)"/>                |
|                                                     | Recommended/Beta:<br><input type="text" value="All"/> ?               |

3. Select a driver version as required. The following uses Tesla 425.25 as an example.

**Figure 1-95** Selecting a driver version (Windows)

Advanced Driver Search

Product Type:

Operating System:

Product Series:

CUDA Toolkit:

Product:

Language:

Recommended/Beta:  ?

| Name                                                   | Version | Release Date      | CUDA Toolkit |
|--------------------------------------------------------|---------|-------------------|--------------|
| <input type="checkbox"/> Tesla Driver for Windows WHQL | 426.50  | February 28, 2020 | 10.1         |
| <input type="checkbox"/> Tesla Driver for Windows WHQL | 426.32  | December 9, 2019  | 10.1         |
| <input type="checkbox"/> Tesla Driver for Windows WHQL | 426.23  | October 3, 2019   | 10.1         |
| <input type="checkbox"/> Tesla Driver for Windows WHQL | 426.00  | August 14, 2019   | 10.1         |
| <input type="checkbox"/> Tesla Driver for Windows WHQL | 425.25  | May 7, 2019       | 10.1         |
| <input type="checkbox"/> Tesla Driver for Windows WHQL | 419.69  | March 25, 2019    | 10.1         |

4. Click the driver to be downloaded. On the **TESLA DRIVER FOR WINDOWS** page that is displayed, click **DOWNLOAD**.
5. Click **Agree & Download** to download the installation package.

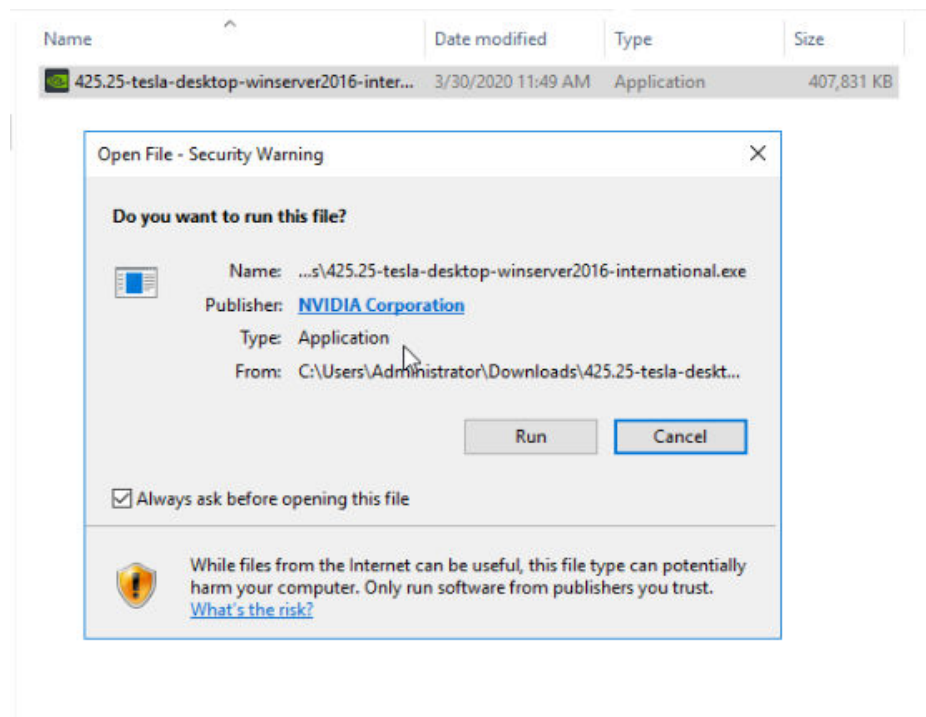
**Figure 1-96** Downloading the driver installation package

### Download

By clicking the "Agree & Download" button below, you are confirming that you have read and agree to be bound by the [License For Customer Use of NVIDIA Software](#) for use of the driver. The driver will begin downloading immediately after clicking on the "Agree & Download" button below. NVIDIA recommends users update to the latest driver version. Please review [NVIDIA Product Security](#) for more information.

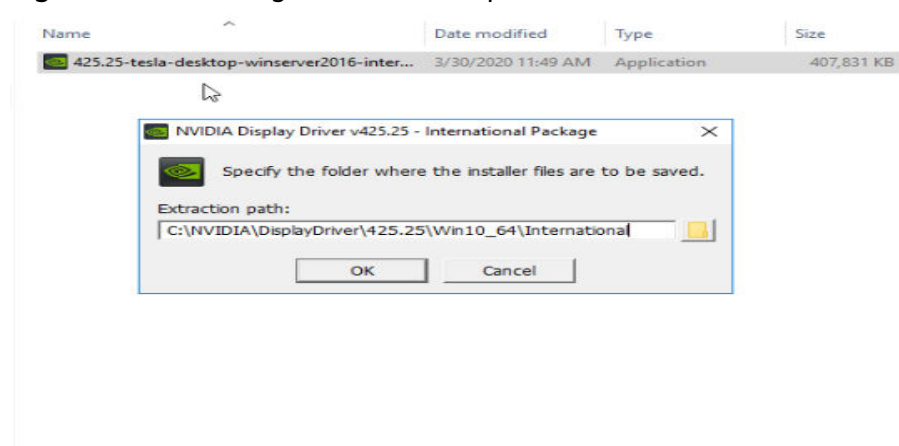
6. Double-click the driver and click **Run**.

**Figure 1-97** Running the NVIDIA driver installation program



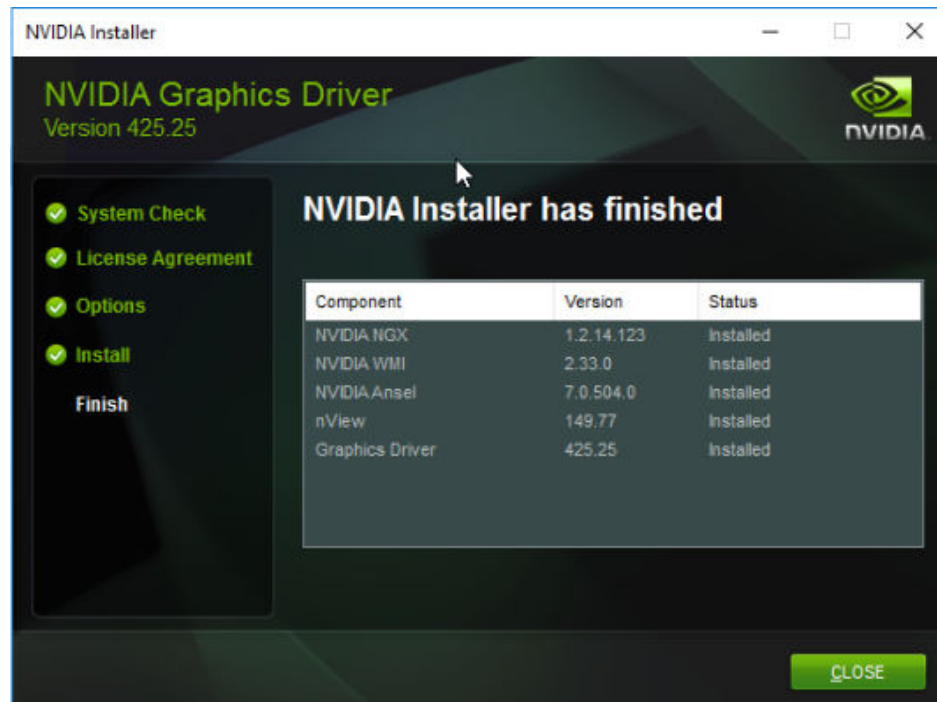
7. Select an installation path and click **OK**.

**Figure 1-98** Selecting an installation path



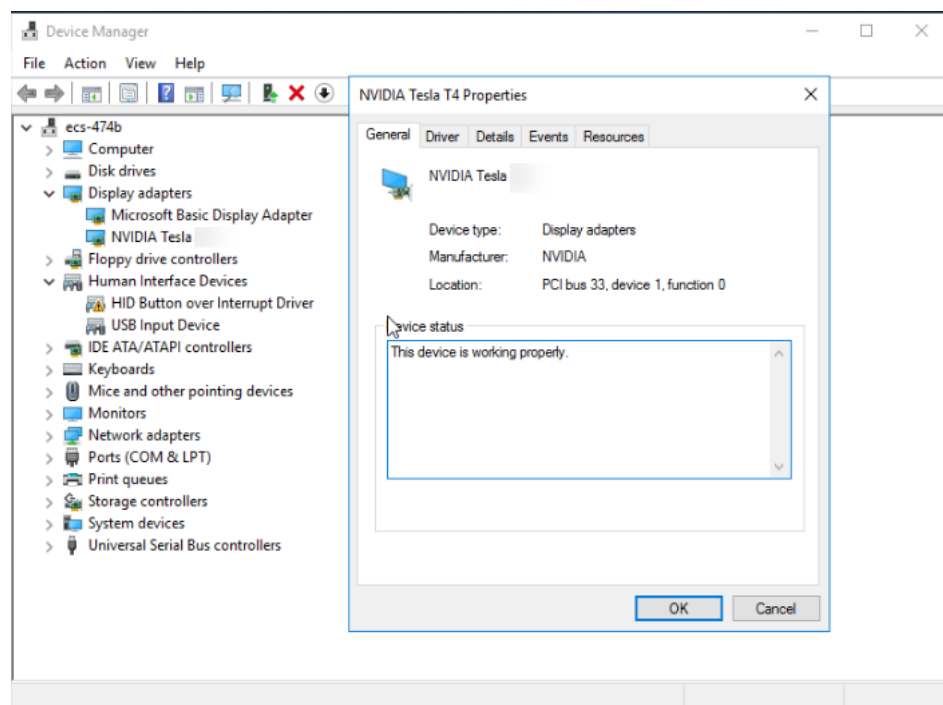
8. Install the NVIDIA program as prompted.

Figure 1-99 Completing the driver installation



9. Restart the ECS.
10. Check whether the NVIDIA driver has been installed.
  - a. Switch to **Device Manager** and click **Display adapters**.

Figure 1-100 Display adapters



- b. Open the **cmd** window on the ECS and run the following commands:  
**cd C:\Program Files\NVIDIA Corporation\NVSMI**

### nvidia-smi

If the command output contains the installed driver version, the driver has been installed.

**Figure 1-101** Viewing the NVIDIA driver version

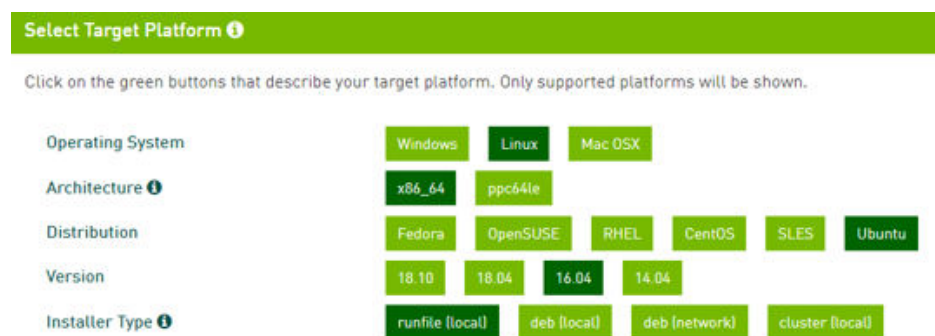
```
C:\Program Files\NVIDIA Corporation\NVSMI>nvidia-smi
2020
+-----+
| NVIDIA-SMI 425.25 Driver Version: 425.25 CUDA Version: 10.1 |
+-----+-----+-----+-----+-----+-----+
| GPU Name TCC/WDDM | Bus-Id Disp.A | Volatile Uncorr. ECC |
| Fan Temp Perf Pwr:Usage/Cap | Memory-Usage | GPU-Util Compute M. |
+-----+-----+-----+-----+-----+-----+
| 0 Tesla TCC | 00000000:21:01.0 Off | 0% 0 |
| N/A 33C P8 11W / 70W | 0MiB / 15205MiB | 0% Default |
+-----+-----+-----+-----+-----+-----+
+-----+-----+-----+-----+-----+
| Processes: GPU Memory |
| GPU PID Type Process name Usage |
+-----+-----+-----+-----+-----+
| No running processes found. |
+-----+-----+-----+-----+-----+
C:\Program Files\NVIDIA Corporation\NVSMI>
```

## Installing the CUDA Toolkit on a Linux ECS

The following uses Ubuntu 16.04 64bit as an example to describe how to install the CUDA 10.1 toolkit on a GPU-accelerated ECS.

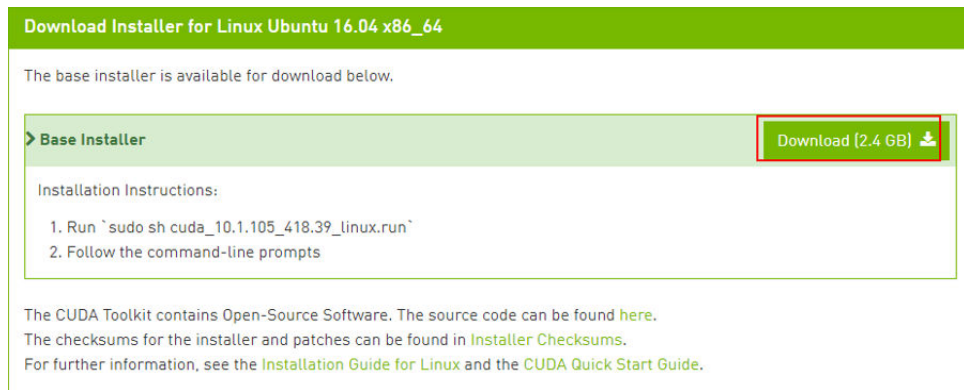
1. Log in to the ECS.
2. On the CUDA download page, set parameters according to the information shown in [Obtaining a Tesla Driver and CUDA Toolkit](#).

**Figure 1-102** Selecting a CUDA version



3. Find the link for downloading CUDA 10.1 and copy the link.

Figure 1-103 Copying the link for downloading CUDA

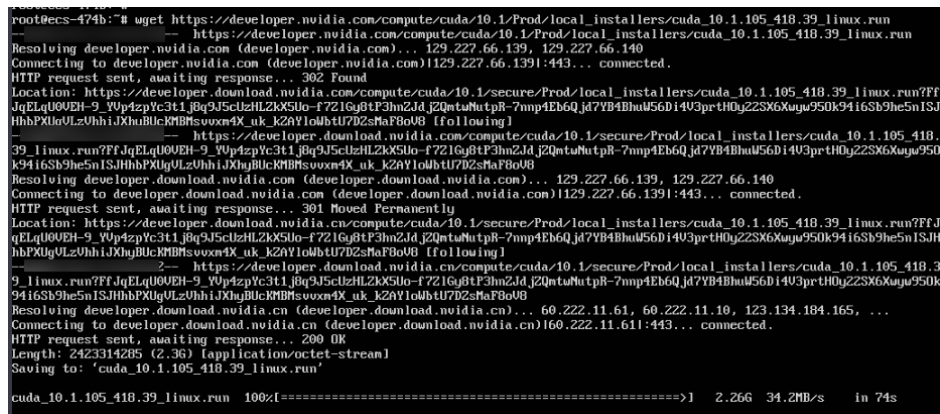


- 4. Run the following command on the ECS to download CUDA:

**wget Copied link**

For example, **wget https://developer.nvidia.com/compute/cuda/10.1/Prod/local\_installers/cuda\_10.1.105\_418.39\_linux.run**

Figure 1-104 Downloading CUDA



- 5. Install CUDA.  
Follow the instructions provided on the official NVIDIA website.

Figure 1-105 Installing CUDA



- 6. Run the following command to install CUDA:  
**sh cuda\_10.1.243\_418.87.00\_linux.run**
- 7. Select **accept** on the installation page and press **Enter**.

Figure 1-106 Installing CUDA\_1

```
End User License Agreement

Preface

The Software License Agreement in Chapter 1 and the Supplement
in Chapter 2 contain license terms and conditions that govern
the use of NVIDIA software. By accepting this agreement, you
agree to comply with all the terms and conditions applicable
to the product(s) included herein.

NVIDIA Driver

Description

This package contains the operating system driver and

Do you accept the above EULA? (accept/decline/quit):
accept
```

8. Select **Install** and press **Enter** to start the installation.

Figure 1-107 Installing CUDA\_2

```
CUDA Installer
- [X] Driver
 [X] 418.39
+ [X] CUDA Toolkit 10.1
 [X] CUDA Samples 10.1
 [X] CUDA Demo Suite 10.1
 [X] CUDA Documentation 10.1
 Install
 Options

Up/Down: Move | Left/Right: Expand | 'Enter': Select | 'A': Advanced options
```

Figure 1-108 Completing the installation

```
=====
= Summary =
=====
Driver: Installed
Toolkit: Installed in /usr/local/cuda-10.1/
Samples: Installed in /root/, but missing recommended libraries

Please make sure that
- PATH includes /usr/local/cuda-10.1/bin
- LD_LIBRARY_PATH includes /usr/local/cuda-10.1/lib64, or, add /usr/local/cuda-10.1/lib64 to /etc/ld.so.conf and run ldconfig
as root

To uninstall the CUDA Toolkit, run cuda-uninstaller in /usr/local/cuda-10.1/bin
To uninstall the NVIDIA Driver, run nvidia-uninstall

Please see CUDA_Installation_Guide_Linux.pdf in /usr/local/cuda-10.1/doc/pdf for detailed information on setting up CUDA.
Logfile is /var/log/cuda-installer.log
root@ecs-474b:~# _
```

9. Run the following command to switch to `/usr/local/cuda-10.1/samples/1_Utillities/deviceQuery`:

**cd /usr/local/cuda-10.1/samples/1\_Uutilities/deviceQuery**

10. Run the **make** command to automatically compile the deviceQuery program.
11. Run the following command to check whether CUDA has been installed:

```
./deviceQuery
```

If the command output contains the CUDA version, CUDA has been installed.

**Figure 1-109** deviceQuery common output

```
root@ecs-474b:/usr/local/cuda-10.1/samples/1_Uutilities/deviceQuery# ./deviceQuery
./deviceQuery Starting...

CUDA Device Query (Runtime API) version (CUDA RT static linking)
Detected 1 CUDA Capable device(s)
Device 0: "Tesla "
 CUDA Driver Version / Runtime Version 10.1 / 10.1
 CUDA Capability Major/Minor version number: 7.5
 Total amount of global memory: 15080 MBytes (15812263936 bytes)
 (40) Multiprocessors, (64) CUDA Cores/MP: 2560 CUDA Cores
 GPU Max Clock rate: 1590 MHz (1.59 GHz)
 Memory Clock rate: 5001 Mhz
 Memory Bus Width: 256-bit
 L2 Cache Size: 4194304 bytes
 Maximum Texture Dimension Size (x,y,z) 1D=(131072), 2D=(131072, 65536), 3D=(16384, 16384, 16384)
 Maximum Layered 1D Texture Size, (num) layers 1D=(32768), 2048 layers
 Maximum Layered 2D Texture Size, (num) layers 2D=(32768, 32768), 2048 layers
 Total amount of constant memory: 65536 bytes
 Total amount of shared memory per block: 49152 bytes
 Total number of registers available per block: 65536
 Warp size: 32
 Maximum number of threads per multiprocessor: 1024
 Maximum number of threads per block: 1024
 Max dimension size of a thread block (x,y,z): (1024, 1024, 64)
 Max dimension size of a grid size (x,y,z): (2147483647, 65535, 65535)
 Maximum memory pitch: 2147483647 bytes
 Texture alignment: 512 bytes
 Concurrent copy and kernel execution: Yes with 3 copy engine(s)
 Run time limit on kernels: No
 Integrated GPU sharing Host Memory: No
 Support host page-locked memory mapping: Yes
 Alignment requirement for Surfaces: Yes
 Device has ECC support: Enabled
 Device supports Unified Addressing (UVA): Yes
 Device supports Compute Preemption: Yes
 Supports Cooperative Kernel Launch: Yes
 Supports MultiDevice Co-op Kernel Launch: Yes
 Device PCI Domain ID / Bus ID / location ID: 0 / 33 / 1
 Compute Mode:
 < Default (multiple host threads can use ::cudaSetDevice() with device simultaneously) >
deviceQuery, CUDA Driver = CUDART, CUDA Driver Version = 10.1, CUDA Runtime Version = 10.1, NumDevs = 1
Result = PASS
root@ecs-474b:/usr/local/cuda-10.1/samples/1_Uutilities/deviceQuery#
```

12. Check the CUDA version.

```
/usr/local/cuda/bin/nvcc -V
```

**Figure 1-110** Checking the CUDA version

```
root@ecs-474b:/usr/local/cuda/bin# ./deviceQuery
[root@ecs-474b deviceQuery]# /usr/local/cuda/bin/nvcc -V
nvcc: NVIDIA (R) Cuda compiler driver
Copyright (c) 2005-2019 NVIDIA Corporation
Built on Fri_Feb__8_19:08:17_PST_2019
Cuda compilation tools, release 10.1, V10.1.105
[root@ecs-474b deviceQuery]#
```

13. Run the following command to enable the persistent mode:

```
sudo nvidia-smi -pm 1
```

Enabling the persistent mode optimizes the GPU performance on Linux ECSs.

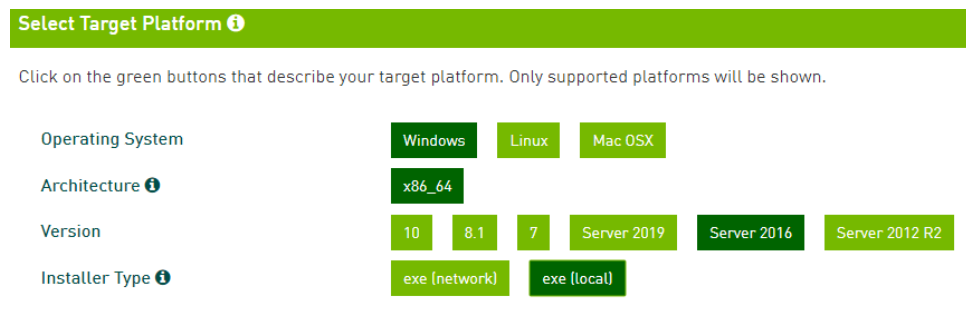
## Installing the CUDA Toolkit on a Windows ECS

The following uses Windows Server 2016 Standard 64bit as an example to describe how to install the CUDA 10.1 toolkit on a GPU-accelerated ECS.



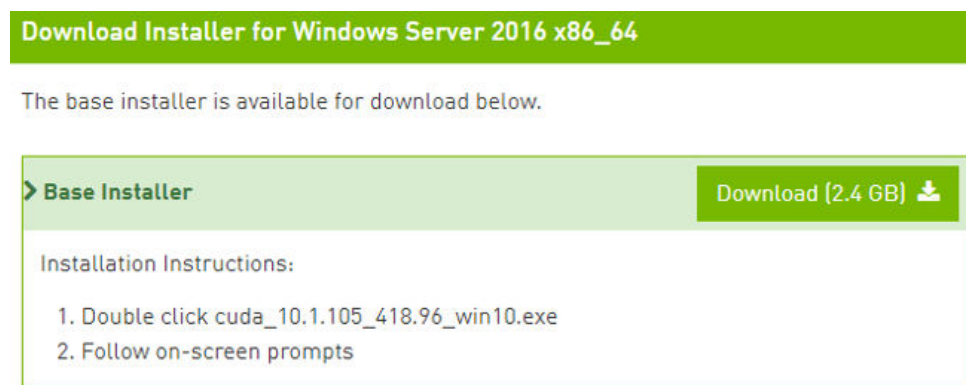
1. Log in to the ECS.
2. On the CUDA download page, set parameters according to the information shown in [Downloading a CUDA Toolkit](#).

**Figure 1-111** Selecting a CUDA version



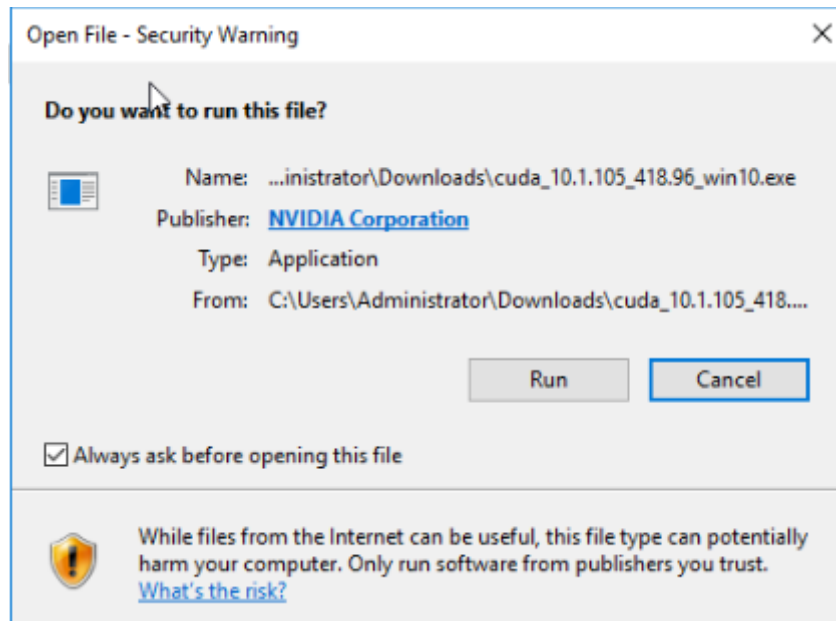
3. Find the link for downloading CUDA 10.1.

**Figure 1-112** Finding the link for downloading CUDA



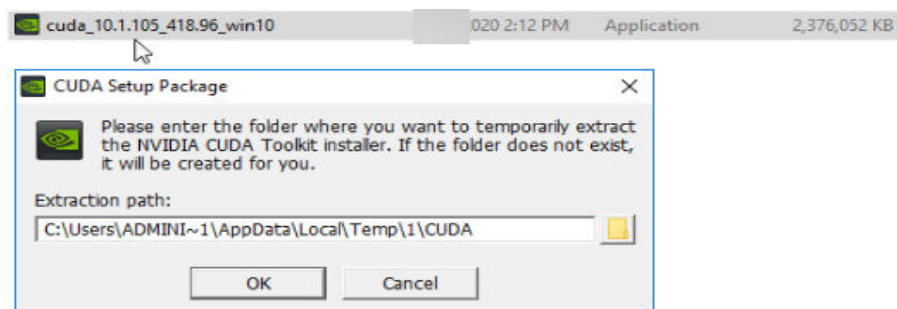
4. Click **Download** to download the CUDA toolkit.
5. Double-click the installation file and click **Run** to install the CUDA toolkit.

**Figure 1-113** Installing CUDA



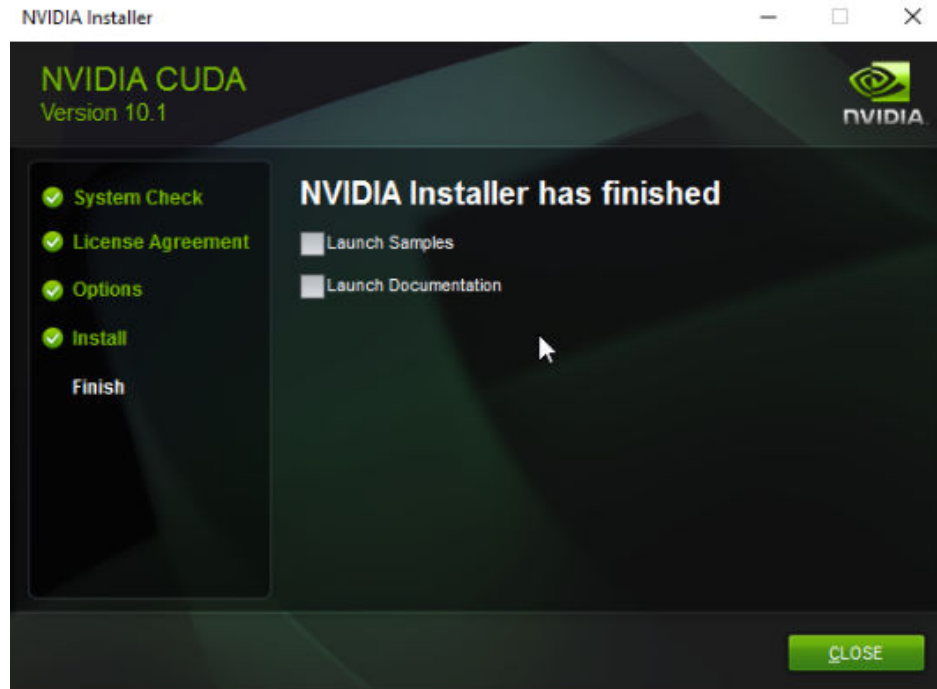
6. On the **CUDA Setup Package** page, select an installation path and click **OK**.

**Figure 1-114** Selecting an installation path



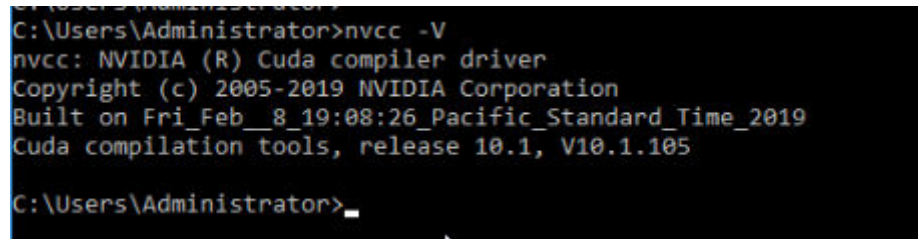
7. Install the CUDA toolkit as prompted.

Figure 1-115 Completing the installation



8. Check whether CUDA has been installed  
Open the **cmd** window and run the following command:  
**nvcc -V**  
If the command output contains the CUDA version, CUDA has been installed.

Figure 1-116 Successful installation



# 2 Images

---

## 2.1 Overview

### Image

An image is an ECS or BMS template that contains an OS or service data and may also contain proprietary software and application software, such as database software. Images can be public, private, or shared.

**Image Management Service (IMS)** allows you to easily create and manage images. You can create an ECS using a public image, private image, or shared image. You can also use an existing ECS or external image file to create a private image.

### Public Image

A standard, widely used image. A public image contains an OS, such as Windows, Ubuntu, CentOS, or Debian, and preinstalled public applications. This image will be available to all users. Select your desired public image. Alternatively, create a private image based on a public image to copy an existing ECS or rapidly create ECSs in a batch. You can customize a public image by configuring the application environment and software.

For more information about public images, see [Overview](#).

### Private Image

A private image contains an OS or service data, preinstalled public applications, and private applications. It is available only to the user who created it.

**Table 2-1** Private image types

| Image Type        | Description                                                                                                                                          |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| System disk image | Contains an OS and application software for running services. You can use a system disk image to create ECSs and migrate your services to the cloud. |
| Data disk image   | Contains only service data. You can use a data disk image to create EVS disks and migrate your service data to the cloud.                            |
| Full-ECS image    | Contains an OS, application software, and data for running services. A full-ECS image contains the system disk and all data disks attached to it.    |

If you plan to use a private image to change the OS, ensure that the private image is available. For instructions about how to create a private image, see [Image Management Service User Guide](#).

- If the image of a specified ECS is required, make sure that a private image has been created using this ECS.
- If a local image file is required, make sure that the image file has been imported to the cloud platform and registered as a private image.
- If a private image from another region is required, make sure that the image has been copied.
- If a private image from another user account is required, make sure that the image has been shared with you.

## Shared Image

A shared image is a private image shared by another user and can be used as your own private image. For more details, see [Sharing Images](#),

- Only the private images that have not been published in Marketplace can be shared.
- Images can be shared within a region only.
- Each image can be shared to a maximum of 128 tenants.
- You can stop sharing images anytime without notifying the recipient.
- You can delete shared image anytime without notifying the recipient.
- Encrypted images cannot be shared.
- Only the full-ECS images created using CBR can be shared.

## Marketplace Image

A third-party image that has the OS, application environment, and software preinstalled. You can use the images to deploy websites and application development environments with a few clicks. No additional configuration is required.

A Marketplace image can be free of charge or paid, based on image service providers. When you use a paid image to create an ECS, you need to pay for the Marketplace image and ECS.

## Helpful Links

- [Creating a Private Image](#)
- [Image Source Management](#)

## 2.2 Creating an Image


### Scenarios

You can use an existing ECS to create a system disk image, data disk image, and full-ECS image.

- **System disk image:** contains an OS and application software for running services. You can use a system disk image to create ECSs and migrate your services to the cloud.
- **Data disk image:** contains only service data. You can create a data disk image from an ECS data disk. You can also use a data disk image to create EVS disks and migrate your service data to the cloud.
- **Full-ECS image:** contains all the data of an ECS, including the data on the data disks attached to the ECS. A full-ECS image can be used to rapidly create ECSs with service data.

You can use a private image to change the OS. For instructions about how to create a private image, see [Image Management Service User Guide](#).

### Procedure

1. Log in to the management console.
2. Click  in the upper left corner and select your region and project.
3. Under **Computing**, click **Elastic Cloud Server**.
4. Locate the row containing the target ECS. Click **More** in the **Operation** column and select **Manage Image/Disk > Create Image**.
5. Configure image information as prompted.
  - **Source:** ECS
  - **ECS:** Retain default settings.
  - **Name:** Customize your image name.
  - **Enterprise Project:** Select an enterprise project from the drop-down list.
6. Click **Next**.

# 3 EVS Disks

---

## 3.1 Overview

### What Is Elastic Volume Service?

Elastic Volume Service (EVS) offers scalable block storage for ECSs. With high reliability, high performance, and rich specifications, EVS disks can be used for distributed file systems, development and test environments, data warehouse applications, and high-performance computing (HPC) scenarios to meet diverse service requirements.

### Disk Types

EVS disk types differ in performance. Choose the disk type based on your requirements.

For more information about EVS disk specifications and performance, see [Elastic Volume Service User Guide](#).

### Helpful Links

- [Attaching an EVS Disk to an ECS](#)
- [Introduction to Data Disk Initialization Scenarios and Partition Styles](#)
- [What Cannot I Find My Newly Purchased Data Disk After I Log In to My Windows ECS?](#)
- [How Can I Adjust System Disk Partitions?](#)
- [Can Multiple Disks Be Attached to an ECS?](#)
- [What Are the Restrictions on Attaching an EVS Disk to an ECS?](#)

## 3.2 Adding a Disk to an ECS


### Scenarios

The disks attached to an ECS include one system disk and one or more data disks. The system disk of an ECS is automatically created and attached when the ECS is created. You do not need to purchase it again.

You can add a data disk when purchasing an ECS, or add data disks after purchasing an ECS. The data disks will be automatically attached to the ECS.

This section describes how to add a data disk.

### Procedure

1. Log in to the management console.
2. Click  in the upper left corner and select your region and project.
3. Under **Computing**, click **Elastic Cloud Server**.
4. Locate the row containing the target ECS. Click **More** in the **Operation** column and select **Manage Image/Disk > Add Disk**.

The page for adding a disk is displayed.

5. Set parameters for the new EVS disk as prompted.

For instructions about how to set EVS disk parameters, see [Purchase an EVS Disk](#).

#### NOTE

- By default, the billing mode of the new disk is the same as that of the ECS.
  - By default, the new disk is in the same region as the ECS.
  - By default, the new disk is in the same AZ as the ECS, and the AZ of the disk cannot be changed.
  - After the new disk is created, it is attached to the ECS by default.
  - The expiration time of a new disk billed on a yearly/monthly basis is the same as that of the ECS.
6. Click **Next** to confirm the order and complete the payment.

The system automatically switches back to the **Disks** tab on the ECS management console. Then, you can view the information of the new disk.

### Follow-up Procedure

The system automatically attaches the new disk to the ECS, but the disk can be used only after it is initialized. To do so, log in to the ECS and initialize the disk.

For instructions about how to initialize a data disk, see [Introduction to Data Disk Initialization Scenarios and Partition Styles](#).



## 3.3 Attaching an EVS Disk to an ECS


### Scenarios

If the existing disks of an ECS fail to meet service requirements, for example, due to insufficient disk space or poor disk performance, you can attach more available EVS disks to the ECS, or purchase more disks (**Storage > Elastic Volume Service**) and attach them to the ECS.

### Prerequisites

- EVS disks are available.  
For instructions about how to purchase an EVS disk, see [Purchasing an EVS Disk](#).

### Procedure

1. Log in to the management console.
2. Click  in the upper left corner and select your region and project.
3. Under **Computing**, click **Elastic Cloud Server**.
4. In the search box above the upper right corner of the ECS list, enter the ECS name, IP address, or ID for search.
5. Click the name of the target ECS.  
The page providing details about the ECS is displayed.
6. Click the **Disks** tab. Then, click **Attach Disk**.  
The **Attach Disk** dialog box is displayed.
7. Select the target disk and set the device name as prompted.  
Device names are as follows:
  - For Xen ECSs, you can specify the device name of a disk, such as **/dev/sdb**.
  - For KVM ECSs, you can specify a disk as a system disk or data disk but cannot specify a device name for the disk.

#### NOTE

- If no EVS disks are available, click **Create Disk** in the lower part of the list.
  - For details about restrictions on attaching a disk, see [What Are the Restrictions on Attaching an EVS Disk to an ECS?](#)
8. Click **OK**.  
After the disk is attached, you can view the information about it on the **Disks** tab.

### Follow-up Procedure

If the attached disk is newly created, the disk can be used only after it is initialized.


For instructions about how to initialize a data disk, see [Introduction to Data Disk Initialization Scenarios and Partition Styles](#).

## 3.4 Adding a Yearly/Monthly EVS Disk

### Scenarios

You are allowed to add yearly/monthly EVS disks to a yearly/monthly ECS. The expiration time of the newly added EVS disks is the same as that of the ECS.

### Procedure

1. Log in to the management console.
2. Click  in the upper left corner and select your region and project.
3. Under **Computing**, click **Elastic Cloud Server**.
4. In the search box above the upper right corner of the ECS list, enter the ECS name, IP address, or ID for search.
5. Click the name of the target ECS.  
The page providing details about the ECS is displayed.
6. Click the **Disks** tab. Then, click **Add Disk**.  
The system switches to the EVS disk purchase page.
7. Configure parameters for the new EVS disk as prompted.
8. Click **Next**.
9. Verify that the disk is correctly configured, select the agreement, and click **Submit**.

The new EVS disk is automatically attached to the target ECS.

#### NOTE

After the new disk is detached, it can only be attached to the original ECS.

## 3.5 Detaching an EVS Disk from a Running ECS

### Scenarios

An EVS disk attached to an ECS can function as a system disk or data disk.

- EVS disks mounted to `/dev/sda` or `/dev/vda` function as system disks. You can only detach system disks offline. Before detaching a system disk from an ECS, you must stop the ECS.
- EVS disks mounted to other locations function as data disks. In addition to offline detachment, data disks can be detached online if the OS running on the ECS supports this feature.

This section describes how to detach a disk from a running ECS.

## Constraints

- The EVS disk to be detached must be mounted at a location other than **/dev/sda** or **/dev/vda**.  
EVS disks mounted to **/dev/sda** or **/dev/vda** are system disks and cannot be detached from running ECSs.
- Before detaching an EVS disk from a running Windows ECS, make sure that VMTools have been installed on the ECS and that the tools are running properly.
- Before detaching an EVS disk from a running Windows ECS, ensure that no program is reading data from or writing data to the disk. Otherwise, data will be lost.
- SCSI EVS disks cannot be detached from running Windows ECSs.
- Before detaching an EVS disk from a running Linux ECS, you must log in to the ECS and run the **umount** command to cancel the association between the disk and the file system. In addition, ensure that no program is reading data from or writing data to the disk. Otherwise, detaching the disk will fail.

## Notes

- On a Windows ECS, if the disk is in non-offline state, the system forcibly detaches the EVS disk. If this occurs, the system may generate a xenvbd alarm. You can ignore this alarm.

### NOTE

To view the status of an EVS disk, perform the following operations:

1. Click **Start** in the task bar. In the displayed **Start** menu, right-click **Computer** and choose **Manage** from the shortcut menu.

The **Server Manager** page is displayed.

2. In the navigation pane on the left, choose **Storage > Disk Management**.

The EVS disk list is displayed in the right pane.

3. View the status of each EVS disk.

- Do not detach an EVS disk from an ECS that is being started, stopped, or restarted.
- Do not detach an EVS disk from a running ECS whose OS does not support this feature. OSs supporting EVS disk detachment from a running ECS are listed in [OSs Supporting EVS Disk Detachment from a Running ECS](#).
- For a running Linux ECS, the drive letter may be changed after an EVS disk is detached from it and then attached to it again. This is a normal case due to the drive letter allocation mechanism of the Linux system.
- For a running Linux ECS, the drive letter may be changed after an EVS disk is detached from it and the ECS is restarted. This is a normal case due to the drive letter allocation mechanism of the Linux system.

## OSs Supporting EVS Disk Detachment from a Running ECS

OSs supporting EVS disk detachment from a running ECS include two parts:

- For the first part, see [Formats and OSs Supported for External Image Files](#).
- [Table 3-1](#) lists the second part of supported OSs.

**Table 3-1** OSs supporting EVS disk detachment from a running ECS

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

**NOTE**

Online detachment is not supported by the ECSs running OSs not listed in the preceding table. For such ECSs, stop the ECSs before detaching disks from them to prevent any possible problems from occurring.

## Procedure

1. On the **Elastic Cloud Server** page, click the name of the ECS from which the EVS disk is to be detached. The page providing details about the ECS is displayed.
2. Click the **Disks** tab. Locate the row containing the EVS disk to be detached and click **Detach**.

## 3.6 Expanding the Capacity of an EVS Disk

### Scenarios

When your disk capacity is insufficient, you can handle the insufficiency by expanding the disk capacity.

### Procedure

The capacity of an EVS disk can be expanded in either of the following ways:

- Apply for an EVS disk and attach it to an ECS.
- Expand the capacity of an existing EVS disk. The capacities of both system disks and data disks can be expanded.

For more details, see **Expanding the Capacity of an EVS Disk** in *Elastic Volume Service User Guide*.

#### NOTE

After the capacity is expanded through the management console, only the storage capacity of the EVS disk is expanded. To use the expanded capacity, you also need to log in to the ECS and expand the partition and file system.

### Related Operations

For instructions about how to expand the capacity of an EVS disk, see [Expansion Overview](#).

## 3.7 Expanding the Local Disks of a Disk-intensive ECS

### Scenarios

Disk-intensive ECSs can use both local disks and EVS disks to store data. Local disks are generally used to store service data and feature higher throughput than EVS disks.

Disk-intensive ECSs do not support modifying specifications. Therefore, when the idle capacity of the local disks of such an ECS is insufficient, you must create a new disk-intensive ECS with higher specifications for capacity expansion. In such a case, the data stored in the original ECS can be migrated to the new ECS through an EVS disk.

## Procedure

1. Create an EVS disk according to the volume of data to be migrated.
2. Attach the EVS disk to the disk-intensive ECS.
3. Back up the data stored in the local disks to the EVS disk that is newly attached to the disk-intensive ECS.
4. Detach the EVS disk from the ECS.
  - a. On the **Elastic Cloud Server** page, select this disk-intensive ECS and ensure that it is **Stopped**.  
If the ECS is in the **Running** state, choose **More > Stop** to stop it.
  - b. Click the name of the disk-intensive ECS. The page providing details about the ECS is displayed.
  - c. Click the **Disks** tab. Locate the row containing the EVS data disk and click **Detach** to detach the disk from the ECS.
5. Ensure that a new disk-intensive ECS with higher specifications than the original one is available.  
The idle local disk capacity of the new ECS must meet service requirements.
6. Attach the EVS disk to the new disk-intensive ECS.  
On the **Elastic Cloud Server** page, click the name of the ECS described in step 5. The page providing details about the ECS is displayed.
7. Click the **Disks** tab. Then, click **Attach Disk**.  
In the displayed dialog box, select the EVS disk detached in step 4 and the device name.
8. Migrate the data from the EVS disk to the local disks of the new disk-intensive ECS.


## 3.8 Enabling Advanced Disk

### Scenarios

- Disk functions have been upgraded on the platform. Newly created ECSs can have up to 60 attached disks. However, an existing ECS can still have a maximum of 24 attached disks (40 for certain ECSs). To allow such ECSs to have up to 60 attached disks, enable advanced disk.
- After advanced disk is enabled, you can view the mapping between device names and disks. For details, see "What Is the Mapping Between Device Names and Disks?"

This section describes how to enable advanced disk on an ECS.

### Procedure

1. Log in to management console.
2. Click  in the upper left corner and select your region and project.
3. Under **Computing**, click **Elastic Cloud Server**.
4. Click the name of the target ECS. The page providing details about the ECS is displayed.

5. Click the **Disks** tab.
6. View the current number of disks that can be attached to the ECS and enable advanced disk as prompted.  
The **Enable Advanced Disk** dialog box is displayed.
7. Click **OK**.
8. Stop and then start the target ECS.  
This operation allows advanced disk to take effect.
9. Switch to the page providing details about the ECS again, click the **Disks** tab, and check whether the number of disks that can be attached to the ECS has been changed.
  - If yes, advanced disk has been enabled.
  - If no, enabling advanced disk failed. In such a case, try again later or contact customer service.

# 4 Passwords and Key Pairs

---

## 4.1 Application Scenarios for Password Reset

If the password for logging in to your ECS is forgotten or expires, you can reset the password.

- If your ECS has had password reset plug-ins installed, see [Resetting the Password for Logging In to an ECS on the Management Console](#).

 NOTE

- The password reset plug-ins have been installed on the ECSs created using a public image by default.
- If your ECS has not had password reset plug-ins installed, see [Resetting the Password for Logging In to a Windows ECS Without Password Reset Plug-ins Installed](#) or [Resetting the Password for Logging In to a Linux ECS Without Password Reset Plug-ins Installed](#).

### Background

[Table 4-1](#) shows the ECS password complexity requirements.



**Table 4-1** Password complexity requirements

| Parameter | Requirement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Example Value                                                                                                         |
|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|
| Password  | <ul style="list-style-type: none"><li>• Consists of 8 characters to 26 characters.</li><li>• Contains at least three of the following character types:<ul style="list-style-type: none"><li>- Uppercase letters</li><li>- Lowercase letters</li><li>- Digits</li><li>- Special characters for Windows: \$!@%-_+=+[:./,;?</li><li>- Special characters for Linux: !@%-_+=+[:./^,{}?</li></ul></li><li>• Cannot contain the username or the username spelled backwards.</li><li>• Cannot contain more than two characters in the same sequence as they appear in the username. (This requirement applies only to Windows ECSs.)</li></ul> | YNbUwp!<br>dUc9MClnv<br><b>NOTE</b><br>The example password is generated randomly. Do not copy this example password. |

## 4.2 Resetting the Password for Logging In to an ECS on the Management Console

### Scenarios

If you did not set a password when creating an ECS, or the password is forgotten or expired, reset the password by following the instructions provided in this section.

### Prerequisites

- You have installed password reset plug-ins before your ECS password is forgotten or expires.
  - The password reset plug-ins have been installed on the ECSs created using a public image by default.
  - If your ECS has been created from a private image and has no password reset plug-ins installed, see [Resetting the Password for Logging In to a Windows ECS](#) or [Resetting the Password for Logging In to a Linux ECS](#).
- Do not delete the CloudResetPwdAgent or CloudResetPwdUpdateAgent process. Otherwise, one-click password reset will not be available.
- One-click password reset can be used on the ECSs created using SUSE 11 SP4 only if their memory capacity is greater than or equal to 4 GiB.
- DHCP is enabled in the VPC to which the ECS belongs.
- The ECS network connectivity is normal.

## Procedure

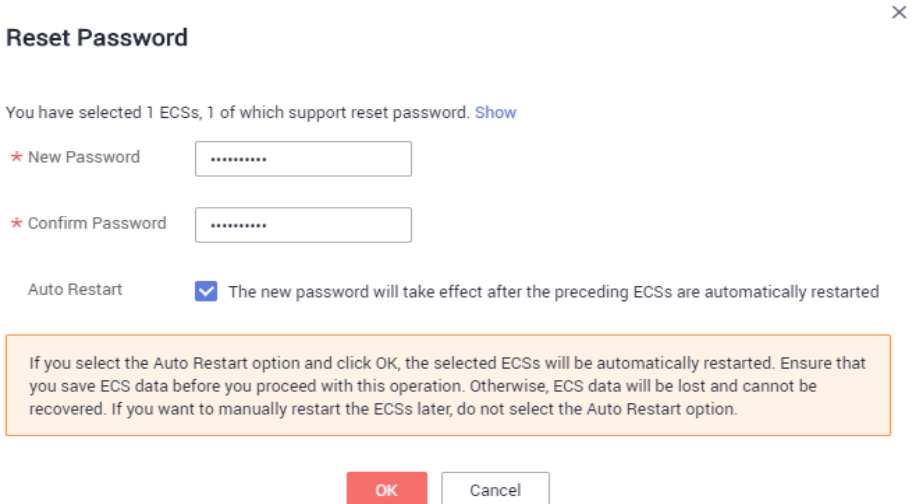
Perform the following operations to change the login password of one or multiple ECSs in a batch on the management console.

### NOTE

If you reset the password when the ECS is running, the new password takes effect only after the ECS is restarted. In such a case, you can manually restart the ECS after resetting the password, or select **Auto Restart** when resetting the password.

1. Log in to the management console.
2. Under **Computing**, click **Elastic Cloud Server**.
3. Locate the row containing the target ECS, click **More** in the **Operation** column, and select **Reset Password** from the drop-down list.

**Figure 4-1** Reset Password



**Reset Password** ×

You have selected 1 ECSs, 1 of which support reset password. [Show](#)

\* New Password

\* Confirm Password

Auto Restart  The new password will take effect after the preceding ECSs are automatically restarted

If you select the Auto Restart option and click OK, the selected ECSs will be automatically restarted. Ensure that you save ECS data before you proceed with this operation. Otherwise, ECS data will be lost and cannot be recovered. If you want to manually restart the ECSs later, do not select the Auto Restart option.

4. Set and confirm a new password as prompted.  
The new password must meet the complexity requirements listed in [Table 4-2](#).

**Table 4-2** Password complexity requirements

| Parameter | Requirement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Example Value                                                                                                         |
|-----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|
| Password  | <ul style="list-style-type: none"><li>• Consists of 8 characters to 26 characters.</li><li>• Contains at least three of the following character types:<ul style="list-style-type: none"><li>– Uppercase letters</li><li>– Lowercase letters</li><li>– Digits</li><li>– Special characters for Windows: \$!@%_-=+[]:./,?</li><li>– Special characters for Linux: !@%_-=+[]:./^,{}?</li></ul></li><li>• Cannot contain the username or the username spelled backwards.</li><li>• Cannot contain more than two characters in the same sequence as they appear in the username. (This requirement applies only to Windows ECSs.)</li></ul> | YNbUwp!<br>dUc9MClnv<br><b>NOTE</b><br>The example password is generated randomly. Do not copy this example password. |

5. Click **OK**.

It takes about 10 minutes for the system to reset the password. Do not repeatedly perform this operation.

- If the ECS is running when you reset the password, you need to manually restart the ECS for the new password to take effect.
- If the ECS is stopped, the new password will take effect after you start the ECS.

## 4.3 Creating a Key Pair

### Overview

To ensure system security, use key pair authentication to authorize the user who attempts to log in to an ECS. Therefore, you must use an existing key pair or create a new one for remote login authentication.

- Creating a key pair

If no key pair is available, create one, in which the private key is used for login authentication. You can use either of the following methods to create a key pair:

- (Recommended) Create a key pair through the management console. After the creation, the public key is automatically stored in the system, and the private key is manually stored in a local directory. For details, see [Creating a Key Pair Through the Management Console](#).
- Create a key pair using **puttygen.exe**. After the creation, both the public key and private key are stored locally. For details, see [Creating a Key Pair](#)

**Using puttygen.exe.** After the creation, import the key pair by following the instructions provided in [Importing a Key Pair](#). Then, the key pair can be used.

- Using an existing key pair

If a key pair is available locally, for example, generated using PuTTYgen, you can import the public key on the management console so that the system maintains the public key file. For details, see [Importing a Key Pair](#).

#### NOTE


If the public key of the existing key pair is stored by clicking **Save public key** of **puttygen.exe**, the public key cannot be imported to the management console.

If this key pair must be used for remote authentication, see [What Should I Do If a Key Pair Created Using puttygen.exe Cannot Be Imported to the Management Console?](#)

## Constraints

- ECSs support the following encryption algorithms:
  - SSH-2 (RSA, 1024)
  - SSH-2 (RSA, 2048)
  - SSH-2 (RSA, 4096)
- The private key is one of the most important functions for protecting your ECS during remote login. To ensure ECS security, you are limited to downloading the private key only once.

## Creating a Key Pair Through the Management Console

1. Log in to the management console.
2. Click  in the upper left corner and select your region and project.
3. Under **Computing**, click **Elastic Cloud Server**.
4. In the navigation pane on the left, choose **Key Pair**.
5. On the right side of the page, click **Create Key Pair**.
6. Enter the key name and click **OK**.

An automatically allocated key name consists of **KeyPair-** and a 4-digit random number. Change it to an easy-to-remember one, for example, **KeyPair-xxxx\_ecs**.

7. Manually or automatically download the private key file. The file name is the specified key pair name with a suffix of **.pem**. Securely store the private key file. In the displayed dialog box, click **OK**.

#### NOTE

This is the only opportunity for you to save the private key file. Keep it secure. When creating an ECS, provide the name of your desired key pair. Each time you log in to the ECS using SSH, provide the private key.

## Creating a Key Pair Using puttygen.exe

**Step 1** Download and install PuTTY and PuTTYgen.

<https://www.chiark.greenend.org.uk/~sgtatham/putty/latest.html>

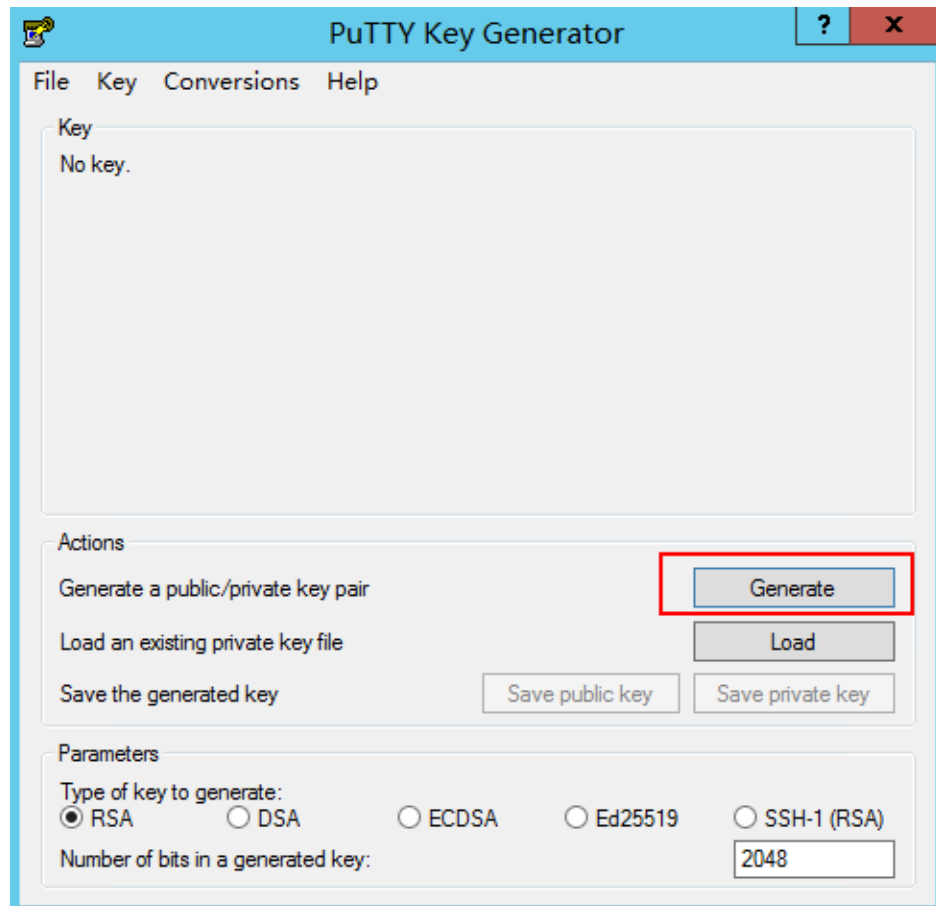
 **NOTE**

PuTTYgen is a key generator, which is used to create a key pair that consists of a public key and a private key for PuTTY.

**Step 2** Obtain the public and private keys.

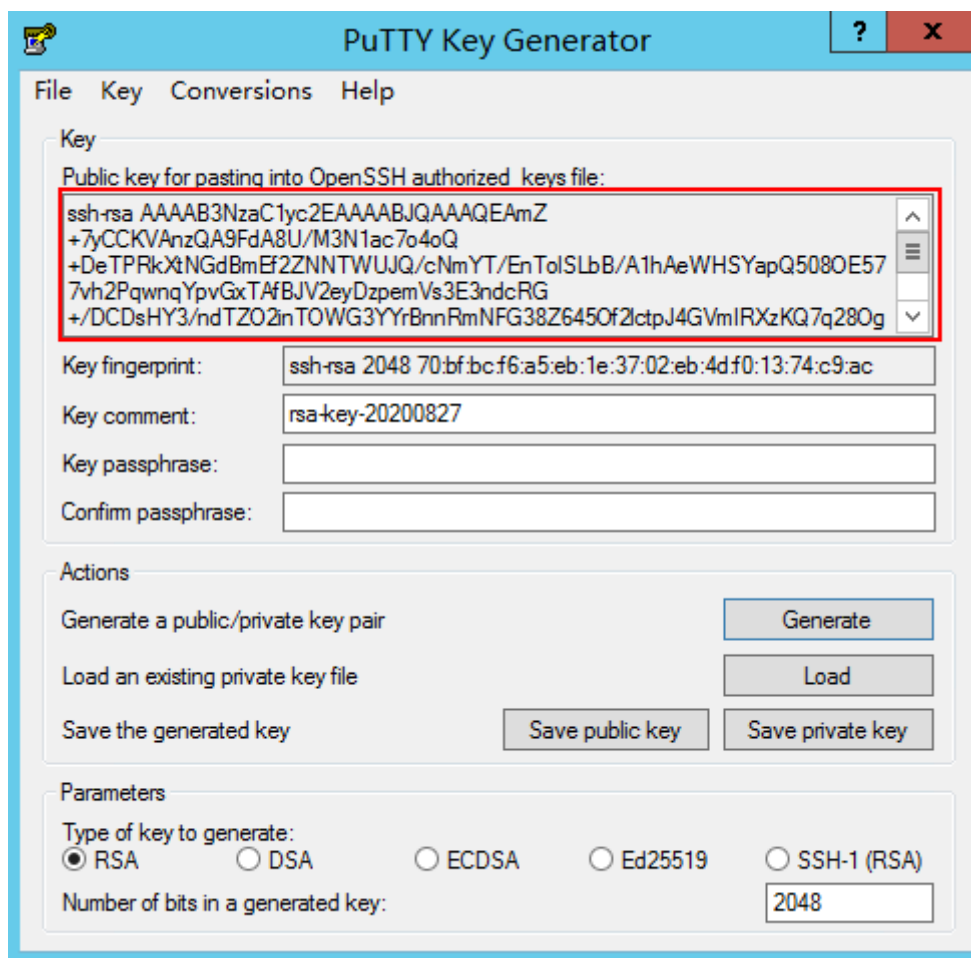
1. Double-click **puttygen.exe** to switch to the **PuTTY Key Generator** page.

**Figure 4-2** PuTTY Key Generator



2. Click **Generate**.

The key generator automatically generates a key pair that consists of a public key and a private key. The public key is shown in the red box in [Figure 4-3](#).

**Figure 4-3** Obtaining the public and private keys

**Step 3** Copy the public key content to a .txt file and save the file in a local directory.

**NOTE**

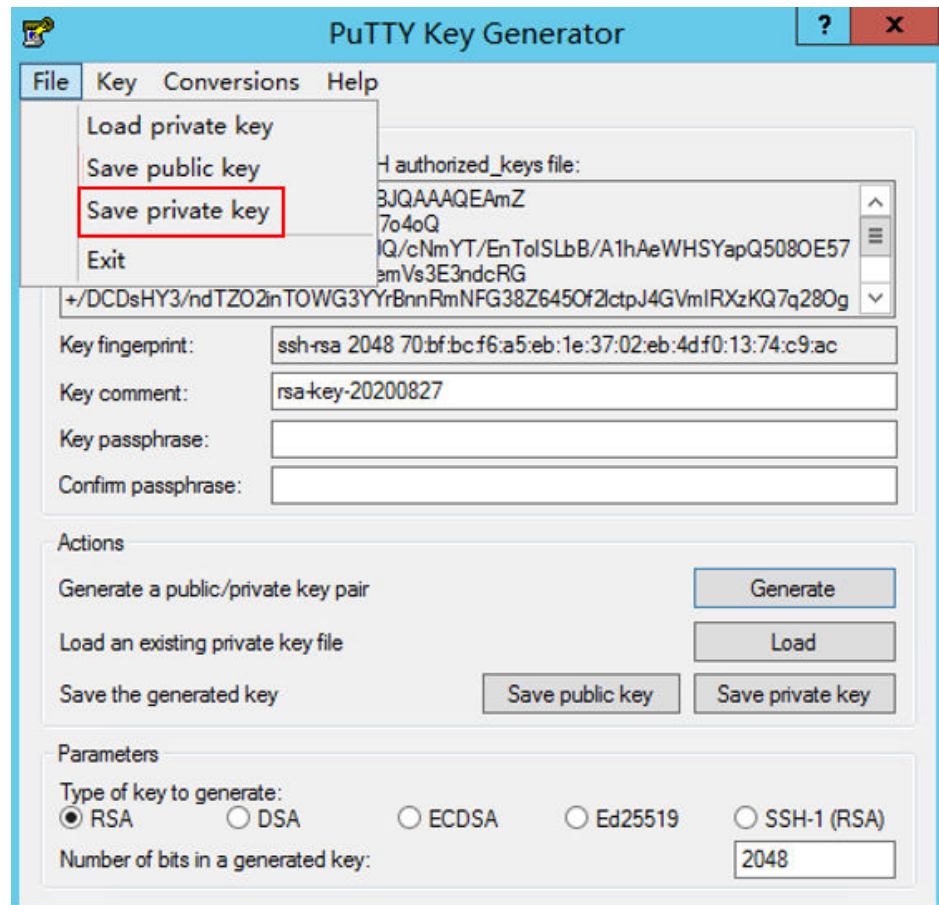
Do not save the public key by clicking **Save public key**. Storing a public key by clicking **Save public key** of **puttygen.exe** will change the format of the public key content. Such a key cannot be imported to the management console.

**Step 4** Save the private key.

The format in which to save your private key varies depending on application scenarios:

- Saving the private key in .ppk format  
When you are required to log in to a Linux ECS using PuTTY, you must use the .ppk private key. To save the private key in .ppk format, perform the following operations:
  - a. On the **PuTTY Key Generator** page, choose **File > Save private key**.

Figure 4-4 Save private key

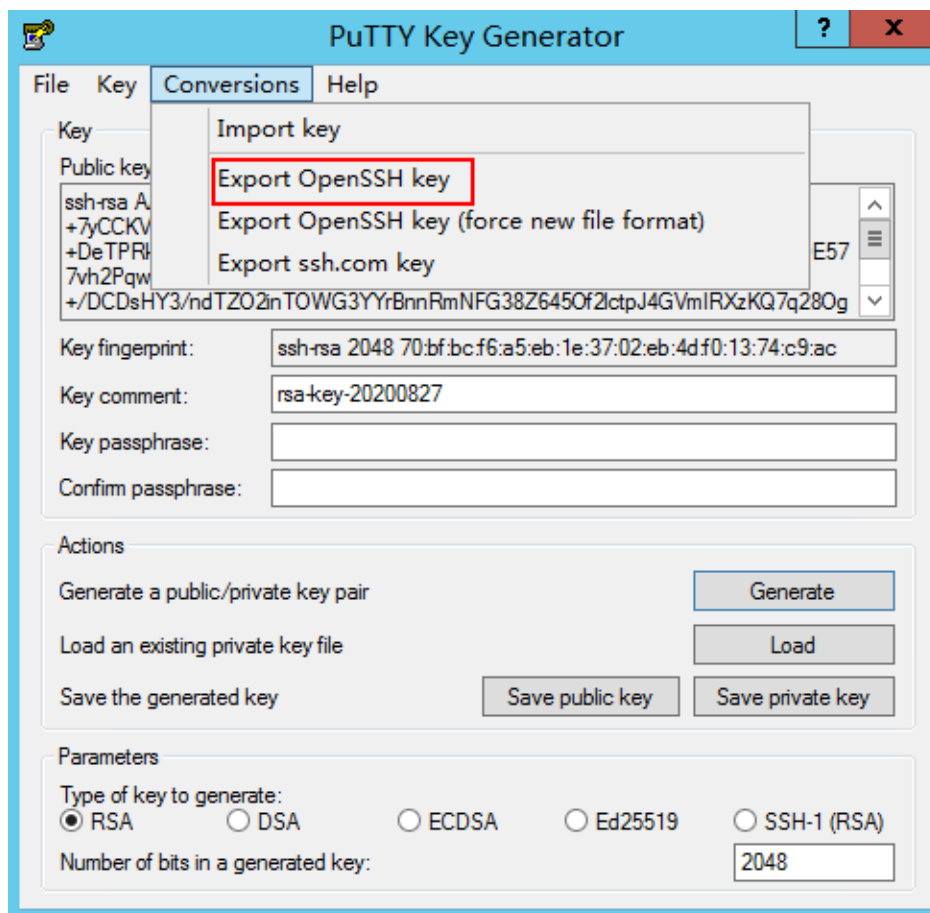


- b. Save the converted private key, for example, **kp-123.ppk**, in a local directory.
- Saving the private key in .pem format  
When you are required to log in to a Linux ECS using Xshell or attempt to obtain the password for logging in to a Windows ECS, you must use the .pem private key for authentication. To save the private key in .pem format, perform the following operations:
    - a. Choose **Conversions > Export OpenSSH key**.

**NOTE**

If you use this private file to obtain the password for logging in to a Windows ECS, when you choose **Export OpenSSH key**, do not configure **Key passphrase**. Otherwise, obtaining the password will fail.

Figure 4-5 Export OpenSSH key




- b. Save the private key, for example, **kp-123.pem**, in a local directory.

**Step 5** Import the public key to the system. For details, see "Copying the public key content" in [Importing a Key Pair](#).

----End

## Importing a Key Pair

If you store a public key by clicking **Save public key** of **puttygen.exe**, the format of the public key content will change. Such a key cannot be imported to the management console.

1. Log in to the management console.
2. Click  in the upper left corner and select your region and project.
3. Under **Computing**, click **Elastic Cloud Server**.
4. In the navigation pane on the left, choose **Key Pair**.
5. On the right side of the page, click **Import Key Pair**.
6. Use either of the following methods to import the key pair:
  - Selecting a file
    - i. On the **Import Key Pair** page of the management console, click **Select File** and select the local public key file, for example, the .txt file saved in [Step 3](#).



 NOTE

When importing a key pair, ensure that the public key is imported. Otherwise, the importing will fail.

- ii. Click **OK**.  
After the public key is imported, you can change its name.
- Copying the public key content
  - i. Copy the content of the public key in .txt file into the **Public Key Content** text box.
  - ii. Click **OK**.

## 4.4 (Optional) Installing One-Click Password Reset Plug-ins

The public cloud platform provides the password reset function. If the password of your ECS is forgotten or expires and your ECS has password reset plug-ins installed, you can reset the password with a few clicks.

This method is convenient and efficient. After you have created an ECS, it is a good practice to log in to it and install the password reset plug-ins.

 NOTE

- The password reset plug-ins have been installed on ECSs created using a public image by default. To check whether the plug-ins have been installed, see [Step 1](#).

### Notes

1. The one-click password reset plug-ins apply only to ECSs.
2. You can determine whether to install the password reset plug-ins.
3. After the installation, do not uninstall the plug-ins by yourself. Otherwise, the ECS password cannot be reset.
4. After you reinstall or change the OS of an ECS, the one-click password reset function will become invalid. If you want to continue using this function, reinstall password reset plug-ins.
5. After you replace the system disk of an ECS, the one-click password reset function will become invalid. If you want to continue using this function, reinstall password reset plug-ins.
6. Password reset plug-ins cannot be installed on a CoreOS ECS.
7. If one-click password reset plug-ins have not been installed before the ECS password is forgotten or expired, the plug-ins cannot be used to reset the ECS password.
8. One-click password reset plug-ins can automatically update only after an EIP is bound to the ECS.
9. CloudResetPwdAgent has been open-sourced in the [GitHub open-source platform](#) according to *GNU General Public License v2.0*.

## Prerequisites

- The available space in drive C of a Windows ECS is greater than 300 MB, and data can be written to it.  
The available space in the root directory of a Linux ECS is greater than 300 MB, and data can be written to it.
- One-click password reset can be used on the ECSs created using SUSE 11 SP4 only if their memory capacity is greater than or equal to 4 GiB.
- DHCP is enabled in the VPC to which the ECS belongs.
- The ECS network connectivity is normal.
- The ECS security group rule in the outbound direction meets the following requirements:

- **Protocol: TCP**
- **Port Range: 80**
- **Remote End: 169.254.0.0/16**

If you use the default security group rules for the outbound direction, the preceding requirements are met, and the ECS can be initialized. The default security group rules for the outbound direction are as follows:

- **Protocol: ANY**
- **Port Range: ANY**
- **Remote End: 0.0.0.0/16**

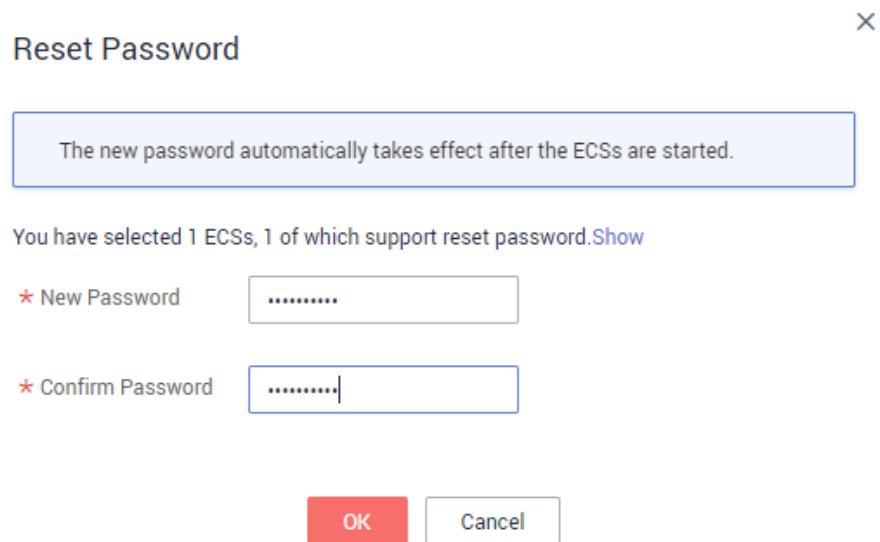
## Installing Password Reset Plug-ins on a Linux ECS

- Step 1** Use either of the following methods to check whether the password reset plug-ins have been installed on the ECS:

Method 1: Use the management console for query.

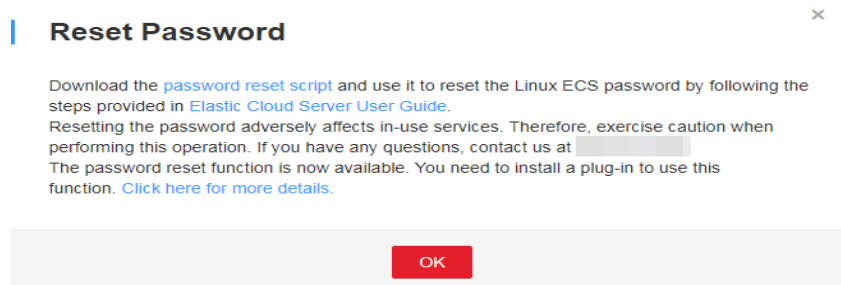
1. Log in to the management console.
2. Under **Computing**, click **Elastic Cloud Server**.
3. Locate the row containing the target ECS, click **More** in the **Operation** column, and select **Reset Password** from the drop-down list.
  - If a dialog box is displayed, asking you to enter the new password, the password reset plug-ins have been installed. No further action is required.

**Figure 4-6** Information displayed if the password reset plug-ins have been installed



- If a dialog box is displayed, asking you to download a password reset script, the password reset plug-ins have not been installed. Then, install them.

**Figure 4-7** Information displayed if the password reset plug-ins have not been installed



Method 2: Use the ECS for query.

1. Log in to the ECS as user **root**.
2. Run the following command to check whether CloudResetPwdAgent and CloudResetPwdUpdateAgent have been installed:

**ls -lh /Cloud\***

**Figure 4-8** Checking whether the plug-ins have been installed

```
[root@test-... home]# ls -lh /Cloud*
/CloudResetPwdUpdateAgent:
total 20K
drwxr-xr-x 2 root root 4.0K Feb 14 09:20 bin
drwxr-xr-x 2 root root 4.0K Dec 6 17:09 conf
drwxr-xr-x 3 root root 4.0K Dec 6 17:09 depend
drwxr-xr-x 2 root root 4.0K Dec 6 17:09 lib
drwxr-xr-x 2 root root 4.0K Feb 14 09:20 logs

/CloudrResetPwdAgent:
total 20K
drwxr-xr-x 2 root root 4.0K Feb 14 09:20 bin
drwxr-xr-x 2 root root 4.0K Dec 6 17:09 conf
drwxr-xr-x 2 root root 4.0K Dec 6 17:09 depend
drwxr-xr-x 2 root root 4.0K Dec 6 17:09 lib
drwxr-xr-x 2 root root 4.0K Feb 14 09:20 logs
```

Check whether the obtained information is similar to that shown in [Figure 4-8](#).

- If yes, the plug-ins have been installed.
- If no, the plug-ins have not been installed. Then, install them.

**Step 2** Download the one-click password reset plug-in **CloudResetPwdAgent.zip** according to your OS, 32bit or 64bit.

There is no special requirement for the directory that stores **CloudResetPwdAgent.zip**. Use any directory.

- For a 32bit OS, run the following command:  
**wget http://ap-southeast-1-cloud-reset-pwd.obs.ap-southeast-1.myhuaweicloud.com/linux/32/reset\_pwd\_agent/CloudResetPwdAgent.zip**  
Download path: [https://ap-southeast-1-cloud-reset-pwd.obs.ap-southeast-1.myhuaweicloud.com/linux/32/reset\\_pwd\\_agent/CloudResetPwdAgent.zip](https://ap-southeast-1-cloud-reset-pwd.obs.ap-southeast-1.myhuaweicloud.com/linux/32/reset_pwd_agent/CloudResetPwdAgent.zip)
- For a 64bit OS, run the following command:  
**wget http://ap-southeast-1-cloud-reset-pwd.obs.ap-southeast-1.myhuaweicloud.com/linux/64/reset\_pwd\_agent/CloudResetPwdAgent.zip**  
Download path: [https://ap-southeast-1-cloud-reset-pwd.obs.ap-southeast-1.myhuaweicloud.com/linux/64/reset\\_pwd\\_agent/CloudResetPwdAgent.zip](https://ap-southeast-1-cloud-reset-pwd.obs.ap-southeast-1.myhuaweicloud.com/linux/64/reset_pwd_agent/CloudResetPwdAgent.zip)

**Step 3** Run the following command to decompress **CloudResetPwdAgent.zip**:

There is no special requirement for the directory that stores the decompressed **CloudResetPwdAgent.zip**. Use any directory.

**unzip -o -d *Decompressed directory* CloudResetPwdAgent.zip**

An example is provided as follows:

If the decompressed directory is **/home/linux/test**, run the following command:

```
unzip -o -d /home/linux/test CloudResetPwdAgent.zip
```

**Step 4** Install the one-click password reset plug-ins.

1. Run the following command to open the **CloudResetPwdUpdateAgent.Linux** file:

```
cd CloudResetPwdAgent/CloudResetPwdUpdateAgent.Linux
```

2. Run the following command to add the execute permission for the **setup.sh** file:

```
chmod +x setup.sh
```

3. Run the following command to install the plug-ins:

```
sudo sh setup.sh
```

4. Run the following commands to check whether the installation is successful:

```
service cloudResetPwdAgent status
```

```
service cloudResetPwdUpdateAgent status
```

If the status of CloudResetPwdAgent and CloudResetPwdUpdateAgent is not **unrecognized service**, the installation is successful. Otherwise, the installation failed.

 **NOTE**

- You can also check whether the password reset plug-ins have been installed using the methods provided in [Step 1](#).
- If the installation failed, check whether the installation environment meets requirements and install the plug-ins again.

----End

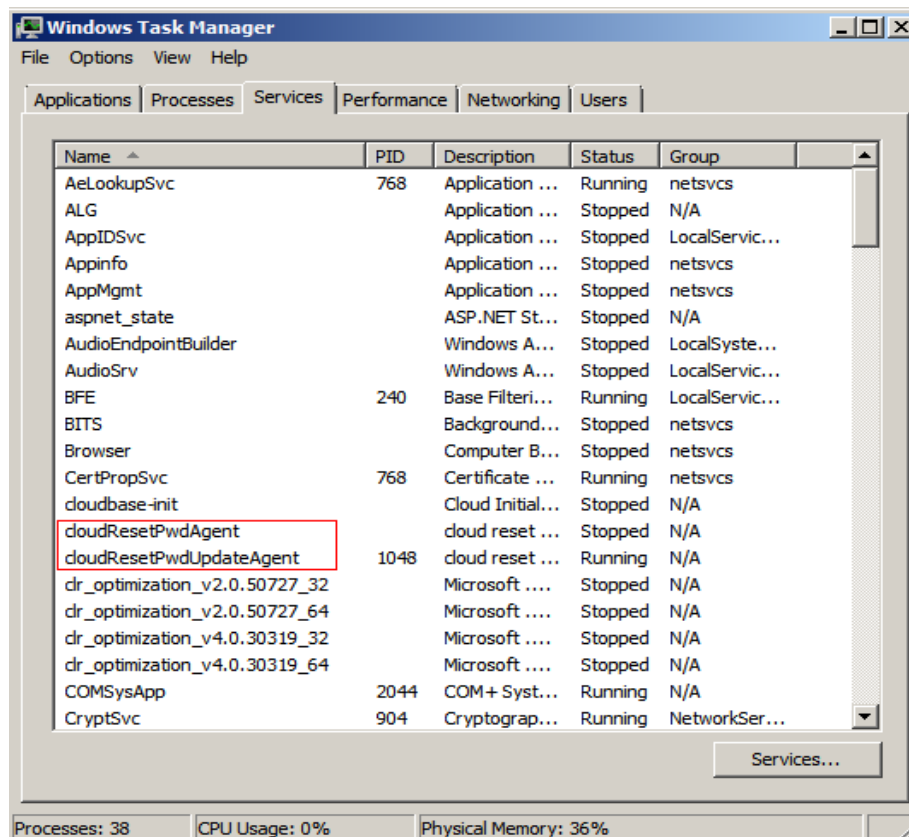
## Installing Password Reset Plug-ins on a Windows ECS

**Step 1** Log in to the ECS.

**Step 2** Check whether password reset plug-ins CloudResetPwdAgent and CloudResetPwdUpdateAgent have been installed on the ECS. To check this, perform the following operations:

Start the **Task Manager** and check whether **cloudResetPwdAgent** and **cloudResetPwdUpdateAgent** are displayed on the **Services** tab page.

Figure 4-9 Windows Task Manager



- If yes, no further action is required.
- If no, go to [Step 3](#).

### Step 3 Download package **CloudResetPwAgent.zip**.

There is no special requirement for the directory that stores **CloudResetPwAgent.zip**. Use any directory.

Download path: [https://ap-southeast-1-cloud-reset-pwd.obs.ap-southeast-1.myhuaweicloud.com/windows/reset\\_pwd\\_agent/CloudResetPwAgent.zip](https://ap-southeast-1-cloud-reset-pwd.obs.ap-southeast-1.myhuaweicloud.com/windows/reset_pwd_agent/CloudResetPwAgent.zip)

### Step 4 Decompress **CloudResetPwAgent.zip**.

There is no special requirement for the directory that stores the decompressed **CloudResetPwAgent.zip**. Use any directory.

### Step 5 Install the plug-ins.

1. Double-click **setup.bat** in both **CloudResetPwAgent.Windows** and **CloudResetPwUpdateAgent.Windows**.

The password reset plug-ins start to be installed.

2. View the **Task Manager** and check whether the installation is successful.

If **cloudResetPwAgent** and **cloudResetPwUpdateAgent** are displayed in the **Task Manager**, as shown in [Figure 4-9](#), the installation is successful. Otherwise, the installation failed.

 NOTE

If the installation failed, check whether the installation environment meets requirements and install the plug-ins again.

----End

## Follow-up Procedure

- After the one-click password reset plug-ins are installed, you can add them to the startup items if they cannot automatically start upon ECS startup. For details, see [What Can I Do If One-Click Password Reset Plug-in Fails to Start?](#)
- After installing the one-click password reset plug-ins, do not delete the CloudResetPwdAgent or CloudResetPwdUpdateAgent process. Otherwise, one-click password reset will not be available.
- One-click password reset plug-ins have been upgraded. New ECSs work in PIPE mode by default, preventing the plug-ins from using service ports. Existing ECSs still work in AUTO mode, in which the plug-ins randomly use a service port ranging from 31,000 to 32,999. The system will automatically select an idle port with the smallest port number.

## Updating the Plug-ins

You do not need to pay special attention to the plug-in updating because the system will automatically update them.

## Uninstalling the Plug-ins

If you do not need the password reset function anymore, perform the following operations to uninstall the plug-ins:

- Linux
  - a. Log in to the ECS.
  - b. Run the following commands to switch to the **bin** directory and delete **cloudResetPwdAgent**:

```
cd /CloudResetPwdAgent/bin
sudo ./cloudResetPwdAgent.script remove
```
  - c. Run the following commands to switch to the **bin** directory and delete **cloudResetPwdUpdateAgent**:

```
cd /CloudResetPwdUpdateAgent/bin
sudo ./cloudResetPwdUpdateAgent.script remove
```
  - d. Run the following commands to delete the plug-ins:

```
sudo rm -rf /CloudResetPwdAgent
sudo rm -rf /CloudResetPwdUpdateAgent
```
- Windows
  - a. Switch to the **C:\CloudResetPwdUpdateAgent\bin** folder.
  - b. Double-click **UninstallApp-NT.bat**.

- c. Delete the file in `C:\CloudResetPwdUpdateAgent`.
- d. Switch to the `C:\CloudResetPwdAgent\bin` folder.
- e. Double-click `UninstallApp-NT.bat`.
- f. Delete the file in `C:\CloudResetPwdAgent`.

## 4.5 Obtaining the Password for Logging In to a Windows ECS

### Scenarios

Password authentication is required to log in to a Windows ECS. Therefore, you must use the key file used when you created the ECS to obtain the administrator password generated during ECS creation. The administrator user is **Administrator** or the user configured using Cloudbase-Init. This password is randomly generated, offering high security.

You can obtain the initial password for logging in to a Windows ECS through the management console or APIs. For details, see this section.

### Obtaining the Password Through the Management Console


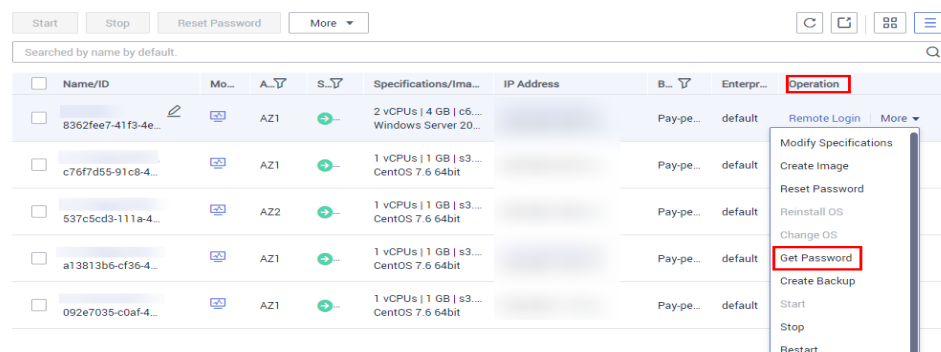
1. Obtain the private key file (.pem file) used when you created the ECS.
2. Log in to the management console.
3. Click  in the upper left corner and select your region and project.
4. Under **Computing**, click **Elastic Cloud Server**.
5. On the **Elastic Cloud Server** page, select the target ECS.
6. In the **Operation** column, click **More** and select **Get Password**.

Figure 4-10 Obtaining a password



7. Use either of the following methods to obtain the password through the key file:
  - Click **Select File** and upload the key file from a local directory.
  - Copy the key file content to the text field.
8. Click **Get Password** to obtain a random password.



## Obtaining the Password Through APIs

1. Obtain the private key file (.pem file) used when you created the ECS.
2. Set up the API calling environment.
3. Call APIs. For details, see "Before You Start" in *Elastic Cloud Server API Reference*.
4. Obtain the ciphertext password.

Call the password obtaining APIs to obtain the ciphertext password of the public key encrypted using RSA. The API URI is in the format "GET /v2/{tenant\_id}/servers/{server\_id}/os-server-password".

### NOTE

For instructions about how to call the APIs, see "Retrieving the Password of a Windows ECS (Native OpenStack API)" in *Elastic Cloud Server API Reference*.

5. Decrypt the ciphertext password.  
Use the private key file used when you created the ECS to decrypt the ciphertext password obtained in step 4.
  - a. Run the following command to convert the ciphertext password format to ".key -nocrypt" using OpenSSL:  
**openssl pkcs8 -topk8 -inform PEM -outform DER -in rsa\_pem.key -out pkcs8\_der.key -nocrypt**
  - b. Invoke the Java class library **org.bouncycastle.jce.provider.BouncyCastleProvider** and use the key file to edit the code decryption ciphertext.


## 4.6 Deleting the Initial Password for Logging In to a Windows ECS

### Scenarios

After you obtain the initial password, it is a good practice to delete it to ensure system security.

Deleting the initial password does not affect ECS operation or login. Once deleted, the password cannot be retrieved. Before you delete a password, it is a good practice to record it.

### Procedure

1. Log in to the management console.
2. Click  in the upper left corner and select your region and project.
3. Under **Computing**, click **Elastic Cloud Server**.
4. On the **Elastic Cloud Server** page, select the target ECS.
5. In the **Operation** column, click **More** and select **Delete Password**.  
The system displays a message, asking you whether you want to delete the password.

6. Click **OK** to delete the password.

# 5 NICs

---

## 5.1 Overview

### VPC

Virtual Private Cloud (VPC) allows you to create customized virtual networks in your logically isolated AZ. Such networks are dedicated zones that are logically isolated, providing secure network environments for your ECSs. You can define security groups, virtual private networks (VPNs), IP address segments, and bandwidth for a VPC. This facilitates internal network configuration and management and allows you to change your network in a secure and convenient network manner. You can also customize the ECS access rules within a security group and between security groups to improve ECS security.

For more information about VPC, see [Virtual Private Cloud User Guide](#).

### NIC

A NIC is a virtual one that can be bound to an ECS in a VPC. Through the NIC, you can manage the ECS network. A NIC can be a primary NIC or an extension NIC.

- Primary NIC

When you create an ECS, the NIC automatically created with the ECS is the primary NIC. The primary NIC cannot be unbound. It is preferentially used for the default route generally.

- Extension NIC


A NIC that can be separately added is an extension NIC, which can be bound to or unbound from an ECS.

## 5.2 Adding a NIC

### Scenarios

If multiple NICs are required by your ECS, you can add them to your ECS. To add a NIC to the ECS, perform the following operations:

## Procedure

1. Log in to the management console.
2. Click  in the upper left corner and select your region and project.
3. Under **Computing**, click **Elastic Cloud Server**.
4. Click the name of the target ECS.  
The page providing details about the ECS is displayed.
5. Click the **Network Interfaces** tab. Then, click **Add NIC**.
6. Select the subnet and security group to be added.
  - **Security Group:** You can select multiple security groups. In such a case, the access rules of all the selected security groups apply on the ECS.
  - **Private IP Address:** If you want to add a NIC with a specified IP address, enter an IP address into the **Private IP Address** field.
7. Click **OK**.

## Follow-up Procedure

Some OSs cannot identify newly added NICs. In this case, you must manually activate the NICs. Ubuntu is used as an example in the following NIC activation procedure. Required operations may vary among systems. For additional information, see the documentation for your OS.

1. Locate the row containing the target ECS and click **Remote Login** in the **Operation** column.  
Log in to the ECS.
2. Run the following command to view the NIC name:  
**ifconfig -a**  
In this example, the NIC name is **eth2**.
3. Run the following command to switch to the target directory:  
**cd /etc/network**
4. Run the following command to open the **interfaces** file:  
**vi interfaces**
5. Add the following information to the **interfaces** file:  
**auto eth2**  
**iface eth2 inet dhcp**
6. Run the following command to save and exit the **interfaces** file:  
**:wq**
7. Run either the **ifup eth2** command or the **/etc/init.d/networking restart** command to make the newly added NIC take effect.  
*X* in the preceding command indicates the NIC name and SN, for example, **ifup eth2**.
8. Run the following command to check whether the NIC name obtained in step 2 is displayed in the command output:  
**ifconfig**  
For example, check whether **eth2** is displayed in the command output.

- If yes, the newly added NIC has been activated, and no further action is required.
  - If no, the newly added NIC failed to be activated. Go to step 9.
9. Log in to the management console. Locate the row containing the target ECS, click **More** in the **Operation** column, and select **Restart**.
  10. Run the following command to check whether the NIC name obtained in step 2 is displayed in the command output:
    - If yes, no further action is required.
    - If no, contact customer service.

## 5.3 Deleting a NIC

### Scenarios

An ECS can have up to 12 NICs, including one primary NIC that cannot be deleted and extension NICs. This section describes how to delete an extension NIC.

### Procedure

1. Log in to the management console.
2. Under **Computing**, click **Elastic Cloud Server**.
3. On the **Elastic Cloud Server** page, click the name of the target ECS.  
The page providing details about the ECS is displayed.
4. Click the **Network Interfaces** tab. Then, click **Delete** in the row of the target NIC.

#### NOTE

You are not allowed to delete the primary ECS NIC. By default, the primary ECS NIC is the first NIC displayed in the NIC list.

5. Click **OK** in the displayed dialog box.

#### NOTE

Certain ECSs do not support NIC deletion when they are running. For details about these ECSs, see the GUI display. To delete a NIC from such an ECS, stop the ECS.

## 5.4 Changing a VPC

### Scenarios

This section describes how to change a VPC.

### Constraints

- A VPC can be changed on a single NIC only.  
A VPC can be changed only on a running ECS. However, ECS network connections will be interrupted during the change process.

- During the change process, do not perform operations on the ECS, including its EIP.
- After the VPC is changed, the subnet, private IP address, and MAC address of the ECS will change.
- After the VPC is changed, the source/destination check and virtual IP address must be configured again.
- After the VPC is changed, you are required to reconfigure network-related application software and services, such as ELB, VPN, NAT, and DNS.

## Procedure

1. Log in to the management console.
2. Under **Computing**, click **Elastic Cloud Server**.
3. Locate the row containing the target ECS. Click **More** in the **Operation** column and select **Manage Network > Change VPC**.

The **Change VPC** page is displayed.

**Figure 5-1** Change VPC

Change VPC ×

Changing the VPC will interrupt ECS network connections and change the subnet, IP address, and MAC address of the ECS.  
During the change process, do not perform operations on the ECS, including its EIP.  
After the VPC is changed, reconfigure source/destination check and virtual IP address.  
After the VPC is changed, reconfigure network-related application software and services, such as ELB, VPN, NAT, and DNS.

ECS Name ecs-764c

VPC vpc1( ) [View In-Use VPCs](#)

Subnet subnet-A( ) [View Subnet](#)

Private IP Address User-defined IP address [View In-Use IP Address](#)

Security Group Sys-default [View Security Group](#)

OK Cancel

4. Select an available VPC and subnet from the drop-down lists, and set the private IP address and security group as prompted.

You can select multiple security groups. In such a case, the access rules of all the selected security groups apply on the ECS.

### NOTE

Using multiple security groups may deteriorate ECS network performance. You are suggested to select no more than five security groups.

5. Click **OK**.

## 5.5 Modifying a Private IP Address

### Scenarios

The cloud platform allows you to modify the private IP address of the primary NIC. For details, see this section. To modify the private IP address of an extension NIC, delete the NIC and attach a new NIC.

### Constraints

- The ECS must be stopped.
- If a virtual IP address or DNAT rule has been configured for the NIC, cancel the configuration before modifying the private IP address.
- If the NIC has an IPv6 address, its private IP address (IPv4 or IPv6 address) cannot be modified.
- Before changing the private IP address of an ELB backend server, delete the backend server group.

### Procedure

1. Log in to the management console.
2. Under **Computing**, click **Elastic Cloud Server**.
3. Click the name of the target ECS.  
The page providing details about the ECS is displayed.
4. Click the **Network Interfaces** tab. Locate the row containing the primary NIC and click **Modify Private IP**.  
The **Modify Private IP** dialog box is displayed.
5. Change the subnet and private IP address of the primary NIC as required.

#### NOTE

Subnets can be changed only within the same VPC.

If the target private IP address is not specified, the system will automatically assign one to the primary NIC.

## 5.6 Managing Virtual IP Addresses

### Scenarios

A virtual IP address provides the second IP address for one or more ECS NICs, improving high availability between the ECSs.

### Procedure

1. Log in to the management console.
2. Under **Computing**, click **Elastic Cloud Server**.
3. On the **Elastic Cloud Server** page, click the name of the target ECS.

The page providing details about the ECS is displayed.

4. Click the **Network Interfaces** tab. Then, click **Manage Virtual IP Address**.
5. On the **IP Addresses** tab of the page that is displayed, locate the row containing the target virtual IP address and select **Bind to EIP** or **Bind to Instance** in the **Operation** column.

Multiple ECSs deployed to work in active/standby mode can be bound with a virtual IP address to improve DR performance.

6. Click **OK**.

## 5.7 Enabling NIC Multi-Queue

### Scenarios

Single-core CPU performance cannot meet the requirement of processing NIC interruptions incurred with the increase of network I/O bandwidth. NIC multi-queue enables multiple CPUs to process ECS NIC interruptions, thereby improving network PPS and I/O performance.

The ECS described in this section is assumed to comply with the requirements on specifications and virtualization type.

- If the ECS was created using a public image listed in [Support of NIC Multi-Queue](#), NIC multi-queue has been enabled on the ECS by default. Therefore, you do not need to perform the operations described in this section.
- In the ECS was created using a private image and the external image file is listed in [Support of NIC Multi-Queue](#), perform the following operations to enable NIC multi-queue:
  - a. [Importing the External Image File to the IMS Console](#)
  - b. [Setting NIC Multi-Queue for the Image](#)
  - c. [Creating an ECS Using a Private Image](#)
  - d. [Running the Script for Configuring NIC Multi-Queue](#)

#### NOTE

After NIC multi-queue is enabled on an ECS, you need to enable this function on the ECS again after you add or delete a NIC or change the VPC for the ECS. For details, see [Running the Script for Configuring NIC Multi-Queue](#).

### Support of NIC Multi-Queue

NIC multi-queue can be enabled on an ECS only when the ECS specifications, virtualization type, and image OS meet the requirements described in this section.

- For details about the ECS specifications that support NIC multi-queue, see [ECS Types](#).

#### NOTE

If the number of NIC queues is greater than 1, NIC multi-queue is supported.

- Only KVM ECSs support NIC multi-queue.
- The Linux public images listed in [Table 5-2](#) support NIC multi-queue.



 NOTE

- Windows OSs have not commercially supported NIC multi-queue. If you enable NIC multi-queue in a Windows image, starting an ECS created using such an image may be slow.
- It is a good practice to upgrade the kernel version of the Linux ECS to 2.6.35 or later. Otherwise, NIC multi-queue is not supported.  
Run the **uname -r** command to obtain the kernel version. If the kernel version is earlier than 2.6.35, contact customer service to upgrade the kernel.

**Table 5-1** Support of NIC multi-queue for Windows ECSs

| Image                                                       | Status                         |
|-------------------------------------------------------------|--------------------------------|
| Windows Server 2008 WEB R2 64bit                            | Supported using private images |
| Windows Server 2008 Enterprise SP2 64bit                    | Supported using private images |
| Windows Server 2008 R2 Standard/DataCenter/Enterprise 64bit | Supported using private images |
| Windows Server 2008 R2 Enterprise 64bit_WithGPUdriver       | Supported using private images |
| Windows Server 2012 R2 Standard 64bit_WithGPUdriver         | Supported using private images |
| Windows Server 2012 R2 Standard/DataCenter 64bit            | Supported using private images |

**Table 5-2** Support of NIC multi-queue for Linux ECSs

| Image                                            | Support of NIC Multi-Queue | NIC Multi-Queue Enabled by Default |
|--------------------------------------------------|----------------------------|------------------------------------|
| Ubuntu 14.04/16.04 server 64bit                  | Yes                        | Yes                                |
| OpenSUSE 42.2 64bit                              | Yes                        | Yes                                |
| SUSE Enterprise 12 SP1/SP2 64bit                 | Yes                        | Yes                                |
| CentOS 6.8/6.9/7.0/7.1/7.2/7.3/7.4/7.5/7.6 64bit | Yes                        | Yes                                |
| Debian 8.0.0/8.8.0/8.9.0/9.0.0 64bit             | Yes                        | Yes                                |
| Fedora 24/25 64bit                               | Yes                        | Yes                                |
| EulerOS 2.2 64bit                                | Yes                        | Yes                                |

## Importing the External Image File to the IMS Console

For details, see "Registering an Image File as a Private Image" in *Image Management Service User Guide*. After the image file is imported, view the value of **NIC Multi-Queue** on the page providing details about the image.

- If the value is **Supported**, go to [Creating an ECS Using a Private Image](#).
- If the value is **Not supported**, go to [Setting NIC Multi-Queue for the Image](#).

## Setting NIC Multi-Queue for the Image

Windows OSs have not commercially supported NIC multi-queue. If you enable NIC multi-queue in a Windows image, starting an ECS created using such an image may be slow.

Use one of the following methods to set the NIC multi-queue attribute:

### Method 1:

1. Log in to the management console.
2. Under **Computing**, click **Image Management Service**.
3. Click the **Private Images** tab, locate the row containing the target image, click **Modify** in the **Operation** column.
4. Set the NIC multi-queue attribute of the image.

### Method 2:

1. Log in to the management console.
2. Under **Computing**, click **Image Management Service**.
3. Click the **Private Images** tab. In the image list, click the name of the target image to switch to the page providing details about the image.
4. Click **Modify** in the upper right corner. In the displayed **Modify Image** dialog box, set the NIC multi-queue attribute.

### Method 3: Add `hw_vif_multiqueue_enabled` to an image through the API.

1. For instructions about how to obtain the token, see [Authentication](#).
2. For instructions about how to call an API to update image information, see [Updating Image Information \(Native OpenStack API\)](#).
3. Add **X-Auth-Token** to the request header.  
The value of **X-Auth-Token** is the token obtained in step 1.
4. Add **Content-Type** to the request header.

The value of **Content-Type** is **application/openstack-images-v2.1-json-patch**.

The request URI is in the following format:

PATCH /v2/images/{image\_id}

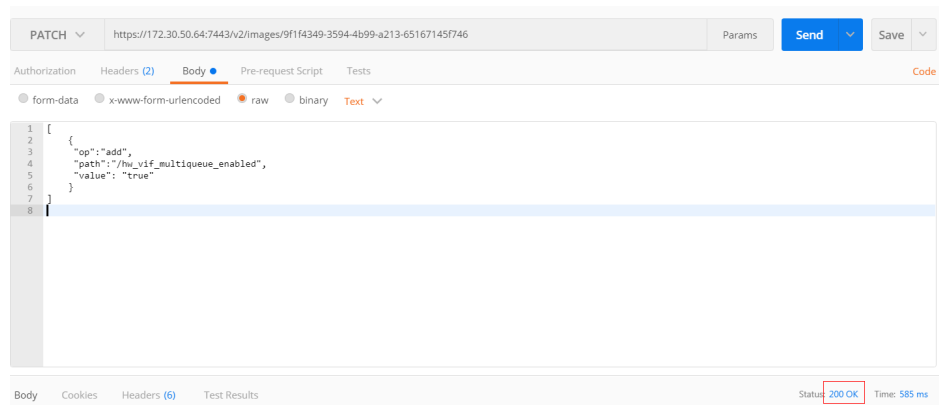
The request body is as follows:

```
[
 {
 "op": "add",
 "path": "/hw_vif_multiqueue_enabled",
 "value": "true"
 }
]
```

```
] }
]
```

**Figure 5-2** shows an example request body for modifying the NIC multi-queue attribute.

**Figure 5-2** Example request body



## Creating an ECS Using a Private Image

Create an ECS using a registered private image. Note the following when setting the parameters:

- **Region:** Select the region where the private image is located.
- **Image:** Select **Private image** and then the desired image from the drop-down list.

## Running the Script for Configuring NIC Multi-Queue

Windows OSs have not commercially supported NIC multi-queue. If you enable NIC multi-queue in a Windows image, starting an ECS created using such an image may be slow.

A script for automatically enabling NIC multi-queue on a Linux ECS is available. After the script is configured, the ECS supports NIC multi-queue.

1. Download the configuration script **multi-queue-hw**.  
URL: <https://ecs-instance-driver.obs.cn-north-1.myhuaweicloud.com/multi-queue-hw>
2. Run the following command to assign execution permissions to the script:  
**chmod +x multi-queue-hw**
3. Run the following command to move the **multi-queue-hw** script to the **/etc/init.d** directory:  
**mv multi-queue-hw /etc/init.d**
4. Run the following command to run the script:  
**/etc/init.d/multi-queue-hw start**  
The script takes effect immediately after being executed. However, after the ECS is stopped, NIC multi-queue automatically becomes invalid.
5. Add startup configuration for each OS so that NIC multi-queue automatically enables upon the ECS startup.

- For CentOS, Red Hat, Fedora, EulerOS, SUSE, and OpenSUSE, run the following command:  
**chkconfig multi-queue-hw on**
- For Ubuntu, run the following command:  
**update-rc.d multi-queue-hw defaults 90 10**
- For Debian, run the following command:  
**systemctl enable multi-queue-hw**

## 5.8 Dynamically Assigning IPv6 Addresses

### Scenarios

IPv6 addresses are used to deal with the problem of IPv4 address exhaustion. If an ECS uses an IPv4 address, the ECS can run in dual-stack mode after IPv6 is enabled. That is, the ECS has two IP addresses: an IPv4 address and an IPv6 address. Both IP addresses can be used to access the intranet or public network.

Some ECSs created according to the network environment requirements in [Constraints](#) cannot dynamically acquire IPv6 addresses. If an ECS is created from a public image, the following requirements must be met:

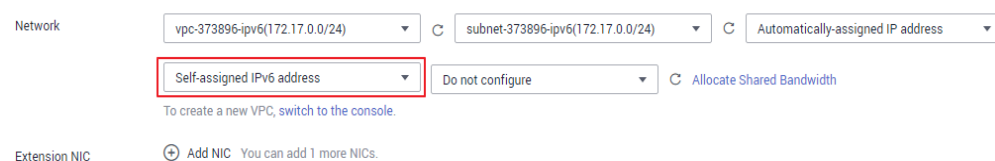
- By default, dynamic IPv6 address assignment is enabled for Windows public images. You do not need to configure it. The operations in [Windows](#) are for your reference only.
- Before enabling dynamic IPv6 address assignment for a Linux public image, check whether IPv6 is supported and then check whether dynamic IPv6 address assignment has been enabled. Currently, all Linux public images support IPv6, and dynamic IPv6 address assignment is enabled for the Ubuntu 16 OS by default. That is, you do not need to configure dynamic IPv6 address assignment for the Ubuntu 16 OS. For other Linux public images, you need to enable this function.

In addition, this document provides the methods for both automatically and manually configuring IPv6 addresses (see [Linux \(Automatic Configuration of IPv6\)](#) and [Linux \(Manual Configuration of IPv6\)](#)). The automatic configuration is recommended.

### Constraints

- Ensure that IPv6 has been enabled on the subnet where the ECS works. For details about how to enable IPv6 on a subnet, see [IPv4 and IPv6 Dual-Stack Network](#).
- Ensure that **Self-assigned IPv6 address** is selected during ECS creation.

**Figure 5-3** Self-assigned IPv6 address



- After the ECS is started, hot-swappable NICs cannot automatically acquire IPv6 addresses.
- Only ECSs can work in the dual-stack network. BMSs do not support this function.
- Only one IPv6 address can be bound to each NIC.

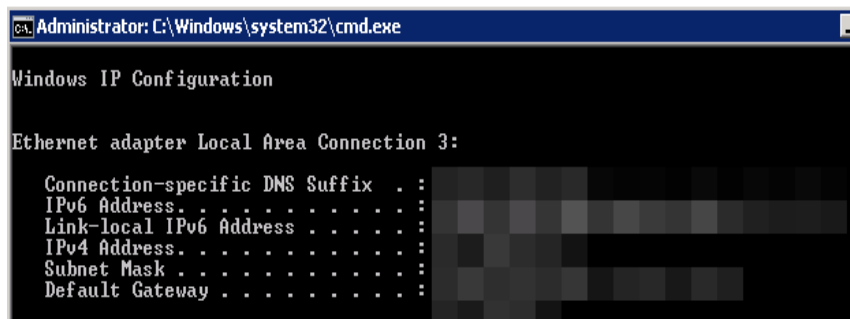
## Windows

**Step 1** Run the following command in the CMD window to check whether IPv6 is enabled for the ECS:

### ipconfig

- If IPv6 is enabled, an IPv6 address is displayed.

**Figure 5-4** Querying the IPv6 address



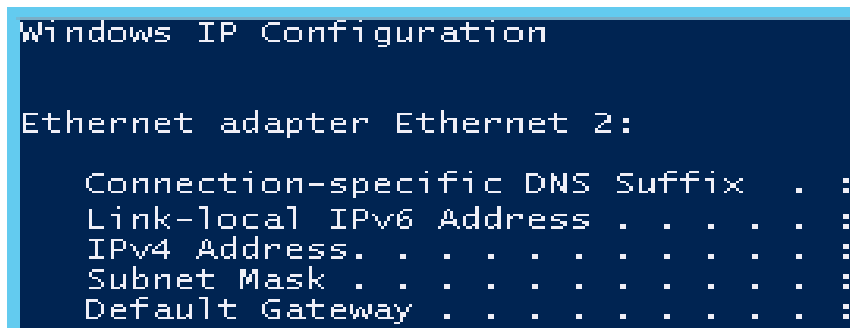
```
Administrator: C:\Windows\system32\cmd.exe
Windows IP Configuration

Ethernet adapter Local Area Connection 3:

 Connection-specific DNS Suffix . :
 IPv6 Address. :
 Link-local IPv6 Address :
 IPv4 Address. :
 Subnet Mask :
 Default Gateway :
```

- If only an IPv6 local link address is displayed, IPv6 addresses cannot be dynamically acquired. Go to [Step 2](#).

**Figure 5-5** IPv6 local link address



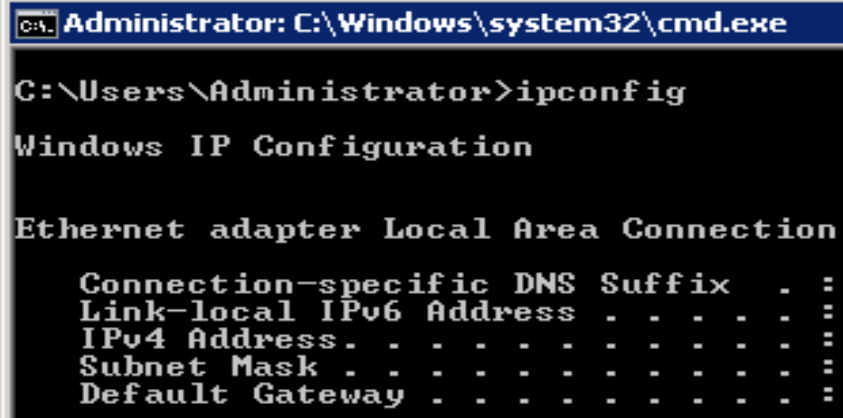
```
Windows IP Configuration

Ethernet adapter Ethernet 2:

 Connection-specific DNS Suffix . :
 Link-local IPv6 Address :
 IPv4 Address. :
 Subnet Mask :
 Default Gateway :
```

- If IPv6 is disabled, no IPv6 address is displayed. Go to [Step 3](#).

Figure 5-6 IPv6 disabled



```
Administrator: C:\Windows\system32\cmd.exe
C:\Users\Administrator>ipconfig

Windows IP Configuration

Ethernet adapter Local Area Connection:

 Connection-specific DNS Suffix . :
 Link-local IPv6 Address :
 IPv4 Address. :
 Subnet Mask :
 Default Gateway :
```

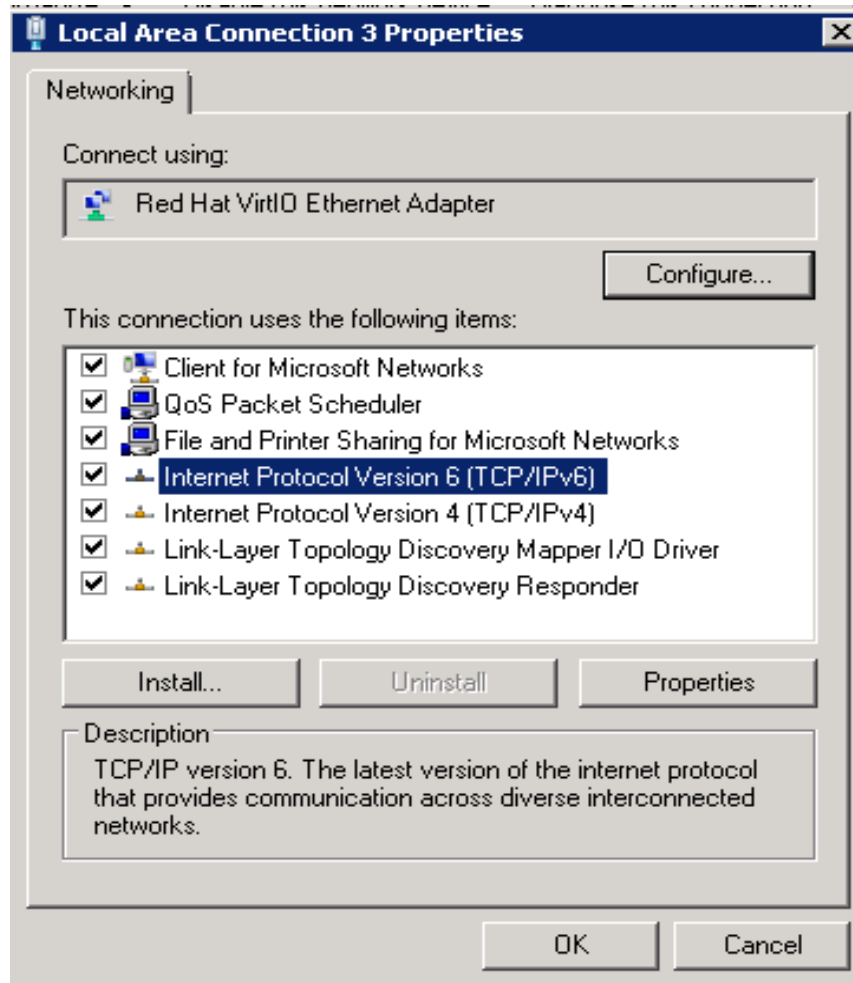
 NOTE

By default, dynamic IPv6 address assignment is enabled for Windows public images (case 1). No special configuration is required.

**Step 2** Configure dynamic IPv6 address assignment. (Windows Server 2008 is used as an example.)

1. Choose **Start > Control Panel**.
2. Click **Network and Sharing Center**.
3. Click **Change adapter settings**.
4. Right-click **Local Connection** and choose **Properties**.
5. Select **Internet Protocol Version 6 (TCP/IPv6)** and click **OK**.

**Figure 5-7** Configuring dynamic IPv6 address assignment

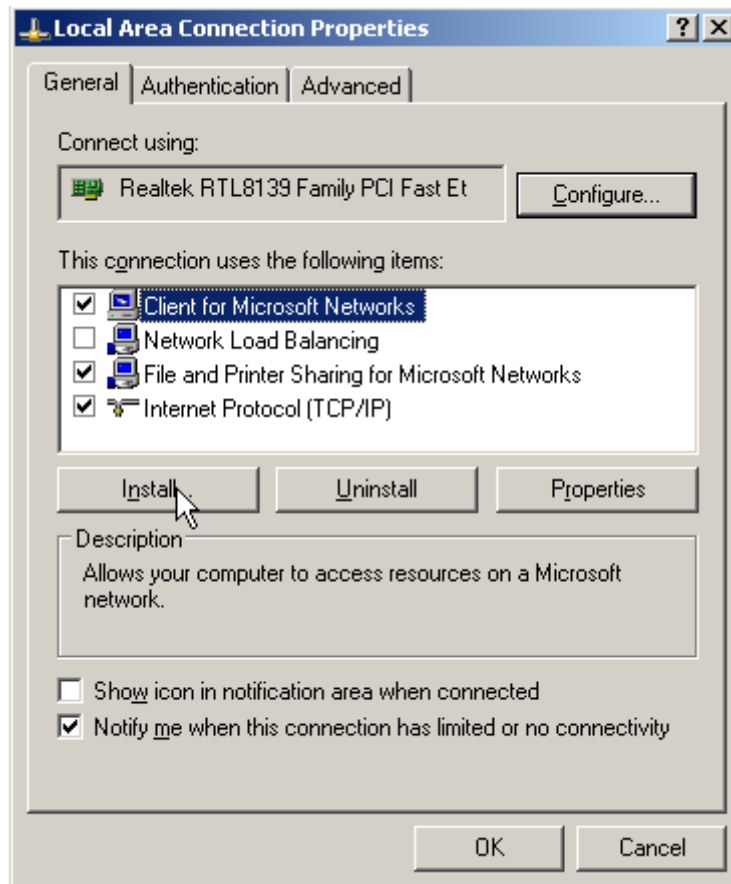


6. Perform **Step 1** to check whether dynamic IPv6 address assignment is enabled.

**Step 3** Enable and configure IPv6.

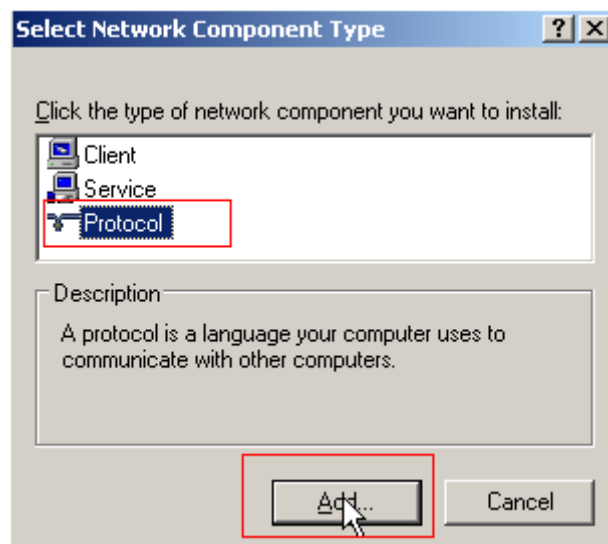
1. Choose **Start > Control Panel > Network Connection > Local Connection**.
2. Select **Properties**, select the following options, and click **Install**.

Figure 5-8 Enabling and configuring IPv6



3. Select **Protocol** and click **Add**.

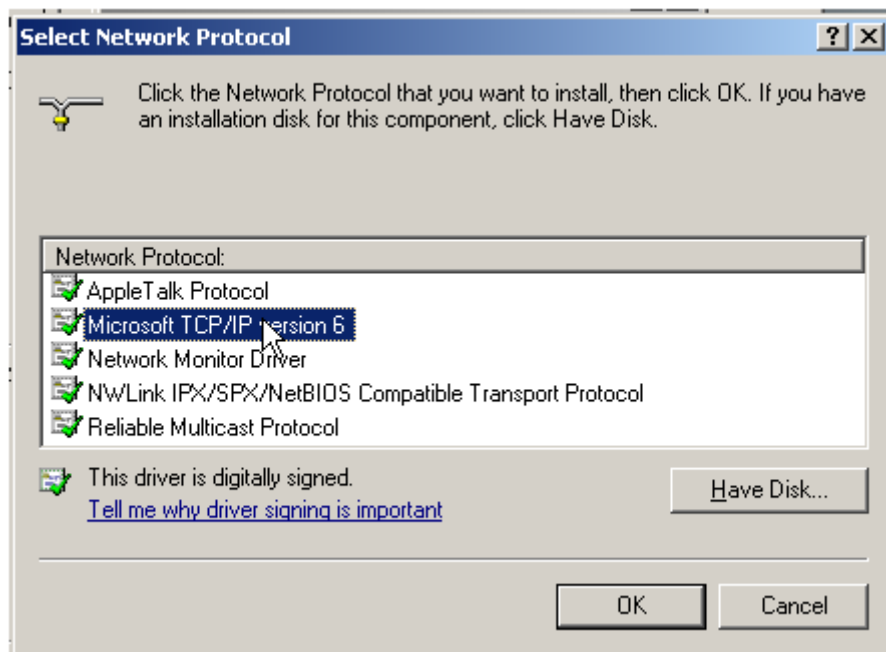
Figure 5-9 Adding the protocol



4. Select **Microsoft TCP/IP Version 6** and click **OK**.



Figure 5-10 Network protocols



5. (Optional) Run the following commands depending on your OS.
  - If the ECS runs Windows Server 2008, run the following command in PowerShell or CMD:  
**netsh interface ipv6 set global randomizeidentifiers=disable**  
Disable the local connection and then enable it again.  
To disable the local connection, choose **Start > Control Panel > Network and Internet > Network and Sharing Center > Change Adapter Options**. Right-click the local connection and choose **Disable** from the shortcut menu.  
To enable the local connection, choose **Start > Control Panel > Network and Internet > Network and Sharing Center > Change Adapter Options**. Right-click the local connection and choose **Enable** from the shortcut menu.
  - If the ECS runs Windows Server 2012/2016, run the following command in PowerShell:  
**Set-NetIPv6Protocol -RandomizeIdentifiers disabled**
6. Perform [Step 1](#) to check whether dynamic IPv6 address assignment is enabled.

----End

## Linux (Automatic Configuration of IPv6)

The **ipv6-setup-xxx** tool can be used to enable Linux OSs to automatically acquire IPv6 addresses. *xxx* indicates a tool, which can be *rhel* or *debian*.

You can also enable IPv6 by following the instructions in [Linux \(Manual Configuration of IPv6\)](#).

**CAUTION**

- When the **ipv6-setup-xxx** tool is running, the network service is automatically restarted. As a result, the network is temporarily unavailable.
- After automatic IPv6 address assignment is configured on an ECS running CentOS 6.x or Debian, the ECS will be created as a private image. When this image is used to create an ECS in an environment that IPv6 is unavailable, the ECS may start slow because acquiring an IPv6 address times out. Before creating the private image, you can set the timeout duration for acquiring IPv6 addresses to 30s by referring to [Setting the Timeout Duration for IPv6 Address Acquisition](#).

**Step 1** Run the following command to check whether IPv6 is enabled for the ECS:

**ip addr**

- If IPv6 is disabled, only an IPv4 address is displayed. Enable IPv6 by referring to [Step 2](#).

**Figure 5-11** IPv6 disable

```
eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP group default qlen 1000
link/ether fa:16:3e:e6:42:c6 brd ff:ff:ff:ff:ff:ff
inet 192.168.22.171/24 brd 192.168.22.255 scope global noprefixroute dynamic eth0
 valid_lft 86351sec preferred_lft 86351sec
```

- If IPv6 is enabled, you can see an LLA address (starting with fe80).

**Figure 5-12** IPv6 enabled

```
eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP group default qlen 1000
link/ether fa:16:3e:e6:d2:c6 brd ff:ff:ff:ff:ff:ff
inet 192.168.22.171/24 brd 192.168.22.255 scope global noprefixroute dynamic eth0
 valid_lft 86319sec preferred_lft 86319sec
inet6 fe80::f816:3eff:fee6:d2c6/64 scope link
 valid_lft forever preferred_lft forever
```

- If IPv6 is enabled and an IPv6 address is acquired, the following is displayed:

**Figure 5-13** IPv6 enabled and an IPv6 address acquired

```
eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP qlen 1000
link/ether fa:16:3e:36:c7:e9 brd ff:ff:ff:ff:ff:ff
inet 192.168.1.21/24 brd 192.168.1.255 scope global dynamic eth0
 valid_lft 69057sec preferred_lft 69057sec
inet6 2001:db8:a583:20:867e:75d1:7e48:1dfc/64 scope global dynamic
 valid_lft 7431sec preferred_lft 7431sec
inet6 fe80::f816:3eff:fe36:c7e9/64 scope link
 valid_lft forever preferred_lft forever
```

**NOTE**

IPv6 is enabled for Linux public images by default ([case 2](#)). IPv6 is enabled and an IPv6 address is acquired for Ubuntu 16 public images by default ([case 3](#)). No special configuration is required.

**Step 2** Enable IPv6 for the Linux ECS.

1. Run the following command to check whether the kernel supports IPv6:  
**sysctl -a | grep ipv6**
  - If a command output is displayed, the kernel supports IPv6.

- If no information is displayed, the kernel does not support IPv6. In this case, go to [Step 2.2](#) to load the IPv6 module.
2. Run the following command to load the IPv6 module:  
**modprobe ipv6**
  3. Add the following content to the `/etc/sysctl.conf` file:  
**net.ipv6.conf.all.disable\_ipv6=0**
  4. Save the configuration and exit. Then, run the following command to load the configuration:  
**sysctl -p**

**Step 3** Enable automatic configuration of IPv6.

1. Download the required **ipv6-setup-rhel** or **ipv6-setup-debian** and upload it to the target ECS.

**ipv6-setup-xxx** adds or modifies the configuration file of the NIC, adds the configuration information for dynamically acquiring IPv6 addresses, and restarts the NIC or network service. [Table 5-3](#) lists the download paths of **ipv6-setup-rhel** and **ipv6-setup-debian**.

**Table 5-3** ipv6-setup-rhel and ipv6-setup-debian download paths

| Series | Release Version                                                                                                | How to Obtain                                                                                                                                                                         |
|--------|----------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| RHEL   | <ul style="list-style-type: none"> <li>- CentOS 6/7</li> <li>- EulerOS 2.2/2.3</li> <li>- Fedora 25</li> </ul> | <a href="https://ecs-instance-driver.obs.cn-north-1.myhuaweicloud.com/ipv6/ipv6-setup-rhel">https://ecs-instance-driver.obs.cn-north-1.myhuaweicloud.com/ipv6/ipv6-setup-rhel</a>     |
| Debian | <ul style="list-style-type: none"> <li>- Ubuntu 16/18</li> <li>- Debian 8/9</li> </ul>                         | <a href="https://ecs-instance-driver.obs.cn-north-1.myhuaweicloud.com/ipv6/ipv6-setup-debian">https://ecs-instance-driver.obs.cn-north-1.myhuaweicloud.com/ipv6/ipv6-setup-debian</a> |

2. Run the following command to assign execution permissions to **ipv6-setup-xxx**:  
**chmod +x ipv6-setup-xxx**
3. Run the following command to enable dynamic IPv6 address assignment for a NIC:

```
./ipv6-setup-xxx --dev [dev]
```

Example:

```
./ipv6-setup-xxx --dev eth0
```

**NOTE**

- To enable dynamic IPv6 address assignment for all NICs, run the **./ipv6-setup-xxx** command.
- To learn how to use **ipv6-setup-xxx**, run the **./ipv6-setup-xxx --help** command.

----End

## Linux (Manual Configuration of IPv6)

### ⚠ CAUTION

After automatic IPv6 address assignment is configured on an ECS running CentOS 6.x or Debian, the ECS will be created as a private image. When this image is used to create an ECS in an environment that IPv6 is unavailable, the ECS may start slow because acquiring an IPv6 address times out. Before creating the private image, you can set the timeout duration for acquiring IPv6 addresses to 30s by referring to [Setting the Timeout Duration for IPv6 Address Acquisition](#).

**Step 1** Run the following command to check whether IPv6 is enabled for the ECS:

#### ip addr

- If IPv6 is disabled, only an IPv4 address is displayed. Enable IPv6 by referring to [Step 2](#).

Figure 5-14 IPv6 disabled

```
eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP group default qlen 1000
link/ether fa:16:3e:e6:d2:c6 brd ff:ff:ff:ff:ff:ff
inet 192.168.22.171/24 brd 192.168.22.255 scope global noprefixroute dynamic eth0
 valid_lft 86351sec preferred_lft 86351sec
```

- If IPv6 is enabled, you can see an LLA address (starting with fe80).

Figure 5-15 IPv6 enabled

```
eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP group default qlen 1000
link/ether fa:16:3e:e6:d2:c6 brd ff:ff:ff:ff:ff:ff
inet 192.168.22.171/24 brd 192.168.22.255 scope global noprefixroute dynamic eth0
 valid_lft 86319sec preferred_lft 86319sec
inet6 fe80::f816:3eff:fe6:d2c6/64 scope link
 valid_lft forever preferred_lft forever
```

- If IPv6 is enabled and an IPv6 address is acquired, the following is displayed:

Figure 5-16 IPv6 enabled and an IPv6 address acquired

```
eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP qlen 1000
link/ether fa:16:3e:36:c7:e9 brd ff:ff:ff:ff:ff:ff
inet 192.168.1.21/24 brd 192.168.1.255 scope global dynamic eth0
 valid_lft 69057sec preferred_lft 69057sec
inet6 2001:db8:a583:20:867e:75d1:7e48:1dfc/64 scope global dynamic
 valid_lft 7431sec preferred_lft 7431sec
inet6 fe80::f816:3eff:fe36:c7e9/64 scope link
 valid_lft forever preferred_lft forever
```

### 📖 NOTE

IPv6 is enabled for Linux public images by default ([case 2](#)). IPv6 is enabled and an IPv6 address is acquired for Ubuntu 16 public images by default ([case 3](#)). No special configuration is required.

**Step 2** Enable IPv6 for the Linux ECS.

1. Run the following command to check whether the kernel supports IPv6:

#### sysctl -a | grep ipv6

- If a command output is displayed, the kernel supports IPv6.
- If no information is displayed, the kernel does not support IPv6. In this case, go to [Step 2.2](#) to load the IPv6 module.

2. Run the following command to load the IPv6 module:  
**modprobe ipv6**
3. Add the following content to the `/etc/sysctl.conf` file:  
**net.ipv6.conf.all.disable\_ipv6=0**
4. Save the configuration and exit. Then, run the following command to load the configuration:  
**sysctl -p**

**Step 3** Enable IPv6 manually. The procedure varies depending on the OS.

- Enable dynamic IPv6 address assignment for an ECS running Ubuntu.

 **NOTE**


For Ubuntu 18.04, perform the following steps. For Ubuntu 16.04, skip these steps because IPv6 is enabled by default.

- a. Add the following content below **iface eth0 inet dhcp** in the `/etc/network/interfaces` configuration file:  

```
iface eth0 inet6 dhcp
```
  - b. (Optional) Set the IPv6 LLA generation mode of the NIC to EUI64.  

```
nmcli con modify "Wired connection 1" ipv6.addr-gen-mode eui64
```
  - c. Run the following commands to restart the network service:  
**ifdown eth0**  
**ifup eth0**
- Enable dynamic IPv6 address assignment for the ECS running Debian.
    - a. Add the following content to the `/etc/network/interfaces` file:  

```
auto lo
iface lo inet loopback
auto eth0
iface eth0 inet dhcp
iface eth0 inet6 dhcp
pre-up sleep 3
```
    - b. If there are multiple NICs, add the NIC configurations in the `/etc/network/interfaces` file. The following uses eth1 as an example:  

```
auto eth1
iface eth1 inet dhcp
iface eth1 inet6 dhcp
pre-up sleep 3
```
    - c. Run the following command to restart the network service:  
**service networking restart**
-  **NOTE**
- If an IPv6 address cannot be acquired after the NICs are brought down and up, you can run this command to restart the network.
- d. Perform [Step 1](#) to check whether dynamic IPv6 address assignment is enabled.
- Enable dynamic IPv6 address assignment for an ECS running CentOS, EulerOS, or Fedora.
    - a. Open the primary NIC configuration file `/etc/sysconfig/network-scripts/ifcfg-eth0`.  
Add the following configuration items to the file:

```
IPV6INIT=yes
DHCPV6C=yes
```

- b. Edit the `/etc/sysconfig/network` file to add or modify the following line:  
`NETWORKING_IPV6=yes`
- c. For the NICs of an ECS running CentOS 6, you need to edit the corresponding configuration files. For example, if the NIC is `eth1`, you need to edit `/etc/sysconfig/network-scripts/ifcfg-eth1`.

Add the following configuration items to the file:

```
IPV6INIT=yes
DHCPV6C=yes
```

In CentOS 6.3, `dhcpv6-client` requests are filtered by `ip6tables` by default. Therefore, modify the `ifcfg-eth*` file and add an `ip6tables` rule that allows the `dhcpv6-client` request for CentOS 6.3. To do so, perform the following operations:

- i. Run the following command to add the `ip6tables` rule:  
**`ip6tables -A INPUT -m state --state NEW -m udp -p udp --dport 546 -d fe80::/64 -j ACCEPT`**
- ii. Run the following command to save the `ip6tables` rule:  
**`service ip6tables save`**

Figure 5-17 Example command

```
root@ecs-cd02 log]# ip6tables -A INPUT -m state --state NEW -m udp -p udp --dport 546 -d fe80::/64 -j ACCEPT
nf_comtrack version 0.5.0 (7964 buckets, 31856 max)
root@ecs-cd02 log]# service ip6tables save
ip6tables: Saving firewall rules to /etc/sysconfig/ip6tablef OK]
```

- d. (Optional) For CentOS 7, change the IPv6 LLA address mode of the extension NIC to `EUI64`.
  - i. Run the following command to query the NIC information:  
**`nmcli con`**

Figure 5-18 Viewing NIC information

```
root@ecs-test ~]# nmcli con
NAME UUID TYPE DEVICE
System eth0 5fb86bd0-8bbb-7ffb-45f1-d6edd65f3e83 ethernet eth0
Wired connection 1 75ff6bd0-b4e8-39da-a2c4-4cdbl1e9214f8 ethernet eth1
Wired connection 2 073de2f4-7181-3f87-9351-f06539da2357 ethernet eth2
```

- ii. Run the following command to change the IPv6 Link Local Address (LLA) mode of `eth1` to `EUI64`:  
**`nmcli con modify "Wired connection 1" ipv6.addr-gen-mode eui64`**
  - iii. Run the following commands to bring `eth1` down and up:  
**`ifdown eth1`**  
**`ifup eth1`**
- e. Restart the network.
  - i. For CentOS 6, run the following command to restart the network:  
**`service network restart`**
  - ii. For CentOS 7, EulerOS, and Fedora, run the following command to restart the network:  
**`systemctl restart NetworkManager`**

- f. Perform [Step 1](#) to check whether dynamic IPv6 address assignment is enabled.
- Enable dynamic IPv6 address assignment for the ECS running SUSE, openSUSE, or CoreOS.  
SUSE 11 SP4 does not support dynamic IPv6 address assignment.  
No special configuration is required for SUSE 12 SP1 or SUSE 12 SP2.  
No special configuration is required for openSUSE 13.2 or openSUSE 42.2.  
No special configuration is required for CoreOS 10.10.5.

----End

## Setting the Timeout Duration for IPv6 Address Acquisition

After automatic IPv6 address assignment is configured on an ECS running CentOS 6.x or Debian, the ECS will be created as a private image. When this image is used to create an ECS in an environment that IPv6 is unavailable, the ECS may start slow because acquiring an IPv6 address times out. Before creating the private image, you can set the timeout duration for acquiring IPv6 addresses to 30s by following the instructions in this section.

- CentOS 6.x:
  - a. Run the following command to edit the **dhclient.conf** file:  
**vi /etc/dhcp/dhclient.conf**
  - b. Press *i* to enter editing mode and add the timeout attribute to the file.  
timeout 30;
  - c. Enter **:wq** to save the settings and exit.
- Debian 7.5:
  - a. Run the following command to edit the **networking** file:  
**vi /etc/init.d/networking**
  - b. Press *i* to enter editing mode and add the timeout attribute.

Figure 5-19 Modification 1

```
115 case "$1" in
116 start)
117 if init_is_upstart; then
118 exit 1
119 fi
120 process_options
121 check_ifstate
122
123 if ["$CONFIGURE_INTERFACES" = no]
124 then
125 log_action_msg "Not configuring network interfaces, see /etc/default/networking"
126 exit 0
127 fi
128 set -f
129 exclusions=$(process_exclusions)
130 log_action_begin_msg "Configuring network interfaces"
131 if /usr/bin/timeout 30 ifup -a $exclusions $verbose && ifup_hotplug $exclusions $verbose
132 then
133 log_action_end_msg $?
134 else
135 log_action_end_msg $?
136 fi
137 ;;
138
139 stop)
140 if init_is_upstart; then
141 exit 0
142 fi
143 check_network_file_systems
144 check_network_swap
145
146 log_action_begin_msg "Deconfiguring network interfaces"
147 if /usr/bin/timeout 30 ifdown -a --exclude=lo $verbose; then
148 log_action_end_msg $?
```

Figure 5-20 Modification 2

```
154 reload)
155 process_options
156
157 log_action_begin_msg "Reloading network interfaces configuration"
158 state=$(cat /run/network/ifstate)
159 [c] /usr/bin/timeout 30 ifdown -a --exclude=lo $verbose || true
160 [c] /usr/bin/timeout 30 ifup --exclude=lo $state $verbose ; then
161 log_action_end_msg $?
162 else
163 log_action_end_msg $?
164 fi
165 ;;
166
167 force-reload|restart)
168 if init_is_upstart; then
169 exit 1
170 fi
171 process_options
172
173 log_warning_msg "Running $0 $1 is deprecated because it may not re-enable some interfaces"
174 log_action_begin_msg "Reconfiguring network interfaces"
175 [c] /usr/bin/timeout 30 ifdown -a --exclude=lo $verbose || true
176 set -f
177 exclusions=$(process_exclusions)
178 [c] if /usr/bin/timeout 30 ifup -a --exclude=lo $exclusions $verbose && ifup_hotplug $exclusions $verbose
179 then
180 log_action_end_msg $?
181 else
182 log_action_end_msg $?
```

- Debian 8.2.0/8.8.0
  - a. Run the following command to edit the **network-pre.conf** file:  
**vi /lib/systemd/system/networking.service.d/network-pre.conf**
  - b. Press **/** to enter editing mode and add the timeout attribute to the file.  
[Service]  
TimeoutStartSec=30
- Debian 9.0
  - a. Run the following command to edit the **networking.service** file:  
**vi /etc/systemd/system/network-online.target.wants/networking.service**
  - b. Press **i** to enter editing mode and change **TimeoutStartSec=5min** to **TimeoutStartSec=30**.



# 6 Security

---

## 6.1 Security Groups

### 6.1.1 Overview

#### Security Group

A security group is a collection of access control rules for ECSs that have the same security protection requirements and that are mutually trusted. After a security group is created, you can create various access rules for the security group, these rules will apply to all ECSs added to this security group.

You can also customize a security group or use the default one. The system provides a default security group for you, which permits all outbound traffic and denies inbound traffic. ECSs in a security group are accessible to each other. For details about the default security group, see [Default Security Group and Rules](#).

#### NOTE

If two ECSs are in the same security group but in different VPCs, the security group does not take effect. You can use a VPC peering connection to connect the two VPCs first. For details, see [VPC Connection](#).

#### Security Group Rules

After a security group is created, you can add rules to the security group. A rule applies either to inbound traffic (ingress) or outbound traffic (egress). After ECSs are added to the security group, they are protected by the rules of that group.

Each security group has default rules. For details, see [Default Security Group and Rules](#). You can also customize security group rules. For details, see [Configuring Security Group Rules](#).

#### Security Group Constraints

- By default, you can create a maximum of 100 security groups in your cloud account.

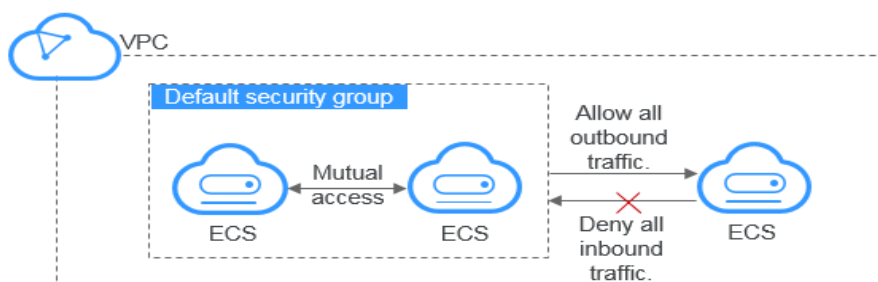
- By default, you can add up to 50 security group rules to a security group.
- By default, you can add an ECS or an ECS extension NIC to a maximum of five security groups. In such a case, the rules of all the selected security groups are aggregated to take effect.
- You can add a maximum of 20 instances to a security group at a time.
- You can add a maximum of 1000 instances to each security group.

## 6.1.2 Default Security Group and Rules

Your account automatically comes with a default security group (**Sys-default**). The default security group allows all outbound traffic, denies all inbound traffic, and allows all traffic between ECSs in the group. Your ECSs in this security group can communicate with each other already without adding additional rules.

**Figure 6-1** shows the default security group.

**Figure 6-1** Default security group



**Table 6-1** describes default security group rules.

**Table 6-1** Rules in the default security group (**Sys-default**)

| Direction | Protocol | Port/Range | Source/Destination                                         | Description                                                                                                       |
|-----------|----------|------------|------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|
| Outbound  | All      | All        | Destination: 0.0.0.0/0                                     | Allows all outbound traffic.                                                                                      |
| Inbound   | All      | All        | Source: the current security group (for example, sg-xxxxx) | Allows communication among ECSs within the security group and denies all inbound traffic (incoming data packets). |
| Inbound   | TCP      | 22         | Source: 0.0.0.0/0                                          | Allows all IP addresses to access Linux ECSs over SSH.                                                            |

| Direction | Protocol | Port/Range | Source/Destination | Description                                              |
|-----------|----------|------------|--------------------|----------------------------------------------------------|
| Inbound   | TCP      | 3389       | Source: 0.0.0.0/0  | Allows all IP addresses to access Windows ECSs over RDP. |

When you create an ECS for the first time, the system automatically creates two security groups, **Sys-WebServer** and **Sys-FullAccess** with the newly created VPC **vpc-default**. The following table lists the default rules configured for the two security groups.

**Table 6-2 Sys-WebServer security group rules**

| Transfer Direction | Protocol | Port Range | Source/Destination                                         | Description                                                                                                       |
|--------------------|----------|------------|------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|
| Outbound           | All      | All        | Destination: 0.0.0.0/0                                     | Allows all outbound traffic.                                                                                      |
| Inbound            | All      | All        | Source: the current security group (for example, sg-xxxxx) | Allows communication among ECSs within the security group and denies all inbound traffic (incoming data packets). |
| Inbound            | TCP      | 22         | Source: 0.0.0.0/0                                          | Allows all IP addresses to access Linux ECSs through SSH.                                                         |
| Inbound            | TCP      | 3389       | Source: 0.0.0.0/0                                          | Allows all IP addresses to access Windows ECSs through RDP.                                                       |
| Inbound            | ICMP     | All        | Source: 0.0.0.0/0                                          | Allows ping operations.                                                                                           |
| Inbound            | TCP      | 443        | Source: 0.0.0.0/0                                          | Allows web page access through HTTPS.                                                                             |

**Table 6-3 Sys-FullAccess** security group rules

| Transfer Direction | Protocol | Port Range | Source/Destination                                         | Description                                                                                                       |
|--------------------|----------|------------|------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|
| Outbound           | All      | All        | Destination: 0.0.0.0/0                                     | Allows all outbound traffic.                                                                                      |
| Inbound            | All      | All        | Source: the current security group (for example, sg-xxxxx) | Allows communication among ECSs within the security group and denies all inbound traffic (incoming data packets). |
| Inbound            | All      | All        | Source: 0.0.0.0/0                                          | Allows all inbound traffic.                                                                                       |

### 6.1.3 Security Group Configuration Examples

Common security group configuration examples are as follows: The following examples allow all outgoing data packets by default and only describe how to configure the inbound rules of a security group.

- [Enabling ECSs in Different Security Groups to Communicate with Each Other Through an Internal Network](#)
- [Enabling Specified IP Addresses to Remotely Access ECSs in a Security Group](#)
- [Remotely Connecting to Linux ECSs Using SSH](#)
- [Remotely Connecting to Windows ECSs Using RDP](#)
- [Enabling Communication Between ECSs](#)
- [Hosting a Website on ECSs](#)
- [Enabling an ECS to Function as a DNS Server](#)
- [Uploading or Downloading Files Using FTP](#)

#### Enabling ECSs in Different Security Groups to Communicate with Each Other Through an Internal Network

- Example scenario:  
Resources on an ECS in a security group need to be copied to an ECS associated with another security group. The two ECSs are in the same VPC. We recommend that you enable private network communication between the ECSs and then copy the resources.
- Security group configuration:  
Within a given VPC, ECSs in the same security group can communicate with one another by default. However, ECSs in different security groups cannot communicate with each other by default. To enable these ECSs to communicate with each other, you need to add certain security group rules.

You can add an inbound rule to the security groups containing the ECSs to allow access from ECSs in the other security group. The required rule is as follows.

| Direction | Protocol/Application                               | Port               | Source                       |
|-----------|----------------------------------------------------|--------------------|------------------------------|
| Inbound   | Used for communication through an internal network | Port or port range | ID of another security group |

## Enabling Specified IP Addresses to Remotely Access ECSs in a Security Group

- Example scenario:  
To prevent ECSs from being attacked, you can change the port number for remote login and configure security group rules that allow only specified IP addresses to remotely access the ECSs.
- Security group configuration:  
To allow IP address **192.168.20.2** to remotely access Linux ECSs in a security group over the SSH protocol (port 22), you can configure the following security group rule.

| Direction | Protocol/Application | Port | Source                                                                          |
|-----------|----------------------|------|---------------------------------------------------------------------------------|
| Inbound   | SSH (22)             | 22   | IPv4 CIDR block or ID of another security group<br>For example, 192.168.20.2/32 |

## Remotely Connecting to Linux ECSs Using SSH

- Example scenario:  
After creating Linux ECSs, you can add a security group rule to enable remote SSH access to the ECSs.

### NOTE

The default security group comes with the following rule. If you use the default security group, you do not need to add this rule again.

- Security group rule:

| Direction | Protocol/Application | Port | Source    |
|-----------|----------------------|------|-----------|
| Inbound   | SSH (22)             | 22   | 0.0.0.0/0 |

## Remotely Connecting to Windows ECSs Using RDP

- Example scenario:

After creating Windows ECSs, you can add a security group rule to enable remote RDP access to the ECSs.

 **NOTE**

The default security group comes with the following rule. If you use the default security group, you do not need to add this rule again.

- Security group rule:

| Direction | Protocol/<br>Application | Port | Source    |
|-----------|--------------------------|------|-----------|
| Inbound   | RDP (3389)               | 3389 | 0.0.0.0/0 |

## Enabling Communication Between ECSs

- Example scenario:

After creating ECSs, you need to add a security group rule so that you can run the **ping** command to test communication between the ECSs.

- Security group rule:

| Direction | Protocol/<br>Application | Port | Source    |
|-----------|--------------------------|------|-----------|
| Inbound   | ICMP                     | All  | 0.0.0.0/0 |

## Hosting a Website on ECSs

- Example scenario:

If you deploy a website on your ECSs and require that your website be accessed over HTTP or HTTPS, you can add rules to the security group used by the ECSs that function as the web servers.

- Security group rule:

| Direction | Protocol/<br>Application | Port | Source    |
|-----------|--------------------------|------|-----------|
| Inbound   | HTTP (80)                | 80   | 0.0.0.0/0 |
| Inbound   | HTTPS (443)              | 443  | 0.0.0.0/0 |

## Enabling an ECS to Function as a DNS Server

- Example scenario:

If you need to use an ECS as a DNS server, you must allow TCP and UDP access from port 53 to the DNS server. You can add the following rules to the security group associated with the ECS.

- Security group rules:

| Direction | Protocol/<br>Application | Port | Source    |
|-----------|--------------------------|------|-----------|
| Inbound   | TCP                      | 53   | 0.0.0.0/0 |
| Inbound   | UDP                      | 53   | 0.0.0.0/0 |

## Uploading or Downloading Files Using FTP

- Example scenario:

If you want to use File Transfer Protocol (FTP) to upload files to or download files from ECSs, you need to add a security group rule.

### NOTE

You must first install the FTP server program on the ECSs and check whether ports 20 and 21 are working properly.

- Security group rule:

| Direction | Protocol/<br>Application | Port  | Source    |
|-----------|--------------------------|-------|-----------|
| Inbound   | TCP                      | 20-21 | 0.0.0.0/0 |

## 6.1.4 Configuring Security Group Rules


### Scenarios

Similar to firewall, a security group is a logical group used to control network access. You can define access rules for a security group to protect the ECSs that are added to this security group.

- Inbound: Inbound rules allow external network traffic to be sent to the ECSs in the security group.
- Outbound: Outbound rules allow network traffic from the ECSs in the security group to be sent out of the security group.

For details about the default security group rules, see [Default Security Groups and Security Group Rules](#). For details about configuration examples for security group rules, see [Security Group Configuration Examples](#).

### Procedure

1. Log in to the management console.
2. Click  in the upper left corner and select your region and project.
3. Under **Computing**, click **Elastic Cloud Server**.
4. On the **Elastic Cloud Server** page, click the name of the target ECS.  
The page providing details about the ECS is displayed.
5. Click the **Security Groups** tab, expand the information of the security group, and view security group rules.

6. Click the security group ID.  
The system automatically switches to the **Security Group** page.
7. On the **Inbound Rules** tab, click **Add Rule**. In the displayed dialog box, set required parameters to add an inbound rule.  
You can click **+** to add more inbound rules.

**Figure 6-2** Add Inbound Rule

**Table 6-4** Inbound rule parameter description

| Parameter       | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Example Value |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| Protocol & Port | <b>Protocol:</b> The network protocol. Currently, the value can be <b>All</b> , <b>TCP</b> , <b>UDP</b> , <b>ICMP</b> , <b>GRE</b> , or others.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | TCP           |
|                 | <b>Port:</b> The port or port range over which the traffic can reach your ECS. The value ranges from 1 to 65535.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 22, or 22-30  |
| Type            | The IP address type. This parameter is available only after the IPv6 function is enabled. <ul style="list-style-type: none"> <li>• IPv4</li> <li>• IPv6</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | IPv4          |
| Source          | The source of the security group rule. The value can be a single IP address, an IP address group, or a security group to allow access from the IP address or instances in the security group. For example: <ul style="list-style-type: none"> <li>• Single IP address: 192.168.10.10/32 (IPv4); 2002:50::44/127 (IPv6)</li> <li>• IP address range: 192.168.1.0/24 (IPv4); 2407:c080:802:469::/64 (IPv6)</li> <li>• All IP addresses: 0.0.0.0/0 (IPv4); ::/0 (IPv6)</li> <li>• Security group: sg-abc</li> <li>• IP address group: ipGroup-test</li> </ul> For more information about IP address groups, see <a href="#">IP Address Group Overview</a> . | 0.0.0.0/0     |

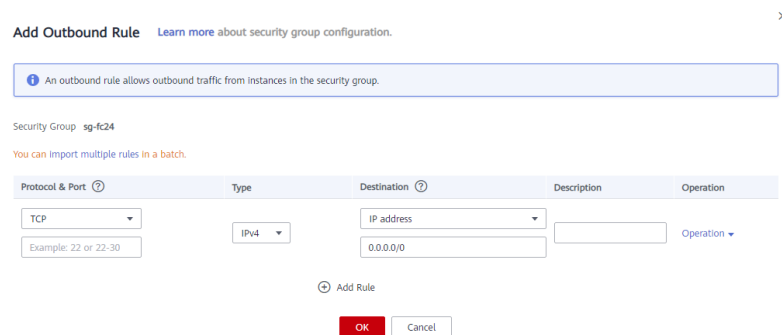


| Parameter   | Description                                                                                                                                                                                                     | Example Value |
|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| Description | Supplementary information about the security group rule. This parameter is optional.<br>The security group rule description can contain a maximum of 255 characters and cannot contain angle brackets (< or >). | N/A           |

- On the **Outbound Rules** tab, click **Add Rule**. In the displayed dialog box, set required parameters to add an outbound rule.

You can click + to add more outbound rules.

**Figure 6-3** Add Outbound Rule



**Table 6-5** Outbound rule parameter description

| Parameter       | Description                                                                                                      | Example Value |
|-----------------|------------------------------------------------------------------------------------------------------------------|---------------|
| Protocol & Port | <b>Protocol:</b> The network protocol. Currently, the value can be <b>All, TCP, UDP, ICMP, GRE</b> , or others.  | TCP           |
|                 | <b>Port:</b> The port or port range over which the traffic can leave your ECS. The value ranges from 1 to 65535. | 22, or 22-30  |
| Type            | The IP address type. <ul style="list-style-type: none"> <li>IPv4</li> <li>IPv6</li> </ul>                        | IPv4          |

| Parameter   | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Example Value |
|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| Destination | <p>The destination of the security group rule. The value can be a single IP address, an IP address group, or a security group to allow access to the IP address or instances in the security group. For example:</p> <ul style="list-style-type: none"><li>• Single IP address: 192.168.10.10/32 (IPv4); 2002:50::44/127 (IPv6)</li><li>• IP address range: 192.168.1.0/24 (IPv4); 2407:c080:802:469::/64 (IPv6)</li><li>• All IP addresses: 0.0.0.0/0 (IPv4); ::/0 (IPv6)</li><li>• Security group: sg-abc</li><li>• IP address group: ipGroup-test</li></ul> <p>For more information about IP address groups, see <a href="#">IP Address Group Overview</a>.</p> | 0.0.0.0/0     |
| Description | <p>Supplementary information about the security group rule. This parameter is optional.</p> <p>The security group rule description can contain a maximum of 255 characters and cannot contain angle brackets (&lt; or &gt;).</p>                                                                                                                                                                                                                                                                                                                                                                                                                                   | N/A           |

9. Click **OK** to complete the security rule configuration.

## Verification

After required security group rules are added, you can verify that the rules take effect. For example, you have deployed a website on ECSs. Users need to access your website over TCP (port 80), and you have added the security group rule shown in [Table 6-6](#).

**Table 6-6** Security group rule

| Direction | Protocol | Port | Source    |
|-----------|----------|------|-----------|
| Inbound   | TCP      | 80   | 0.0.0.0/0 |

### Linux ECS

To verify the security group rule on a Linux ECS:

1. Log in to the ECS.
2. Run the following command to check whether TCP port 80 is being listened on:

```
netstat -an | grep 80
```

If command output shown in [Figure 6-4](#) is displayed, TCP port 80 is being listened on.

**Figure 6-4** Command output for the Linux ECS

```
tcp 0 0 0.0.0.0:80 0.0.0.0:* LISTEN
```

3. Enter **http://ECS EIP** in the address box of the browser and press **Enter**.  
If the requested page can be accessed, the security group rule has taken effect.

### Windows ECS

To verify the security group rule on a Windows ECS:

1. Log in to the ECS.
2. Choose **Start > Accessories > Command Prompt**.
3. Run the following command to check whether TCP port 80 is being listened on:

```
netstat -an | findstr 80
```

If command output shown in **Figure 6-5** is displayed, TCP port 80 is being listened on.

**Figure 6-5** Command output for the Windows ECS

```
TCP 0.0.0.0:80 0.0.0.0:0 LISTENING
```

4. Enter **http://ECS EIP** in the address box of the browser and press **Enter**.  
If the requested page can be accessed, the security group rule has taken effect.

## 6.1.5 Changing a Security Group

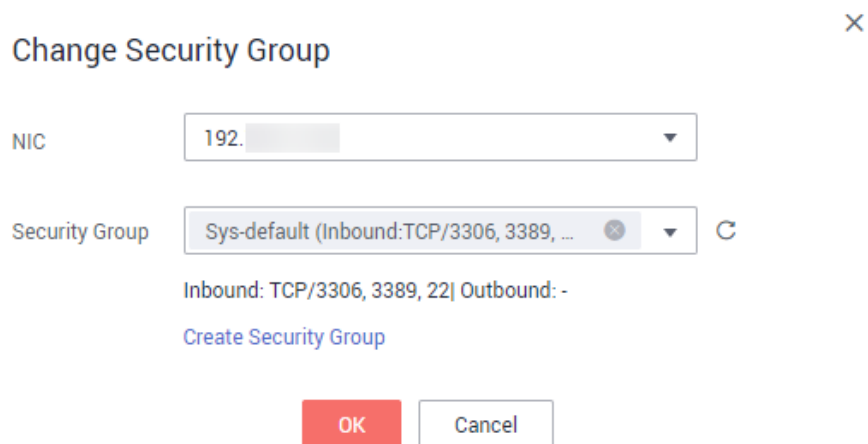
### Scenarios

To change the security group of an ECS NIC, perform the operations described in this section.

### Procedure

1. Log in to the management console.
2. Under **Computing**, click **Elastic Cloud Server**.
3. Locate the row containing the target ECS. Click **More** in the **Operation** column and select **Manage Network > Change Security Group**.  
The **Change Security Group** dialog box is displayed.

**Figure 6-6** Change Security Group



4. Select the target NIC and security group as prompted.  
You can select multiple security groups. In such a case, the access rules of all the selected security groups apply on the ECS. To create a security group, click **Create Security Group**.

**NOTE**

Using multiple security groups may deteriorate ECS network performance. You are suggested to select no more than five security groups.

5. Click **OK**.

# 7 EIPs

---

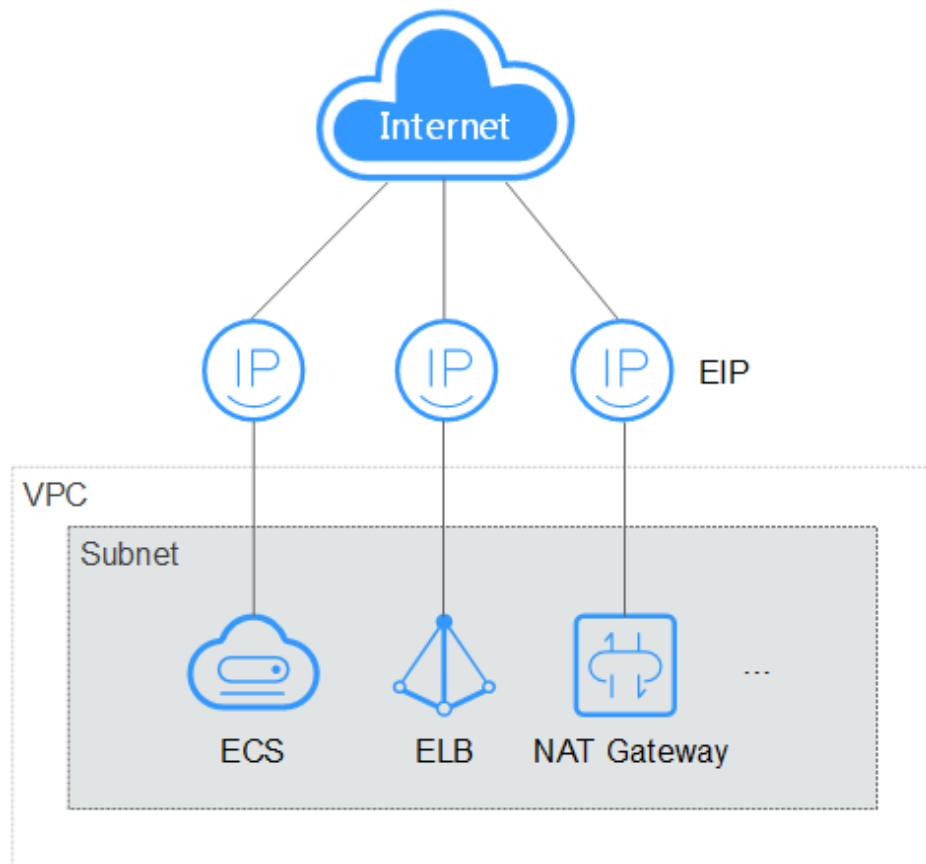
## 7.1 Overview

### EIP

The Elastic IP (EIP) service enables your cloud resources to communicate with the Internet using static public IP addresses and scalable bandwidths. EIPs can be bound to or unbound from ECSs, BMSs, virtual IP addresses, NAT gateways, or load balancers. Various billing modes are provided to meet diversified service requirements.

Each EIP can be used by only one cloud resource at a time.

Figure 7-1 Accessing the Internet using an EIP




## 7.2 Binding an EIP

### Scenarios

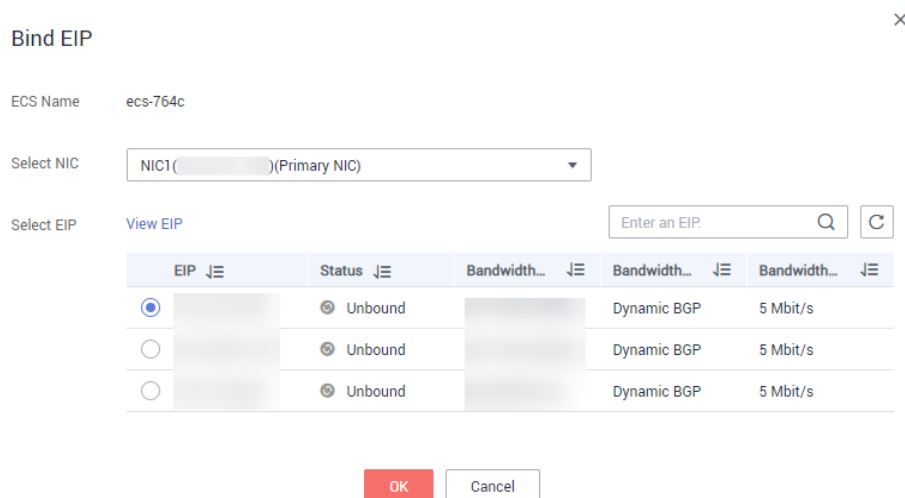
You can assign an EIP and bind it to an ECS to enable the ECS to access the Internet.

### Procedure

1. Log in to the management console.
2. Click  in the upper left corner and select your region and project.
3. Under **Computing**, click **Elastic Cloud Server**.
4. Locate the row containing the target ECS. Click **More** in the **Operation** column and select **Manage Network > Bind EIP**.
5. Select an EIP and click **OK**.

#### NOTE

If no EIP is available in the current region, the EIP list is empty. In such a case, purchase an EIP and then bind it.

**Figure 7-2** Binding an EIP


6. After the EIP is bound, view it on the **Elastic Cloud Server** page.

## 7.3 Unbinding an EIP

### Scenarios

This section describes how to unbind an EIP from an ECS.

### Procedure

1. Log in to the management console.
2. Click  in the upper left corner and select your region and project.
3. Under **Computing**, click **Elastic Cloud Server**.
4. Locate the row containing the target ECS. Click **More** in the **Operation** column and select **Manage Network > Unbind EIP**.
5. Verify the EIP and click **Yes**.

#### NOTE

Unreleased EIPs will continue to be billed. To stop the EIPs from being billed, release them.


## 7.4 Changing an EIP

### Scenarios

If your ECS has an EIP bound, perform the operations described in this section to change the EIP.

The management console does not allow you to directly change the EIP bound to an ECS. Therefore, to change an EIP, unbind it from the ECS and bind the desired one to the ECS.


## Unbinding an EIP

1. Log in to the management console.
2. Click  in the upper left corner and select your region and project.
3. Locate the row containing the target ECS. Click **More** in the **Operation** column and select **Manage Network > Unbind EIP**.
4. Confirm the displayed information and click **Yes**.

### NOTE

Unreleased EIPs will continue to be billed. To stop the EIPs from being billed, release them.

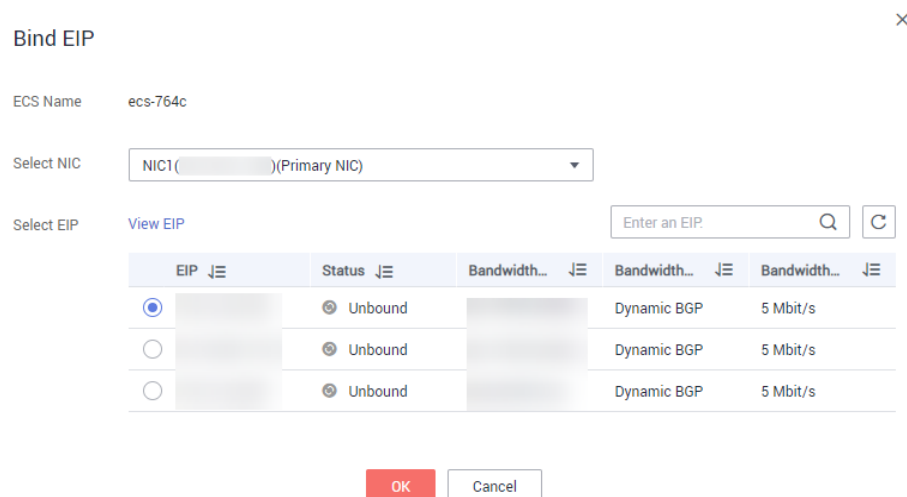
## Binding a New EIP

1. Log in to the management console.
2. Click  in the upper left corner and select your region and project.
3. Locate the row containing the target ECS. Click **More** in the **Operation** column and select **Manage Network > Bind EIP**.
4. Select the desired EIP and click **OK**.

### NOTE

If no EIP is available in the current region, the EIP list is empty. In such a case, purchase an EIP and then bind it.

**Figure 7-3** Binding an EIP



Bind EIP ×

ECS Name ecs-764c

Select NIC NIC1 (Primary NIC)

Select EIP [View EIP](#)

| EIP                              | Status  | Bandwidth... | Bandwidth... | Bandwidth... |
|----------------------------------|---------|--------------|--------------|--------------|
| <input checked="" type="radio"/> | Unbound |              | Dynamic BGP  | 5 Mbit/s     |
| <input type="radio"/>            | Unbound |              | Dynamic BGP  | 5 Mbit/s     |
| <input type="radio"/>            | Unbound |              | Dynamic BGP  | 5 Mbit/s     |


## 7.5 Changing an EIP Bandwidth

### Scenarios

If an EIP has been bound to the ECS, the ECS can access the Internet using the bandwidth associated with the EIP. This section describes how to adjust the bandwidth of an ECS.



## Procedure

1. Log in to the management console.
2. Click  in the upper left corner and select your region and project.
3. Under **Computing**, click **Elastic Cloud Server**.
4. Locate the row containing the target ECS. Click **More** in the **Operation** column and select **Manage Network > Modify Bandwidth**.
5. Change the bandwidth name, billing mode, or bandwidth size as prompted.

## 7.6 Enabling Internet Connectivity for an ECS Without a Public IP Address

### Scenarios

To ensure platform security and conserve public IP address resources, public IP addresses are assigned only to specified ECSs. ECSs without public IP addresses cannot access the Internet directly. If these ECSs need to access the Internet (for example, to perform a software upgrade or install a patch), you can select an ECS with a public IP address bound to function as a proxy ECS, providing an access channel for these ECS.

#### NOTE



NAT Gateway is recommended, which provides both the SNAT and DNAT functions for your ECSs in a VPC and allows the ECSs to access or provide services accessible from the Internet. For more information, see [NAT Gateway](#).

### Prerequisites

- A proxy ECS with a public IP address bound is available.
- The IP address of the proxy ECS is in the same network segment and same security group as the ECSs that need to access the Internet.

### Linux Proxy ECS

In this example, the proxy ECS runs CentOS 6.5.

1. Log in to the management console.
2. Click  in the upper left corner and select your region and project.
3. Under **Computing**, click **Elastic Cloud Server**.
4. In the search box above the upper right corner of the ECS list, enter the proxy ECS name for search.
5. Click the name of the proxy ECS. The page providing details about the ECS is displayed.
6. Click the **Network Interfaces** tab and then . Then, disable **Source/Destination Check**.

By default, the source/destination check function is enabled. When this function is enabled, the system checks whether source IP addresses contained

in the packets sent by ECSs are correct. If the IP addresses are incorrect, the system does not allow the ECSs to send the packets. This mechanism prevents packet spoofing, thereby improving system security. However, this mechanism prevents the packet sender from receiving returned packets. Therefore, disable the source/destination check.

7. Log in to the proxy ECS.

For more details, see [Login Overview](#).

8. Run the following command to check whether the proxy ECS can access the Internet:

```
ping www.baidu.com
```

The proxy ECS can access the Internet if information similar to the following is displayed:

**Figure 7-4** Checking whether the Internet is accessible

```
root@ecs-f4f0 ~]# ping www.baidu.com
PING www.a.shifen.com (61.135.169.121) 56(84) bytes of data:
64 bytes from 61.135.169.121 (61.135.169.121): icmp_seq=1 ttl=47 time=2.77 ms
64 bytes from 61.135.169.121 (61.135.169.121): icmp_seq=2 ttl=47 time=2.65 ms
64 bytes from 61.135.169.121 (61.135.169.121): icmp_seq=3 ttl=47 time=2.61 ms
64 bytes from 61.135.169.121 (61.135.169.121): icmp_seq=4 ttl=47 time=2.83 ms
64 bytes from 61.135.169.121 (61.135.169.121): icmp_seq=5 ttl=47 time=2.69 ms
64 bytes from 61.135.169.121 (61.135.169.121): icmp_seq=6 ttl=47 time=2.63 ms
```

9. Run the following command to check whether IP forwarding is enabled on the proxy ECS:

```
cat /proc/sys/net/ipv4/ip_forward
```

- If **0** (disabled) is displayed, go to **10**.
- If **1** (enabled), go to **16**.

10. Run the following command to open the IP forwarding configuration file in the vi editor:

```
vi /etc/sysctl.conf
```

11. Press **i** to enter editing mode.

12. Set the **net.ipv4.ip\_forward** value to **1**.

Set the **net.ipv4.ip\_forward** value to **1**.

#### NOTE

If the **sysctl.conf** file does not contain the **net.ipv4.ip\_forward** parameter, run the following command to add it:

```
echo net.ipv4.ip_forward=1 >> /etc/sysctl.conf
```

13. Press **Esc**, type **:wq**, and press **Enter**.

The system saves the configurations and exits the vi editor.

14. Run the following command to effect the modification:

```
sysctl -p /etc/sysctl.conf
```

15. Run the following command to delete the original iptables rule:

```
iptables -F
```

16. Run the following command to configure source network address translation (SNAT) to enable ECSs in the same network segment to access the Internet through the proxy ECS:

```
iptables -t nat -A POSTROUTING -o eth0 -s subnet/netmask-bits -j SNAT --to nat-instance-ip
```

For example, if the proxy ECS is in network segment 192.168.125.0, the subnet mask has 24 bits, and the private IP address is 192.168.125.4, run the following command:

```
iptables -t nat -A POSTROUTING -o eth0 -s 192.168.125.0/24 -j SNAT --to 192.168.125.4
```

#### NOTE

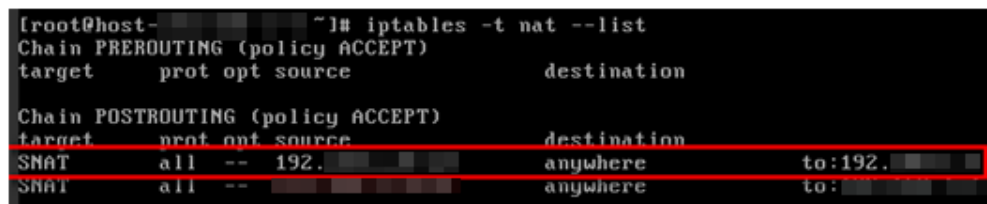
To retain the preceding configuration even after the ECS is restarted, run the `vi /etc/rc.local` command to edit the `rc.local` file. Specifically, copy the rule described in step 16 into `rc.local`, press `Esc` to exit the editing mode, and enter `:wq` to save and exit the file.

17. Run the following command to check whether SNAT has been configured:

```
iptables -t nat --list
```

SNAT has been configured if information similar to [Figure 7-5](#) is displayed.


**Figure 7-5** Successful SNAT configuration



```
[root@host- ~]# iptables -t nat --list
Chain PREROUTING (policy ACCEPT)
target prot opt source destination

Chain POSTROUTING (policy ACCEPT)
target prot opt source destination
SNAT all -- 192.168.125.0/24 anywhere to:192.168.125.4
SNAT all -- 192.168.125.0/24 anywhere to:192.168.125.4
```

18. Add a route.

- a. Log in to the management console.
- b. Click  in the upper left corner and select your region and project.
- c. Under **Network**, click **Virtual Private Cloud**.
- d. Select a VPC to which a route is to be added and click **Route Tables**. On the **Route Tables** page, click **Add Route**.
- e. Set route information on the displayed page.

- **Destination:** indicates the destination network segment. The default value is **0.0.0.0/0**.

- **Next Hop:** indicates the private IP address of the SNAT ECS.

You can obtain the private IP address of the ECS on the **Elastic Cloud Server** page.

19. To delete the added iptables rules, run the following command:

```
iptables -t nat -D POSTROUTING -o eth0 -s subnet/netmask-bits -j SNAT --to nat-instance-ip
```

For example, if the proxy ECS is in network segment 192.168.125.0, the subnet mask has 24 bits, and the private IP address is 192.168.125.4, run the following command:

```
iptables -t nat -D POSTROUTING -o eth0 -s 192.168.125.0/24 -j SNAT --to 192.168.125.4
```

# 8 Resources and Tags

## 8.1 Tag Management

### 8.1.1 Overview

#### Scenarios

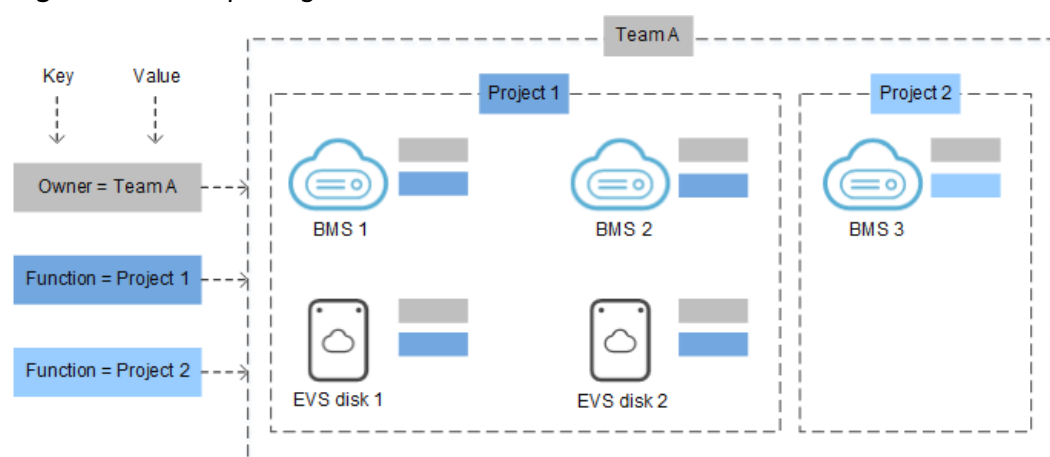
A tag identifies an ECS. Adding tags to an ECS facilitates ECS identification and management.

You can add a tag to an ECS during the ECS creation or after the ECS creation (**Tags** tab on the page providing details about the ECS). Up to 10 tags can be added to an ECS.

#### Basics of Tags

Tags are used to identify cloud resources. When you have many cloud resources of the same type, you can use tags to classify cloud resources by dimension (for example, use, owner, or environment).

**Figure 8-1** Example tags



**Figure 8-1** shows how tags work. In this example, you assign two tags to each cloud resource. Each tag contains a key and a value that you define. The key of one tag is **Owner**, and the key of another tag is **Use**. Each tag has a value.

You can quickly search for and filter specific cloud resources based on the tags added to them. For example, you can define a set of tags for cloud resources in an account to track the owner and usage of each cloud resource, making resource management easier.

## Tag Naming Rules

- Each tag consists of a key-value pair.
- Each ECS supports adding up to 10 tags.
- For each resource, a tag key must be unique and can have only one tag value.
- A tag consists of a tag key and a tag value. **Table 8-1** lists the tag key and value requirements.

**Table 8-1** Tag key and value requirements

| Parameter | Requirement                                                                                                                                                                  | Example Value |
|-----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| Key       | <ul style="list-style-type: none"><li>• Cannot be left blank.</li><li>• The key value must be unique for an ECS.</li><li>• Can contain a maximum of 36 characters.</li></ul> | Organization  |
| Value     | <ul style="list-style-type: none"><li>• Can contain a maximum of 43 characters.</li></ul>                                                                                    | Apache        |

### 8.1.2 Adding Tags


Tags are used to identify cloud resources, such as ECSs, images, and disks. If you have multiple types of cloud resources which are associated with each other, you can add tags to the resources to classify and manage them easily. For more details, see [Overview](#).

You can add tags to ECSs in any of the following ways:

- [Adding Tags When Creating an ECS](#)
- [Adding Tags on the Page Providing Details About an ECS](#)
- [Adding Tags on the TMS Console](#)

For details about how to use predefined tags, see [Using Predefined Tags](#).

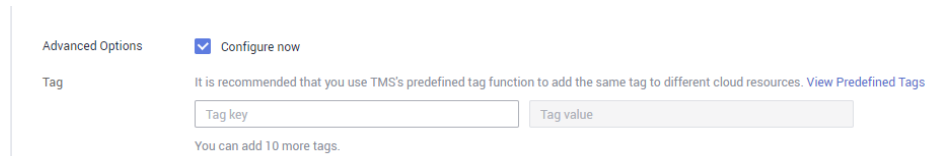
#### Adding Tags When Creating an ECS

1. Log in to the management console.
2. Click  in the upper left corner and select your region and project.
3. Under **Computing**, click **Elastic Cloud Server**.


4. Click **Buy ECS**.
5. Configure ECS parameters.  
Select **Configure now** for **Advanced Options**. Then, add a tag key and tag value. For the tag key and tag value requirements, see [Table 8-1](#).

**NOTE**

- For details about other parameters, see [Purchasing an ECS](#).

**Figure 8-2** Adding a tag

## Adding Tags on the Page Providing Details About an ECS

1. Log in to the management console.
2. Click  in the upper left corner and select your region and project.
3. Under **Computing**, click **Elastic Cloud Server**.
4. On the **Elastic Cloud Server** page, click the name of the target ECS.  
The page providing details about the ECS is displayed.
5. Click the **Tags** tab and then **Add Tag**. In the displayed dialog box, enter the tag key and tag value. For the tag key and tag value requirements, see [Table 8-1](#).

You can change the tag value after the tag is added.

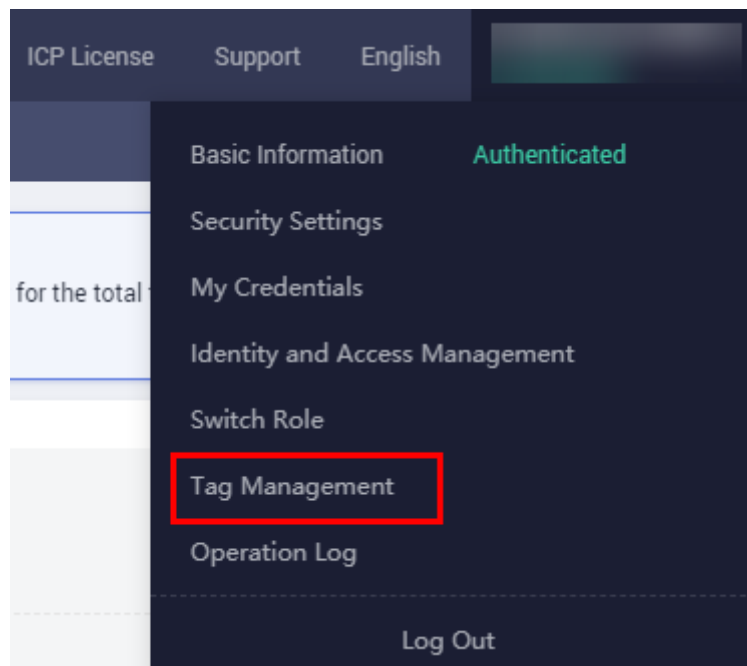
**Figure 8-3** Adding a tag on the Tags tab


## Adding Tags on the TMS Console

**NOTE**

This method is suitable for adding tags with the same tag key to multiple resources.


1. Log in to the management console.
2. In the upper right corner of the page, click the username and select **Tag Management** from the drop-down list.



**Figure 8-4** Tag Management



- On the displayed **Resource Tags** page, select the region where the resource is located, select **ECS** for **Resource Type**, and click **Search**.  
All ECSs matching the search criteria are displayed.
- In the **Search Result** area, click **Create Key**. In the displayed dialog box, enter a key (for example **project**) and click **OK**.  
After the tag is created, the tag key is added to the resource list shown in [Figure 8-5](#). If the key is not displayed in the resource list, click  and select the created key from the drop-down list.  
By default, the value of the tag key is **Not tagged**. You need to set a value for the tag of each resource to associate the tag with the resource.


**Figure 8-5** Resource list

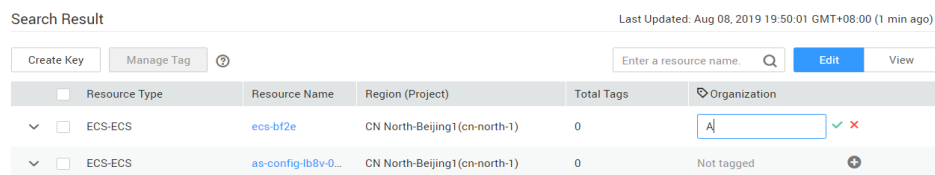
Search Result Last Updated: Aug 08, 2019 19:44:04 GMT+08:00 (1 min ago) [Invalid Tag](#)

Create Key Manage Tag 

Enter a resource name.      

| <input type="checkbox"/> | Resource Type | Resource Name     | Region (Project)              | Total Tags | Organization |                                                                                       |
|--------------------------|---------------|-------------------|-------------------------------|------------|--------------|---------------------------------------------------------------------------------------|
| <input type="checkbox"/> | ECS-ECS       | ecs-bf2e          | CN North-Beijing1(cn-north-1) | 0          | Not tagged   |  |
| <input type="checkbox"/> | ECS-ECS       | as-config-lb8v... | CN North-Beijing1(cn-north-1) | 0          | Not tagged   |  |

- Click **Edit** to make the resource list editable.
- Locate the row containing the target ECS, click , and enter a value (for example **A**).  
After a value is set for a tag key, the number of tags is incremented by 1. Repeat the preceding steps to add tag values for other ECSs.

**Figure 8-6** Setting a tag value

## Using Predefined Tags

If you want to add the same tag to multiple ECSs or other resources, you can create a predefined tag on the TMS console and then select the tag for the ECSs or resources. This frees you from having to repeatedly enter tag keys and values. To do so, perform the following operations:


1. Log in to the management console.
2. In the upper right corner of the page, click the username and select **Tag Management** from the drop-down list.
3. In the navigation pane on the left, choose **Predefined Tags**. In the right pane, click **Create Tag** enter a key (for example **project**) and a value (for example **A**) in the displayed dialog box.
4. Choose **Service List > Computing > Elastic Cloud Server**, and select the predefined tag by following the procedure for adding a tag.

### 8.1.3 Searching for Resources by Tag

After tags are added to resources, you can search for resources by tag using either of the following methods.

#### Searching for ECSs by Tag

On the **Elastic Cloud Server** page, search for ECSs by tag key or value.

1. Log in to the management console.
2. Click  in the upper left corner and select your region and project.
3. Under **Computing**, click **Elastic Cloud Server**.
4. Click **Search by Tag** above the upper right corner of the ECS list to expand the search area.
5. Enter the tag of the ECS to be searched for.

Neither the tag key nor value can be empty. When the tag key or value is matched, the system automatically shows the target ECSs.

6. Add tags.

The system supports multiple tags and uses the intersection set of all tags to search for ECSs.

7. Click **Search**.

The system searches for ECSs based on tag keys and values.



## Filtering Resources on the TMS Console

1. Log in to the management console.
2. In the upper right corner of the page, click the username and select **Tag Management** from the drop-down list.
3. On the **Resource Tags** page, set the search criteria, including **Region**, **Resource Type**, and **Resource Tag**.
4. Click **Search**.


All the resources that meet the search criteria will be displayed in the **Search Result** area.

### 8.1.4 Deleting a Tag

If you no longer need a tag, delete it in any of the following ways:

- [Deleting a Tag on the Page Providing Details About an ECS](#)
- [Deleting a Tag on the TMS Console](#)
- [Batch Deleting Tags on the TMS Console](#)

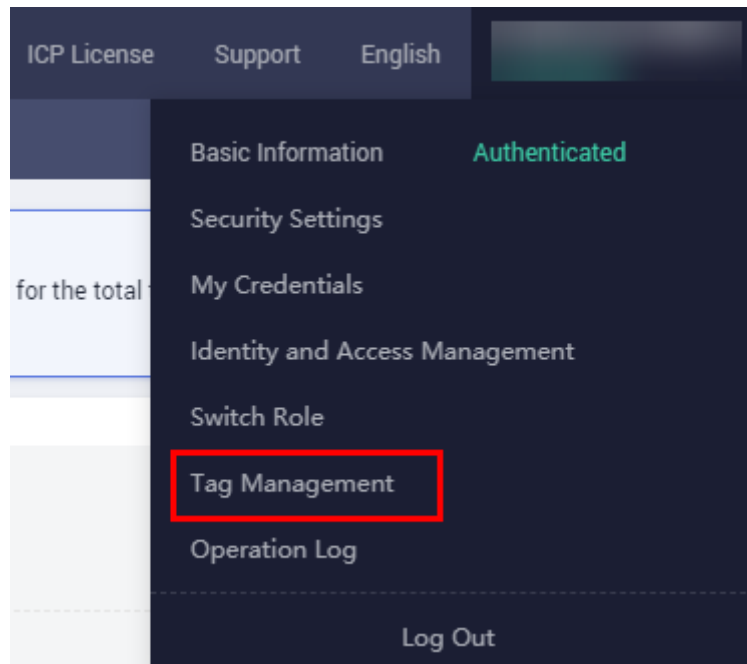
#### Deleting a Tag on the Page Providing Details About an ECS

1. Log in to the management console.
2. Click  in the upper left corner and select your region and project.
3. Under **Computing**, click **Elastic Cloud Server**.
4. On the **Elastic Cloud Server** page, click the name of the target ECS.  
The page providing details about the ECS is displayed.
5. Click the **Tags** tab. Locate the row containing the tag to be deleted and click **Delete** in the **Operation** column. In the **Delete Tag** dialog box, click **Yes**.


#### Deleting a Tag on the TMS Console



1. Log in to the management console.
2. In the upper right corner of the page, click the username and select **Tag Management** from the drop-down list.

Figure 8-7 Tag Management



3. On the **Resource Tags** page, set the search criteria for ECSs and click **Search**.
4. In the **Search Result** area, click **Edit** to make the resource tag list editable.

If the key of a tag you want to delete is not contained in the list, click  and select the tag key from the drop-down list. It is a good practice to select at most 10 keys to display.


5. Locate the row containing the target ECS and click .
6. (Optional) Click  in the upper right of the **Search Result** area. The resource list is refreshed and the refresh time is updated.

## Batch Deleting Tags on the TMS Console

### NOTICE

Exercise caution when deleting tags in a batch. After you delete the tags, they will be removed from all the associated ECSs and cannot be recovered.

1. Log in to the management console.
2. In the upper right corner of the page, click the username and select **Tag Management** from the drop-down list.
3. On the **Resource Tags** page, set the search criteria for ECSs and click **Search**.
4. Select the target ECSs.
5. Click **Manage Tag** in the upper left corner of the list.
6. In the displayed **Manage Tag** dialog box, click **Delete** in the **Operation** column. Click **OK**.

- (Optional) Click  in the upper right of the **Search Result** area.  
The resource list is refreshed and the refresh time is updated.


## 8.2 Quota Adjustment

### What Is Quota?

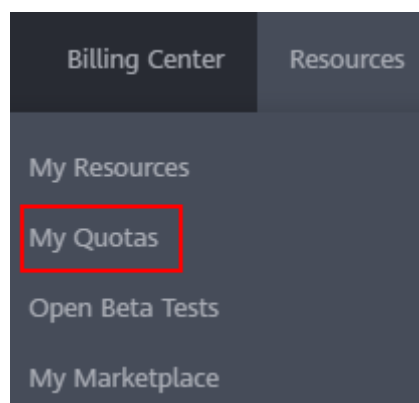
Quotas are enforced for service resources on the platform to prevent unforeseen spikes in resource usage. Quotas can limit the number or amount of resources available to users, such as the maximum number of ECSs or EVS disks that can be created.

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

### How Do I View My Quotas?

- Log in to the management console.
- Click  in the upper left corner and select the desired region and project.
- In the upper right corner of the page, choose **Resources > My Quotas**.  
The **Service Quota** page is displayed.

**Figure 8-8** My Quotas

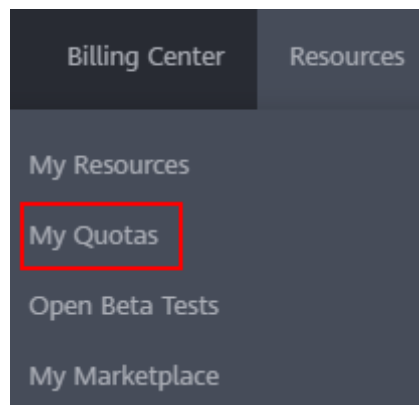


- View the used and total quota of each type of resources on the displayed page.  
If a quota cannot meet service requirements, apply for a higher quota.

### How Do I Apply for a Higher Quota?

- Log in to the management console.
- In the upper right corner of the page, choose **Resources > My Quotas**.  
The **Service Quota** page is displayed.

**Figure 8-9** My Quotas



3. Click **Increase Quota**.
4. On the **Create Service Ticket** page, configure parameters as required. In **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 Tenant Authorization Letter and Privacy Statement** and click **Submit**.

# 9 Monitoring

---

## 9.1 Monitoring ECSs

Monitoring is key for ensuring ECS performance, reliability, and availability. Using monitored data, you can determine ECS resource utilization. The public cloud provides Cloud Eye to help you obtain the running statuses of your ECSs. You can use Cloud Eye to automatically monitor ECSs in real time and manage alarms and notifications to keep track of ECS performance metrics.

**Server Monitoring** includes **Basic Monitoring** and **OS Monitoring**.

- **Basic Monitoring** automatically reports ECS metrics to Cloud Eye.
- Using the agent installed on the target ECS, **OS Monitoring** provides system-wide, active, and fine-grained ECS monitoring.

For instructions about how to install and configure the agent, see **Server Monitoring** in *Cloud Eye User Guide*.

This section covers the following content:

- Viewing basic ECS metrics
- Viewing metrics monitored by ECS OS with Agent installed
- Customizing ECS alarm rules
- Viewing ECS running statuses for routine monitoring

### Helpful Links

- [Troubleshooting High Bandwidth or CPU Usage of a Windows ECS](#)
- [Troubleshooting High Bandwidth or CPU Usage of a Linux ECS](#)

## 9.2 Basic ECS Metrics

### Description

This section describes monitoring metrics reported by ECS to Cloud Eye. You can use Cloud Eye to view these metrics and alarms generated for ECSs.

## Namespace

SYS.ECS

## ECS Metrics

ECS metrics vary depending on ECS OSs and types. For details, see [Table 9-1](#). ✓ indicates that the metric is supported, and x indicates that the metric is not supported.

**Table 9-1** ECS metrics

| Metric               | Windows                                                                            |     | Linux                                                                              |                                                                                |
|----------------------|------------------------------------------------------------------------------------|-----|------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|
|                      | Xen                                                                                | KVM | Xen                                                                                | KVM                                                                            |
| None                 | Xen                                                                                | KVM | Xen                                                                                | KVM                                                                            |
| CPU Usage            | ✓                                                                                  | ✓   | ✓                                                                                  | ✓                                                                              |
| Memory Usage         | ✓                                                                                  | ✓   | ✓ (VMTools must be installed on the image. Otherwise, this metric is unavailable.) | x (Agent must be installed on the ECS. Otherwise, this metric is unavailable.) |
| Disk Usage           | ✓                                                                                  | ✓   | ✓ (VMTools must be installed on the image. Otherwise, this metric is unavailable.) | x (Agent must be installed on the ECS. Otherwise, this metric is unavailable.) |
| Disk Read Bandwidth  | ✓                                                                                  | ✓   | ✓                                                                                  | ✓                                                                              |
| Disk Write Bandwidth | ✓                                                                                  | ✓   | ✓                                                                                  | ✓                                                                              |
| Disk Read IOPS       | ✓                                                                                  | ✓   | ✓                                                                                  | ✓                                                                              |
| Disk Write IOPS      | ✓                                                                                  | ✓   | ✓                                                                                  | ✓                                                                              |
| Inband Incoming Rate | ✓ (VMTools must be installed on the image. Otherwise, this metric is unavailable.) | ✓   | ✓ (VMTools must be installed on the image. Otherwise, this metric is unavailable.) | x (Agent must be installed on the ECS. Otherwise, this metric is unavailable.) |

| Metric                | Windows                                                                                                             |   | Linux                                                                                                               |                                                                                |
|-----------------------|---------------------------------------------------------------------------------------------------------------------|---|---------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|
| Inband Outgoing Rate  | √ (VMTools must be installed on the image. Otherwise, this metric is unavailable.)                                  | √ | √ (VMTools must be installed on the image. Otherwise, this metric is unavailable.)                                  | x (Agent must be installed on the ECS. Otherwise, this metric is unavailable.) |
| Outband Incoming Rate | √ (If VMTools is installed on the image, this metric is unavailable. In such a case, use the inband incoming rate.) | √ | √ (If VMTools is installed on the image, this metric is unavailable. In such a case, use the inband incoming rate.) | √                                                                              |
| Outband Outgoing Rate | √ (If VMTools is installed on the image, this metric is unavailable. In such a case, use the inband outgoing rate.) | √ | √ (If VMTools is installed on the image, this metric is unavailable. In such a case, use the inband outgoing rate.) | √                                                                              |

 **NOTE**

- Certain ECS metrics require the installation of VMTools on the image, based on which the ECS is created. For instructions about how to install VMTools, see <https://github.com/UEP-Tools/UEP-Tools/>.
- Certain ECS metrics require the installation of the agent on the ECS. After the agent is installed, log in to the management console and choose **Cloud Eye** under **Management & Deployment**. Then, view ECS metrics, such as **AGT. User Space CPU Usage**, by choosing **ECS Monitoring** > Target ECS > **OS Monitoring**. For details, see **ECS Metrics Under OS Monitoring**.
  - For instructions about how to install the agent on a Windows ECS, see "Installing and Configuring the Agent (Windows)" in *Cloud Eye User Guide*.
  - For instructions about how to install the agent on a Linux ECS, see "Installing and Configuring the Agent (Linux)" in *Cloud Eye User Guide*.

**Table 9-2** describes these ECS metrics.

The monitoring intervals for the following ECSs with raw monitoring metrics are as follows:

- Xen ECS: 4 minutes

- KVM ECS: 5 minutes

**Table 9-2** Metric description

| Metric   | Parameter    | Description                                                                                                                                                                                                                                                                                                                                                                                               | Value Range | Monitored Object | Monitoring Interval (Raw Metrics and KVM Only) |
|----------|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------------|------------------------------------------------|
| cpu_util | CPU Usage    | <p>CPU usage of an ECS</p> <p>This metric is used to show the CPU usage of the physical server accommodating the monitored ECS, which is not accurate as the CPU usage obtained on the monitored ECS. For details, see <a href="#">Why Is the Basic Monitoring Data Inconsistent with the OS Monitoring Data?</a></p> <p>Unit: Percent</p> <p>Formula: CPU usage of an ECS/Number of vCPUs in the ECS</p> | $\geq 0$    | ECS              | 5 minutes                                      |
| mem_util | Memory Usage | <p>Memory usage of an ECS</p> <p>This metric is unavailable if the image has no VMTools installed.</p> <p>Unit: Percent</p> <p>Formula: Used memory of an ECS/ Total memory of the ECS</p>                                                                                                                                                                                                                | $\geq 0$    | ECS              | 5 minutes                                      |



| Metric                | Parameter            | Description                                                                                                                                                                                                                             | Value Range | Monitored Object | Monitoring Interval (Raw Metrics and KVM Only) |
|-----------------------|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------------|------------------------------------------------|
| disk_util_inband      | Disk Usage           | Disk usage of an ECS<br>This metric is unavailable if the image has no VMTools installed.<br>Unit: Percent<br>Formula: Used capacity of an ECS disk/Total capacity of the ECS disk                                                      | $\geq 0$    | ECS              | 5 minutes                                      |
| disk_read_bytes_rate  | Disk Read Bandwidth  | Number of bytes read from an ECS disk per second<br>Unit: byte/s<br>Formula: Total number of bytes read from an ECS disk/Monitoring interval<br>$\text{byte\_out} = (\text{rd\_bytes} - \text{last\_rd\_bytes})/\text{Time difference}$ | $\geq 0$    | ECS              | 5 minutes                                      |
| disk_write_bytes_rate | Disk Write Bandwidth | Number of bytes written to an ECS disk per second<br>Unit: byte/s<br>Formula: Total number of bytes written to an ECS disk/Monitoring interval                                                                                          | $\geq 0$    | ECS              | 5 minutes                                      |

| Metric                             | Parameter            | Description                                                                                                                                                                                                                     | Value Range | Monitored Object | Monitoring Interval (Raw Metrics and KVM Only) |
|------------------------------------|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------------|------------------------------------------------|
| disk_read_requests_rate            | Disk Read IOPS       | Number of read requests sent to an ECS disk per second<br>Unit: request/s<br>Formula: Total number of read requests sent to an ECS disk/Monitoring interval<br>$req\_out = (rd\_req - last\_rd\_req) / \text{Time difference}$  | $\geq 0$    | ECS              | 5 minutes                                      |
| disk_write_requests_rate           | Disk Write IOPS      | Number of write requests sent to an ECS disk per second<br>Unit: request/s<br>Formula: Total number of write requests sent to an ECS disk/Monitoring interval<br>$req\_in = (wr\_req - last\_wr\_req) / \text{Time difference}$ | $\geq 0$    | ECS              | 5 minutes                                      |
| network_incoming_bytes_rate_inband | Inband Incoming Rate | Number of incoming bytes on an ECS per second<br>Unit: byte/s<br>Formula: Total number of inband incoming bytes on an ECS/Monitoring interval                                                                                   | $\geq 0$    | ECS              | 5 minutes                                      |

| Metric                                | Parameter             | Description                                                                                                                                                                                                          | Value Range | Monitored Object | Monitoring Interval (Raw Metrics and KVM Only) |
|---------------------------------------|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------------|------------------------------------------------|
| network_outgoing_bytes_rate_inband    | Inband Outgoing Rate  | Number of outgoing bytes on an ECS per second<br>Unit: byte/s<br>Formula: Total number of inband outgoing bytes on an ECS/Monitoring interval                                                                        | $\geq 0$    | ECS              | 5 minutes                                      |
| network_incoming_bytes_aggregate_rate | Outband Incoming Rate | Number of incoming bytes on an ECS per second on the hypervisor<br>Unit: byte/s<br>Formula: Total number of outband incoming bytes on an ECS/Monitoring interval<br>This metric is unavailable if SR-IOV is enabled. | $\geq 0$    | ECS              | 5 minutes                                      |
| network_outgoing_bytes_aggregate_rate | Outband Outgoing Rate | Number of outgoing bytes on an ECS per second on the hypervisor<br>Unit: byte/s<br>Formula: Total number of outband outgoing bytes on an ECS/Monitoring interval<br>This metric is unavailable if SR-IOV is enabled. | $\geq 0$    | ECS              | 5 minutes                                      |
| network_vm_connections                | Network connections   | Total number of TCP and UDP connections to an ECS<br>Unit: count                                                                                                                                                     | $\geq 0$    | ECS              | 5 minutes                                      |

## Dimensions

| Key         | Value                 |
|-------------|-----------------------|
| instance_id | Specifies the ECS ID. |

## 9.3 OS Monitoring Metrics Supported by ECSs with the Agent Installed

### Description

CPU, CPU load, memory, disk, disk I/O, file system, GPU, and NIC metrics can be monitored.

After installing the agent on an ECS, you can view its OS monitoring metrics. Monitoring data is collected every 1 minute.

### OS Metrics

After the agent is installed, you can view the default metrics listed in the following table, regardless of ECS types and OSs.

**Table 9-3** CPU metrics

| Metric         | Parameter              | Description                                                                                                                                                                                                                                                                 | Value Range | Monitored Object | Monitoring Period (Raw Data) |
|----------------|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------------|------------------------------|
| cpu_usage_idle | (Agent) Idle CPU Usage | Percentage of time that CPU is idle<br>Unit: percent <ul style="list-style-type: none"><li>Linux: Check metric value changes in file / <b>proc/stat</b> in a collection period.</li><li>Windows: Run the <b>top</b> command to check the <b>%Cpu(s) id</b> value.</li></ul> | 0-100       | ECS              | 1 minute                     |

| Metric           | Parameter                       | Description                                                                                                                                                                                                                                                                                                                                                                        | Value Range | Monitored Object | Monitoring Period (Raw Data) |
|------------------|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------------|------------------------------|
| cpu_usage_other  | (Agent) Other Process CPU Usage | <p>Percentage of time that the CPU is used by other processes</p> <p>Unit: percent</p> <ul style="list-style-type: none"> <li>Linux: <b>Other Process CPU Usage = 1 - Idle CPU Usage - Kernel Space CPU Usage - User Space CPU Usage</b></li> <li>Windows: <b>Other Process CPU Usage = 1 - Idle CPU Usage - Kernel Space CPU Usage - User Space CPU Usage</b></li> </ul>          | 0-100       | ECS              | 1 minute                     |
| cpu_usage_system | (Agent) Kernel Space CPU Usage  | <p>Percentage of time that the CPU is used by kernel space</p> <p>Unit: percent</p> <ul style="list-style-type: none"> <li>Linux: Check metric value changes in file / <b>proc/stat</b> in a collection period. Run the <b>top</b> command to check the <b>%Cpu(s) sy</b> value.</li> <li>Windows: Obtain the metric value using the Windows API <b>GetSystemTimes</b>.</li> </ul> | 0-100       | ECS              | 1 minute                     |

| Metric         | Parameter                    | Description                                                                                                                                                                                                                                                                                                                                                        | Value Range | Monitored Object | Monitoring Period (Raw Data) |
|----------------|------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------------|------------------------------|
| cpu_usage_user | (Agent) User Space CPU Usage | Percentage of time that the CPU is used by user space<br>Unit: percent <ul style="list-style-type: none"><li>Linux: Check metric value changes in file / <b>proc/stat</b> in a collection period. Run the <b>top</b> command to check the <b>%Cpu(s) us</b> value.</li><li>Windows: Obtain the metric value using the Windows API <b>GetSystemTimes</b>.</li></ul> | 0-100       | ECS              | 1 minute                     |
| cpu_usage      | (Agent) CPU Usage            | CPU usage of the monitored object<br>Unit: percent <ul style="list-style-type: none"><li>Linux: Check metric value changes in file / <b>proc/stat</b> in a collection period. Run the <b>top</b> command to check the <b>%Cpu(s)</b> value.</li><li>Windows: Obtain the metric value using the Windows API <b>GetSystemTimes</b>.</li></ul>                        | 0-100       | ECS              | 1 minute                     |

| Metric           | Parameter                        | Description                                                                                                                                                                                                                                                                                                                                                                                                 | Value Range | Monitored Object | Monitoring Period (Raw Data) |
|------------------|----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------------|------------------------------|
| cpu_usage_nice   | (Agent) Nice Process CPU Usage   | Percentage of time that the CPU is in user mode with low-priority processes which can easily be interrupted by higher-priority processes<br>Unit: percent <ul style="list-style-type: none"><li>Linux: Check metric value changes in file / <b>proc/stat</b> in a collection period. Run the <b>top</b> command to check the <b>%Cpu(s) ni</b> value.</li><li>Windows is not supported currently.</li></ul> | 0-100       | ECS              | 1 minute                     |
| cpu_usage_iowait | (Agent) iowait Process CPU Usage | Percentage of time that the CPU is waiting for I/O operations to complete<br>Unit: percent <ul style="list-style-type: none"><li>Linux: Check metric value changes in file / <b>proc/stat</b> in a collection period. Run the <b>top</b> command to check the <b>%Cpu(s) wa</b> value.</li><li>Windows is not supported currently.</li></ul>                                                                | 0-100       | ECS              | 1 minute                     |
| cpu_usage_irq    | (Agent) CPU Interrupt Time       | Percentage of time that the CPU is servicing interrupts<br>Unit: percent <ul style="list-style-type: none"><li>Linux: Check metric value changes in file / <b>proc/stat</b> in a collection period. Run the <b>top</b> command to check the <b>%Cpu(s) hi</b> value.</li><li>Windows is not supported currently.</li></ul>                                                                                  | 0-100       | ECS              | 1 minute                     |

| Metric            | Parameter                           | Description                                                                                                                                                                                                                                                                                                                                          | Value Range | Monitored Object | Monitoring Period (Raw Data) |
|-------------------|-------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------------|------------------------------|
| cpu_usage_softirq | (Agent) CPU Software Interrupt Time | Percentage of time that the CPU is servicing software interrupts<br>Unit: percent <ul style="list-style-type: none"> <li>Linux: Check metric value changes in file <code>/proc/stat</code> in a collection period. Run the <code>top</code> command to check the <code>%Cpu(s)</code> value.</li> <li>Windows is not supported currently.</li> </ul> | 0-100       | ECS              | 1 minute                     |

Table 9-4 CPU load metrics

| Metric        | Parameter                     | Description                                                                                                                                                                                                                                   | Value Range | Monitored Object | Monitoring Period (Raw Data) |
|---------------|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------------|------------------------------|
| load_average1 | (Agent) 1-Minute Load Average | CPU load averaged from the last 1 minute<br>Linux: Obtain the metric value from the number of logic CPUs in <code>load1/</code> in file <code>/proc/loadavg</code> . Run the <code>top</code> command to check the <code>load1</code> value.  | $\geq 0$    | ECS              | 1 minute                     |
| load_average5 | (Agent) 5-Minute Load Average | CPU load averaged from the last 5 minutes<br>Linux: Obtain the metric value from the number of logic CPUs in <code>load5/</code> in file <code>/proc/loadavg</code> . Run the <code>top</code> command to check the <code>load5</code> value. | $\geq 0$    | ECS              | 1 minute                     |



| Metric          | Parameter                      | Description                                                                                                                                                                                                                  | Value Range | Monitored Object | Monitoring Period (Raw Data) |
|-----------------|--------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------------|------------------------------|
| load_averages15 | (Agent) 15-Minute Load Average | CPU load averaged from the last 15 minutes<br><br>Linux: Obtain the metric value from the number of logic CPUs in <b>load15/</b> in file <b>/proc/loadavg</b> . Run the <b>top</b> command to check the <b>load15</b> value. | $\geq 0$    | ECS              | 1 minute                     |

 NOTE

The Windows OS does not support the CPU load metrics.

**Table 9-5** Memory metrics

| Metric        | Parameter                | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Value Range | Monitored Object | Monitoring Period (Raw Data) |
|---------------|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------------|------------------------------|
| mem_available | (Agent) Available Memory | Amount of memory that is available and can be given instantly to processes<br><br>Unit: GB<br><br><ul style="list-style-type: none"> <li>Linux: Obtain the metric value from <b>MemAvailable</b> in file <b>/proc/meminfo</b>. If <b>MemAvailable</b> is not available in <b>/proc/meminfo</b>, it equals to <b>MemFree+Buffers+Cached</b>.</li> <li>Windows: It is calculated by available memory minuses used memory. The value is obtained by calling the Windows API <b>GlobalMemoryStatusEx</b>.</li> </ul> | $\geq 0$    | ECS              | 1 minute                     |

| Metric          | Parameter            | Description                                                                                                                                                                                                                                                                                                                            | Value Range | Monitored Object | Monitoring Period (Raw Data) |
|-----------------|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------------|------------------------------|
| mem_usedPercent | (Agent) Memory Usage | <p>Memory usage of the monitored object</p> <p>Unit: percent</p> <ul style="list-style-type: none"> <li>Linux: Obtain the metric value from the <b>/proc/meminfo</b> file (<b>MemTotal-MemAvailable</b>)/<b>MemTotal</b>.</li> <li>Windows: The calculation formula is as follows: Used memory size/Total memory size*100%.</li> </ul> | 0-100       | ECS              | 1 minute                     |
| mem_free        | (Agent) Idle Memory  | <p>Amount of memory that is not being used</p> <p>Unit: GB</p> <ul style="list-style-type: none"> <li>Linux: Obtain the metric value from <b>/proc/meminfo</b>.</li> <li>Windows is not supported currently.</li> </ul>                                                                                                                | $\geq 0$    | ECS              | 1 minute                     |
| mem_buffers     | (Agent) Buffer       | <p>Amount of memory that is being used for buffers</p> <p>Unit: GB</p> <ul style="list-style-type: none"> <li>Linux: Obtain the metric value from <b>/proc/meminfo</b>. Run the <b>top</b> command to check the <b>KiB Mem:buffers</b> value.</li> <li>Windows is not supported currently.</li> </ul>                                  | $\geq 0$    | ECS              | 1 minute                     |

| Metric    | Parameter     | Description                                                                                                                                                                                                                                                                                                | Value Range | Monitored Object | Monitoring Period (Raw Data) |
|-----------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------------|------------------------------|
| mem_ached | (Agent) Cache | <p>Amount of memory that is being used for file caches</p> <p>Unit: GB</p> <ul style="list-style-type: none"><li>Linux: Obtain the metric value from /<b>proc/meminfo</b>. Run the <b>top</b> command to check the <b>KiB Swap:cached Mem</b> value.</li><li>Windows is not supported currently.</li></ul> | $\geq 0$    | ECS              | 1 minute                     |

**Table 9-6** Disk metrics

| Metric                     | Parameter                    | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Value Range | Monitored Object | Monitoring Period (Raw Data) |
|----------------------------|------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------------|------------------------------|
| mountPointPrefix_disk_free | (Agent) Available Disk Space | Free space on the disks<br>Unit: GB <ul style="list-style-type: none"><li>Linux: Run the <b>df -h</b> command to check the value in the <b>Avail</b> column. The path of the mount point prefix cannot exceed 64 characters. It must start with a letter, and contain only digits, letters, hyphens (-), dots (.), and swung dashes (~).</li><li>Windows: Use the WMI interface to call GetDiskFreeSpaceEx W API to obtain disk space data. The path of the mount point prefix cannot exceed 64 characters. It must start with a letter, and contain only digits, letters, hyphens (-), dots (.), and swung dashes (~).</li></ul> | $\geq 0$    | ECS              | 1 minute                     |

| Metric                      | Parameter                     | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Value Range | Monitored Object | Monitoring Period (Raw Data) |
|-----------------------------|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------------|------------------------------|
| mountPointPrefix_disk_total | (Agent) Disk Storage Capacity | <p>Total space on the disks, including used and free<br/>Unit: GB</p> <ul style="list-style-type: none"><li>Linux: Run the <b>df -h</b> command to check the value in the <b>Size</b> column. The path of the mount point prefix cannot exceed 64 characters. It must start with a letter, and contain only digits, letters, hyphens (-), dots (.), and swung dashes (~).</li><li>Windows: Use the WMI interface to call GetDiskFreeSpaceEx W API to obtain disk space data. The path of the mount point prefix cannot exceed 64 characters. It must start with a letter, and contain only digits, letters, hyphens (-), dots (.), and swung dashes (~).</li></ul> | $\geq 0$    | ECS              | 1 minute                     |

| Metric                     | Parameter               | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Value Range | Monitored Object | Monitoring Period (Raw Data) |
|----------------------------|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------------|------------------------------|
| mountPointPrefix_disk_used | (Agent) Used Disk Space | Used space on the disks<br>Unit: GB <ul style="list-style-type: none"><li>Linux: Run the <b>df -h</b> command to check the value in the <b>Used</b> column. The path of the mount point prefix cannot exceed 64 characters. It must start with a letter, and contain only digits, letters, hyphens (-), dots (.), and swung dashes (~).</li><li>Windows: Use the WMI interface to call GetDiskFreeSpaceEx W API to obtain disk space data. The path of the mount point prefix cannot exceed 64 characters. It must start with a letter, and contain only digits, letters, hyphens (-), dots (.), and swung dashes (~).</li></ul> | $\geq 0$    | ECS              | 1 minute                     |

| Metric                            | Parameter          | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Value Range | Monitored Object | Monitoring Period (Raw Data) |
|-----------------------------------|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------------|------------------------------|
| mountPointPrefix_disk_usedPercent | (Agent) Disk Usage | <p>Percentage of total disk space that is used, which is calculated as follows: <b>Disk Usage = Used Disk Space/Disk Storage Capacity</b></p> <p>Unit: percent</p> <ul style="list-style-type: none"> <li>Linux: It is calculated as follows: Used/Size. The path of the mount point prefix cannot exceed 64 characters. It must start with a letter, and contain only digits, letters, hyphens (-), dots (.), and swung dashes (~).</li> <li>Windows: Use the WMI interface to call GetDiskFreeSpaceEx W API to obtain disk space data. The path of the mount point prefix cannot exceed 64 characters. It must start with a letter, and contain only digits, letters, hyphens (-), dots (.), and swung dashes (~).</li> </ul> | 0-100       | ECS              | 1 minute                     |

Table 9-7 Disk I/O metrics

| Metric                                    | Parameter               | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Value Range | Monitored Object | Monitoring Period (Raw Data) |
|-------------------------------------------|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------------|------------------------------|
| mountPointPrefix_disk_agt_read_bytes_rate | (Agent) Disks Read Rate | <p>Number of bytes read from the monitored disk per second</p> <p>Unit: byte/s</p> <ul style="list-style-type: none"><li>Linux:<br/>The disk read rate is calculated based on the data changes in the sixth column of the corresponding device in file <b>/proc/diskstats</b> in a collection period.</li></ul> <p>The path of the mount point prefix cannot exceed 64 characters. It must start with a letter, and contain only digits, letters, hyphens (-), dots (.), and swung dashes (~).</p> <ul style="list-style-type: none"><li>Windows:<ul style="list-style-type: none"><li>Use Win32_PerfFormattedData_PerfDisk_LogicalDisk object in the WMI to obtain disk I/O data.</li><li>The path of the mount point prefix cannot exceed 64 characters. It must start with a letter, and contain only digits, letters, hyphens (-), dots (.), and swung dashes (~).</li></ul></li></ul> | $\geq 0$    | ECS              | 1 minute                     |



| Metric | Parameter | Description                                                                                                                                                                         | Value Range | Monitored Object | Monitoring Period (Raw Data) |
|--------|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------------|------------------------------|
|        |           | <ul style="list-style-type: none"> <li>- When the CPU usage is high, monitoring data obtaining timeout may occur and result in the failure of obtaining monitoring data.</li> </ul> |             |                  |                              |

| Metric                                       | Parameter                   | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Value Range | Monitored Object | Monitoring Period (Raw Data) |
|----------------------------------------------|-----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------------|------------------------------|
| mountPointPrefix_disk_agt_read_requests_rate | (Agent) Disks Read Requests | <p>Number of read requests sent to the monitored disk per second</p> <p>Unit: request/s</p> <ul style="list-style-type: none"> <li>• Linux:                     <p>The disk read requests are calculated based on the data changes in the fourth column of the corresponding device in file <b>/proc/diskstats</b> in a collection period.</p> <p>The path of the mount point prefix cannot exceed 64 characters. It must start with a letter, and contain only digits, letters, hyphens (-), dots (.), and swung dashes (~).</p> </li> <li>• Windows:                     <ul style="list-style-type: none"> <li>- Use Win32_PerfFormattedData_PerfDisk_LogicalDisk object in the WMI to obtain disk I/O data.</li> <li>- The path of the mount point prefix cannot exceed 64 characters. It must start with a letter, and contain only digits, letters, hyphens (-), dots (.), and swung dashes (~).</li> </ul> </li> </ul> | ≥ 0         | ECS              | 1 minute                     |

| Metric | Parameter | Description                                                                                                                                                                         | Value Range | Monitored Object | Monitoring Period (Raw Data) |
|--------|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------------|------------------------------|
|        |           | <ul style="list-style-type: none"> <li>- When the CPU usage is high, monitoring data obtaining timeout may occur and result in the failure of obtaining monitoring data.</li> </ul> |             |                  |                              |

| Metric                                     | Parameter                | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Value Range | Monitored Object | Monitoring Period (Raw Data) |
|--------------------------------------------|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------------|------------------------------|
| mountPointPrefix_disk_agt_write_bytes_rate | (Agent) Disks Write Rate | <p>Number of bytes written to the monitored disk per second</p> <p>Unit: byte/s</p> <ul style="list-style-type: none"><li>Linux:<br/>The disk write rate is calculated based on the data changes in the tenth column of the corresponding device in file <b>/proc/diskstats</b> in a collection period.<p>The path of the mount point prefix cannot exceed 64 characters. It must start with a letter, and contain only digits, letters, hyphens (-), dots (.), and swung dashes (~).</p></li><li>Windows:<ul style="list-style-type: none"><li>- Use Win32_PerfFormattedData_PerfDisk_LogicalDisk object in the WMI to obtain disk I/O data.</li><li>- The path of the mount point prefix cannot exceed 64 characters. It must start with a letter, and contain only digits, letters, hyphens (-), dots (.), and swung dashes (~).</li><li>- When the CPU usage is high,</li></ul></li></ul> | $\geq 0$    | ECS              | 1 minute                     |

| Metric | Parameter | Description                                                                                         | Value Range | Monitored Object | Monitoring Period (Raw Data) |
|--------|-----------|-----------------------------------------------------------------------------------------------------|-------------|------------------|------------------------------|
|        |           | monitoring data obtaining timeout may occur and result in the failure of obtaining monitoring data. |             |                  |                              |

| Metric                                          | Parameter                    | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Value Range | Monitored Object | Monitoring Period (Raw Data) |
|-------------------------------------------------|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------------|------------------------------|
| mountPointPrefix_disk_agent_write_requests_rate | (Agent) Disks Write Requests | <p>Number of write requests sent to the monitored disk per second</p> <p>Unit: request/s</p> <ul style="list-style-type: none"> <li>• Linux:                     <p>The disk write requests are calculated based on the data changes in the eighth column of the corresponding device in file <b>/proc/diskstats</b> in a collection period.</p> <p>The path of the mount point prefix cannot exceed 64 characters. It must start with a letter, and contain only digits, letters, hyphens (-), dots (.), and swung dashes (~).</p> </li> <li>• Windows:                     <ul style="list-style-type: none"> <li>- Use Win32_PerfFormattedData_PerfDisk_LogicalDisk object in the WMI to obtain disk I/O data.</li> <li>- The path of the mount point prefix cannot exceed 64 characters. It must start with a letter, and contain only digits, letters, hyphens (-), dots (.), and swung dashes (~).</li> </ul> </li> </ul> | ≥ 0         | ECS              | 1 minute                     |

| Metric        | Parameter                         | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Value Range | Monitored Object | Monitoring Period (Raw Data) |
|---------------|-----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------------|------------------------------|
|               |                                   | <ul style="list-style-type: none"> <li>- When the CPU usage is high, monitoring data obtaining timeout may occur and result in the failure of obtaining monitoring data.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                       |             |                  |                              |
| disk_readTime | (Agent) Average Read Request Time | <p>Average amount of time that read requests have waited on the disks<br/>Unit: ms/count</p> <ul style="list-style-type: none"> <li>• Linux:<br/>The average read request time is calculated based on the data changes in the seventh column of the corresponding device in file <b>/proc/diskstats</b> in a collection period.<br/>The path of the mount point prefix cannot exceed 64 characters. It must start with a letter, and contain only digits, letters, hyphens (-), dots (.), and swung dashes (~).</li> <li>• Windows is not supported currently.</li> </ul> | ≥ 0         | ECS              | 1 minute                     |

| Metric         | Parameter                          | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Value Range | Monitored Object | Monitoring Period (Raw Data) |
|----------------|------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------------|------------------------------|
| disk_writeTime | (Agent) Average Write Request Time | <p>Average amount of time that write requests have waited on the disks<br/>Unit: ms/count</p> <ul style="list-style-type: none"> <li>Linux:<br/>The average write request time is calculated based on the data changes in the eleventh column of the corresponding device in file <b>/proc/diskstats</b> in a collection period.<br/>The path of the mount point prefix cannot exceed 64 characters. It must start with a letter, and contain only digits, letters, hyphens (-), dots (.), and swung dashes (~).</li> <li>Windows is not supported currently.</li> </ul> | ≥ 0         | ECS              | 1 minute                     |



| Metric        | Parameter              | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Value Range | Monitored Object | Monitoring Period (Raw Data) |
|---------------|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------------|------------------------------|
| disk_io Utils | (Agent) Disk I/O Usage | <p>Percentage of the time that the disk has had I/O requests queued to the total disk operation time</p> <p>Unit: percent</p> <ul style="list-style-type: none"> <li>Linux:                     <p>The disk I/O usage is calculated based on the data changes in the thirteenth column of the corresponding device in file <b>/proc/diskstats</b> in a collection period.</p> <p>The path of the mount point prefix cannot exceed 64 characters. It must start with a letter, and contain only digits, letters, hyphens (-), dots (.), and swung dashes (~).</p> </li> <li>Windows is not supported currently.</li> </ul> | 0-100       | ECS              | 1 minute                     |

| Metric            | Parameter                 | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Value Range | Monitored Object | Monitoring Period (Raw Data) |
|-------------------|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------------|------------------------------|
| disk_queue_length | (Agent) Disk Queue Length | <p>Average number of read or write requests queued up for completion for the monitored disk in the monitoring period</p> <p>Unit: count</p> <ul style="list-style-type: none"> <li>Linux: The average disk queue length is calculated based on the data changes in the fourteenth column of the corresponding device in file <b>/proc/diskstats</b> in a collection period. The path of the mount point prefix cannot exceed 64 characters. It must start with a letter, and contain only digits, letters, hyphens (-), dots (.), and swung dashes (~).</li> <li>Windows is not supported currently.</li> </ul> | ≥ 0         | ECS              | 1 minute                     |

| Metric                         | Parameter                       | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Value Range | Monitored Object | Monitoring Period (Raw Data) |
|--------------------------------|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------------|------------------------------|
| disk_write_bytes_per_operation | (Agent) Average Disk Write Size | <p>Average number of bytes in an I/O write for the monitored disk in the monitoring period</p> <p>Unit: byte/op</p> <ul style="list-style-type: none"> <li>Linux:                     <p>The average disk write size is calculated based on the data changes in the tenth column of the corresponding device to divide that of the eighth column in file <b>/proc/diskstats</b> in a collection period.</p> <p>The path of the mount point prefix cannot exceed 64 characters. It must start with a letter, and contain only digits, letters, hyphens (-), dots (.), and swung dashes (~).</p> </li> <li>Windows is not supported currently.</li> </ul> | ≥ 0         | ECS              | 1 minute                     |

| Metric                        | Parameter                         | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Value Range | Monitored Object | Monitoring Period (Raw Data) |
|-------------------------------|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------------|------------------------------|
| disk_read_bytes_per_operation | (Agent)<br>Average Disk Read Size | <p>Average number of bytes in an I/O read for the monitored disk in the monitoring period</p> <p>Unit: byte/op</p> <ul style="list-style-type: none"> <li>Linux:<br/>The average disk read size is calculated based on the data changes in the sixth column of the corresponding device to divide that of the fourth column in file <b>/proc/diskstats</b> in a collection period. <p>The path of the mount point prefix cannot exceed 64 characters. It must start with a letter, and contain only digits, letters, hyphens (-), dots (.), and swung dashes (~).</p> </li> <li>Windows is not supported currently.</li> </ul> | ≥ 0         | ECS              | 1 minute                     |

| Metric        | Parameter                     | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Value Range | Monitored Object | Monitoring Period (Raw Data) |
|---------------|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------------|------------------------------|
| disk_io_svctm | (Agent) Disk I/O Service Time | <p>Average time in an I/O read or write for the monitored disk in the monitoring period</p> <p>Unit: ms/op</p> <ul style="list-style-type: none"> <li>Linux:                     <p>The average disk I/O service time is calculated based on the data changes in the thirteenth column of the corresponding device to divide the sum of data changes in the fourth and eighth columns in file <b>/proc/diskstats</b> in a collection period.</p> <p>The path of the mount point prefix cannot exceed 64 characters. It must start with a letter, and contain only digits, letters, hyphens (-), dots (.), and swung dashes (~).</p> </li> <li>Windows is not supported currently.</li> </ul> | ≥ 0         | ECS              | 1 minute                     |

**Table 9-8** File system metrics

| Metric           | Parameter                             | Description                                                                                                                                                                                                                                                                                                      | Value Range | Monitored Object | Monitoring Period (Raw Data) |
|------------------|---------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------------|------------------------------|
| disk_fs_rwstate  | (Agent) File System Read/Write Status | Read and write status of the mounted file system of the monitored object<br>Possible values are <b>0</b> (read and write) and <b>1</b> (read only).<br><br>Linux: Check file system information in the fourth column in file <code>/proc/mounts</code> .                                                         | 0 or 1      | ECS              | 1                            |
| disk_inodesTotal | (Agent) Disk inode Total              | Total number of index nodes on the disk<br>Linux: Run the <code>df -i</code> command to check the value in the <b>Inodes</b> column. The path of the mount point prefix cannot exceed 64 characters. It must start with a letter, and contain only digits, letters, hyphens (-), dots (.), and swung dashes (~). | $\geq 0$    | ECS              | 1 minute                     |
| disk_inodesUsed  | (Agent) Total inode Used              | Number of used index nodes on the disk<br>Linux: Run the <code>df -i</code> command to check the value in the <b>IUsed</b> column. The path of the mount point prefix cannot exceed 64 characters. It must start with a letter, and contain only digits, letters, hyphens (-), dots (.), and swung dashes (~).   | $\geq 0$    | ECS              | 1 minute                     |

| Metric                 | Parameter                               | Description                                                                                                                                                                                                                                                                                                               | Value Range | Monitored Object | Monitoring Period (Raw Data) |
|------------------------|-----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------------|------------------------------|
| disk_inodesUsedPercent | (Agent) Percentage of Total inodes Used | Number of used index nodes on the disk<br>Unit: percent<br>Linux: Run the <b>df -i</b> command to check the value in the <b>IUse%</b> column. The path of the mount point prefix cannot exceed 64 characters. It must start with a letter, and contain only digits, letters, hyphens (-), dots (.), and swung dashes (~). | 0-100       | ECS              | 1 minute                     |

 NOTE

The Windows OS does not support the file system metrics.

**Table 9-9** NIC metrics

| Metric      | Parameter                  | Description                                                                                                                                                                                                                                                                               | Value Range | Monitored Object | Monitoring Period (Raw Data) |
|-------------|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------------|------------------------------|
| net_bitRecv | (Agent) Outbound Bandwidth | Number of bits sent by this NIC per second<br>Unit: bit/s<br><ul style="list-style-type: none"> <li>Linux: Check metric value changes in file <b>/proc/net/dev</b> in a collection period.</li> <li>Windows: Use the MibIfRow object in the WMI to obtain network metric data.</li> </ul> | ≥ 0         | ECS              | 1 minute                     |

| Metric             | Parameter                       | Description                                                                                                                                                                                                                                                                                     | Value Range | Monitored Object | Monitoring Period (Raw Data) |
|--------------------|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------------|------------------------------|
| net_bit Sent       | (Agent) Inbound Bandwidth       | Number of bits received by this NIC per second<br>Unit: bit/s<br><ul style="list-style-type: none"><li>Linux: Check metric value changes in file <b>/proc/net/dev</b> in a collection period.</li><li>Windows: Use the MibIfRow object in the WMI to obtain network metric data.</li></ul>      | $\geq 0$    | ECS              | 1 minute                     |
| net_packetReceived | (Agent) NIC Packet Receive Rate | Number of packets received by this NIC per second<br>Unit: count/s<br><ul style="list-style-type: none"><li>Linux: Check metric value changes in file <b>/proc/net/dev</b> in a collection period.</li><li>Windows: Use the MibIfRow object in the WMI to obtain network metric data.</li></ul> | $\geq 0$    | ECS              | 1 minute                     |
| net_packetSent     | (Agent) NIC Packet Send Rate    | Number of packets sent by this NIC per second<br>Unit: count/s<br><ul style="list-style-type: none"><li>Linux: Check metric value changes in file <b>/proc/net/dev</b> in a collection period.</li><li>Windows: Use the MibIfRow object in the WMI to obtain network metric data.</li></ul>     | $\geq 0$    | ECS              | 1 minute                     |



| Metric      | Parameter                            | Description                                                                                                                                                                                                                                                                     | Value Range | Monitored Object | Monitoring Period (Raw Data) |
|-------------|--------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------------|------------------------------|
| net_errin   | (Agent) Receive Error Rate           | Percentage of receive errors detected by this NIC per second<br>Unit: percent <ul style="list-style-type: none"><li>Linux: Check metric value changes in file <b>/proc/net/dev</b> in a collection period.</li><li>Windows is not supported currently.</li></ul>                | 0-100       | ECS              | 1 minute                     |
| net_errout  | (Agent) Transmit Error Rate          | Percentage of transmit errors detected by this NIC per second<br>Unit: percent <ul style="list-style-type: none"><li>Linux: Check metric value changes in file <b>/proc/net/dev</b> in a collection period.</li><li>Windows is not supported currently.</li></ul>               | 0-100       | ECS              | 1 minute                     |
| net_dropin  | (Agent) Received Packet Drop Rate    | Percentage of packets received by this NIC which were dropped per second<br>Unit: percent <ul style="list-style-type: none"><li>Linux: Check metric value changes in file <b>/proc/net/dev</b> in a collection period.</li><li>Windows is not supported currently.</li></ul>    | 0-100       | ECS              | 1 minute                     |
| net_dropout | (Agent) Transmitted Packet Drop Rate | Percentage of packets transmitted by this NIC which were dropped per second<br>Unit: percent <ul style="list-style-type: none"><li>Linux: Check metric value changes in file <b>/proc/net/dev</b> in a collection period.</li><li>Windows is not supported currently.</li></ul> | 0-100       | ECS              | 1 minute                     |

**Table 9-10** Process metrics

| Metric           | Parameter | Description                                                                                                                                                                                                                                                                                                                                                 | Value Range | Monitored Object | Monitoring Period (Raw Data) |
|------------------|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------------|------------------------------|
| proc_pHashId_cpu | CPU Usage | <p>CPU consumed by a process. <b>pHashId</b> (process name and process ID) is the value of <b>md5</b>.</p> <p>Unit: percent</p> <ul style="list-style-type: none"><li>Linux: Check metric value changes in file <b>/proc/pid/stat</b>.</li><li>Windows: Call the Windows API <code>GetProcessTimes</code> to obtain the CPU usage of the process.</li></ul> | 0-100       | ECS              | 1 minute                     |

| Metric           | Parameter    | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Value Range | Monitored Object | Monitoring Period (Raw Data) |
|------------------|--------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------------|------------------------------|
| proc_pHashId_mem | Memory Usage | <p>Memory consumed by a process. <b>pHashId</b> (process name and process ID) is the value of <b>md5</b>.</p> <p>Unit: percent</p> <ul style="list-style-type: none"> <li>Linux: <math>RSS * PAGESIZE / MemTotal</math><br/>Obtain the <b>RSS</b> value by checking the second column of file <b>/proc/pid/statm</b>.<br/>Obtain the <b>PAGESIZE</b> value by running the <b>getconf PAGESIZE</b> command.<br/>Obtain the <b>MemTotal</b> value by checking file <b>/proc/meminfo</b>.</li> <li>Windows: Call the Windows API <code>procGlobalMemoryStatusEx</code> to obtain the total memory size. Call <code>GetProcessMemoryInfo</code> to obtain the used memory size. Use the used memory size to divide the total memory size to get the memory usage.</li> </ul> | 0-100       | ECS              | 1 minute                     |

| Metric             | Parameter         | Description                                                                                                                                                                                                                                                                                                                    | Value Range | Monitored Object | Monitoring Period (Raw Data) |
|--------------------|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------------|------------------------------|
| proc_pHashId_file  | Opened Files      | <p>Number of files opened by a process. <b>pHashId</b> (process name and process ID) is the value of <b>md5</b>.</p> <ul style="list-style-type: none"><li>Linux: Run the <b>ls -l /proc/pid/fd</b> command to view the number of opened files.</li><li>Windows is not supported currently.</li></ul>                          | ≥ 0         | ECS              | 1 minute                     |
| proc_running_count | Running Processes | <p>Number of processes that are running</p> <ul style="list-style-type: none"><li>Linux: You can obtain the state of each process by checking the <b>Status</b> value in the <b>/proc/pid/status</b> file, and then collect the total number of processes in each state.</li><li>Windows is not supported currently.</li></ul> | ≥ 0         | ECS              | 1 minute                     |
| proc_idle_count    | Idle Processes    | <p>Number of processes that are idle</p> <ul style="list-style-type: none"><li>Linux: You can obtain the state of each process by checking the <b>Status</b> value in the <b>/proc/pid/status</b> file, and then collect the total number of processes in each state.</li><li>Windows is not supported currently.</li></ul>    | ≥ 0         | ECS              | 1 minute                     |

| Metric              | Parameter          | Description                                                                                                                                                                                                                                                                                                                     | Value Range | Monitored Object | Monitoring Period (Raw Data) |
|---------------------|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------------|------------------------------|
| proc_zombie_count   | Zombie Processes   | <p>Number of zombie processes</p> <ul style="list-style-type: none"><li>Linux: You can obtain the state of each process by checking the <b>Status</b> value in the <b>/proc/pid/status</b> file, and then collect the total number of processes in each state.</li><li>Windows is not supported currently.</li></ul>            | $\geq 0$    | ECS              | 1 minute                     |
| proc_blocked_count  | Blocked Processes  | <p>Number of processes that are blocked</p> <ul style="list-style-type: none"><li>Linux: You can obtain the state of each process by checking the <b>Status</b> value in the <b>/proc/pid/status</b> file, and then collect the total number of processes in each state.</li><li>Windows is not supported currently.</li></ul>  | $\geq 0$    | ECS              | 1 minute                     |
| proc_sleeping_count | Sleeping Processes | <p>Number of processes that are sleeping</p> <ul style="list-style-type: none"><li>Linux: You can obtain the state of each process by checking the <b>Status</b> value in the <b>/proc/pid/status</b> file, and then collect the total number of processes in each state.</li><li>Windows is not supported currently.</li></ul> | $\geq 0$    | ECS              | 1 minute                     |

| Metric           | Parameter       | Description                                                                                                                                                                                                                                                                                                                                                                                                                  | Value Range | Monitored Object | Monitoring Period (Raw Data) |
|------------------|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------------|------------------------------|
| proc_total_count | Total Processes | <p>Total number of processes on the monitored object</p> <ul style="list-style-type: none"> <li>Linux: You can obtain the state of each process by checking the <b>Status</b> value in the <b>/proc/pid/status</b> file, and then collect the total number of processes in each state.</li> <li>Windows: Obtain the total number of processes by using the system process status support module <b>psapi.dll</b>.</li> </ul> | ≥ 0         | ECS              | 1 minute                     |

**Table 9-11** GPU Metrics

| Metric                      | Parameter          | Description                                                                                                                                             | Value Range                                                                                                                                                            | Monitored Object    | Monitoring Period (Raw Data) |
|-----------------------------|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|------------------------------|
| slot0_gpu_performance_state | Performance Status | GPU performance status of the monitored object<br>Unit: none<br>Linux: Run the <b>nvidia-smi</b> command to check the value in the <b>Perf</b> column.  | P0-P15, P32<br><b>P0</b> indicates the maximum performance status.<br><b>P15</b> indicates the minimum performance status.<br><b>P32</b> indicates the unknown status. | GPU-accelerated ECS | 1 minute                     |
| slot0_gpu_usage_mem         | Memory Usage       | Memory usage of the monitored object<br>Unit: percent<br>Linux: Run the <b>nvidia-smi</b> command to check the value in the <b>Memory-Usage</b> column. | 0-100                                                                                                                                                                  | GPU-accelerated ECS | 1 minute                     |
| slot0_gpu_usage_gpu         | GPU Usage          | GPU usage of the monitored object<br>Unit: percent<br>Linux: Run the <b>nvidia-smi</b> command to check the value in the <b>GPU-Util</b> column.        | 0-100                                                                                                                                                                  | GPU-accelerated ECS | 1 minute                     |

**NOTE**

The Windows OS does not support the GPU metrics.

## Dimensions

| Key         | Value                 |
|-------------|-----------------------|
| instance_id | Specifies the ECS ID. |

## 9.4 OS Monitoring Metrics Supported by ECSs with the Agent Installed and Using Simplified Monitoring Metrics

### Description

This section describes the OS metrics supported by ECSs. In the following regions, the agent of the latest version is used with simplified monitoring metrics:

CN East-Shanghai1, CN East-Shanghai2, CN North-Beijing1, CN North-Beijing4, CN South-Guangzhou, AP-Hong Kong, AP-Bangkok, AP-Singapore, AF-Johannesburg, and Russia-Moscow2

After installing the agent on an ECS, you can view its OS monitoring metrics. Monitoring data is collected every 1 minute.

### OS Monitoring Metrics

Table 9-12 OS monitoring metrics

| Metric    | Parameter         | Description                                                                                                                                                                                                                                                                                                                                          | Value Range | Monitored Object | Monitoring Period (Raw Data) |
|-----------|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------------|------------------------------|
| cpu_usage | (Agent) CPU Usage | CPU usage of the monitored object<br>Unit: percent<br><ul style="list-style-type: none"><li>Linux: Check metric value changes in file / <b>proc/stat</b> in a collection period. Run the <b>top</b> command to check the <b>%Cpu(s)</b> value.</li><li>Windows: Obtain the metric value using the Windows API <code>GetSystemTimes</code>.</li></ul> | 0-100       | ECS              | 1 minute                     |



| Metric          | Parameter                     | Description                                                                                                                                                                                                                                                                                                                                     | Value Range | Monitored Object | Monitoring Period (Raw Data) |
|-----------------|-------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------------|------------------------------|
| load_average5   | (Agent) 5-Minute Load Average | CPU load averaged from the last 5 minutes <ul style="list-style-type: none"><li>Linux: Obtain the metric value from the number of logic CPUs in <b>load5/</b> in file <b>/proc/loadavg</b>. Run the <b>top</b> command to check the <b>load5</b> value.</li><li>Windows does not support this metric.</li></ul>                                 | ≥ 0         | ECS              | 1 minute                     |
| mem_usedPercent | (Agent) Memory Usage          | Memory usage of the monitored object<br>Unit: percent <ul style="list-style-type: none"><li>Linux: Obtain the metric value from the <b>/proc/meminfo</b> file (<b>MemTotal - MemAvailable</b>)/<b>MemTotal</b>.</li><li>Windows: Obtain the value using the following formula:<br/>Used memory size/<br/>Total memory size x<br/>100%</li></ul> | 0-100       | ECS              | 1 minute                     |

| Metric                     | Parameter                    | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Value Range | Monitored Object | Monitoring Period (Raw Data) |
|----------------------------|------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------------|------------------------------|
| mountPointPrefix_disk_free | (Agent) Available Disk Space | <p>Free disk space<br/>Unit: GB</p> <ul style="list-style-type: none"> <li>Linux: Run the <b>df -h</b> command to check the value in the <b>Avail</b> column. The path of the device name prefix cannot exceed 64 characters. It must start with a letter, and contain only digits, letters, hyphens (-), dots (.), and swung dashes (~).</li> <li>Windows: Obtain the metric value using the WMI API GetDiskFreeSpaceEx W. The path of the device name prefix cannot exceed 64 characters. It must start with a letter, and contain only digits, letters, hyphens (-), dots (.), and swung dashes (~).</li> </ul> | ≥ 0         | ECS              | 1 minute                     |

| Metric                            | Parameter          | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Value Range | Monitored Object | Monitoring Period (Raw Data) |
|-----------------------------------|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------------|------------------------------|
| mountPointPrefix_disk_usedPercent | (Agent) Disk Usage | <p>Percentage of total disk space that is used<br/>Unit: percent</p> <ul style="list-style-type: none"> <li>Linux: Obtain the metric value using following formula:<br/><b>Disk Usage = Used Disk Space/Disk Storage Capacity.</b><br/>The path of the device name prefix cannot exceed 64 characters. It must start with a letter, and contain only digits, letters, hyphens (-), dots (.), and swung dashes (~).</li> <li>Windows: Obtain the metric value using the WMI API GetDiskFreeSpaceEx W. The path of the device name prefix cannot exceed 64 characters. It must start with a letter, and contain only digits, letters, hyphens (-), dots (.), and swung dashes (~).</li> </ul> | 0-100       | ECS              | 1 minute                     |

| Metric                             | Parameter                                              | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Value Range | Monitored Object | Monitoring Period (Raw Data) |
|------------------------------------|--------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------------|------------------------------|
| disk_io<br>Utils                   | (Agent)<br>Disk I/O<br>Usage                           | <p>Percentage of the time that the disk has had I/O requests queued to the total disk operation time</p> <p>Unit: percent</p> <ul style="list-style-type: none"><li>Linux:<br/>Obtain the metric value by calculating the data changes in the thirteenth column of the monitored object in file <b>/proc/diskstats</b> in a collection period.</li></ul> <p>The path of the device name prefix cannot exceed 64 characters. It must start with a letter, and contain only digits, letters, hyphens (-), dots (.), and swung dashes (~).</p> <ul style="list-style-type: none"><li>Windows does not support this metric.</li></ul> | 0-100       | ECS              | 1 minute                     |
| disk_in<br>odesUs<br>edPerc<br>ent | (Agent)<br>Percenta<br>ge of<br>Total<br>inode<br>Used | <p>Number of used index nodes on the disk</p> <p>Unit: percent</p> <ul style="list-style-type: none"><li>Linux: Run the <b>df -i</b> command to check the value in the <b>IUse %</b> column. The path of the device name prefix cannot exceed 64 characters. It must start with a letter, and contain only digits, letters, hyphens (-), dots (.), and swung dashes (~).</li></ul> <ul style="list-style-type: none"><li>Windows does not support this metric.</li></ul>                                                                                                                                                          | 0-100       | ECS              | 1 minute                     |

| Metric         | Parameter                       | Description                                                                                                                                                                                                                                                                                  | Value Range | Monitored Object | Monitoring Period (Raw Data) |
|----------------|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------------|------------------------------|
| net_bit Sent   | (Agent) Inbound Bandwidth       | Number of bits received by the monitored object per second<br>Unit: bit/s<br><ul style="list-style-type: none"><li>Linux: Check metric value changes in file / <b>proc/net/dev</b> in a collection period.</li><li>Windows: Obtain the metric value using the WMI MibIfRow object.</li></ul> | $\geq 0$    | ECS              | 1 minute                     |
| net_bit Recv   | (Agent) Outbound Bandwidth      | Number of bits sent by the target NIC per second<br>Unit: bit/s<br><ul style="list-style-type: none"><li>Linux: Check metric value changes in file / <b>proc/net/dev</b> in a collection period.</li><li>Windows: Obtain the metric value using the WMI MibIfRow object.</li></ul>           | $\geq 0$    | ECS              | 1 minute                     |
| net_packetRecv | (Agent) NIC Packet Receive Rate | Number of packets received by this NIC per second<br>Unit: count/s<br><ul style="list-style-type: none"><li>Linux: Check metric value changes in file / <b>proc/net/dev</b> in a collection period.</li><li>Windows: Obtain the metric value using the WMI MibIfRow object.</li></ul>        | $\geq 0$    | ECS              | 1 minute                     |

| Metric              | Parameter                                     | Description                                                                                                                                                                                                                                                                         | Value Range | Monitored Object | Monitoring Period (Raw Data) |
|---------------------|-----------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------------|------------------------------|
| net_packetSent      | (Agent) NIC Packet Send Rate                  | Number of packets sent by this NIC per second<br>Unit: count/s<br><ul style="list-style-type: none"> <li>Linux: Check metric value changes in file <b>/proc/net/dev</b> in a collection period.</li> <li>Windows: Obtain the metric value using the WMI MibIfRow object.</li> </ul> | ≥ 0         | ECS              | 1 minute                     |
| net_tcp_total       | (Agent) Total number of TCP connections       | Total number of TCP connections of this NIC                                                                                                                                                                                                                                         | ≥ 0         | ECS              | 1 minute                     |
| net_tcp_established | (Agent) Number of ESTABLISHED TCP connections | Number of ESTABLISHED TCP connections of this NIC                                                                                                                                                                                                                                   | ≥ 0         | ECS              | 1 minute                     |

## Dimensions

| Key         | Value                 |
|-------------|-----------------------|
| instance_id | Specifies the ECS ID. |


## 9.5 Setting Alarm Rules

### Scenarios

Setting ECS alarm rules allows you to customize the monitored objects and notification policies so that you can closely monitor your ECSs.

This section describes how to set ECS alarm rules, including alarm rule names, monitoring objects, monitoring metrics, alarm thresholds, monitoring intervals, and notifications.

## Procedure

1. Log in to the management console.
2. Click  in the upper left corner and select your region and project.
3. Under **Management & Deployment**, click **Cloud Eye**.
4. In the navigation pane on the left, choose **Alarm Management > Alarm Rules**.
5. On the **Alarm Rules** page, click **Create Alarm Rule** to create an alarm rule, or modify an existing alarm rule.

The following operations use modifying an existing alarm rule as an example.

- a. Click the target alarm rule.
- b. Click **Modify** in the upper right corner of the page.
- c. On the **Modify Alarm Rule** page, set parameters as prompted.
- d. Click **OK**.

After an alarm rule is modified, the system automatically notifies you of an alarm when the alarm complying with the alarm rule is generated.

### NOTE

For more information about ECS alarm rules, see [Cloud Eye User Guide](#).

## 9.6 Viewing ECS Metrics

### Scenarios

The public cloud platform provides Cloud Eye, which monitors the running statuses of your ECSs. You can obtain the monitoring metrics of each ECS on the management console.

### Prerequisites


- The ECS is running properly.  
Cloud Eye does not display the monitoring data for a stopped, faulty, or deleted ECS. After such an ECS restarts or recovers, the monitoring data is available in Cloud Eye.

### NOTE

Cloud Eye discontinues monitoring ECSs that remain in **Stopped** or **Faulty** state for 24 hours and removes them from the monitoring list. However, the alarm rules for such ECSs are not automatically deleted.

- Alarm rules have been configured in Cloud Eye for the target ECS.  
The monitoring data is unavailable for the ECSs without alarm rules configured in Cloud Eye. For details, see [Setting Alarm Rules](#).
- The target ECS has been properly running for at least 10 minutes.  
The monitoring data and graphics are available for a new ECS after the ECS runs for at least 10 minutes.

## Procedure

1. Log in to the management console.
2. Click  in the upper left corner and select your region and project.
3. Under **Computing**, click **Elastic Cloud Server**.
4. In the search box above the upper right corner of the ECS list, enter the ECS name, IP address, or ID for search.
5. Click the name of the target ECS. The page providing details about the ECS is displayed.
6. Click the **Monitoring** tab to view the monitoring data.
7. In the ECS monitoring area, select a duration to view the monitoring data.  
You can view the monitoring data of the ECS in the last 1, 3, or 12 hours.



# 10<sub>CTS</sub>

## 10.1 Supported CTS Operations

### Scenarios

Cloud Trace Service (CTS) records user operations performed on ECSs and related resources for query, auditing, and backtracking later.

### Prerequisites

CTS is available.

### Key ECS Operations Recorded by CTS

**Table 10-1** ECS operations recorded by CTS

| Operation                             | Resource Type | Event Name    |
|---------------------------------------|---------------|---------------|
| Creating an ECS                       | ECS           | createServer  |
| Deleting an ECS                       | ECS           | deleteServer  |
| Starting an ECS                       | ECS           | startServer   |
| Restarting an ECS                     | ECS           | rebootServer  |
| Stopping an ECS                       | ECS           | stopServer    |
| Adding an ECS NIC                     | ECS           | addNic        |
| Deleting an ECS NIC                   | ECS           | deleteNic     |
| Attaching a disk                      | ECS           | attachVolume  |
| Attaching a disk (on the EVS console) | ECS           | attachVolume2 |
| Detaching a disk                      | ECS           | detachVolume  |

| Operation                              | Resource Type | Event Name          |
|----------------------------------------|---------------|---------------------|
| Reinstalling an OS                     | ECS           | reinstallOs         |
| Changing an OS                         | ECS           | changeOs            |
| Modifying specifications               | ECS           | resizeServer        |
| Enabling automatic recovery on an ECS  | ECS           | addAutoRecovery     |
| Disabling automatic recovery on an ECS | ECS           | deleteAutoRecovery  |
| Creating a security group              | ECS           | createSecurityGroup |


## 10.2 Viewing Tracing Logs

### Scenarios

CTS starts to record ECS operations immediately after it is provisioned. You can view the operation records of the last seven days on the management console.

This section describes how to view the operation records.

### Procedure

1. Log in to the management console.
2. Click  in the upper left corner and select your region and project.
3. Click **Service List**. Under **Management & Deployment**, click **Cloud Trace Service**.
4. In the navigation pane on the left, choose **Trace List**.
5. Click **Filter** and specify filter criteria as needed. The following four filter criteria are available:
  - **Trace Source, Resource Type, and Search By**  
Select a filter criterion from the drop-down list.  
If you select **Trace name** for **Search By**, you need to select a specific trace name.  
If you select **Resource ID** for **Search By**, you need to select or enter a specific resource ID.  
When you select **Resource name** for **Search By**, you need to select or enter a specific resource name.
  - **Operator**: Select a specific operator (which is a user rather than the tenant).
  - **Trace Status**: Available options include **All trace statuses**, **normal**, **warning**, and **incident**. You can only select one of them.
  - **Time Range**: You can view traces generated during any time range of the last seven days.

- Expand the trace for details.

**Figure 10-1** Expanding trace details

| Trace Name    | Resource Type                        | Trace Source | Resource ID       | Resource Name | Trace Status                    | Operator | Operation Time                  | Operation                  |
|---------------|--------------------------------------|--------------|-------------------|---------------|---------------------------------|----------|---------------------------------|----------------------------|
| createTracker | tracker                              | CTS          |                   | system        | normal                          |          | Feb 02, 2019 19:22:43 GMT+08:00 | <a href="#">View Trace</a> |
| Trace ID      | dbee5100-26dc-11e9-bb00-285ed488cbe2 |              | Source IP Address |               |                                 |          |                                 |                            |
| Trace Type    | ConsoleAction                        |              | Generated         |               | Feb 02, 2019 19:22:43 GMT+08:00 |          |                                 |                            |

- Click **View Trace**. A dialog box is displayed, in which the trace structure details are displayed.

For more information about CTS, see [Cloud Trace Service User Guide](#).

# A Change History

| Released On | Description                                                                                                                                                                                                                                                                                                                                        |
|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2021-03-10  | This issue is the twenty-seventh official release.<br>Modified the following content: <ul style="list-style-type: none"><li>Added the URL for downloading the PV driver and UVP VMTools in <a href="#">Changing a Xen ECS to a KVM ECS (Windows)</a>.</li></ul>                                                                                    |
| 2021-02-20  | This issue is the twenty-sixth official release.<br>Modified the following content: <ul style="list-style-type: none"><li>Modified steps in <a href="#">Changing Yearly/Monthly to Pay-per-Use</a>.</li></ul>                                                                                                                                      |
| 2020-12-17  | This issue is the twenty-fifth official release.<br>Added the following content: <ul style="list-style-type: none"><li><a href="#">OS Monitoring Metrics Supported by ECSs with the Agent Installed and Using Simplified Monitoring Metrics</a></li></ul>                                                                                          |
| 2020-09-29  | This issue is the twenty-fourth official release.<br>Added the following content: <ul style="list-style-type: none"><li><a href="#">Changing a Xen ECS to a KVM ECS (Windows)</a></li><li><a href="#">Automatically Changing a Xen ECS to a KVM ECS (Linux)</a></li><li><a href="#">Manually Changing a Xen ECS to a KVM ECS (Linux)</a></li></ul> |
| 2020-08-31  | This issue is the twenty-third official release.<br>Added the following content: <ul style="list-style-type: none"><li>Added notes and firewall configuration examples in <a href="#">Obtaining Metadata</a>.</li><li>Deleted the example of using a plaintext password in <a href="#">Injecting User Data into ECSs</a>.</li></ul>                |
| 2020-06-09  | This issue is the twenty-second official release.<br>Added the following content: <ul style="list-style-type: none"><li><a href="#">Dynamically Assigning IPv6 Addresses</a></li></ul>                                                                                                                                                             |

| Released On | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
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| 2020-05-06  | <p>This issue is the twenty-first official release.</p> <p>Added the following content:</p> <ul style="list-style-type: none"><li>• <a href="#">Adding a Disk to an ECS</a></li><li>• <a href="#">Unbinding an EIP</a></li></ul> <p>Modified the following content:</p> <ul style="list-style-type: none"><li>• Optimized the operations for installing a Tesla driver and CUDA toolkit in <a href="#">Installing a Tesla Driver and CUDA Toolkit on a GPU-accelerated ECS</a>.</li><li>• Added <a href="#">GPU Driver</a> to describe GRID and Tesla drivers.</li><li>• Modified operations in <a href="#">Reinstalling the OS</a> and <a href="#">Changing the OS</a>.</li><li>• <a href="#">Binding an EIP</a></li></ul>                                                                                    |
| 2020-02-18  | <p>This issue is the twentieth official release.</p> <ul style="list-style-type: none"><li>• Added <a href="#">Logging In to Windows ECS from a Mac</a>.</li><li>• Added <a href="#">Overview</a>.</li><li>• Added <a href="#">Overview</a>.</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 2019-11-28  | <p>This issue is the nineteenth official release.</p> <ul style="list-style-type: none"><li>• Added constraints in <a href="#">Managing ECS Groups</a>.</li><li>• Modified description in <a href="#">Resetting the Password for Logging In to an ECS on the Management Console</a> because login passwords can be reset when the target ECSs are running.</li><li>• Moved "Changing the Login Password on an ECS" to FAQs.</li><li>• Moved "Resetting the Forgotten Password for Logging In to a Windows ECS Without Password Reset Plug-ins Installed" to FAQs.</li><li>• Moved "Resetting the Password for Logging In to a Linux ECS Without Password Reset Plug-ins Installed" to FAQs.</li><li>• Added an example for setting a time zone in <a href="#">Changing the Time Zone for an ECS</a>.</li></ul> |
| 2019-10-28  | <p>This issue is the eighteenth official release.</p> <p>Added the following content:</p> <ul style="list-style-type: none"><li>• <a href="#">Installing a GRID Driver on a GPU-accelerated ECS</a></li><li>• <a href="#">Installing a NVIDIA GPU Driver and CUDA Toolkit (Recommended)</a></li><li>• <a href="#">Installing a Tesla Driver and CUDA Toolkit on a GPU-accelerated ECS</a></li><li>• Modified <a href="#">Managing ECS Groups</a>.</li><li>• Modified NIC multi-queue supported by Linux ECSs in <a href="#">Enabling NIC Multi-Queue</a>.</li></ul>                                                                                                                                                                                                                                            |

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| 2019-10-25  | <p>This issue is the seventeenth official release.</p> <p>Modified the following content:</p> <ul style="list-style-type: none"><li>• <a href="#">Basic ECS Metrics</a></li><li>• <a href="#">Viewing ECS Creation Statuses</a></li></ul> <p>Added the following content:</p> <ul style="list-style-type: none"><li>• <a href="#">OS Monitoring Metrics Supported by ECSs with the Agent Installed</a></li></ul>                                                                                  |
| 2019-09-23  | <p>This issue is the sixteenth official release.</p> <p>Modified the following content:</p> <ul style="list-style-type: none"><li>• Modified application scenarios in <a href="#">Changing an EIP Bandwidth</a>.</li><li>• Modified application scenarios in <a href="#">Changing an EIP</a>.</li><li>• Added notes for adding an ECS to an ECS group in <a href="#">Managing ECS Groups</a>.</li></ul>                                                                                           |
| 2019-09-06  | <p>This issue is the fifteenth official release.</p> <p>Added the following content:</p> <ul style="list-style-type: none"><li>• <a href="#">Spot Pricing</a></li><li>• <a href="#">Purchasing a Spot Price ECS</a></li></ul> <p>Modified the following content:</p> <ul style="list-style-type: none"><li>• <a href="#">Configuring Security Group Rules</a></li><li>• <a href="#">Resetting the Password for Logging In to an ECS on the Management Console</a></li></ul>                       |
| 2019-07-30  | <p>This issue is the fourteenth official release.</p> <p>Added the following content:</p> <ul style="list-style-type: none"><li>• <a href="#">Logging In to a Windows ECS from a Mobile Terminal</a></li><li>• <a href="#">Logging In to a Linux ECS from a Mobile Terminal</a></li></ul>                                                                                                                                                                                                         |
| 2019-06-30  | <p>This issue is the thirteenth official release.</p> <p>Added the following content:</p> <ul style="list-style-type: none"><li>• <a href="#">Yearly/Monthly Pricing</a></li><li>• <a href="#">Pay-Per-Use Pricing</a></li><li>• <a href="#">Changing Yearly/Monthly to Pay-per-Use</a></li></ul> <p>Modified the following content:</p> <ul style="list-style-type: none"><li>• Optimized the document structure.</li><li>• Modified the character set for resetting a login password.</li></ul> |

| Released On | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
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| 2019-05-30  | <p>This issue is the twelfth official release.</p> <p>Modified the following content:</p> <ul style="list-style-type: none"><li>• Added an example for user data injection in <a href="#">Injecting User Data into ECSs</a>.</li><li>• Deleted "Troubleshooting".</li><li>• Added constraints in <a href="#">General Operations for Modifying Specifications</a>.</li><li>• <a href="#">Enabling NIC Multi-Queue</a></li><li>• <a href="#">Login Using MSTSC</a></li></ul>                                                                                                                                  |
| 2019-04-03  | <p>This issue is the eleventh official release.</p> <p>Added the following content:</p> <ul style="list-style-type: none"><li>• <a href="#">Changing Pay-per-Use to Yearly/Monthly</a></li></ul>                                                                                                                                                                                                                                                                                                                                                                                                            |
| 2019-03-04  | <p>This issue is the tenth official release.</p> <p>Added the following content:</p> <ul style="list-style-type: none"><li>• Purchasing an RI</li><li>• Modifying an RI</li></ul> <p>Modified the following content:</p> <ul style="list-style-type: none"><li>• Modified ECS metadata types in <a href="#">Obtaining Metadata</a>.</li><li>• Added use restrictions in <a href="#">Injecting User Data into ECSs</a>.</li></ul>                                                                                                                                                                            |
| 2019-02-28  | <p>This issue is the ninth official release.</p> <p>Modified the following content:</p> <ul style="list-style-type: none"><li>• Modified ECS metrics in <a href="#">Basic ECS Metrics</a>.</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                        |
| 2018-11-19  | <p>This issue is the eighth official release.</p> <p>Modified the following content:</p> <ul style="list-style-type: none"><li>• Updated supported images in <a href="#">Enabling NIC Multi-Queue</a>.</li></ul>                                                                                                                                                                                                                                                                                                                                                                                            |
| 2018-07-30  | <p>This issue is the seventh official release.</p> <p>Added the following content:</p> <ul style="list-style-type: none"><li>• Changing the Login Password on an ECS</li></ul> <p>Modified the following content:</p> <ul style="list-style-type: none"><li>• <a href="#">(Optional) Installing One-Click Password Reset Plug-ins</a></li><li>• Discarded "6.1 Application Scenarios" for resetting the password for logging in to an ECS.</li><li>• Modified description in <a href="#">Changing a Security Group</a>, allowing you to change the security group in the <b>Operation</b> column.</li></ul> |

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| 2018-06-30  | <p>This issue is the sixth official release.</p> <p>Added the following content:</p> <ul style="list-style-type: none"><li>• <a href="#">CTS</a></li></ul> <p>Modified the following content:</p> <ul style="list-style-type: none"><li>• Allowed to export certain ECSs in <a href="#">Exporting ECS Information</a>.</li><li>• Modified prerequisites in <a href="#">Changing the OS</a>, allowing you to change the OS of an ECS on which reinstalling the OS failed.</li></ul>                                                             |
| 2018-05-30  | <p>This issue is the fifth official release.</p> <p>Modified the following content:</p> <ul style="list-style-type: none"><li>• Changed the term EIP in Chinese.</li><li>• Modified the description of <b>local-ipv4</b> and <b>public-ipv4</b> in <a href="#">Obtaining Metadata</a>.</li><li>• Modified <a href="#">Basic ECS Metrics</a> because the monitoring metric <b>System Status Check Failed</b> has been terminated.</li><li>• Added introduction to user data scripts in <a href="#">Injecting User Data into ECSs</a>.</li></ul> |
| 2018-04-30  | <p>This issue is the fourth official release.</p> <p>Added the following content:</p> <ul style="list-style-type: none"><li>• <a href="#">Creating an Image</a></li><li>• <a href="#">Viewing Failures</a></li></ul> <p>Modified the following content:</p> <ul style="list-style-type: none"><li>• Added description in <a href="#">Login Using VNC</a>, indicating that data can be copied and pasted on VNC pages.</li></ul>                                                                                                                |
| 2018-01-30  | <p>This issue is the third official release.</p> <p>Modified the following content:</p> <ul style="list-style-type: none"><li>• Added "Follow-up Procedure" in <a href="#">General Operations for Modifying Specifications</a>.</li></ul>                                                                                                                                                                                                                                                                                                      |
| 2018-01-04  | <p>This issue is the second official release.</p> <p>Added the following content:</p> <ul style="list-style-type: none"><li>• Added one-click password reset in <a href="#">(Optional) Installing One-Click Password Reset Plug-ins</a>.</li><li>• <a href="#">Resetting the Password for Logging In to an ECS on the Management Console</a></li></ul>                                                                                                                                                                                         |
| 2017-12-31  | <p>This issue is the first official release.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |