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### Document conventions

<table>
<thead>
<tr>
<th>Style</th>
<th>Description</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>🚨</td>
<td>A danger notice indicates a situation that will cause major system changes, faults, physical injuries, and other adverse results.</td>
<td>⚠️ Danger: Resetting will result in the loss of user configuration data.</td>
</tr>
<tr>
<td>⚠️</td>
<td>A warning notice indicates a situation that may cause major system changes, faults, physical injuries, and other adverse results.</td>
<td>⚠️ Warning: Restarting will cause business interruption. About 10 minutes are required to restart an instance.</td>
</tr>
<tr>
<td>⚠️</td>
<td>A caution notice indicates warning information, supplementary instructions, and other content that the user must understand.</td>
<td>⚠️ Notice: If the weight is set to 0, the server no longer receives new requests.</td>
</tr>
<tr>
<td>☑️</td>
<td>A note indicates supplemental instructions, best practices, tips, and other content.</td>
<td>☑️ Note: You can use Ctrl + A to select all files.</td>
</tr>
<tr>
<td>&gt;</td>
<td>Closing angle brackets are used to indicate a multi-level menu cascade.</td>
<td>Click Settings &gt; Network &gt; Set network type.</td>
</tr>
<tr>
<td><strong>Bold</strong></td>
<td>Bold formatting is used for buttons, menus, page names, and other UI elements.</td>
<td>Click OK.</td>
</tr>
<tr>
<td>📜 <strong>Courier font</strong></td>
<td>Courier font is used for commands.</td>
<td>Run the <code>cd /d C:/windows</code> command to enter the Windows system folder.</td>
</tr>
<tr>
<td><em>Italic</em></td>
<td>Italic formatting is used for parameters and variables.</td>
<td><code>bae log list --instanceid Instance_ID</code></td>
</tr>
<tr>
<td>[] or [a</td>
<td>b]</td>
<td>This format is used for an optional value, where only one item can be selected.</td>
</tr>
<tr>
<td>Style</td>
<td>Description</td>
<td>Example</td>
</tr>
<tr>
<td>----------</td>
<td>------------------------------------------------------------------------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>{} or {a</td>
<td>b}</td>
<td>This format is used for a required value, where only one item can be selected.</td>
</tr>
</tbody>
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1 Overview

An ECS instance is a virtual machine that contains basic computing components such as the CPU, memory, operating system, and network. You can fully customize and modify all configurations of an ECS instance. After logging on to Alibaba Cloud Management Console, you can manage resources and configure the environment of your ECS instances.

Instance families

ECS instances are categorized into different instance families based on the business scenarios to which instance families can be applied. You can select current and previous instance families for a business scenario. An instance family also has many instance types based on different CPU and memory configurations. An ECS instance defines two basic attributes: the instance CPU and memory configuration (including the CPU model and clock speed). For more information about instance types, see `#unique_4` and `#unique_5`. If the instance configuration does not suit your application requirements, you can change the instance type. For more information, see `#unique_6`.

Billing details

For more information about the billing methods and prices of ECS instances, see `#unique_7`.

Limits

For more information about the limits and quotas of ECS instances, see `#unique_8`.
The lifecycle of an ECS instance begins when the instance is created and ends when the instance is released. This topic describes the states that an ECS instance may go through during its lifecycle.

Instance states

The following table describes the states that an ECS instances may go through during its lifecycle.

<table>
<thead>
<tr>
<th>State</th>
<th>State in an API response</th>
<th>State attribute</th>
<th>Description</th>
<th>Visible in the ECS console</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparing</td>
<td>Pending</td>
<td>Intermediate</td>
<td>After an instance is created, it is in this state before it enters the Running state. If the instance remains in this state for an extended period of time, an exception occurs.</td>
<td>No</td>
</tr>
<tr>
<td>Starting</td>
<td>Starting</td>
<td>Intermediate</td>
<td>After you start or restart an instance through the ECS console or by calling an API operation, the instance enters this state before it enters the Running state. If the instance remains in this state for an extended period of time, an exception occurs.</td>
<td>Yes</td>
</tr>
<tr>
<td>Running</td>
<td>Running</td>
<td>Stable</td>
<td>If an instance is in the Running state, it is functioning properly. You can run services on it.</td>
<td>Yes</td>
</tr>
<tr>
<td>Expiring</td>
<td>Running</td>
<td>Stable</td>
<td>A subscription instance remains in the Expiring state for 15 days before it expires. We recommend that you renew your instances in the Expiring state in a timely manner. For more information, see Renewal overview.</td>
<td>Yes</td>
</tr>
<tr>
<td>State</td>
<td>State in an API response</td>
<td>State attribute</td>
<td>Description</td>
<td>Visible in the ECS console</td>
</tr>
<tr>
<td>------------------</td>
<td>--------------------------</td>
<td>-----------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td>Stopping</td>
<td>Stopping</td>
<td>Intermediate</td>
<td>After you stop an instance through the ECS console or by calling an API operation, the instance enters this state before it enters the Stopped state. If the instance remains in this state for an extended period of time, an exception occurs.</td>
<td>Yes</td>
</tr>
<tr>
<td>Stopped</td>
<td>Stopped</td>
<td>Stable</td>
<td>After an instance has been stopped or after it has been created but not started, it is in the Stopped state. Instances in the Stopped state cannot provide external services.</td>
<td>Yes</td>
</tr>
<tr>
<td>Expired</td>
<td>Stopped</td>
<td>Stable</td>
<td>After subscription instances expire or pay-as-you-go instances are stopped due to overdue payments, the instances enter the Expired state. Instances in the Expired state cannot provide external services. For more information about resource state changes, see Subscription and Pay-as-you-go.</td>
<td>Yes</td>
</tr>
<tr>
<td>Locked</td>
<td>Stopped</td>
<td>Stable</td>
<td>If your account has an overdue payment or your account is insecure, your instance enters the Locked state. You can submit a ticket to unlock the instance.</td>
<td>Yes</td>
</tr>
<tr>
<td>To Be Released</td>
<td>Stopped</td>
<td>Stable</td>
<td>If you apply for a refund for a subscription instance before the instance expires, the instance enters the To Be Released state.</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**States in API responses**

You can call the `DescribeInstanceStatus` or `DescribeInstances` to query the states of instances. The following figure shows transitions between the states in API responses.
Elastic Compute Service

ECS instance status

- Image
  - Create Instance
  - Delete Instance

- Pending
  - Start Instance
  - Delete Instance

- Stopped
  - Stop Instance
  - Reboot Instance

- Starting
  - Start Instance

- Stopping
  - Stop Instance

- Running
  - Stop Instance

Stable

Transitory
3 Instance families

This topic describes available ECS instance families and their features, specifications, and application scenarios.

An ECS instance is the smallest unit that can provide compute capabilities and services for your business.

ECS instances are categorized into different instance families based on the business scenarios to which they can be applied. Each instance family is divided into different instance types based on their CPU and memory specifications. *ECS instance type* defines the basic properties of an ECS instance: CPU (including CPU model and clock speed) and memory. In addition to the instance type, you must also configure the block storage, image, and network type when you create an instance.

**Note:**
The available instance families and types vary from region to region. You can go to the *ECS Instance Types Available for Each Region page* to view the instance types available in each region.

Enterprise scenarios have high business stability requirements. Alibaba Cloud ECS instance families are divided into enterprise-level and entry-level based on whether the instance families are suitable for enterprise scenarios. Enterprise-level instance families offer consistent performance and dedicated resources. Each vCPU in enterprise-level instance families corresponds to an Intel Xeon core hyperthread.

**Note:**
For the differences between enterprise-level and entry-level instance families, see *FAQs about ECS instances*.

You can upgrade or downgrade instances within or between certain instance families. For such instance families and the corresponding upgrade and downgrade rules, see *Instance families that support instance type changes*.

Some instance families are no longer available for purchase. For more information, see *Phased-out instance types*. 

Issue: 20200109
Alibaba Cloud ECS instances are categorized into the following instance families:

- **Enterprise-level computing instance families based on the x86 architecture:**
  - g6, general purpose instance family
  - g5, general purpose instance family
  - g5se, memory optimized instance family with enhanced performance
  - sn2ne, general purpose instance family with enhanced network performance
  - ic5, compute intensive instance family
  - c6, compute optimized instance family
  - c5, compute optimized instance family
  - sn1ne, compute optimized instance family with enhanced network performance
  - r6, memory optimized instance family
  - r5, memory optimized instance family
  - re4, memory optimized instance family with enhanced performance
  - re4e, memory optimized instance family with enhanced performance
  - se1ne, memory optimized instance family with enhanced network performance
  - se1, memory optimized instance family
  - d1ne, big data instance family with enhanced network performance
  - d1, big data instance family
  - i2, instance family with local SSDs
  - i2g, instance family with local SSDs
  - i1, instance family with local SSDs
  - hfc6, compute optimized instance family with high clock speed
  - hfg6, general purpose instance family with high clock speed
  - hfr6, memory optimized instance family with high clock speed
  - hfc5, compute optimized instance family with high clock speed
  - hfg5, general purpose instance family with high clock speed
• Enterprise-level heterogeneous computing instance families:
  - vgn5i, lightweight compute optimized instance family with GPU capabilities
  - gn6i, compute optimized instance family with GPU capabilities
  - gn6v, compute optimized instance family with GPU capabilities
  - gn5, compute optimized instance family with GPU capabilities
  - gn5i, compute optimized instance family with GPU capabilities
  - gn4, compute optimized family with GPU capabilities
  - ga1, visualization and compute optimized instance family with GPU capabilities
  - f1, compute optimized instance family with FPGAs
  - f3, compute optimized instance family with FPGAs

• ECS Bare Metal Instance families and Super Computing Cluster (SCC) instance families:
  - ebmgn6v, compute optimized ECS Bare Metal Instance family with GPU
  - ebmgn6i, compute optimized ECS Bare Metal Instance family with GPU
  - ebmc6, compute optimized ECS Bare Metal Instance family
  - ebmg6, general purpose ECS Bare Metal Instance family
  - ebmr6, memory optimized ECS Bare Metal Instance family
  - ebmhf6c, compute optimized ECS Bare Metal Instance family with high clock speed
  - ebmhf6g, general purpose ECS Bare Metal Instance family with high clock speed
  - ebmhf6r, memory optimized ECS Bare Metal Instance family with high clock speed
  - ebmc5s, compute optimized ECS Bare Metal Instance family with enhanced network performance
  - ebmg5s, general purpose ECS Bare Metal Instance family with enhanced network performance
  - ebmr5s, memory optimized ECS Bare Metal Instance family with enhanced network performance
  - ebmhf5g, ECS Bare Metal Instance family with high clock speed
  - ebmc4, compute optimized ECS Bare Metal Instance family
  - ebmg5, general purpose ECS Bare Metal Instance family
  - scch5, SCC instance family with high clock speed
  - sccg5, general purpose SCC instance family
  - sccgn6, compute optimized SCC instance family with GPU capabilities
• Entry-level computing instance families based on the x86 architecture:
  - t6, burstable instance family
  - t5, burstable instance family
  - v5, CPU over provisioned instance family
  - xn4, previous-generation entry-level computing instance family
  - n4, previous-generation entry-level computing instance family
  - mn4, previous-generation entry-level computing instance family
  - e4, previous-generation entry-level computing instance family

g6, general purpose instance family

Features

• Provides predictable stable and high performance and reduces virtualization overheads with the use of the ECS Bare Metal Instance architecture
• I/O optimized
• Supports enhanced SSDs, standard SSDs, and ultra disks

Note:
The maximum performance of disks varies depending on instance families. A single g6 instance supports a maximum of 200,000 IOPS. For higher storage I/O performance, we recommend that you use g5se. For more information, see g5se, memory optimized instance family with enhanced performance.

• Provides strong storage I/O performance proportional to computing capacity
• CPU-to-memory ratio of 1:4
• Ultra high packet forwarding rate
• Equipped with 2.5 GHz Intel Xeon Platinum 8269CY (Cascade Lake) processors with Turbo Boost up to 3.2 GHz
• Provides strong network performance proportional to computing capacity
• Supports configuration changes to c6 or r6
• Suitable for the following scenarios:
  - Scenarios where large volumes of packets are received and transmitted, such as bullet screen and re-transmission of telecommunication information
  - Enterprise-grade applications of various types and sizes
  - Website and application servers
  - Game servers
  - Small and medium-sized database systems, caches, and search clusters
  - Data analysis and computing
  - Computing clusters and memory-intensive data processing

## Instance types

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPUs</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>Base bandwidth (Gbit/s)</th>
<th>Burst bandwidth (Gbit/s)</th>
<th>Packet forwarding rate (Kpps)</th>
<th>IPv6 support</th>
<th>NIC queue (including one primary ENI)</th>
<th>ENIs per ENI</th>
<th>Private IP addresses per ENI</th>
<th>Disk IOPS</th>
<th>Disk bandwidth (Gbit/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs.g6.large</td>
<td>2</td>
<td>8.0</td>
<td>N/A</td>
<td>1.0</td>
<td>3.0</td>
<td>300</td>
<td>Yes</td>
<td>2</td>
<td>6</td>
<td>10,000</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>ecs.g6.xlarge</td>
<td>4</td>
<td>16.0</td>
<td>N/A</td>
<td>1.5</td>
<td>5.0</td>
<td>500</td>
<td>Yes</td>
<td>4</td>
<td>3</td>
<td>20,000</td>
<td>1.5</td>
<td>2</td>
</tr>
<tr>
<td>ecs.g6.2xlarge</td>
<td>8</td>
<td>32.0</td>
<td>N/A</td>
<td>2.5</td>
<td>8.0</td>
<td>800</td>
<td>Yes</td>
<td>8</td>
<td>4</td>
<td>25,000</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>ecs.g6.3xlarge</td>
<td>12</td>
<td>48.0</td>
<td>N/A</td>
<td>4.0</td>
<td>10.0</td>
<td>900</td>
<td>Yes</td>
<td>8</td>
<td>6</td>
<td>30,000</td>
<td>2.5</td>
<td>3</td>
</tr>
<tr>
<td>ecs.g6.4xlarge</td>
<td>16</td>
<td>64.0</td>
<td>N/A</td>
<td>5.0</td>
<td>10.0</td>
<td>1,000</td>
<td>Yes</td>
<td>8</td>
<td>8</td>
<td>40,000</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>ecs.g6.6xlarge</td>
<td>24</td>
<td>96.0</td>
<td>N/A</td>
<td>7.5</td>
<td>10.0</td>
<td>1,500</td>
<td>Yes</td>
<td>12</td>
<td>8</td>
<td>50,000</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPUs</th>
<th>Memory (GiB)</th>
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<th>Base bandwidth (Gbit/s)</th>
<th>Burst bandwidth (Gbit/s)</th>
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<th>NIC queue (includes one primary ENI)</th>
<th>ENIs per ENI</th>
<th>Privat IP addresses per ENI</th>
<th>Disk IOPS</th>
<th>Disk bandwidth (Gbit/s)</th>
</tr>
</thead>
<tbody>
<tr>
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</table>

Note:
- For more information about these specifications, see Instance specification metrics.

g5, general purpose instance family

Features
- I/O optimized
- Supports enhanced SSDs, standard SSDs, and ultra disks

Note:
The maximum performance of disks varies depending on instance families. A single g5 instance supports a maximum of 200,000 IOPS. For higher storage I/O performance, we recommend that you use g5se. For more information, see g5se, memory optimized instance family with enhanced performance.

- CPU-to-memory ratio of 1:4
- Ultra high packet forwarding rate
- Equipped with 2.5 GHz Intel Xeon Platinum 8163 (Skylake) or 8269CY (Cascade Lake) processors.
- Provides strong network performance proportional to computing capacity
- Suitable for the following scenarios:
  - Scenarios where large volumes of packets are received and transmitted, such as bullet screen and re-transmission of telecommunication information
  - Enterprise-grade applications of various types and sizes
  - Small and medium-sized database systems, caches, and search clusters
  - Data analysis and computing
  - Computing clusters and memory-intensive data processing

### Instance types

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPUs</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>Bandwidth (Gbit/s)</th>
<th>Packet forwarding rate (Kpps)</th>
<th>IPv6 support</th>
<th>NIC queues</th>
<th>ENIs (including one primary ENI)</th>
<th>Private IP addresses per ENI</th>
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<td>16</td>
<td>8</td>
<td>20</td>
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</tbody>
</table>

Note:
- For more information about these specifications, see Instance specification metrics.
g5se, memory optimized instance family with enhanced performance

Features

• With ESSD disks attached, an ECS instance can have the maximum random read/write IOPS of 1,000,000 and the maximum throughput of 32 Gbit/s.
• You can create g5se instances only through dedicated hosts.

Note:
For information about other types of instances that can be created through dedicated hosts, see #unique_73.

• I/O optimized.
• Supports enhanced SSDs, standard SSDs, and ultra disks.
• Provides strong storage I/O performance proportional to computing capacity.
• CPU-to-memory ratio of 1:4.
• Equipped with 2.5 GHz Intel Xeon Platinum 8163 (Skylake) processors.
• Suitable for the following scenarios:
  - I/O-intensive scenarios, such as medium and large OLTP core databases.
  - Medium and large NoSQL databases.
  - Search and real-time log analytics.
  - Traditional large enterprise-level commercial software, such as SAP.

Instance types
<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPU</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>Bandwidth (inbound or outbound in Gbit/s)</th>
<th>Packet forwarding rate (inbound or outbound in Kpps)</th>
<th>NIC queue</th>
<th>ENI IPv4 address of a single ENI</th>
<th>Disk IOPS (K)</th>
<th>Disk bandwidth (Gbit/s)</th>
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<td>100</td>
<td>1,000</td>
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</table>

**Note:**
sn2ne, general purpose instance family with enhanced network performance

Features

- I/O optimized
- Supports standard SSDs and ultra disks
- CPU-to-memory ratio of 1:4
- Ultra high packet forwarding rate
- Equipped with 2.5 GHz Intel Xeon E5-2682 v4 (Broadwell) or Platinum 8163 (Skylake) processors
- Provides strong network performance proportional to computing capacity
- Suitable for the following scenarios:
  - Scenarios where large volumes of packets are received and transmitted, such as bullet screen and re-transmission of telecommunication information
  - Enterprise-grade applications of various types and sizes
  - Small and medium-sized database systems, caches, and search clusters
  - Data analysis and computing
  - Computing clusters and memory-intensive data processing

Instance types

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPUs</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>Bandwidth (Gbit/s)</th>
<th>Packet forwarding rate (Kpps)</th>
<th>IPv6 support</th>
<th>NIC queues</th>
<th>ENIs (including one primary ENI)</th>
<th>Private IP addresses per ENI</th>
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<td>Packet forwarding rate (Kpps)</td>
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<td>ENIs (including one primary ENI)</td>
<td>Private IP addresses per ENI</td>
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<td>20</td>
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</table>

Note:

- For more information about these specifications, see *Instance specification metrics*.

ic5, compute-intensive instance family

Features

- I/O-optimized.
- Supports enhanced SSDs, standard SSDs, and ultra disks.
- CPU-to-memory ratio of 1:1.
- Ultra high packet forwarding rate.
  - Equipped with 2.5 GHz Intel Xeon Platinum 8163 (Skylake) or 8269CY (Cascade Lake) processors.
- Provides strong network performance proportional to computing capacity.
- Suitable for the following scenarios:
  - Web frontend servers.
  - Data analysis, batch compute, and video encoding.
  - Scenarios where large volumes of packets are received and transmitted, such as bullet screen and re-transmission of telecommunication information.
  - Frontends of Massively Multiplayer Online (MMO) games.

**Instance types**

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPU</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>Bandwidth (inbound or outbound in Gbit/s)</th>
<th>Packet forwarding rate (inbound or outbound in Kpps)</th>
<th>IPv6 support</th>
<th>NIC queues</th>
<th>ENI</th>
<th>Private IP addresses of a single ENI</th>
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<td>8</td>
<td>20</td>
</tr>
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</table>

**Note:**
- For more information about these specifications, see *Instance specification metrics*.

c6, compute optimized instance family

**Features**
Elastic Compute Service

• Provides predictable stable and high performance and reduces virtualization overheads with the use of the ECS Bare Metal Instance architecture.

• I/O-optimized.

• Supports enhanced SSDs, standard SSDs, and ultra disks.

Note:
The maximum performance of cloud disks varies depending on instance families. A single c6 instance supports a maximum of 200,000 IOPS. For higher storage I/O performance, we recommend that you use g5se. For more information, see **g5se, memory optimized instance family with enhanced performance.**

• Provides strong storage I/O performance proportional to computing capacity

• CPU-to-memory ratio of 1:2.

• Ultra high packet forwarding rate.

  Equipped with 2.5 GHz Intel Xeon Platinum 8269CY (Cascade Lake) processors, up to 3.2 GHz Turbo Boost.

• Provides strong network performance proportional to computing capacity.

• Supports configuration changes to g6 or r6.

• Suitable for the following scenarios:
  - Scenarios where large volumes of packets are received and transmitted, such as bullet screen and re-transmission of telecommunication information.
  - Web frontend servers.
  - Frontends of Massively Multiplayer Online (MMO) gaming.
  - Data analysis, batch processing, and video encoding.
  - High-performance science and engineering applications.

Instance types
<table>
<thead>
<tr>
<th>Instance type</th>
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<th>Local storage (GiB)</th>
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<th>Packet forwarding rate (inbound or outbound in Kpps)</th>
<th>IPv6 support</th>
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<th>ENI</th>
<th>Private IP address of a single ENI</th>
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<th>Disk bandwidth (Gbit/s)</th>
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</table>
Elastic Compute Service

Instance / 3 Instance families

Note:

- For more information about these specifications, see Instance specification metrics.

c5, compute optimized instance family

Features

- I/O-optimized.
- Supports enhanced SSDs, standard SSDs, and ultra disks.

Note:
The maximum performance of cloud disks varies depending on instance families. A single c5 instance supports a maximum of 200,000 IOPS. For higher storage I/O performance, we recommend that you use g5se. For more information, see g5se, memory optimized instance family with enhanced performance.

- CPU-to-memory ratio of 1:2.
- Ultra high packet forwarding rate.

  - Equipped with 2.5 GHz Intel Xeon Platinum 8163 (Skylake) or 8269CY (Cascade Lake) processors.
- Provides strong network performance proportional to computing capacity.
- Suitable for the following scenarios:
  - Scenarios where large volumes of packets are received and transmitted, such as bullet screen and re-transmission of telecommunication information.
  - Web frontend servers.
  - Frontends of Massively Multiplayer Online (MMO) gaming.
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<th>IPv6 support</th>
<th>NIC queues</th>
<th>ENI</th>
<th>Private IP addresses of a single ENI</th>
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<tbody>
<tr>
<td>ecs.c5.large</td>
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<td>4.0</td>
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</table>

**Note:**

- For more information about these specifications, see *Instance specification metrics*.

sn1ne, compute optimized instance family with enhanced network performance

**Features**

- I/O-optimized.
- Supports standard SSDs and ultra disks.
- CPU-to-memory ratio of 1:2.
- Ultra high packet forwarding rate.
Elastic Compute Service

- Equipped with 2.5 GHz Intel Xeon E5-2682 v4 (Broadwell) or Platinum 8163 (Skylake) processors.
- Provides strong network performance proportional to computing capacity.
- Suitable for the following scenarios:
  - Scenarios where large volumes of packets are received and transmitted, such as bullet screen and re-transmission of telecommunication information.
  - Web frontend servers.
  - Frontends of Massively Multiplayer Online (MMO) gaming.
  - Data analysis, batch processing, and video encoding.
  - High-performance scientific and engineering applications.

Instance types

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPU</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>Bandwidth (inbound or outbound in Gbit/s)</th>
<th>Packet forwarding rate (inbound or outbound in Kpps)</th>
<th>IPv6 support</th>
<th>NIC queues</th>
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### Elastic Compute Service

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**Note:**
- For more information about these specifications, see Instance specification metrics.

r6, memory optimized instance family

**Features**

- Provides predictable stable and high performance and reduces virtualization overheads with the use of the ECS Bare Metal Instance architecture.
- I/O optimized.
- Supports enhanced SSDs, standard SSDs, and ultra disks.

**Note:**
The maximum performance of cloud disks varies depending on instance families. A single r6 instance supports a maximum of 200,000 IOPS. For higher storage I/O performance, we recommend that you use g5se. For more information, see g5se, memory optimized instance family with enhanced performance.

- Provides strong IOPS performance based on sufficient computing capacity.
• Ultra high packet forwarding rate.

Equipped with 2.5 GHz Second Generation Intel Xeon Scalable processors, up to 3.2 GHz Turbo Boost.

• Provides strong network performance based on sufficient computing capacity.

• Supports configuration changes to g6 or c6.

• Suitable for the following scenarios:
  
  - Scenarios where large volumes of packets are received and transmitted, such as bullet screen and re-transmission of telecommunication information.
  
  - High-performance and in-memory databases.
  
  - Data analysis and mining, and distributed memory cache.
  
  - Hadoop, Spark, and other memory-intensive enterprise applications.

### Instance types

<table>
<thead>
<tr>
<th>Instance type</th>
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<td>IOPS (K)</td>
<td>Disk bandwidth (Gbit/s)</td>
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</table>

Note:

- For more information about these specifications, see Instance specification metrics.

r5, memory optimized instance family

Features

- I/O optimized.
- Supports enhanced SSDs, standard SSDs, and ultra disks.

**Note:**
The maximum performance of cloud disks varies depending on instance families. A single r5 instance supports a maximum of 200,000 IOPS. For higher storage I/O performance, we recommend that you use g5se. For more information, see [g5se, memory optimized instance family with enhanced performance](#).

- Ultra high packet forwarding rate.
  - Equipped with 2.5 GHz Intel Xeon Platinum 8163 (Skylake) processors.
- Provides strong network performance based on sufficient computing capacity.
- Suitable for the following scenarios:
  - Scenarios where large volumes of packets are received and transmitted, such as bullet screen and re-transmission of telecommunication information.
  - High-performance and in-memory databases.
  - Data analysis and mining, and distributed memory cache.
  - Hadoop, Spark, and other memory-intensive enterprise applications.

### Instance types

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPU</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>Bandwidth (inbound or outbound in Gbit/s)</th>
<th>Packet forward rate (inbound or outbound in Kpps)</th>
<th>IPv6 support</th>
<th>NIC queues</th>
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</table>

Note:
- For more information about these specifications, see Instance specification metrics.

re4, memory optimized instance family with enhanced performance

Features
- I/O optimized.
- Supports standard SSDs and ultra disks.
- Optimized for high-performance databases, in-memory databases, and other memory-intensive enterprise applications.
  - Equipped with 2.2 GHz Intel Xeon E7 8880 v4 (Broadwell) processors, up to 2.4 GHz Turbo Boost.
- CPU-to-memory ratio of 1:12, up to 1920.0 GiB memory.
- ecs.re4.20xlarge and ecs.re4.40xlarge have been certified by SAP HANA.
Suitable for the following scenarios:
- High-performance databases and in-memory databases such as SAP HANA.
- Memory-intensive applications.
- Big data processing engines such as Apache Spark or Presto.

Instance types

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPU</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>Bandwidth (inbound or outbound in Gbit/s)</th>
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</table>

Note:
- For more information about these specifications, see Instance specification metrics.

re4e, memory optimized instance family with enhanced performance

Features
- I/O optimized.
- Supports standard SSDs and ultra disks.
- Optimized for high-performance databases, in-memory databases, and other memory-intensive enterprise applications.
  - Equipped with 2.2 GHz Intel Xeon E7 8880 v4 (Broadwell) processors, up to 2.4 GHz Turbo Boost.
  - CPU-to-memory ratio of 1:24, up to 3840.0 GiB memory.
- Suitable for the following scenarios:
  - High-performance databases and in-memory databases such as SAP HANA.
  - Memory-intensive applications.
  - Big data processing engines such as Apache Spark or Presto.

### Instance types

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPU</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
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**Note:**
- For more information about these specifications, see *Instance specification metrics*.

### Features

- I/O optimized.
- Supports standard SSDs and ultra disks.
- CPU-to-memory ratio of 1:8.
- Ultra high packet forwarding rate.
  - Equipped with 2.5 GHz Intel Xeon E5-2682 v4 (Broadwell) or Platinum 8163 (Skylake) processors.
- Provides strong network performance based on sufficient computing capacity.
Suitable for the following scenarios:

- Scenarios where large volumes of packets are received and transmitted, such as bullet screen and re-transmission of telecommunication information.
- High-performance and in-memory databases.
- Data analysis and mining, and distributed memory cache.
- Hadoop, Spark, and other memory-intensive enterprise applications.

### Instance types

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### Instance / 3 Instance families

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<th>Local storage (GiB)</th>
<th>Bandwidth (inbound or outbound in Gbit/s)</th>
<th>Packet forwarding rate (inbound or outbound in Kpps)</th>
<th>IPv6 support</th>
<th>NIC queues</th>
<th>ENI</th>
<th>Private IP address of a single ENI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs. se1ne. 8xlarge</td>
<td>32</td>
<td>256.0</td>
<td>None</td>
<td>6.0</td>
<td>2,500</td>
<td>Yes</td>
<td>8</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>ecs. se1ne. 14xlarge</td>
<td>56</td>
<td>480.0</td>
<td>None</td>
<td>10.0</td>
<td>4,500</td>
<td>Yes</td>
<td>14</td>
<td>8</td>
<td>20</td>
</tr>
</tbody>
</table>

**Note:**
- For more information about these specifications, see *Instance specification metrics*.

**Features**
- I/O optimized.
- Supports standard SSDs and ultra disks.
- CPU-to-memory ratio of 1:8.
- Equipped with 2.5 GHz Intel Xeon E5-2682 v4 (Broadwell) processors.
- Provides strong network performance based on sufficient computing capacity.
- Suitable for the following scenarios:
  - High-performance and in-memory databases.
  - Data analysis and mining, and distributed memory cache.
  - Hadoop, Spark, and other memory-intensive enterprise applications.

**Instance types**
<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPU</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>Bandwidth (inbound or outbound in Gbit/s)</th>
<th>Packet forwarding rate (inbound or outbound in Kpps)</th>
<th>IPv6 support</th>
<th>NIC queues</th>
<th>ENI</th>
<th>Private IP address of a single ENI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs. se1. large</td>
<td>2</td>
<td>16.0</td>
<td>None</td>
<td>0.5</td>
<td>100</td>
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<td>4</td>
<td>32.0</td>
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<td>0.8</td>
<td>200</td>
<td>No</td>
<td>1</td>
<td>3</td>
<td>10</td>
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<tr>
<td>ecs. se1. 2xlarge</td>
<td>8</td>
<td>64.0</td>
<td>None</td>
<td>1.5</td>
<td>400</td>
<td>No</td>
<td>1</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>ecs. se1. 4xlarge</td>
<td>16</td>
<td>128.0</td>
<td>None</td>
<td>3.0</td>
<td>500</td>
<td>No</td>
<td>2</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>ecs. se1. 8xlarge</td>
<td>32</td>
<td>256.0</td>
<td>None</td>
<td>6.0</td>
<td>800</td>
<td>No</td>
<td>3</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>ecs. se1. 14xlarge</td>
<td>56</td>
<td>480.0</td>
<td>None</td>
<td>10.0</td>
<td>1,200</td>
<td>No</td>
<td>4</td>
<td>8</td>
<td>20</td>
</tr>
</tbody>
</table>

**Note:**
- For more information about these specifications, see *Instance specification metrics*.

Big data instance family with enhanced network performance, d1ne

**Features:**
- Optimized I/O performance
- Supports SSDs and ultra disks
• High-capacity local SATA hard disk drives (SATA HDDs) with high throughput and a maximum of 35 Gbit/s bandwidth among instances
• 1:4 CPU-to-memory ratio, designed for big data scenarios
  2.5 GHz Intel Xeon E5-2682 v4 (Broadwell) processors
• Higher network performance along with more computing capacity
• Scenarios:
  - Hadoop MapReduce, HDFS, Hive, and HBase
  - Spark in-memory computing and MLlib
  - Enterprises in Internet, finance, and other industries that need to compute, store, and analyze large volumes of data
  - Elasticsearch and logging

The following table describes the instance types that belong to the d1ne instance family and specifications of these instance types.

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPUs</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>Bandwidth (Gbit/s, inbound or outbound)</th>
<th>Packet forwarding rate (Kpps, inbound or outbound)</th>
<th>Support IPv6</th>
<th>NIC queues</th>
<th>ENIs (including one primary ENI)</th>
<th>Private IP addresses for a single ENI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs. d1ne. 2xlarge</td>
<td>8</td>
<td>32.0</td>
<td>4 × 5, 500</td>
<td>6.0</td>
<td>1,000</td>
<td>Yes</td>
<td>4</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>ecs. d1ne. 4xlarge</td>
<td>16</td>
<td>64.0</td>
<td>8 × 5, 500</td>
<td>12.0</td>
<td>1,600</td>
<td>Yes</td>
<td>4</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>ecs. d1ne. 6xlarge</td>
<td>24</td>
<td>96.0</td>
<td>12 × 5, 500</td>
<td>16.0</td>
<td>2,000</td>
<td>Yes</td>
<td>6</td>
<td>8</td>
<td>20</td>
</tr>
</tbody>
</table>
### Elastic Compute Service Instance / 3 Instance families

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPUs</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>Bandwidth (Gbit/s, inbound or outbound)</th>
<th>Packet forwarding rate (Kpps, inbound or outbound)</th>
<th>Support IPv6</th>
<th>NIC queues</th>
<th>ENIs (including one primary ENI)</th>
<th>Private IP addresses for a single ENI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs. d1ne-c8d3. 8xlarge</td>
<td>32</td>
<td>128.0</td>
<td>$12 \times 5,500$</td>
<td>20.0</td>
<td>2,000</td>
<td>Yes</td>
<td>6</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>ecs. d1ne. 8xlarge</td>
<td>32</td>
<td>128.0</td>
<td>$16 \times 5,500$</td>
<td>20.0</td>
<td>2,500</td>
<td>Yes</td>
<td>8</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>ecs. d1ne-c14d3. 14xlarge</td>
<td>56</td>
<td>160.0</td>
<td>$12 \times 5,500$</td>
<td>35.0</td>
<td>4,500</td>
<td>Yes</td>
<td>14</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>ecs. d1ne. 14xlarge</td>
<td>56</td>
<td>224.0</td>
<td>$28 \times 5,500$</td>
<td>35.0</td>
<td>4,500</td>
<td>Yes</td>
<td>14</td>
<td>8</td>
<td>20</td>
</tr>
</tbody>
</table>

**Note:**
- For more information about the specifications in the table, see *Instance specification metrics*.

Big data instance family, d1

**Features:**

- Optimized I/O performance
- Supports SSDs and ultra disks
- High-capacity local SATA HDDs with high throughput and up to 17 Gbit/s of bandwidth among instances
- 1:4 CPU-to-memory ratio, designed for big data scenarios
- 2.5 GHz Intel Xeon E5-2682 v4 (Broadwell) processors
- Higher network performance along with more computing capacity
- Scenarios:
  - Hadoop MapReduce, HDFS, Hive, and HBase
  - Spark in-memory computing and MLlib
  - Enterprises in Internet, finance, other industries that need to compute, store, and analyze large volumes of data
  - Elasticsearch and logging

The following table describes the instance types that belong to the d1 instance family and specifications of these instance types.

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPUs</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>Bandwidth (Gbit/s, inbound or outbound)</th>
<th>Packet forward rate (Kpps, inbound or outbound)</th>
<th>Support IPv6</th>
<th>NIC queues</th>
<th>ENIs (including one primary ENI)</th>
<th>Private IP addresses for a single ENI</th>
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</thead>
<tbody>
<tr>
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<td>32.0</td>
<td>4 × 5, 500</td>
<td>3.0</td>
<td>300</td>
<td>No</td>
<td>1</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>ecs.d1.3xlarge</td>
<td>12</td>
<td>48.0</td>
<td>6 × 5, 500</td>
<td>4.0</td>
<td>400</td>
<td>No</td>
<td>1</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td>ecs.d1.4xlarge</td>
<td>16</td>
<td>64.0</td>
<td>8 × 5, 500</td>
<td>6.0</td>
<td>600</td>
<td>No</td>
<td>2</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>ecs.d1.6xlarge</td>
<td>24</td>
<td>96.0</td>
<td>12 × 5, 500</td>
<td>8.0</td>
<td>800</td>
<td>No</td>
<td>2</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>ecs.d1-c8d3.8xlarge</td>
<td>32</td>
<td>128.0</td>
<td>12 × 5, 500</td>
<td>10.0</td>
<td>1,000</td>
<td>No</td>
<td>4</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>ecs.d1.8xlarge</td>
<td>32</td>
<td>128.0</td>
<td>16 × 5, 500</td>
<td>10.0</td>
<td>1,000</td>
<td>No</td>
<td>4</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>Instance type</td>
<td>vCPUs</td>
<td>Memory (GiB)</td>
<td>Local storage (GiB)</td>
<td>Bandwidth (Gbit/s, inbound or outbound)</td>
<td>Packet forwarding rate (Kpps, inbound or outbound)</td>
<td>Support IPv6</td>
<td>NIC queues</td>
<td>ENIs (including one primary ENI)</td>
<td>Private IP addresses for a single ENI</td>
</tr>
<tr>
<td>---------------</td>
<td>-------</td>
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<td>--------------</td>
<td>------------</td>
<td>---------------------------------</td>
<td>-------------------------------------</td>
</tr>
<tr>
<td>ecs.d1-c14d3. 14xlarge</td>
<td>56</td>
<td>160.0</td>
<td>$12 \times 5,500$</td>
<td>17.0</td>
<td>1,800</td>
<td>No</td>
<td>6</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>ecs.d1.14xlarge</td>
<td>56</td>
<td>224.0</td>
<td>$28 \times 5,500$</td>
<td>17.0</td>
<td>1,800</td>
<td>No</td>
<td>6</td>
<td>8</td>
<td>20</td>
</tr>
</tbody>
</table>

**Note:**
- For more information about the specifications in the table, see [Instance specification metrics](#).

Instance family with local SSDs, i2

**Features:**
- Optimized I/O performance
- Supports SSDs and ultra disks
- High-performance local NVMe SSDs with high IOPS, high I/O throughput, and low latency
- 1:8 CPU-to-memory ratio, designed for high-performance databases
- 2.5 GHz Intel Xeon Platinum 8163 (Skylake) processors
- Higher network performance along with more computing capacity

**Scenarios:**
- Online transaction processing (OLTP) and high-performance relational databases
- NoSQL databases such as Cassandra and MongoDB
- Search scenarios such as Elasticsearch

---

**Issue:** 20200109
The following table describes the instance types that belong to the i2 instance family and specifications of these instance types.

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPUs</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>Bandwidth (Gbit/s, inbound or outbound)</th>
<th>Packet forwarding rate (Kpps, inbound or outbound)</th>
<th>Support IPv6</th>
<th>NIC queues</th>
<th>ENIs (including one primary ENI)</th>
<th>Private IP addresses for a single ENI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs.i2.xlarge</td>
<td>4</td>
<td>32.0</td>
<td>1 × 894</td>
<td>1.0</td>
<td>500</td>
<td>Yes</td>
<td>2</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>ecs.i2.2xlarge</td>
<td>8</td>
<td>64.0</td>
<td>1 × 1,788</td>
<td>2.0</td>
<td>1,000</td>
<td>Yes</td>
<td>2</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>ecs.i2.4xlarge</td>
<td>16</td>
<td>128.0</td>
<td>2 × 1,788</td>
<td>3.0</td>
<td>1,500</td>
<td>Yes</td>
<td>4</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>ecs.i2.8xlarge</td>
<td>32</td>
<td>256.0</td>
<td>4 × 1,788</td>
<td>6.0</td>
<td>2,000</td>
<td>Yes</td>
<td>8</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>ecs.i2.16xlarge</td>
<td>64</td>
<td>512.0</td>
<td>8 × 1,788</td>
<td>10.0</td>
<td>4,000</td>
<td>Yes</td>
<td>16</td>
<td>8</td>
<td>20</td>
</tr>
</tbody>
</table>

**Note:**

- For more information about the specifications in the table, see *Instance specification metrics*.

Instance family with local SSDs, i2g

**Features:**

- Optimized I/O performance
- Supports SSDs and ultra disks
- High-performance local NVMe SSDs with high IOPS, high I/O throughput, and low latency
- 1:4 CPU-to-memory ratio, designed for high-performance databases
2.5 GHz Intel® Xeon® Platinum 8163 (Skylake) processors

- Higher network performance along with more computing capacity
- Scenarios:
  - OLTP and high-performance relational databases
  - NoSQL databases such as Cassandra and MongoDB
  - Search scenarios such as Elasticsearch

The following table describes the instance types that belong to the i2g instance family and specifications of these instance types.

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPUs</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>Bandwidth (Gbit/s, inbound or outbound)</th>
<th>Packet forwarding rate (Kpps, inbound or outbound)</th>
<th>Support IPv6</th>
<th>NIC queues</th>
<th>ENIs (including one primary ENI)</th>
<th>Private IP addresses for a single ENI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs. i2g. 2xlarge</td>
<td>8</td>
<td>32.0</td>
<td>1 × 894</td>
<td>2.0</td>
<td>1,000</td>
<td>No</td>
<td>2</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>ecs. i2g. 4xlarge</td>
<td>16</td>
<td>64.0</td>
<td>1 × 1,788</td>
<td>3.0</td>
<td>1,500</td>
<td>No</td>
<td>4</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>ecs. i2g. 8xlarge</td>
<td>32</td>
<td>128.0</td>
<td>2 × 1,788</td>
<td>6.0</td>
<td>2,000</td>
<td>No</td>
<td>8</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>ecs. i2g. 16xlarge</td>
<td>64</td>
<td>256.0</td>
<td>4 × 1,788</td>
<td>10.0</td>
<td>4,000</td>
<td>No</td>
<td>16</td>
<td>8</td>
<td>20</td>
</tr>
</tbody>
</table>

**Note:**

- For more information about the specifications in the table, see *Instance specification metrics*. 
Instance family with local SSDs, i1

Features:

- Optimized I/O performance
- Supports SSDs and ultra disks
- High-performance local NVMe SSDs with high IOPS, high I/O throughput, and low latency
- 1:4 CPU-to-memory ratio, designed for high-performance databases
- 2.5 GHz Intel Xeon E5-2682 v4 (Broadwell) processors
- Higher network performance along with more computing capacity
- Scenarios:
  - Online transaction processing (OLTP) and high-performance relational databases
  - NoSQL databases such as Cassandra and MongoDB
  - Search scenarios such as Elasticsearch

The following table describes the instance types that belong to the i1 instance family and specifications of these instance types.

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPUs</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>Bandwidth (Gbit/s, inbound or outbound)</th>
<th>Packet forwarding rate (Kpps, inbound or outbound)</th>
<th>Support IPv6</th>
<th>NIC queues</th>
<th>ENIs (including one primary ENI)</th>
<th>Private IP addresses for a single ENI</th>
</tr>
</thead>
<tbody>
<tr>
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<td>4</td>
<td>16.0</td>
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<td>No</td>
<td>1</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>ecs.i1.2xlarge</td>
<td>8</td>
<td>32.0</td>
<td>2 × 208</td>
<td>1.5</td>
<td>400</td>
<td>No</td>
<td>1</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>ecs.i1.3xlarge</td>
<td>12</td>
<td>48.0</td>
<td>2 × 312</td>
<td>2.0</td>
<td>400</td>
<td>No</td>
<td>1</td>
<td>6</td>
<td>10</td>
</tr>
</tbody>
</table>
### Elastic Compute Service

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPUs</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>Bandwidth (Gbit/s, inbound or outbound)</th>
<th>Packet forwarding rate (Kpps, inbound or outbound)</th>
<th>Support IPv6</th>
<th>NIC queues</th>
<th>ENIs (including one primary ENI)</th>
<th>Private IP addresses for a single ENI</th>
</tr>
</thead>
<tbody>
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<td>16</td>
<td>64.0</td>
<td>2 × 416</td>
<td>3.0</td>
<td>500</td>
<td>No</td>
<td>2</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>ecs.i1-c5d1.4xlarge</td>
<td>16</td>
<td>64.0</td>
<td>2 × 1, 456</td>
<td>3.0</td>
<td>400</td>
<td>No</td>
<td>2</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>ecs.i1.6xlarge</td>
<td>24</td>
<td>96.0</td>
<td>2 × 624</td>
<td>4.5</td>
<td>600</td>
<td>No</td>
<td>2</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>ecs.i1.8xlarge</td>
<td>32</td>
<td>128.0</td>
<td>2 × 832</td>
<td>6.0</td>
<td>800</td>
<td>No</td>
<td>3</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>ecs.i1-c10d1.8xlarge</td>
<td>32</td>
<td>128.0</td>
<td>2 × 1, 456</td>
<td>6.0</td>
<td>800</td>
<td>No</td>
<td>3</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>ecs.i1.14xlarge</td>
<td>56</td>
<td>224.0</td>
<td>2 × 1, 456</td>
<td>10.0</td>
<td>1,200</td>
<td>No</td>
<td>4</td>
<td>8</td>
<td>20</td>
</tr>
</tbody>
</table>

**Note:**

- For more information about the specifications in the table, see *Instance specification metrics*.

hfc6, compute optimized instance family with high clock speed

**Features:**

- The X-Dragon architecture to offload a large number of virtualization features to dedicated hosts, reduced virtualization overheads, consistent and predictable performance
- Optimized I/O performance
- Supports enhanced SSDs, standard SSDs, and ultra disks

**Issue:** 20200109
Elastic Compute Service

• Provides strong storage I/O performance proportional to computing capacity
• CPU-to-memory ratio of 1:2
• Ultra high packet forwarding rate
  
  Equipped with 3.1 GHz Intel Xeon Platinum 8269 (Cascade Lake), with Turbo Boost up to 3.5 GHz for consistent computing performance
• Provides strong network performance proportional to computing capacity
• Scenarios:
  - Scenarios where large volumes of packets are received and transmitted, such as on-screen video comments and telecom data forwarding
  - Web frontend servers
  - Frontends of Massively Multiplayer Online (MMO) gaming
  - Data analysis, batch processing, and video encoding
  - High-performance scientific and engineering applications

Instance types

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPU</th>
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**Note:**

- For more information about the specifications in the preceding table, see *Instance specification metrics*.

hfc6, general purpose instance family with high clock speed

**Features:**

- The X-Dragon architecture to offload a large number of virtualization features to dedicated hosts, reduced virtualization overheads, consistent and predictable performance
- Optimized I/O performance
• Supports enhanced SSDs, standard SSDs, and ultra disks
• Provides strong storage I/O performance proportional to computing capacity
• CPU-to-memory ratio of 1:4.
• Ultra high packet forwarding rate

Equipped with 3.1 GHz Intel® Xeon® Platinum 8269 (Cascade Lake), with Turbo Boost up to 3.5 GHz for consistent computing performance
• Provides strong network performance proportional to computing capacity
• Scenarios:
  - Scenarios where large volumes of packets are received and transmitted, such as on-screen video comments and telecom data forwarding
  - Enterprise-grade applications of various types and sizes
  - Website and application servers
  - Game servers
  - Small and medium-sized database systems, caches, and search clusters
  - Data analysis and computing
  - Compute clusters and memory-intensive data processing

### Instance types

<table>
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<tr>
<th>Instance type</th>
<th>vCPU</th>
<th>Mem (GiB)</th>
<th>Local storage (GiB)</th>
<th>Basic bandwidth (Gbit/s)</th>
<th>Burst bandwidth (Gbit/s)</th>
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**Note:**

- For more information about the specifications in the preceding table, see *Instance specification metrics*.

hfr6, memory optimized instance family with high clock speed

**Features:**
The X-Dragon architecture to offload a large number of virtualization features to dedicated hosts, reduced virtualization overheads, consistent and predictable performance

- Optimized I/O performance
- Supports enhanced SSDs, standard SSDs, and ultra disks
- Provides strong storage I/O performance proportional to computing capacity
- CPU-to-memory ratio of 1:8
- Ultra high packet forwarding rate

Equipped with 3.1 GHz Intel Xeon Platinum 8269 (Cascade Lake), with Turbo Boost up to 3.5 GHz for consistent computing performance

- Provides strong network performance proportional to computing capacity

Scenarios:

- Scenarios where large volumes of packets are received and transmitted, such as on-screen video comments and telecom data forwarding
- High-performance databases and in-memory databases
- Data analysis and mining, and distributed memory cache
- Memory-intensive enterprise applications such as Hadoop and Spark clusters

<table>
<thead>
<tr>
<th>Instance types</th>
<th>vCPU</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>Basic bandwidth (Gbit/s)</th>
<th>Burst bandwidth (Gbit/s)</th>
<th>Packet forwarding rate (Kpps)</th>
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<th>Disk IOPS (K)</th>
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Note:

- For more information about the specifications in the preceding table, see Instance specification metrics.
Elastic Compute Service

Instance / 3 Instance families

hfc5, compute optimized instance family with high clock speed

Features:

- Optimized I/O performance
- Supports only standard SSDs and ultra disks
- Consistent computing performance

  - Equipped with 3.1 GHz Intel Xeon Gold 6149 (Skylake)
- CPU-to-memory ratio of 1:2
- Provides strong network performance proportional to computing capacity

Scenarios:

- High-performance Web frontend servers
- High-performance scientific and engineering applications
- Massive multiplayer online (MMO) gaming and video encoding

Instance types

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<thead>
<tr>
<th>Instance type</th>
<th>vCPU</th>
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Note:
- For more information about the specifications in the preceding table, see Instance specification metrics.

hfg5, general purpose instance family with high clock speed

Features:
- Optimized I/O performance
- Supports only standard SSDs and ultra disks
- Consistent computing performance
  - Equipped with 3.1 GHz Intel Xeon Gold 6149 (Skylake)
- CPU-to-memory ratio of 1:4 (excluding the instance type with 56 vCPUs)
- Provides strong network performance proportional to computing capacity
- Scenarios:
  - High-performance Web frontend servers
  - High-performance scientific and engineering applications
  - Massive multiplayer online (MMO) gaming and video encoding

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<th>Instance type</th>
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<th>Local storage (GiB)</th>
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<th>IPv6 support</th>
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<td>20</td>
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</tbody>
</table>

Note:
- For more information about these specifications, see Instance specification metrics.

vg5n, lightweight compute optimized instance family with GPU capabilities

Features
- I/O optimized
Elastic Compute Service

- Supports standard SSDs and ultra disks
- Uses NVIDIA P4 GPU computing accelerators
- Contains virtual GPUs (vGPUs), which are the result of GPU virtualization with mediated pass-through
  - Supports the 1/8, 1/4, 1/2, and 1/1 computing capacity of NVIDIA® Tesla® P4 GPUs
  - Supports 1, 2, 4, and 8 GB of GPU memory
- CPU-to-memory ratio of 1:3
  - Equipped with 2.5 GHz Intel® Xeon® E5-2682 v4 (Broadwell) processors
- Provides strong network performance with large computing capacity
- Suitable for the following scenarios:
  - Real-time rendering for cloud gaming
  - Real-time rendering for AR and VR applications
  - AI (deep learning and machine learning) inference for the elastic deployment of Internet services
  - Educational environment of deep learning
  - Modeling experiment environment of deep learning

Instance types

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPUs</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>GPU</th>
<th>GPU memory (GB)</th>
<th>Bandwidth (Gbit/s)</th>
<th>Packet forwarding rate (Kpps)</th>
<th>IPv6 support</th>
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<th>ENIs</th>
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Elastic Compute Service

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<th>GPU memory (GB)</th>
<th>Bandwidth (Gbit/s)</th>
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Note:
- For more information about these specifications, see *Instance specification metrics*.

**gn6i**, compute optimized instance family with GPU capabilities

**Features**
- I/O optimized
- CPU-to-memory ratio of 1:4
- Equipped with 2.5 GHz Intel Xeon Platinum 8163 (Skylake) processors
- Supports standard SSDs, ultra disks, and enhanced SSDs that deliver millions of IOPS
- Achieves better performance with the new-generation X-Dragon compute architecture
- Uses NVIDIA T4 GPU computing accelerators
  - Powered by the new NVIDIA Turing architecture
  - Up to 320 Turing Tensor Cores
  - Up to 2,560 CUDA Cores
  - Mixed-precision Tensor Cores support 65 FP16 TFLOPS, 130 INT8 TOPS, and 260 INT4 TOPS
  - 16 GB memory capacity (320 GB/s bandwidth)
- Provides strong network performance with large computing capacity
• Suitable for the following scenarios:
  - AI (deep learning and machine learning) inference for computer vision, voice recognition, speech synthesis, natural language processing, machine translation, and reference systems
  - Real-time rendering for cloud gaming
  - Real-time rendering for AR and VR applications
  - Reload graphics computing or Graphics Workstation
  - GPU-accelerated databases
  - High-performance computing

Instance types

<table>
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<tr>
<th>Instance type</th>
<th>vCPUs</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
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<td>T4*1</td>
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<td>500</td>
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<td>N/A</td>
<td>T4*1</td>
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<td>800</td>
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<td>GPU memory (GB)</td>
<td>Bandwidth (Gbit/s)</td>
<td>Packet forwarding rate (Kpps)</td>
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<td>NIC queues</td>
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**Note:**
- For more information about these specifications, see *Instance specification metrics*.

**gn6v**, compute optimized instance family with GPU capabilities

**Features**
- I/O optimized
- Supports enhanced SSDs, standard SSDs, and ultra disks.
- Uses NVIDIA V100 GPU processors
- CPU-to-memory ratio of 1:4
  - Equipped with 2.5 GHz Intel Xeon Platinum 8163 (Skylake) processors
- Uses NVIDIA V100 GPU computing accelerators (SXM2-based)
  - Powered by the innovative NVIDIA Volta architecture
  - 16 GB HBM2 GPU memory
  - 5,120 CUDA Cores
  - 640 Tensor Cores
  - Memory bandwidth of 900 GB/s
  - Supports up to six NVLink connections for a total bandwidth of 300 GB/s with 25 GB/s each
• Provides strong network performance with large computing capacity

• Suitable for the following scenarios:
  - Deep learning, image classification, autonomous vehicles, voice recognition, and other AI applications
  - Scientific computing applications, such as fluid dynamics, finance, molecular dynamics, and environmental analysis

Instance types

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPUs</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>GPU memo (GB)</th>
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Note:
• For more information about these specifications, see Instance specification metrics.

gn5, compute optimized instance family with GPU capabilities

Features
• I/O optimized
• Supports standard SSDs and ultra disks
• Uses NVIDIA P100 GPU processors
Elastic Compute Service

- Multiple CPU-to-memory ratios
- High-performance local NVMe SSDs
- Equipped with 2.5 GHz Intel Xeon E5-2682 v4 (Broadwell) processors
- Provides strong network performance with large computing capacity
- Suitable for the following scenarios:
  - Deep learning
  - Scientific computing applications, such as fluid dynamics, finance, genomics, and environmental analysis
  - High-performance computing, rendering, multimedia encoding and decoding, and other server-side GPU compute workloads

### Instance types

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<tr>
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<td>60.0</td>
<td>440</td>
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<td>1 * 16</td>
<td>3.0</td>
<td>400</td>
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<td>120.0</td>
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</table>

**Note:**
- For more information about these specifications, see *Instance specification metrics.*

gn5i, compute optimized instance family with GPU capabilities

**Features**
- I/O optimized
- Supports standard SSDs and ultra disks
- Uses NVIDIA P4 GPU processors
- CPU-to-memory ratio of 1:4
- Equipped with 2.5 GHz Intel Xeon E5-2682 v4 (Broadwell) processors
- Provides strong network performance with large computing capacity
- Suitable for the following scenarios:
  - Deep learning inference
  - Multimedia encoding and decoding, and other server-side GPU compute workloads

### Instance types

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPUs</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>GPU</th>
<th>GPU memo (GB)</th>
<th>Bandwidth (Gbit/s)</th>
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<th>IPv6 support</th>
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<th>ENIs</th>
<th>Private IP address of a single ENI</th>
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<td>1* 8 NVIDIA P4</td>
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</tbody>
</table>

**Note:**

- For more information about these specifications, see *Instance specification metrics*.

gn4, compute optimized family with GPU capabilities

**Features**

- I/O optimized
- Supports standard SSDs and ultra disks
- Uses NVIDIA M40 GPU processors
- Multiple CPU-to-memory ratios
  - Equipped with 2.5 GHz Intel Xeon E5-2682 v4 (Broadwell) processors
- Provides strong network performance with large computing capacity
- Suitable for the following scenarios:
  - Deep learning
  - Scientific computing applications, such as fluid dynamics, finance, genomics, and environmental analysis
  - High-performance computing, rendering, multimedia encoding and decoding, and other server-side GPU compute workloads

**Instance types**
### Elastic Compute Service

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPUs</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>GPU</th>
<th>GPU memo (GB)</th>
<th>Bandwidth (Gbit/s)</th>
<th>Packet forwarding rate (Kpps)</th>
<th>IPv6 support</th>
<th>NIC queue</th>
<th>ENIs</th>
<th>Private IP address of a single ENI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs. gn4-c4g1.xlarge</td>
<td>4</td>
<td>30.0</td>
<td>N/A</td>
<td>1 * NVIDIA M40</td>
<td>1 * 12</td>
<td>3.0</td>
<td>300</td>
<td>No</td>
<td>1</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>ecs. gn4-c8g1.2xlarge</td>
<td>8</td>
<td>30.0</td>
<td>N/A</td>
<td>1 * NVIDIA M40</td>
<td>1 * 12</td>
<td>3.0</td>
<td>400</td>
<td>No</td>
<td>1</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>ecs. gn4.8xlarge</td>
<td>32</td>
<td>48.0</td>
<td>N/A</td>
<td>1 * NVIDIA M40</td>
<td>1 * 12</td>
<td>6.0</td>
<td>800</td>
<td>No</td>
<td>3</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>ecs. gn4-c4g1.2xlarge</td>
<td>8</td>
<td>60.0</td>
<td>N/A</td>
<td>2 * NVIDIA M40</td>
<td>2 * 12</td>
<td>5.0</td>
<td>500</td>
<td>No</td>
<td>1</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>ecs. gn4-c8g1.4xlarge</td>
<td>16</td>
<td>60.0</td>
<td>N/A</td>
<td>2 * NVIDIA M40</td>
<td>2 * 12</td>
<td>5.0</td>
<td>500</td>
<td>No</td>
<td>1</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>ecs. gn4.14xlarge</td>
<td>56</td>
<td>96.0</td>
<td>N/A</td>
<td>2 * NVIDIA M40</td>
<td>2 * 12</td>
<td>10.0</td>
<td>1,200</td>
<td>No</td>
<td>4</td>
<td>8</td>
<td>20</td>
</tr>
</tbody>
</table>

**Note:**

- For more information about these specifications, see *Instance specification metrics*.

GPU-based compute-optimized instance family, ga1

**Features:**

- Optimized I/O performance
- Supports SSDs and ultra disks
- AMD S7150 GPUs
- 1:2.5 CPU-to-memory ratio
- 2.5 GHz Intel Xeon E5-2682 v4 (Broadwell) processors
- High-performance local NVMe SSDs
- Higher network performance along with more computing capacity
- Scenarios:
  - Rendering and multimedia encoding and decoding
  - Machine learning, high-performance computing, and high-performance databases
  - Other server-end workloads that require powerful concurrent floating-point compute capabilities

The following table describes the instance types that belong to the ga1 instance family and specifications of these instance types.

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPUs</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>GPU</th>
<th>GPU memory (GB)</th>
<th>Bandwidth (Gbit/s, inbound or outbound)</th>
<th>Packet forward rate (Kpps, inbound or outbound)</th>
<th>Supports IPv6</th>
<th>NIC queue</th>
<th>ENIs (including one primary ENI)</th>
<th>Private IP addresses for a single ENI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs. ga1. xlarge</td>
<td>4</td>
<td>10.0</td>
<td>1 × 87</td>
<td></td>
<td>0.25 × AMD S7150</td>
<td>2</td>
<td>1.0</td>
<td>No</td>
<td>1</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>ecs. ga1. 2xlarge</td>
<td>8</td>
<td>20.0</td>
<td>1 × 175</td>
<td></td>
<td>0.5 × AMD S7150</td>
<td>4</td>
<td>1.5</td>
<td>No</td>
<td>1</td>
<td>4</td>
<td>10</td>
</tr>
</tbody>
</table>
## Elastic Compute Service

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPUs</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>GPU memory (GB)</th>
<th>GPU Bandwidth (Gbit/s, inbound or outbound)</th>
<th>Packet forwarding rate (Kpps, inbound or outbound)</th>
<th>Supports IPv6</th>
<th>NIC queues</th>
<th>ENIs (including one primary ENI)</th>
<th>Private IP addresses for a single ENI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs. ga1. 4xlarge</td>
<td>16</td>
<td>40.0</td>
<td>1 × 350</td>
<td>1 × AMD S7150</td>
<td>8</td>
<td>3.0</td>
<td>No</td>
<td>2</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>ecs. ga1. 8xlarge</td>
<td>32</td>
<td>80.0</td>
<td>1 × 700</td>
<td>2 × AMD S7150</td>
<td>2 × 8</td>
<td>6.0</td>
<td>No</td>
<td>3</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>ecs. ga1. 14xlarge</td>
<td>56</td>
<td>160.0</td>
<td>1 × 1,400</td>
<td>4 × AMD S7150</td>
<td>4 × 8</td>
<td>10.0</td>
<td>No</td>
<td>4</td>
<td>8</td>
<td>20</td>
</tr>
</tbody>
</table>

**Note:**
- For more information, see Create a ga1 instance.
- For more information about the specifications in the table, see Instance specification metrics.

FPGA-based compute-optimized instance family, f1

**Features:**
- Optimized I/O performance
- Supports SSDs and ultra disks
- Intel Arria 10 GX 1150 FPGAs
- 1:7.5 CPU-to-memory ratio
- 2.5 GHz Intel Xeon E5-2682 v4 (Broadwell) processors
• Higher network performance along with more computing capacity
• Scenarios:
  - Deep learning and reasoning
  - Genomics research
  - Financial analysis
  - Image transcoding
  - Computational workloads such as real-time video processing and security management

The following table describes the instance types that belong to the f1 instance family and specifications of these instance types.

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPUs</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>FPGAs</th>
<th>Bandwidth (Gbit/s, inbound or outbound)</th>
<th>Packet forwarding rate (Kpps, inbound or outbound)</th>
<th>Supports IPv6</th>
<th>NIC queues</th>
<th>ENIs (including one primary ENI)</th>
<th>Private IP addresses for a single ENI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs.f1-c8f1.2xlarge</td>
<td>8</td>
<td>60.0</td>
<td>None</td>
<td>Intel Arria 10 GX 1150</td>
<td>3.0</td>
<td>400</td>
<td>Yes</td>
<td>4</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>ecs.f1-c8f1.4xlarge</td>
<td>16</td>
<td>120.0</td>
<td>None</td>
<td>2 × Intel Arria 10 GX 1150</td>
<td>5.0</td>
<td>1,000</td>
<td>Yes</td>
<td>4</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>ecs.f1-c28f1.7xlarge</td>
<td>28</td>
<td>112.0</td>
<td>None</td>
<td>Intel Arria 10 GX 1150</td>
<td>5.0</td>
<td>2,000</td>
<td>Yes</td>
<td>8</td>
<td>8</td>
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</tr>
<tr>
<td>Instance type</td>
<td>vCPUs</td>
<td>Memory (GiB)</td>
<td>Local storage (GiB)</td>
<td>FPGAs</td>
<td>Bandwidth (Gbit/s, inbound or outbound)</td>
<td>Packet forwarding rate (Kpps, inbound or outbound)</td>
<td>Support IPv6</td>
<td>NIC queues</td>
<td>ENIs (including one primary ENI)</td>
<td>Private IP addresses for a single ENI</td>
</tr>
<tr>
<td>---------------</td>
<td>-------</td>
<td>--------------</td>
<td>---------------------</td>
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<td>----------------------------------------</td>
<td>-------------------------------------------------</td>
<td>-------------</td>
<td>-----------</td>
<td>----------------------------------</td>
<td>--------------------------------------</td>
</tr>
<tr>
<td>ecs.f1-c28f1.14xlarge</td>
<td>56</td>
<td>224.0</td>
<td>None</td>
<td>2 × Intel Arria 10 GX 1150</td>
<td>10.0</td>
<td>2,000</td>
<td>Yes</td>
<td>14</td>
<td>8</td>
<td>20</td>
</tr>
</tbody>
</table>

Note:
- For more information about the specifications in the table, see Instance specification metrics.

FPGA-based compute-optimized instance family, f3

Features:
- Optimized I/O performance
- Supports SSDs and ultra disks
- Xilinx 16nm Virtex UltraScale+ VU9P
- 1:4 CPU-to-memory ratio
  - 2.5 GHz Intel Xeon Platinum 8163 (Skylake) processors
- Higher network performance along with more computing capacity

Scenarios:
- Deep learning and reasoning
- Genomics research
- Database acceleration
- Image transcoding such as converting JPEG images to WebP images
- Real-time video processing such as H.265 video compression
The following table describes the instance types that belong to the f3 instance family and specifications of these instance types.

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPUs</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>FPGAs</th>
<th>Bandwidth (Gbit/s, inbound or outbound)</th>
<th>Packet forwarding rate (Kpps, inbound or outbound)</th>
<th>Supports IPv6</th>
<th>NIC queues</th>
<th>ENIs (including one primary ENI)</th>
<th>Private IP addresses for a single ENI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs.f3-c4f1.xlarge</td>
<td>4</td>
<td>16.0</td>
<td>None</td>
<td>1 × Xilinx VU9P</td>
<td>1.5</td>
<td>300</td>
<td>No</td>
<td>2</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>ecs.f3-c8f1.2xlarge</td>
<td>8</td>
<td>32.0</td>
<td>None</td>
<td>1 × Xilinx VU9P</td>
<td>2.5</td>
<td>500</td>
<td>No</td>
<td>4</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>ecs.f3-c16f1.4xlarge</td>
<td>16</td>
<td>64.0</td>
<td>None</td>
<td>1 × Xilinx VU9P</td>
<td>5.0</td>
<td>1,000</td>
<td>No</td>
<td>4</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>ecs.f3-c16f1.8xlarge</td>
<td>32</td>
<td>128.0</td>
<td>None</td>
<td>2 × Xilinx VU9P</td>
<td>10.0</td>
<td>2,000</td>
<td>No</td>
<td>8</td>
<td>8</td>
<td>20</td>
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<tr>
<td>ecs.f3-c16f1.16xlarge</td>
<td>64</td>
<td>256.0</td>
<td>None</td>
<td>4 × Xilinx VU9P</td>
<td>20.0</td>
<td>2,500</td>
<td>No</td>
<td>16</td>
<td>8</td>
<td>20</td>
</tr>
</tbody>
</table>

Note:
- For more information about the specifications in the table, see *Instance specification metrics*.

ebmgn6v, compute optimized ECS Bare Metal Instance family with GPU capabilities

Features
- Powered by flexible and powerful software-defined compute based on the X-Dragon architecture
- I/O optimized
- Supports enhanced SSDs, standard SSDs, and ultra disks
- Uses NVIDIA V100 GPU processors
- CPU-to-memory ratio of 1:4
- Equipped with 2.5 GHz Intel Xeon Platinum 8163 (Skylake) processors
- Uses NVIDIA V100 GPU computing accelerators (SXM2-based)
  - Powered by the innovative NVIDIA Volta architecture
  - 16 GB of HBM2 memory (900 GB/s bandwidth)
  - 5,120 CUDA Cores
  - 640 Tensor Cores
  - Supports six NVLink connections for a total bandwidth of 300 GB/s (25 GB/s per connection)
- Provides strong network performance based on large computing capacity
- Suitable for the following scenarios:
  - Deep learning applications such as training and inference applications of AI algorithms used in image classification, autonomous vehicles, and speech recognition
  - Scientific computing applications such as computational fluid dynamics, computational finance, molecular dynamics, and environmental analysis

Instance types
<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPU</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>GPU</th>
<th>GPU memory (GB)</th>
<th>Bandwidth (Gbit/s)</th>
<th>Packet forwarding rate (Kpps)</th>
<th>IPv6 support</th>
<th>NIC queue</th>
<th>ENI (including one primary ENI)</th>
<th>Private IP address for a single ENI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs. ebmgn6i</td>
<td>96</td>
<td>384.0</td>
<td>N/A</td>
<td>8 × V100</td>
<td>128</td>
<td>30.0</td>
<td>4,500</td>
<td>Yes</td>
<td>8</td>
<td>32</td>
<td>10</td>
</tr>
</tbody>
</table>

Note:
- For more information about these specifications, see *Instance specification metrics*.

ebmgn6i, compute optimized ECS Bare Metal Instance family with GPU capabilities

Features

- Powered by flexible and powerful software-defined compute based on the X-Dragon architecture
- I/O optimized
- CPU-to-memory ratio of 1:4
- Equipped with 2.5 GHz Intel Xeon Platinum 8163 (Skylake) processors
- Supports enhanced SSDs (million-level IOPS), standard SSDs, and ultra disks
- Uses NVIDIA T4 GPU computing accelerators:
  - Powered by the new NVIDIA Turing architecture
  - 16 GB memory capacity (320 GB/s bandwidth)
  - 2,560 CUDA Cores
  - Up to 320 Turing Tensor Cores
  - Mixed-precision Tensor Cores support 65 FP16 TFLOPS, 130 INT8 TOPS, and 260 INT4 TOPS
- Provides strong network performance based on large computing capacity
Suitable for the following scenarios:

- AI (deep learning and machine learning) inference for computer vision, speech recognition, speech synthesis, natural language processing (NLP), machine translation, and recommendation systems
- Real-time rendering for cloud gaming
- Real-time rendering for AR and VR applications
- Graphics workstations or overloaded graphics computing
- GPU-accelerated databases
- High-performance computing

### Instance types

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPU</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>GPU(es)</th>
<th>GPU memory (GB)</th>
<th>Bandwidth (Gbit/s)</th>
<th>Packet forwarding rate (Kpps)</th>
<th>IPv6 support</th>
<th>NIC queue</th>
<th>ENI (including one primary ENI)</th>
<th>Private IP address for a single ENI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs.ebmgnei 24xlarge</td>
<td>96</td>
<td>384.0</td>
<td>N/A</td>
<td>4 × T4</td>
<td>64</td>
<td>30.0</td>
<td>4,500</td>
<td>Yes</td>
<td>8</td>
<td>32</td>
<td>10</td>
</tr>
</tbody>
</table>

Note:

- For more information about these specifications, see *Instance specification metrics*.

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ebmc6, compute optimized ECS Bare Metal Instance family

**Features**

- I/O optimized
- Supports enhanced SSDs, standard SSDs, and ultra disks
- CPU-to-memory ratio of 1:1.8
- Equipped with 2.5 GHz Intel Xeon Platinum 8269 (Cascade Lake) processors, 104 vCPUs, up to 3.2 GHz Turbo Boost
- High network performance: 6,000 Kpps packet forwarding rate
- Supports VPCs only
- Provides dedicated hardware resources and physical isolation
- Suitable for the following scenarios:
  - Scenarios where large volumes of packets are received and transmitted, such as on-screen video comments and telecom data forwarding
  - Workloads that require direct access to physical resources or scenarios that require a license to be bound to the hardware
  - Third-party virtualization (including but not limited to Xen and KVM), and AnyStack (including but not limited to OpenStack and ZStack)
  - Containers (including but not limited to Docker, Clear Containers, and Pouch)
  - Video encoding, decoding, and rendering
  - Massively Multiplayer Online (MMO) game frontends
  - High-performance scientific and engineering applications

### Instance types

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPU</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>Bandwidth (Gbit/s)</th>
<th>Packet forwarding rate (Kpps)</th>
<th>IPv6 support</th>
<th>NIC queue</th>
<th>ENI (including one primary ENI)</th>
<th>Private IP address for a single ENI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs.ebmc6.26xlarge</td>
<td>104</td>
<td>192.0</td>
<td>N/A</td>
<td>30.0</td>
<td>6,000</td>
<td>Yes</td>
<td>8</td>
<td>32</td>
<td>10</td>
</tr>
</tbody>
</table>

**Note:**
- For more information about these specifications, see *Instance specification metrics.*

**ebmg6**, general purpose ECS Bare Metal Instance family

**Features**

- I/O optimized
- Supports enhanced SSDs, standard SSDs, and ultra disks
- CPU-to-memory ratio of 1:3.7
Elastic Compute Service

Instance / 3 Instance families

- Equipped with 2.5 GHz Intel Xeon Platinum 8269 (Cascade Lake) processors, 104 vCPUs, up to 3.2 GHz Turbo Boost
- High network performance: 6,000 Kpps packet forwarding rate
- Supports VPCs only
- Provides dedicated hardware resources and physical isolation
- Suitable for the following scenarios:
  - Workloads that require direct access to physical resources or scenarios that require a license to be bound to the hardware
  - Third-party virtualization (including but not limited to Xen and KVM), and AnyStack (including but not limited to OpenStack and ZStack)
  - Containers (including but not limited to Docker, Clear Containers, and Pouch)
  - Video encoding, decoding, and rendering
  - Enterprise-level applications, such as large and medium-sized databases
  - Computing clusters and memory-intensive data processing
  - Data analysis and computing

### Instance types

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPU</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>Bandwidth (Gbit/s)</th>
<th>Packet forwarding rate (Kpps)</th>
<th>IPv6 support</th>
<th>NIC queue</th>
<th>ENI (including one primary ENI)</th>
<th>Private IP address for a single ENI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs. ebmg6.26xlarge</td>
<td>104</td>
<td>384.0</td>
<td>N/A</td>
<td>30.0</td>
<td>6,000</td>
<td>Yes</td>
<td>8</td>
<td>32</td>
<td>10</td>
</tr>
</tbody>
</table>

**Note:**
- For more information about these specifications, see *Instance specification metrics*.

ebmr6, memory optimized ECS Bare Metal Instance family

**Features**

- I/O optimized
- Supports enhanced SSDs, standard SSDs, and ultra disks
- CPU-to-memory ratio of 1:7.4
- Equipped with 2.5 GHz Intel Xeon Platinum 8269 (Cascade Lake) processors, 104 vCPUs, up to 3.2 GHz Turbo Boost
- High network performance: 6,000 Kpps packet forwarding rate
- Supports VPCs only
- Provides dedicated hardware resources and physical isolation
- Suitable for the following scenarios:
  - Workloads that require direct access to physical resources or scenarios that require a license to be bound to the hardware
  - Third-party virtualization (including but not limited to Xen and KVM), and AnyStack (including but not limited to OpenStack and ZStack)
  - Containers (including but not limited to Docker, Clear Containers, and Pouch)
  - High-performance databases and in-memory databases
  - Data analysis and mining, and distributed memory cache
  - Hadoop, Spark, and other memory-intensive enterprise applications

### Instance types

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPU</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>Bandwidth (Gbit/s)</th>
<th>Packet forwarding rate (Kpps)</th>
<th>IPv6 support</th>
<th>NIC queue</th>
<th>ENI (including one primary ENI)</th>
<th>Private IP address for a single ENI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs. ebmr6.26xlarge</td>
<td>104</td>
<td>768.0</td>
<td>N/A</td>
<td>30.0</td>
<td>6,000</td>
<td>Yes</td>
<td>8</td>
<td>32</td>
<td>10</td>
</tr>
</tbody>
</table>

**Note:**
- For more information about these specifications, see [Instance specification metrics](#).

ebmhfc6, compute optimized ECS Bare Metal Instance family with high clock speed

**Features**
- I/O optimized
- Supports enhanced SSDs, standard SSDs, and ultra disks
- CPU-to-memory ratio of 1:2.4
  - Equipped with 3.1 GHz Intel Xeon Platinum 8269 (Cascade Lake) processors, 80 vCPUs, up to 3.5 GHz Turbo Boost
- High network performance: 6,000 Kpps packet forwarding rate
- Supports VPCs only
- Provides dedicated hardware resources and physical isolation
- Suitable for the following scenarios:
  - Scenarios where large volumes of packets are received and transmitted, such as on-screen video comments and telecom data forwarding
  - Workloads that require direct access to physical resources or scenarios that require a license to be bound to the hardware
  - Third-party virtualization (including but not limited to Xen and KVM), and AnyStack (including but not limited to OpenStack and ZStack)
  - Containers (including but not limited to Docker, Clear Containers, and Pouch)
  - Video encoding, decoding, and rendering

### Instance types

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPU</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>Bandwidth (Gbit/s)</th>
<th>Packet forwarding rate (Kpps)</th>
<th>IPv6 support</th>
<th>NIC queue</th>
<th>ENI (including one primary ENI)</th>
<th>Private IP address for a single ENI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs.ebmhfc6.20xlarge</td>
<td>80</td>
<td>192.0</td>
<td>N/A</td>
<td>30.0</td>
<td>6,000</td>
<td>Yes</td>
<td>8</td>
<td>32</td>
<td>10</td>
</tr>
</tbody>
</table>

**Note:**
- For more information about these specifications, see [*Instance specification metrics*](#).
Elastic Compute Service

Instance / 3 Instance families

ebmhfg6, general purpose ECS Bare Metal Instance family with high clock speed

Features

- I/O optimized
- Supports enhanced SSDs, standard SSDs, and ultra disks
- CPU-to-memory ratio of 1:4.8

  Equipped with 3.1 GHz Intel® Xeon® Platinum 8269 (Cascade Lake) processors, 80 vCPUs, up to 3.5 GHz Turbo Boost
- High network performance: 6,000 Kpps packet forwarding rate
- Supports VPCs only
- Provides dedicated hardware resources and physical isolation
- Suitable for the following scenarios:
  - Workloads that require direct access to physical resources or scenarios that require a license to be bound to the hardware
  - Third-party virtualization (including but not limited to Xen and KVM), and AnyStack (including but not limited to OpenStack and ZStack)
  - Containers (including but not limited to Docker, Clear Containers, and Pouch)
  - Enterprise-level applications, such as large and medium-sized databases
  - Video encoding, decoding, and rendering

Instance types

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPU</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>Bandwidth (Gbit/s)</th>
<th>Packet forwarding rate (Kpps)</th>
<th>IPv6 support</th>
<th>NIC queue</th>
<th>ENI (including one primary ENI)</th>
<th>Private IP address for a single ENI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs. ebmhfg6 20xlarge</td>
<td>80</td>
<td>384.0</td>
<td>N/A</td>
<td>30.0</td>
<td>6,000</td>
<td>Yes</td>
<td>8</td>
<td>32</td>
<td>10</td>
</tr>
</tbody>
</table>

Note:

- For more information about these specifications, see Instance specification metrics.
Elastic Compute Service

Instance / 3 Instance families

Ebmhfr6, memory optimized ECS Bare Metal Instance family with high clock speed

Features

• I/O optimized
• Supports enhanced SSDs, standard SSDs, and ultra disks
• CPU-to-memory ratio of 1:9.6
  • Equipped with 3.1 GHz Intel Xeon Platinum 8269 (Cascade Lake) processors, 80 vCPUs, up to 3.5 GHz Turbo Boost
• High network performance: 6,000 Kpps packet forwarding rate
• Supports VPCs only
• Provides dedicated hardware resources and physical isolation
• Suitable for the following scenarios:
  - Workloads that require direct access to physical resources or scenarios that require a license to be bound to the hardware
  - Third-party virtualization (including but not limited to Xen and KVM), and AnyStack (including but not limited to OpenStack and ZStack)
  - Containers (including but not limited to Docker, Clear Containers, and Pouch)
  - High-performance databases and in-memory databases
  - Data analysis and mining, and distributed memory cache
  - Hadoop, Spark, and other memory-intensive enterprise applications

Instance types

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPU</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>Bandwidth (Gbit/s)</th>
<th>Packet forwarding rate (Kpps)</th>
<th>IPv6 support</th>
<th>NIC queue</th>
<th>ENI (including one primary ENI)</th>
<th>Private IP address for a single ENI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs.ebmhfr6.20xlarge</td>
<td>80</td>
<td>768.0</td>
<td>N/A</td>
<td>30.0</td>
<td>6,000</td>
<td>Yes</td>
<td>8</td>
<td>32</td>
<td>10</td>
</tr>
</tbody>
</table>

Note:
Elastic Compute Service

Instance / 3 Instance families

- For more information about these specifications, see Instance specification metrics.

ebmc5s, compute optimized ECS Bare Metal Instance family with enhanced network performance

Features

- I/O optimized
- Supports enhanced SSDs, standard SSDs, and ultra disks
- CPU-to-memory ratio of 1:2

  Equipped with 2.5 GHz Intel Xeon Platinum 8163 (Skylake) processors, 96 vCPUs, up to 2.7 GHz Turbo Boost

- High network performance: 4,500 Kpps packet forwarding rate
- Supports VPCs only
- Provides dedicated hardware resources and physical isolation
- Suitable for the following scenarios:
  - Scenarios where large volumes of packets are received and transmitted, such as on-screen video comments and telecom data forwarding
  - Workloads that require direct access to physical resources or scenarios that require a license to be bound to the hardware
  - Third-party virtualization (including but not limited to Xen and KVM), and AnyStack (including but not limited to OpenStack and ZStack)
  - Containers (including but not limited to Docker, Clear Containers, and Pouch)
  - Video encoding, decoding, and rendering

Instance types

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPU</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>Bandwidth (Gbit/s)</th>
<th>Packet forwarding rate (Kpps)</th>
<th>IPv6 support</th>
<th>NIC queue</th>
<th>ENI (including one primary ENI)</th>
<th>Private IP address for a single ENI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs. ebmc5s 24xlarge</td>
<td>96</td>
<td>192.0</td>
<td>N/A</td>
<td>30.0</td>
<td>4,500</td>
<td>No</td>
<td>8</td>
<td>32</td>
<td>10</td>
</tr>
</tbody>
</table>

Issue: 20200109
Note:

- For more information about these specifications, see *Instance specification metrics*.

**Elastic Compute Service**

**Instance / 3 Instance families**

**ebmg5s**, general purpose ECS Bare Metal Instance family with enhanced network performance

**Features**

- I/O optimized
- Supports enhanced SSDs, standard SSDs, and ultra disks
- CPU-to-memory ratio of 1:4
- Equipped with 2.5 GHz Intel® Xeon® Platinum 8163 (Skylake) processors, 96 vCPUs, up to 2.7 GHz Turbo Boost
- High network performance: 4,500 Kpps packet forwarding rate
- Supports VPCs only
- Provides dedicated hardware resources and physical isolation
- Suitable for the following scenarios:
  - Workloads that require direct access to physical resources or scenarios that require a license to be bound to the hardware
  - Third-party virtualization (including but not limited to Xen and KVM), and AnyStack (including but not limited to OpenStack and ZStack)
  - Containers (including but not limited to Docker, Clear Containers, and Pouch)
  - Enterprise-level applications, such as large and medium-sized databases
  - Video encoding

**Instance types**

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPU</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>Bandwidth (Gbit/s)</th>
<th>Packet forwarding rate (Kpps)</th>
<th>IPv6 support</th>
<th>NIC queue</th>
<th>ENI (including one primary ENI)</th>
<th>Private IP address for a single ENI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs. ebmg5s 24xlarge</td>
<td>96</td>
<td>384.0</td>
<td>N/A</td>
<td>30.0</td>
<td>4,500</td>
<td>No</td>
<td>8</td>
<td>32</td>
<td>10</td>
</tr>
</tbody>
</table>
Note:
- For more information about these specifications, see *Instance specification metrics*.

ebmr5s, memory optimized ECS Bare Metal Instance family with enhanced network performance

**Features**
- I/O optimized
- Supports enhanced SSDs, standard SSDs, and ultra disks
- CPU-to-memory ratio of 1:8
- Equipped with 2.5 GHz Intel Xeon Platinum 8163 (Skylake) processors, 96 vCPUs, up to 2.7 GHz Turbo Boost
- High network performance: 4,500 Kpps packet forwarding rate
- Supports VPCs only
- Provides dedicated hardware resources and physical isolation
- Suitable for the following scenarios:
  - Workloads that require direct access to physical resources or scenarios that require a license to be bound to the hardware
  - Third-party virtualization (including but not limited to Xen and KVM), and AnyStack (including but not limited to OpenStack and ZStack)
  - Containers (including but not limited to Docker, Clear Containers, and Pouch)
  - High-performance databases and in-memory databases
  - Data analysis and mining, and distributed memory cache
  - Hadoop, Spark, and other memory-intensive enterprise applications

**Instance types**
<table>
<thead>
<tr>
<th>Instance Type</th>
<th>vCPU</th>
<th>Memory (GiB)</th>
<th>Local Storage (GiB)</th>
<th>Bandwidth (Gbit/s)</th>
<th>Packet Forward Rate (Kpps)</th>
<th>IPv6 Support</th>
<th>NIC Queue</th>
<th>ENI (including one primary ENI)</th>
<th>Private IP Address for a single ENI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs. ebmr5s. 24xlarge</td>
<td>96</td>
<td>768.0</td>
<td>N/A</td>
<td>30.0</td>
<td>4,500</td>
<td>No</td>
<td>8</td>
<td>32</td>
<td>10</td>
</tr>
</tbody>
</table>

Note:
- For more information about these specifications, see Instance specification metrics.

**ebmhfg5, ECS Bare Metal Instance family with high clock speed**

**Features**
- I/O optimized
- Supports standard SSDs and ultra disks
- CPU-to-memory ratio of 1:4
  - Equipped with 3.7 GHz Intel Xeon E3-1240 v6 (Skylake) processors, 8 vCPUs, up to 4.1 GHz Turbo Boost
- High network performance: 2,000 Kpps packet forwarding rate
- Supports VPCs only
- Provides dedicated hardware resources and physical isolation
- Does not support automatic recovery
  - Supports Intel SGX
- Suitable for the following scenarios:
  - Workloads that require direct access to physical resources or scenarios that require a license to be bound to the hardware
  - Gaming or finance applications requiring high performance
  - High-performance Web servers
  - Enterprise-level applications such as high-performance databases
### Instance types

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPU</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>Bandwidth (Gbit/s)</th>
<th>Packet forwarding rate (Kpps)</th>
<th>IPv6 support</th>
<th>NIC queue</th>
<th>ENI (including one primary ENI)</th>
<th>Private IP address for a single ENI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs. ebmhfg5 2xlarge</td>
<td>8</td>
<td>32.0</td>
<td>N/A</td>
<td>6.0</td>
<td>2,000</td>
<td>No</td>
<td>8</td>
<td>8</td>
<td>6</td>
</tr>
</tbody>
</table>

**Note:**

- For more information about these specifications, see *Instance specification metrics*.

### Features

- I/O optimized
- Supports standard SSDs and ultra disks
- CPU-to-memory ratio of 1:2
  - Equipped with 2.5 GHz Intel Xeon E5-2682 v4 (Broadwell) processors, up to 2.9 GHz Turbo Boost
- High network performance: 4,000 Kpps packet forwarding rate
- Supports VPCs only
- Provides dedicated hardware resources and physical isolation
- Suitable for the following scenarios:
  - Workloads that require direct access to physical resources or scenarios that require a license to be bound to the hardware
  - Third-party virtualization (including but not limited to Xen and KVM), and AnyStack (including but not limited to OpenStack and ZStack)
  - Containers (including but not limited to Docker, Clear Containers, and Pouch)
  - Enterprise-level applications, such as large and medium-sized databases
  - Video encoding
### Instance types

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPU (GiB)</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>Bandwidth (Gbit/s)</th>
<th>Packet forwarding rate (Kpps)</th>
<th>IPv6 support</th>
<th>NIC queue</th>
<th>ENI (including one primary ENI)</th>
<th>Private IP address for a single ENI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs. ebmc4.8xlarge</td>
<td>32</td>
<td>64.0</td>
<td>N/A</td>
<td>10.0</td>
<td>4,000</td>
<td>No</td>
<td>8</td>
<td>12</td>
<td>10</td>
</tr>
</tbody>
</table>

**Note:**
- For more information about these specifications, see *Instance specification metrics*.

### ebmg5, general purpose ECS Bare Metal Instance family

**Features**

- I/O optimized
- Supports standard SSDs and ultra disks
- CPU-to-memory ratio of 1:4
- Equipped with 2.5 GHz Intel Xeon Platinum 8163 (Skylake) processors, 96 vCPUs, up to 2.7 GHz Turbo Boost
- High network performance: 4,000 Kpps packet forwarding rate
- Supports VPCs only
- Provides dedicated hardware resources and physical isolation
- Suitable for the following scenarios:
  - Workloads that require direct access to physical resources or scenarios that require a license to be bound to the hardware
  - Third-party virtualization (including but not limited to Xen and KVM), and AnyStack (including but not limited to OpenStack and ZStack)
  - Containers (including but not limited to Docker, Clear Containers, and Pouch)
  - Enterprise-level applications, such as large and medium-sized databases
  - Video encoding
## Instance types

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPU</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>Bandwidth (Gbit/s)</th>
<th>Packet forwarding rate (Kpps)</th>
<th>IPv6 support</th>
<th>NIC queue</th>
<th>ENI (including one primary ENI)</th>
<th>Private IP address for a single ENI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs.ebmg5.24xlarge</td>
<td>96</td>
<td>384.0</td>
<td>N/A</td>
<td>10.0</td>
<td>4,000</td>
<td>No</td>
<td>8</td>
<td>32</td>
<td>10</td>
</tr>
</tbody>
</table>

**Note:**
- For more information about these specifications, see *Instance specification metrics*.

scch5, SCC instance type family with high clock speed

### Features
- I/O optimized
- Supports only standard SSDs and ultra disks
- Supports both RoCE and VPC networks, of which RoCE is dedicated to RDMA communication
- With all features of ECS Bare Metal Instances
  - Equipped with 3.1 GHz Intel Xeon Gold 6149 (Skylake)
- CPU-to-memory ratio of 1:3
- Suitable for the following scenarios:
  - Large-scale machine learning training
  - Large-scale high performance scientific computing and simulations
  - Large-scale data analysis, batch computing, and video encoding
### Elastic Compute Service

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPU</th>
<th>Physical core</th>
<th>Memory (GiB)</th>
<th>GPU</th>
<th>Bandwidth (Gbit/s)</th>
<th>Packet forwarding rate (Kpps)</th>
<th>RoCE (Gbit/s)</th>
<th>IPv6 support</th>
<th>NIC queue</th>
<th>ENI</th>
<th>Private IP address of a single ENI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs.scch5.16xlarge</td>
<td>64</td>
<td>32</td>
<td>192.0</td>
<td>N/A</td>
<td>10.0</td>
<td>4,500</td>
<td>2 × 25</td>
<td>No</td>
<td>8</td>
<td>32</td>
<td>10</td>
</tr>
</tbody>
</table>

**Note:**

- ecs.scch5.16xlarge provides 64 logical processors on 32 physical cores.
- For more information about these specifications, see [Instance specification metrics](#).

sccg5, general purpose SCC instance family

**Features**

- I/O optimized
- Supports only standard SSDs and ultra disks
- Supports both RoCE and VPC networks, of which RoCE is dedicated to RDMA communication
- With all features of ECS Bare Metal Instances
  - Equipped with 2.5 GHz Intel® Xeon® Platinum 8163 (Skylake) processors
- CPU-to-memory ratio of 1:4
- Suitable for the following scenarios:
  - Large-scale machine learning training
  - Large-scale high performance scientific computing and simulations
  - Large-scale data analysis, batch computing, and video encoding

**Instance types**
## Elastic Compute Service

### Instance / 3 Instance families

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPU</th>
<th>Physical core</th>
<th>Memory (GiB)</th>
<th>GPU</th>
<th>Bandwidth (Gbit/s)</th>
<th>Packet forwarding rate (Kpps)</th>
<th>RoCE (Gbit/s)</th>
<th>IPv6 support</th>
<th>NIC queue</th>
<th>ENI</th>
<th>Private IP address of a single ENI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs. sccg5.24xlarge</td>
<td>96</td>
<td>48</td>
<td>384.0</td>
<td>N/A</td>
<td>10.0</td>
<td>4,500</td>
<td>2 × 25</td>
<td>No</td>
<td>8</td>
<td>32</td>
<td>10</td>
</tr>
</tbody>
</table>

**Note:**

- ecs.sccg5.24xlarge provides 96 logical processors on 48 physical cores.
- For more information about these specifications, see *Instance specification metrics*.

sccgn6, compute optimized SCC GPU instance family

**Features**

- I/O-optimized
- CPU-to-memory ratio of 1:4
  - Equipped with 2.5 GHz Intel Xeon Platinum 8163 (Skylake) processors
- With all features of ECS Bare Metal Instances
- Storage:
  - Supports enhanced SSDs (million-level IOPS), standard SSDs, and ultra disks
  - Supports high performance Cloud Parallel File System (CPFS)
- Networking:
  - Supports VPC networks equipped with two 25 Gbps ports
  - Supports RoCE v2 networks, which is dedicated to RDMA communication
• Uses NVIDIA V100 GPU processors (with the SXM2 module):
  - Based on the new NVIDIA Volta architecture
  - 16 GB HBM2 memory capacity
  - Up to 5,120 CUDA Cores
  - Up to 640 Tensor Cores
  - Offers a 900 GB/s memory bandwidth
  - Supports up to six NVLink connections and total bandwidth of 300 GB/s (25 GB/s per connection)

• Suitable for the following scenarios:
  - Ultra-large-scale machine learning training on a distributed GPU cluster
  - Large-scale high performance scientific computing and simulations
  - Large-scale data analysis, batch computing, and video encoding

### Instance types

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPU</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>GPU Bandwidth (Gbit/s)</th>
<th>Packet forwarding rate (Kpps)</th>
<th>RoCE (Gbit/s)</th>
<th>IPv6 support</th>
<th>NIC queue</th>
<th>ENI</th>
<th>Private IP address of a single ENI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs.sccgn6.24xlarge</td>
<td>96</td>
<td>384</td>
<td>N/A</td>
<td>8 × V100</td>
<td>30</td>
<td>4,500</td>
<td>2 × 25</td>
<td>Yes</td>
<td>8</td>
<td>32</td>
</tr>
</tbody>
</table>

**Note:**

- For more information about these specifications, see *Instance specification metrics*.

### t6, burstable instance family

**Features:**

- Equipped with 2.5 GHz Intel Xeon Cascade Lake processors, with Turbo Boost up to 3.2 GHz
• More cost-effective, compared with t5 burstable instance family
• The maximum bandwidth can reach 6 Gbit/s
• Paired with DDR4 memory
• Provides baseline CPU performance and is burstable, but limited by accumulated CPU credits
• Supports VPCs only
• Suitable for the following scenarios:
  - Web application servers
  - Lightweight applications and microservices
  - Development and testing environments

The following table describes the instance types that belong to the t6 burstable instance family and specifications of these instance types.

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPU</th>
<th>Memory (GiB)</th>
<th>Baseline CPU performance per vCPU</th>
<th>Max CPU credit per hour</th>
<th>Local storage (GiB)</th>
<th>Burstable bandwidth (Gbit/s)</th>
<th>Packet forwarding rate (Kpps)</th>
<th>IPv6 support</th>
<th>NIC queue (1 includes one primary ENI)</th>
<th>Private IP addresses of a single ENI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs.t6-c4m1.large</td>
<td>2</td>
<td>0.5</td>
<td>5%</td>
<td>6</td>
<td>144</td>
<td>6.0</td>
<td>40</td>
<td>Yes</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>ecs.t6-c2m1.large</td>
<td>2</td>
<td>1.0</td>
<td>10%</td>
<td>12</td>
<td>288</td>
<td>6.0</td>
<td>60</td>
<td>Yes</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>ecs.t6-c1m1.large</td>
<td>2</td>
<td>2.0</td>
<td>20%</td>
<td>24</td>
<td>576</td>
<td>6.0</td>
<td>100</td>
<td>Yes</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Instance type</td>
<td>vCPU</td>
<td>Memory (GiB)</td>
<td>Baseline CPU performance per vCPU</td>
<td>CPU credits per hour</td>
<td>Max Baseline CPU computing performance per vCPU</td>
<td>Local storage (GiB)</td>
<td>Burst bandwidth (Gbit/s)</td>
<td>Packets forwarded rate (Kpps)</td>
<td>IPv6 support</td>
<td>NIC queues (including one primary ENI)</td>
</tr>
<tr>
<td>-----------------------</td>
<td>------</td>
<td>--------------</td>
<td>-----------------------------------</td>
<td>---------------------</td>
<td>-----------------------------------------------</td>
<td>---------------------</td>
<td>----------------------</td>
<td>--------------------------------</td>
<td>---------------</td>
<td>--------------------------------------</td>
</tr>
<tr>
<td>ecs.t6-c1m2.large</td>
<td>2</td>
<td>4.0</td>
<td>20%</td>
<td>24</td>
<td>576</td>
<td>None</td>
<td>6.0</td>
<td>100</td>
<td>Yes</td>
<td>1</td>
</tr>
<tr>
<td>ecs.t6-c1m4.large</td>
<td>2</td>
<td>8.0</td>
<td>30%</td>
<td>36</td>
<td>864</td>
<td>None</td>
<td>6.0</td>
<td>100</td>
<td>Yes</td>
<td>1</td>
</tr>
<tr>
<td>ecs.t6-c1m4.xlarge</td>
<td>4</td>
<td>16.0</td>
<td>40%</td>
<td>96</td>
<td>2,304</td>
<td>None</td>
<td>6.0</td>
<td>200</td>
<td>Yes</td>
<td>1</td>
</tr>
<tr>
<td>ecs.t6-c1m4.2xlarge</td>
<td>8</td>
<td>32.0</td>
<td>40%</td>
<td>192</td>
<td>4,608</td>
<td>None</td>
<td>6.0</td>
<td>400</td>
<td>Yes</td>
<td>1</td>
</tr>
</tbody>
</table>

**Note:**

- For more information about these specifications, see *Instance specification metrics*.

t5, burstable instance family

**Features:**

- Equipped with 2.5 GHz Intel Xeon processors
- Paired with DDR4 memory
- Supports multiple CPU-to-memory ratios
- Provides baseline CPU performance and is burstable, but limited by accumulated CPU credits
- Offers a balance of compute, memory, and network resources
- Supports VPCs only
- Suitable for the following scenarios:
  - Web application servers
  - Lightweight applications and microservices
  - Development and testing environments

The following table lists the instance types that belong to the t5 instance family and specifications of these instance types.

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPU</th>
<th>Memory (GiB)</th>
<th>Baseline CPU computing performance per vCPU</th>
<th>Max CPU credits per hour</th>
<th>Local storage (GiB)</th>
<th>Bandwidth (Gbit/s)</th>
<th>Packet forwarding rate (Kpps)</th>
<th>IPv6 support</th>
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<td>Bandwidth (Gbit/s)</td>
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<td>Private IP addresses of a single ENI</td>
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<td>ecs.t5-c1m2.4xlarge</td>
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<td>25%</td>
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<td>5,760</td>
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<td>2</td>
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**Note:**
- For more information about these specifications, see [Instance specification metrics](#).

v5, CPU overprovisioned instance family

*You can create v5 instances only through dedicated hosts. For information about other types of instances that can be created through dedicated hosts, see #unique_73.*
<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPU</th>
<th>Memory (GiB)</th>
<th>Disk queue</th>
<th>Bandwidth (inbound or outbound in Gbit/s)</th>
<th>Packet forwarding rate (inbound or outbound in Kpps)</th>
<th>NIC queues</th>
<th>ENI</th>
<th>Private IP address of a single ENI</th>
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<td>2.0</td>
<td>300</td>
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<td>Disk queue</td>
<td>Bandwidth (inbound or outbound in Gbit/s)</td>
<td>Packet forward rate (inbound or outbound in Kpps)</td>
<td>NIC queues</td>
<td>ENI</td>
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<td>4.0</td>
<td>500</td>
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<td>Memory (GiB)</td>
<td>Disk queue</td>
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<td>Packet forward rate (inbound or outbound in Kpps)</td>
<td>NIC queues</td>
<td>ENI</td>
<td>Private IP address of a single ENI</td>
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<td>2.0</td>
<td>300</td>
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<tr>
<td>ecs.v5-c1m8.xlarge</td>
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<td>32.0</td>
<td>1</td>
<td>2.0</td>
<td>300</td>
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<td>2</td>
<td>6</td>
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<td>ecs.v5-c1m8.2xlarge</td>
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<td>64.0</td>
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<td>3.0</td>
<td>400</td>
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<td>3</td>
<td>6</td>
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<td>400</td>
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<td>4.0</td>
<td>500</td>
<td>8</td>
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</table>

Note:
For more information about these specifications, see [Instance specification metrics](#).

Last generation instance families

Features of xn4, n4, mn4, and e4:

- 2.5 GHz Intel Xeon E5-2682 v4 (Broadwell) processors
- DDR4 memory
- Flexible CPU-to-memory ratio
<table>
<thead>
<tr>
<th>Instance family</th>
<th>Feature</th>
<th>vCPU-to-memory ratio</th>
<th>Scenarios</th>
</tr>
</thead>
<tbody>
<tr>
<td>xn4</td>
<td>Compact type</td>
<td>1:1</td>
<td>• Frontend Web applications</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Lightweight applications and microservices</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Applications for development or testing environments</td>
</tr>
<tr>
<td>n4</td>
<td>Compute type</td>
<td>1:2</td>
<td>• Websites and Web applications</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Development environments, servers, code repositories, microservices, and testing and staging environments</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Lightweight enterprise applications</td>
</tr>
<tr>
<td>mn4</td>
<td>Balanced type</td>
<td>1:4</td>
<td>• Websites and Web applications</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Lightweight databases and caches</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Integrated applications and lightweight enterprise services</td>
</tr>
</tbody>
</table>
### Instance family / 3 Instance families

<table>
<thead>
<tr>
<th>Instance family</th>
<th>Feature</th>
<th>vCPU-to-memory ratio</th>
<th>Scenarios</th>
</tr>
</thead>
<tbody>
<tr>
<td>e4</td>
<td>Memory type</td>
<td>1:8</td>
<td>· Applications that require large volumes of memory · Lightweight databases and caches</td>
</tr>
</tbody>
</table>

The following table describes the instance types that belong to the xn4 instance family and specifications of these instance types.

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPUs</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>Bandwidth (Gbit/s, inbound or outbound)</th>
<th>Packet forwarding rate (Kpps, inbound or outbound)</th>
<th>Support IPv6</th>
<th>NIC queues</th>
<th>ENIs (including one primary ENI)</th>
<th>Private IP addresses for a single ENI</th>
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<td>50</td>
<td>No</td>
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<td>1</td>
<td>2</td>
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</tbody>
</table>

Note:

- For more information about the specifications in the table, see Instance specification metrics.

The following table describes the instance types that belong to the n4 instance family and specifications of these instance types.
### Elastic Compute Service

<table>
<thead>
<tr>
<th>Instance Type</th>
<th>vCPUs</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>Bandwidth (Gbit/s, inbound or outbound)</th>
<th>Packet forwarding rate (Kpps, inbound or outbound)</th>
<th>Support IPv6</th>
<th>NIC queues</th>
<th>ENIs (including one primary ENI)</th>
<th>Private IP addresses for a single ENI</th>
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<tbody>
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<td>2.0</td>
<td>None</td>
<td>0.5</td>
<td>50</td>
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<td>1</td>
<td>2</td>
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<td>100</td>
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<td>None</td>
<td>2.5</td>
<td>400</td>
<td>No</td>
<td>1</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>ecs.n4. 8xlarge</td>
<td>32</td>
<td>64.0</td>
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<td>500</td>
<td>No</td>
<td>1</td>
<td>2</td>
<td>6</td>
</tr>
</tbody>
</table>

**Note:**

- For more information about the specifications in the table, see *Instance specification metrics*.

The following table describes the instance types that belong to the mn4 instance family and specifications of these instance types.
<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPUs</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>Bandwidth (Gbit/s, inbound or outbound)</th>
<th>Packet forwarding rate (Kpps, inbound or outbound)</th>
<th>Support IPv6</th>
<th>NIC queues</th>
<th>ENIs (including one primary ENI)</th>
<th>Private IP addresses for a single ENI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs. mn4. small</td>
<td>1</td>
<td>4.0</td>
<td>None</td>
<td>0.5</td>
<td>50</td>
<td>No</td>
<td>1</td>
<td>1</td>
<td>2</td>
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<tr>
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<td>8.0</td>
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<td>100</td>
<td>No</td>
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<td>1</td>
<td>2</td>
</tr>
<tr>
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<td>No</td>
<td>1</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
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<td>32.0</td>
<td>None</td>
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<td>300</td>
<td>No</td>
<td>1</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>ecs. mn4. 4xlarge</td>
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<td>64.0</td>
<td>None</td>
<td>2.5</td>
<td>400</td>
<td>No</td>
<td>1</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>ecs. mn4. 8xlarge</td>
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<td>8</td>
<td>6</td>
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</tbody>
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**Note:**

- For more information about the specifications in the table, see Instance specification metrics.

The following table describes the instance types that belong to the e4 instance family and specifications of these instance types.
### Instance types

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPUs</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>Bandwidth (Gbit/s, inbound or outbound)</th>
<th>Packet forwarding rate (Kpps, inbound or outbound)</th>
<th>Support IPv6</th>
<th>NIC queues</th>
<th>ENIs (including one primary ENI)</th>
<th>Private IP addresses for a single ENI</th>
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<tr>
<td>ecs.e4. small</td>
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<td>8.0</td>
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<td>1</td>
<td>2</td>
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<tr>
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<td>16.0</td>
<td>None</td>
<td>0.5</td>
<td>100</td>
<td>No</td>
<td>1</td>
<td>1</td>
<td>2</td>
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<tr>
<td>ecs.e4. xlarge</td>
<td>4</td>
<td>32.0</td>
<td>None</td>
<td>0.8</td>
<td>150</td>
<td>No</td>
<td>1</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>ecs.e4. 2xlarge</td>
<td>8</td>
<td>64.0</td>
<td>None</td>
<td>1.2</td>
<td>300</td>
<td>No</td>
<td>1</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>ecs.e4. 4xlarge</td>
<td>16</td>
<td>128.0</td>
<td>None</td>
<td>2.5</td>
<td>400</td>
<td>No</td>
<td>1</td>
<td>8</td>
<td>6</td>
</tr>
</tbody>
</table>

**Note:**
- For more information about the specifications in the table, see Instance specification metrics.

### Instance specification metrics

<table>
<thead>
<tr>
<th>Metric</th>
<th>Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local storage</td>
<td>Local storage, also called cache disks or local disks, refers to the disks attached to the physical servers where ECS instances are hosted. Local storage provides temporary block storage for instances. Local storage capacity is measured in GiB. Data stored in the local disks may be lost in some cases, such as when the compute resources (vCPU and memory) of an instance are released or when an instance is migrated because the physical server is down. For more information, see Local disks.</td>
<td></td>
</tr>
<tr>
<td>Metric</td>
<td>Description</td>
<td></td>
</tr>
<tr>
<td>---------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td><strong>Bandwidth</strong></td>
<td>The maximum bandwidth in one direction. Inbound bandwidth and outbound bandwidth are calculated separately.</td>
<td></td>
</tr>
<tr>
<td><strong>Packet forwarding rate</strong></td>
<td>The maximum sum of inbound and outbound packet forwarding rates. For more information about how to test the packet forwarding rate, see <a href="#">Test network performance</a>.</td>
<td></td>
</tr>
<tr>
<td><strong>NIC queues</strong></td>
<td>The maximum number of NIC queues that the primary NIC of an instance supports. If your instance type is not of an ECS Bare Metal Instance family, the maximum number of NIC queues supported by the secondary NIC is the same as that supported by the primary NIC.</td>
<td></td>
</tr>
<tr>
<td><strong>ENI</strong></td>
<td>Enterprise-level instance types that are equipped with two or more vCPU cores support Elastic Network Interfaces (ENIs). Entry-level instance types that are equipped with four or more vCPU cores support ENIs. For more information, see <a href="#">ENI overview</a>.</td>
<td></td>
</tr>
</tbody>
</table>
4 Instance type families

4.1 General purpose

This topic describes the g5 and g6 general purpose instance families, and sn2ne general purpose instance family with enhanced network performance and lists their instance types.

g6, general purpose instance family

Features

- Provides predictable stable and high performance and reduces virtualization overheads with the use of the ECS Bare Metal Instance architecture
- I/O optimized
- Supports enhanced SSDs, standard SSDs, and ultra disks

Note:
The maximum performance of disks varies depending on instance families. A single g6 instance supports a maximum of 200,000 IOPS. For higher storage I/O performance, we recommend that you use g5se. For more information, see g5se, memory optimized instance family with enhanced performance.

- Provides strong storage I/O performance proportional to computing capacity
- CPU-to-memory ratio of 1:4
- Ultra high packet forwarding rate
  - Equipped with 2.5 GHz Intel Xeon Platinum 8269CY (Cascade Lake) processors with Turbo Boost up to 3.2 GHz
- Provides strong network performance proportional to computing capacity
- Supports configuration changes to c6 or r6
Suitable for the following scenarios:

- Scenarios where large volumes of packets are received and transmitted, such as bullet screen and re-transmission of telecommunication information
- Enterprise-grade applications of various types and sizes
- Website and application servers
- Game servers
- Small and medium-sized database systems, caches, and search clusters
- Data analysis and computing
- Computing clusters and memory-intensive data processing

### Instance types

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPUs</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>Base bandwith (Gbit/s)</th>
<th>Burst bandwith (Gbit/s)</th>
<th>Packet forwarding rate (Kpps)</th>
<th>IPv6 support</th>
<th>NIC queue (incl. one primary ENI)</th>
<th>ENIs per ENI</th>
<th>Privat IP address</th>
<th>Disk IOPS</th>
<th>Disk bandwidth (Gbit/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs.g6.large</td>
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<td>8.0</td>
<td>N/A</td>
<td>1.0</td>
<td>3.0</td>
<td>300</td>
<td>Yes</td>
<td>2</td>
<td>6</td>
<td>10,000</td>
<td>1</td>
<td></td>
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<tr>
<td>ecs.g6.xlarge</td>
<td>4</td>
<td>16.0</td>
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<td>5.0</td>
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<td>Yes</td>
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<td>3</td>
<td>20,000</td>
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<tr>
<td>ecs.g6.2xlarge</td>
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<td>32.0</td>
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<td>8.0</td>
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<td>4</td>
<td>25,000</td>
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<td>ecs.g6.3xlarge</td>
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<td>48.0</td>
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<td>10.0</td>
<td>900</td>
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<td>8</td>
<td>6</td>
<td>30,000</td>
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<td>10.0</td>
<td>1,000</td>
<td>Yes</td>
<td>8</td>
<td>8</td>
<td>40,000</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>ecs.g6.6xlarge</td>
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<td>96.0</td>
<td>N/A</td>
<td>7.5</td>
<td>10.0</td>
<td>1,500</td>
<td>Yes</td>
<td>12</td>
<td>8</td>
<td>50,000</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Instance type</td>
<td>vCPUs</td>
<td>Memory (GiB)</td>
<td>Local storage (GiB)</td>
<td>Base bandwidth (Gbit/s)</td>
<td>Burst bandwidth (Gbit/s)</td>
<td>Packet forwarding rate (Kpps)</td>
<td>IPv6 support</td>
<td>NIC queue (including one primary ENI)</td>
<td>ENIs</td>
<td>Privat IP address per ENI</td>
<td>Disk IOPS (GiB/s)</td>
<td>Disk bandwidth (Gbit/s)</td>
</tr>
<tr>
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<tr>
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<td>20</td>
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<td>32</td>
<td>15</td>
<td>20</td>
<td>200,000</td>
<td>16</td>
</tr>
</tbody>
</table>

**Note:**
- You can go to the *ECS Instance Types Available for Each Region page* to view the instance types available in each region.
- For more information about these specifications, see *Instance specification metrics*.

**g5, general purpose instance family**

**Features**
- I/O optimized
- Supports enhanced SSDs, standard SSDs, and ultra disks

**Note:**
The maximum performance of disks varies depending on instance families. A single g5 instance supports a maximum of 200,000 IOPS. For higher storage I/O performance, we recommend that you use g5se. For more information, see *g5se, memory optimized instance family with enhanced performance*.
- CPU-to-memory ratio of 1:4
- Ultra high packet forwarding rate
- Equipped with 2.5 GHz Intel® Xeon® Platinum 8163 (Skylake) or 8269CY (Cascade Lake) processors.
- Provides strong network performance proportional to computing capacity
- Suitable for the following scenarios:
  - Scenarios where large volumes of packets are received and transmitted, such as bullet screen and re-transmission of telecommunication information
  - Enterprise-grade applications of various types and sizes
  - Small and medium-sized database systems, caches, and search clusters
  - Data analysis and computing
  - Computing clusters and memory-intensive data processing

### Instance types

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPUs</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>Bandwidth (Gbit/s)</th>
<th>Packet forwarding rate (Kpps)</th>
<th>IPv6 support</th>
<th>NIC queues</th>
<th>ENIs (including one primary ENI)</th>
<th>Private IP addresses per ENI</th>
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</thead>
<tbody>
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<td>6</td>
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<td>500</td>
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<td>2</td>
<td>3</td>
<td>10</td>
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<tr>
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<td>32.0</td>
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<td>800</td>
<td>Yes</td>
<td>2</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>ecs.g5.3xlarge</td>
<td>12</td>
<td>48.0</td>
<td>N/A</td>
<td>4.0</td>
<td>900</td>
<td>Yes</td>
<td>4</td>
<td>6</td>
<td>10</td>
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<td>ecs.g5.4xlarge</td>
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<td>1,000</td>
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<td>8</td>
<td>20</td>
</tr>
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<td>1,500</td>
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<td>8</td>
<td>20</td>
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<tr>
<td>ecs.g5.8xlarge</td>
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<td>2,000</td>
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<td>8</td>
<td>20</td>
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</table>
Elastic Compute Service

Instance / 4 Instance type families

Note:

- You can go to the ECS Instance Types Available for Each Region page to view the instance types available in each region.
- For more information about these specifications, see Instance specification metrics.

sn2ne, general purpose instance family with enhanced network performance

Features

- I/O optimized
- Supports standard SSDs and ultra disks
- CPU-to-memory ratio of 1:4
- Ultra high packet forwarding rate
  - Equipped with 2.5 GHz Intel Xeon E5-2682 v4 (Broadwell) or Platinum 8163 (Skylake) processors
- Provides strong network performance proportional to computing capacity
- Suitable for the following scenarios:
  - Scenarios where large volumes of packets are received and transmitted, such as bullet screen and re-transmission of telecommunication information
  - Enterprise-grade applications of various types and sizes
  - Small and medium-sized database systems, caches, and search clusters
  - Data analysis and computing
  - Computing clusters and memory-intensive data processing

Instance types

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPUs</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>Bandwidth (Gbit/s)</th>
<th>Packet forwarding rate (Kpps)</th>
<th>IPv6 support</th>
<th>NIC queues</th>
<th>ENIs (including one primary ENI)</th>
<th>Private IP addresses per ENI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs.sn2ne.large</td>
<td>2</td>
<td>8.0</td>
<td>N/A</td>
<td>1.0</td>
<td>300</td>
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<td>2</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>Instance type</td>
<td>vCPUs</td>
<td>Memory (GiB)</td>
<td>Local storage (GiB)</td>
<td>Bandwidth (Gbit/s)</td>
<td>Packet forward rate (Kpps)</td>
<td>IPv6 support</td>
<td>NIC queues</td>
<td>ENIs (including one primary ENI)</td>
<td>Private IP addresses per ENI</td>
</tr>
<tr>
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<td>--------------</td>
<td>-----------</td>
<td>---------------------------------</td>
<td>-----------------------------</td>
</tr>
<tr>
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<td>N/A</td>
<td>1.5</td>
<td>500</td>
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<td>2</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>ecs. sn2ne. 2xlarge</td>
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<td>32.0</td>
<td>N/A</td>
<td>2.0</td>
<td>1,000</td>
<td>Yes</td>
<td>4</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>ecs. sn2ne. 3xlarge</td>
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<td>48.0</td>
<td>N/A</td>
<td>2.5</td>
<td>1,300</td>
<td>Yes</td>
<td>4</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td>ecs. sn2ne. 4xlarge</td>
<td>16</td>
<td>64.0</td>
<td>N/A</td>
<td>3.0</td>
<td>1,600</td>
<td>Yes</td>
<td>4</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>ecs. sn2ne. 6xlarge</td>
<td>24</td>
<td>96.0</td>
<td>N/A</td>
<td>4.5</td>
<td>2,000</td>
<td>Yes</td>
<td>6</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>ecs. sn2ne. 8xlarge</td>
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<td>128.0</td>
<td>N/A</td>
<td>6.0</td>
<td>2,500</td>
<td>Yes</td>
<td>8</td>
<td>8</td>
<td>20</td>
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<td>Yes</td>
<td>14</td>
<td>8</td>
<td>20</td>
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</tbody>
</table>

**Note:**

- You can go to the *ECS Instance Types Available for Each Region page* to view the instance types available in each region.
- For more information about these specifications, see *Instance specification metrics*.

**References**

- *Instance families*
- *Create an instance by using the provided wizard*
4.2 Compute optimized

This topic describes the ic5 compute-intensive instance family, c5 and c6 compute optimized instance families, and sn1ne compute optimized instance family with enhanced network performance and lists their instance types.

ic5, compute-intensive instance family

Features

- I/O-optimized.
- Supports enhanced SSDs, standard SSDs, and ultra disks.
- CPU-to-memory ratio of 1:1.
- Ultra high packet forwarding rate.
  
  Equipped with 2.5 GHz Intel Xeon Platinum 8163 (Skylake) or 8269CY (Cascade Lake) processors.

- Provides strong network performance proportional to computing capacity.
- Suitable for the following scenarios:
  
  - Web frontend servers.
  - Data analysis, batch compute, and video encoding.
  - Scenarios where large volumes of packets are received and transmitted, such as bullet screen and re-transmission of telecommunication information.
  - Frontends of Massively Multiplayer Online (MMO) games.

Instance types

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPU</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>Bandwidth (inbound or outbound in Gbit/s)</th>
<th>Packet forwarding rate (inbound or outbound in Kpps)</th>
<th>IPv6 support</th>
<th>NIC queues</th>
<th>ENI</th>
<th>Private IP addresses of a single ENI</th>
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**Note:**

- You can go to the *ECS Instance Types Available for Each Region page* to view the instance types available in each region.
- For more information about these specifications, see *Instance specification metrics*.

c6, compute optimized instance family

**Features**

- Provides predictable stable and high performance and reduces virtualization overheads with the use of the ECS Bare Metal Instance architecture.
- I/O-optimized.
- Supports enhanced SSDs, standard SSDs, and ultra disks.

**Note:**
The maximum performance of cloud disks varies depending on instance families. A single c6 instance supports a maximum of 200,000 IOPS. For higher storage I/O performance, we recommend that you use g5se. For more information, see g5se, memory optimized instance family with enhanced performance.

- Provides strong storage I/O performance proportional to computing capacity
- CPU-to-memory ratio of 1:2.
- Ultra high packet forwarding rate.

Equipped with 2.5 GHz Intel Xeon Platinum 8269CY (Cascade Lake) processors, up to 3.2 GHz Turbo Boost.

- Provides strong network performance proportional to computing capacity.
- Supports configuration changes to g6 or r6.
- Suitable for the following scenarios:
  - Scenarios where large volumes of packets are received and transmitted, such as bullet screen and re-transmission of telecommunication information.
  - Web frontend servers.
  - Frontends of Massively Multiplayer Online (MMO) gaming.
  - Data analysis, batch processing, and video encoding.
  - High-performance science and engineering applications.

### Instance types

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPU</th>
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<th>Local storage (GiB)</th>
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<th>Burst bandwidth (inbound or outbound in Gbit/s)</th>
<th>Packet forwarding rate (inbound or outbound in Kpps)</th>
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<th>ENI private IP address of a single ENI</th>
<th>Disk IOPS (K)</th>
<th>Disk bandwidth (Gbit/s)</th>
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</table>

**Note:**
c5, compute optimized instance family

Features

- I/O-optimized.
- Supports enhanced SSDs, standard SSDs, and ultra disks.

Note:
The maximum performance of cloud disks varies depending on instance families. A single c5 instance supports a maximum of 200,000 IOPS. For higher storage I/O performance, we recommend that you use g5se. For more information, see g5se, memory optimized instance family with enhanced performance.

- CPU-to-memory ratio of 1:2.
- Ultra high packet forwarding rate.
  - Equipped with 2.5 GHz Intel Xeon Platinum 8163 (Skylake) or 8269CY (Cascade Lake) processors.
- Provides strong network performance proportional to computing capacity.
- Suitable for the following scenarios:
  - Scenarios where large volumes of packets are received and transmitted, such as bullet screen and re-transmission of telecommunication information.
  - Web frontend servers.
  - Frontends of Massively Multiplayer Online (MMO) gaming.
  - Data analysis, batch processing, and video encoding.
  - High-performance scientific and engineering applications.

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<th>NIC queues</th>
<th>ENI</th>
<th>Private IP addresses of a single ENI</th>
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**Note:**

- You can go to the *ECS Instance Types Available for Each Region page* to view the instance types available in each region.
- For more information about these specifications, see *Instance specification metrics*.

sn1ne, compute optimized instance family with enhanced network performance

**Features**

- I/O-optimized.
- Supports standard SSDs and ultra disks.
• CPU-to-memory ratio of 1:2.
• Ultra high packet forwarding rate.
  
  Equipped with 2.5 GHz Intel Xeon E5-2682 v4 (Broadwell) or Platinum 8163 (Skylake) processors.
• Provides strong network performance proportional to computing capacity.
• Suitable for the following scenarios:
  - Scenarios where large volumes of packets are received and transmitted, such as bullet screen and re-transmission of telecommunication information.
  - Web frontend servers.
  - Frontends of Massively Multiplayer Online (MMO) gaming.
  - Data analysis, batch processing, and video encoding.
  - High-performance scientific and engineering applications.

## Instance types

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<thead>
<tr>
<th>Instance type</th>
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<th>Local storage (GiB)</th>
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Note:

- You can go to the ECS Instance Types Available for Each Region page to view the instance types available in each region.
- For more information about these specifications, see Instance specification metrics.

References

- Instance families
- Create an instance by using the provided wizard

4.3 Memory optimized

This topic describes the r5 and r6 memory optimized instance families, re4 memory optimized instance family with enhanced performance, re4e memory optimized instance family with enhanced performance, se1ne memory optimized
instance family with enhanced network performance, and se1 memory optimized instance family and lists their instance types.

r6, memory optimized instance family

Features

- Provides predictable stable and high performance and reduces virtualization overheads with the use of the ECS Bare Metal Instance architecture.
- I/O-optimized.
- Supports enhanced SSDs, standard SSDs, and ultra disks.

Note:
The maximum performance of cloud disks varies depending on instance families. A single r6 instance supports a maximum of 200,000 IOPS. For higher storage I/O performance, we recommend that you use g5se. For more information, see g5se, memory optimized instance family with enhanced performance.

- Provides strong storage I/O performance proportional to computing capacity.
- Ultra high packet forwarding rate.
  - Equipped with 2.5 GHz Intel Xeon Platinum 8269CY (Cascade Lake) processors, up to 3.2 GHz Turbo Boost.
- Provides strong network performance proportional to computing capacity.
- Supports configuration changes to g6 or c6.
- Suitable for the following scenarios:
  - Scenarios where large volumes of packets are received and transmitted, such as bullet screen and re-transmission of telecommunication information.
  - High-performance databases and in-memory databases.
  - Data analysis and mining, and distributed memory cache.
  - Memory-intensive enterprise applications such as Hadoop and Spark clusters.

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<tr>
<th>Instance type</th>
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</table>
Note:

- You can go to the *ECS Instance Types Available for Each Region page* to view the instance types available in each region.
- For more information about these specifications, see *Instance specification metrics*.

r5, memory optimized instance family

**Features**

- I/O-optimized.
- Supports enhanced SSDs, standard SSDs, and ultra disks.

Note:
The maximum performance of cloud disks varies depending on instance families. A single r5 instance supports a maximum of 200,000 IOPS. For higher storage I/O performance, we recommend that you use g5se. For more information, see *g5se, memory optimized instance family with enhanced performance*.

- Ultra high packet forwarding rate.
- Equipped with 2.5 GHz Intel® Xeon® Platinum 8163 (Skylake) or 8269CY (Cascade Lake) processors.
- Provides strong network performance proportional to computing capacity.
- Suitable for the following scenarios:
  - Scenarios where large volumes of packets are received and transmitted, such as bullet screen and re-transmission of telecommunication information.
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</tr>
</thead>
<tbody>
<tr>
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<td>2</td>
<td>16.0</td>
<td>None</td>
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<td>300</td>
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<td>ecs.r5.xlarge</td>
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<td>2</td>
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<td>10</td>
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<tr>
<td>ecs.r5.2xlarge</td>
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<td>800</td>
<td>Yes</td>
<td>2</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>ecs.r5.3xlarge</td>
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<td>None</td>
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<td>Yes</td>
<td>4</td>
<td>6</td>
<td>10</td>
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<tr>
<td>ecs.r5.4xlarge</td>
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<td>128.0</td>
<td>None</td>
<td>5.0</td>
<td>1,000</td>
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<td>4</td>
<td>8</td>
<td>20</td>
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<td>ecs.r5.6xlarge</td>
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<td>6</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>ecs.r5.8xlarge</td>
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<td>256.0</td>
<td>None</td>
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<td>Yes</td>
<td>8</td>
<td>8</td>
<td>20</td>
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<tr>
<td>ecs.r5.16xlarge</td>
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<td>4,000</td>
<td>Yes</td>
<td>16</td>
<td>8</td>
<td>20</td>
</tr>
</tbody>
</table>

**Note:**

- You can go to the *ECS Instance Types Available for Each Region page* to view the instance types available in each region.
- For more information about these specifications, see *Instance specification metrics*.

re4, memory optimized instance family with enhanced performance

**Features**

- I/O-optimized.
- Supports standard SSDs and ultra disks.
- Optimized for high-performance databases, in-memory databases, and other memory-intensive enterprise applications.
  - Equipped with 2.2 GHz Intel Xeon E7 8880 v4 (Broadwell) processors, up to 2.4 GHz Turbo Boost.
- CPU-to-memory ratio of 1:12, up to 1920.0 GiB memory.
- ecs.re4.20xlarge and ecs.re4.40xlarge have been certified by SAP HANA.
- Suitable for the following scenarios:
  - High-performance databases and in-memory databases such as SAP HANA.
  - Memory-intensive applications.
  - Big data processing engines such as Apache Spark or Presto.

Instance types

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPU</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>Bandwidth (inbound or outbound in Gbit/s)</th>
<th>Packet forwarding rate (inbound or outbound in Kpps)</th>
<th>IPv6 support</th>
<th>NIC queues</th>
<th>ENI</th>
<th>Private IP address of a single ENI</th>
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</thead>
<tbody>
<tr>
<td>ecs. re4.20xlarge</td>
<td>80</td>
<td>960.0</td>
<td>None</td>
<td>15.0</td>
<td>2,000</td>
<td>Yes</td>
<td>16</td>
<td>8</td>
<td>20</td>
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<tr>
<td>ecs. re4.40xlarge</td>
<td>160</td>
<td>1920.0</td>
<td>None</td>
<td>30.0</td>
<td>4,500</td>
<td>Yes</td>
<td>16</td>
<td>8</td>
<td>20</td>
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</tbody>
</table>

Note:
- You can go to the ECS Instance Types Available for Each Region page to view the instance types available in each region.
- For more information about these specifications, see Instance specification metrics.
re4e, memory optimized instance family with enhanced performance

Features

- I/O-optimized.
- Supports standard SSDs and ultra disks.
- Optimized for high-performance databases, in-memory databases, and other memory-intensive enterprise applications.
- Equipped with 2.2 GHz Intel Xeon E7 8880 v4 (Broadwell) processors, up to 2.4 GHz Turbo Boost.
- CPU-to-memory ratio of 1:24, up to 3840.0 GiB memory.
- Suitable for the following scenarios:
  - High-performance databases and in-memory databases such as SAP HANA.
  - Memory-intensive applications.
  - Big data processing engines such as Apache Spark or Presto.

Instance types

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPU</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>Bandwidth (inbound or outbound in Gbit/s)</th>
<th>Packet forwarding rate (inbound or outbound in Kpps)</th>
<th>IPv6 support</th>
<th>NIC queues</th>
<th>ENI</th>
<th>Private IP address of a single ENI</th>
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<td>Yes</td>
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<td>15</td>
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</table>

Note:

- You can go to the ECS Instance Types Available for Each Region page to view the instance types available in each region.
- For more information about these specifications, see Instance specification metrics.
se1ne, memory optimized instance family with enhanced network performance

Features

• I/O-optimized.
• Supports standard SSDs and ultra disks.
• CPU-to-memory ratio of 1:8.
• Ultra high packet forwarding rate.

Equipped with 2.5 GHz Intel Xeon E5-2682 v4 (Broadwell) or Platinum 8163 (Skylake) processors.
• Provides strong network performance proportional to computing capacity.
• Suitable for the following scenarios:

  - Scenarios where large volumes of packets are received and transmitted, such as bullet screen and re-transmission of telecommunication information.
  - High-performance databases and in-memory databases.
  - Data analysis and mining, and distributed memory cache.
  - Memory-intensive enterprise applications such as Hadoop and Spark clusters.

Instance types

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPU</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>Bandwidth (inbound or outbound in Gbit/s)</th>
<th>Packet forwarding rate (inbound or outbound in Kpps)</th>
<th>IPv6 support</th>
<th>NIC queues</th>
<th>ENI</th>
<th>Private IP address of a single ENI</th>
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</thead>
<tbody>
<tr>
<td>ecs. se1ne. large</td>
<td>2</td>
<td>16.0</td>
<td>None</td>
<td>1.0</td>
<td>300</td>
<td>Yes</td>
<td>2</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>ecs. se1ne. xlarge</td>
<td>4</td>
<td>32.0</td>
<td>None</td>
<td>1.5</td>
<td>500</td>
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### Elastic Compute Service

<table>
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<tr>
<th>Instance type</th>
<th>vCPU</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>Bandwidth (inbound or outbound in Gbit/s)</th>
<th>Packet forwarding rate (inbound or outbound in Kpps)</th>
<th>IPv6 support</th>
<th>NIC queues</th>
<th>ENI</th>
<th>Private IP address of a single ENI</th>
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</thead>
<tbody>
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<td>64.0</td>
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<td>2.0</td>
<td>1,000</td>
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<td>4</td>
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<tr>
<td>ecs. se1ne. 3xlarge</td>
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<td>96.0</td>
<td>None</td>
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<td>1,300</td>
<td>Yes</td>
<td>4</td>
<td>6</td>
<td>10</td>
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<tr>
<td>ecs. se1ne. 4xlarge</td>
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<td>3.0</td>
<td>1,600</td>
<td>Yes</td>
<td>4</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>ecs. se1ne. 6xlarge</td>
<td>24</td>
<td>192.0</td>
<td>None</td>
<td>4.5</td>
<td>2,000</td>
<td>Yes</td>
<td>6</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>ecs. se1ne. 8xlarge</td>
<td>32</td>
<td>256.0</td>
<td>None</td>
<td>6.0</td>
<td>2,500</td>
<td>Yes</td>
<td>8</td>
<td>8</td>
<td>20</td>
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<tr>
<td>ecs. se1ne. 14xlarge</td>
<td>56</td>
<td>480.0</td>
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<td>4,500</td>
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<td>14</td>
<td>8</td>
<td>20</td>
</tr>
</tbody>
</table>

**Note:**
- You can go to the [ECS Instance Types Available for Each Region page](#) to view the instance types available in each region.
- For more information about these specifications, see [Instance specification metrics](#).

**se1**, memory optimized instance family

**Features**
- I/O-optimized.
• Supports only standard SSDs and ultra disks.
• CPU-to-memory ratio of 1:8.
• Equipped with 2.5 GHz Intel® Xeon® E5-2682 v4 (Broadwell) processors.
• Provides strong network performance based on sufficient computing capacity.
• Suitable for the following scenarios:
  - High-performance and in-memory databases.
  - Data analysis and mining, and distributed memory cache.
  - Memory-intensive enterprise applications such as Hadoop and Spark clusters.

### Instance types

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPU</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>Bandwidth (inbound or outbound in Gbit/s)</th>
<th>Packet forwarding rate (inbound or outbound in Kpps)</th>
<th>IPv6 support</th>
<th>NIC queues</th>
<th>ENI</th>
<th>Private IP address of a single ENI</th>
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</thead>
<tbody>
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<td>None</td>
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<td>No</td>
<td>1</td>
<td>2</td>
<td>6</td>
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<tr>
<td>ecs.se1.xlarge</td>
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<td>0.8</td>
<td>200</td>
<td>No</td>
<td>1</td>
<td>3</td>
<td>10</td>
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<td>No</td>
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<td>4</td>
<td>10</td>
</tr>
<tr>
<td>ecs.se1.4xlarge</td>
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<td>128.0</td>
<td>None</td>
<td>3.0</td>
<td>500</td>
<td>No</td>
<td>2</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>ecs.se1.8xlarge</td>
<td>32</td>
<td>256.0</td>
<td>None</td>
<td>6.0</td>
<td>800</td>
<td>No</td>
<td>3</td>
<td>8</td>
<td>20</td>
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<td>Instance type</td>
<td>vCPU</td>
<td>Memory (GiB)</td>
<td>Local storage (GiB)</td>
<td>Bandwidth (inbound or outbound in Gbit/s)</td>
<td>Packet forwarding rate (inbound or outbound in Kpps)</td>
<td>IPv6 support</td>
<td>NIC queues</td>
<td>ENI</td>
<td>Private IP address of a single ENI</td>
</tr>
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</tr>
<tr>
<td>ecs. se1. 14xlarge</td>
<td>56</td>
<td>480.0</td>
<td>None</td>
<td>10.0</td>
<td>1,200</td>
<td>No</td>
<td>4</td>
<td>8</td>
<td>20</td>
</tr>
</tbody>
</table>

Note:

- You can go to the [ECS Instance Types Available for Each Region page](#) to view the instance types available in each region.
- For more information about these specifications, see [Instance specification metrics](#).

References

- [Instance families](#)
- [Create an instance by using the provided wizard](#)

4.4 Big data instance families

This topic describes the big data instance families with enhanced network performance: d1 and d1ne. This topic also includes the information about the instance types that belong to the instance families.

Description

The d1ne and d1 instance families are designed to deliver cloud computing and massive data storage to support big data-oriented business needs. These instances are suitable for Hadoop distributed computing, massive log processing, large data warehousing, and other scenarios that require offline computing and storage of massive data. The storage performance, storage capacity, internal bandwidth, and other specifications of these instance types can satisfy the requirements of distributed computing businesses that typically use Hadoop.
These instance families are suitable for customers in Internet, finance, and other industries that need to compute, store, and analyze large volumes of data. Following the requirements of distributed computing high availability frameworks such as Hadoop, the d1ne and d1 instance families adopt the design of local storage. With only a cost similar to that for building a Hadoop cluster in an Internet data center (IDC), you can guarantee massive storage space and high storage performance.

Common features of d1ne and d1:

- Enterprise-level computing power that guarantees efficient and stable data processing.
- Enhanced network performance including the maximum internal bandwidth per instance and the maximum packet forwarding rate that satisfies the demand for data transfer during peak hours, such as shuffling in Hadoop MapReduce.
- A sequential read and write performance of 190 MB/s for a single disk (when you create an instance for the first time, disks require time to warm up before they can achieve optimal performance) and a maximum 5 GB/s of storage throughput for a single instance. These features shorten the time of reading data from and writing data to Hadoop Distributed File System (HDFS) files.
- The cost of local storage is 97% lower than that of SSD disk storage. This represents a huge reduction in costs for building Hadoop clusters.

When using the d1ne and d1 instance families, note the following:

- The configurations of instances with local SSDs are fixed. Automatic switchover upon dedicated host failures is not supported for instances with local SSDs.
- The number and capacity of local disks of an instance vary depending on the instance type. You cannot attach additional local disks to instances with local SSDs because instances with local SSDs can only use default local SSDs. You cannot detach a local disk from an instance with local SSDs and then attach it to another instance.
- You cannot create a snapshot for local disks. If you need to create an image for the system disk and data disks of an instance with local SSDs, we recommend that you create an image through the snapshots of both the system disk and data disks (data disks must be non-local disks).
You cannot create an image for the system disk and data disks of an instance with local SSDs based on the instance ID. Therefore, you cannot use a custom image to create an instance with local SSDs.

You can attach an SSD disk to an instance with local SSDs. The capacity of the SSD disk is scalable.

Operations made on an instance with local SSDs may affect the data stored on the local disk. For more information, see *Local disks*.

Big data instance family with enhanced network performance, d1ne

**Features:**

- Optimized I/O performance
- Supports only standard SSDs and ultra disks
- High-capacity local SATA hard disk drives (SATA HDDs) with high throughput and a maximum of 35 Gbit/s bandwidth among instances
- 1:4 CPU-to-memory ratio, designed for big data scenarios
  - 2.5 GHz Intel Xeon E5-2682 v4 (Broadwell) processors
- Higher network performance along with more computing capacity

**Scenarios:**

- Hadoop MapReduce, HDFS, Hive, and HBase
- Spark in-memory computing and MLlib
- Enterprises in Internet, finance, and other industries that need to compute, store, and analyze large volumes of data
- Elasticsearch and logging

The following table describes the instance types that belong to the d1ne instance family and the specifications of these instance types.
<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPUs</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>Bandwidth (inbound and outbound, Gbit/s)</th>
<th>Packet forwarding rate (inbound and outbound, 10,000 PPS)</th>
<th>IPv6 support</th>
<th>NIC queues</th>
<th>ENIs (including one primary ENI)</th>
<th>Private IP addresses of a single ENI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs. d1ne. 2xlarge</td>
<td>8</td>
<td>32.0</td>
<td>4 × 5, 500</td>
<td>6.0</td>
<td>100</td>
<td>Yes</td>
<td>4</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>ecs. d1ne. 4xlarge</td>
<td>16</td>
<td>64.0</td>
<td>8 × 5, 500</td>
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<td>160</td>
<td>Yes</td>
<td>4</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>ecs. d1ne. 6xlarge</td>
<td>24</td>
<td>96.0</td>
<td>12 × 5, 500</td>
<td>16.0</td>
<td>200</td>
<td>Yes</td>
<td>6</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>ecs. d1ne-c8d3. 8xlarge</td>
<td>32</td>
<td>128.0</td>
<td>12 × 5, 500</td>
<td>20.0</td>
<td>200</td>
<td>Yes</td>
<td>6</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>ecs. d1ne. 8xlarge</td>
<td>32</td>
<td>128.0</td>
<td>16 × 5, 500</td>
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<td>250</td>
<td>Yes</td>
<td>8</td>
<td>8</td>
<td>20</td>
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<td>160.0</td>
<td>12 × 5, 500</td>
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</table>

**Note:**

- You can go to the *ECS Instance Types Available for Each Region page* to view the instance types available in each region.
For more information about the specifications in the table, see Instance specification metrics.

Big data instance family, d1

Features:

- Optimized I/O performance
- Supports only standard SSDs and ultra disks
- High-capacity local SATA HDDs with high throughput and up to 17 Gbit/s of bandwidth among instances
- 1:4 CPU-to-memory ratio, designed for big data scenarios
- 2.5 GHz Intel Xeon E5-2682 v4 (Broadwell) processors
- Higher network performance along with more computing capacity
- Scenarios:
  - Hadoop MapReduce, HDFS, Hive, and HBase
  - Spark in-memory computing and MLlib
  - Enterprises in Internet, finance, and other industries that need to compute, store, and analyze large volumes of data
  - Elasticsearch and logging

The following table describes the instance types that belong to the d1 instance family and the specifications of these instance types.

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPUs</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>Bandwidth (inbound and outbound, Gbit/s)</th>
<th>Packet forwarding rate (inbound and outbound, 10,000 PPS)</th>
<th>IPv6 support</th>
<th>NIC queues</th>
<th>ENIs (including one primary ENI)</th>
<th>Private IP addresses of a single ENI</th>
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</thead>
<tbody>
<tr>
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<td>32.0</td>
<td>$4 \times 5$, $500$</td>
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<td>No</td>
<td>1</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>Instance type</td>
<td>vCPUs</td>
<td>Memory (GiB)</td>
<td>Local storage (GiB)</td>
<td>Bandwidth (inbound and outbound, Gbit/s)</td>
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<td>ENIs (including one primary ENI)</td>
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</tr>
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<td>10</td>
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<tr>
<td>ecs.d1.4xlarge</td>
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<td>64.0</td>
<td>$8 \times 5,500$</td>
<td>6.0</td>
<td>60</td>
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<td>8</td>
<td>20</td>
</tr>
<tr>
<td>ecs.d1.6xlarge</td>
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<td>96.0</td>
<td>$12 \times 5,500$</td>
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<td>80</td>
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<td>8</td>
<td>20</td>
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<tr>
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<td>32</td>
<td>128.0</td>
<td>$12 \times 5,500$</td>
<td>10.0</td>
<td>100</td>
<td>No</td>
<td>4</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>ecs.d1.8xlarge</td>
<td>32</td>
<td>128.0</td>
<td>$16 \times 5,500$</td>
<td>10.0</td>
<td>100</td>
<td>No</td>
<td>4</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>ecs.d1-c14d3.14xlarge</td>
<td>56</td>
<td>160.0</td>
<td>$12 \times 5,500$</td>
<td>17.0</td>
<td>180</td>
<td>No</td>
<td>6</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>ecs.d1.14xlarge</td>
<td>56</td>
<td>224.0</td>
<td>$28 \times 5,500$</td>
<td>17.0</td>
<td>180</td>
<td>No</td>
<td>6</td>
<td>8</td>
<td>20</td>
</tr>
</tbody>
</table>

Note:

- You can go to the *ECS Instance Types Available for Each Region* page to view the instance types available in each region.
- For more information about the specifications in the table, see *Instance specification metrics*.
4.5 Instance families with local SSDs

This topic describes the instance families with local SSDs: i2, i2g, and i1. This topic also includes the information about the instance types that belong to the instance families.

Description

Instances with local SSDs provide high I/O performance. They are suitable for scenarios that impose high demands on storage I/O performance and high availability architecture at the application level. For example, they are suitable for NoSQL databases, massively parallel processing (MPP) databases, and distributed file systems.

For enterprises that provide online services like online gaming, e-commerce, live video streaming, and media, instances with local SSDs can satisfy the high requirements of I/O-intensive applications over low latency and high I/O performance of block storage.

Features:

- Provides tens of thousands to hundreds of thousands of low-latency random read/write IOPS for large databases.
- Offers a throughput of up to several gibibytes per second for sequential read/write operations in big data, concurrent computing, and other large dataset scenarios.
- Local NVMe SSDs guarantee hundreds of thousands of random read/write IOPS with only several microseconds of latency.

When using instances with local SSDs, note the following:

- The associations of instances with local SSDs are fixed. Automatic switchover upon dedicated host failures is not supported for instances with local SSDs.
- The number and capacity of local disks of an instance vary depending on the instance type. You cannot attach additional local disks to instances with local SSDs because instances with local SSDs can only use default local SSDs. You cannot detach a local disk from an instance with local SSDs and then attach it to another instance.
- You cannot create a snapshot for local disks. If you need to create an image for the system disk and data disks of an instance with local SSDs, we recommend...
that you create an image by creating snapshots for the system disk and non-local data disks.

• You cannot create an image for the system disk and data disks of an instance with local SSDs based on the instance ID. Therefore, you cannot use a custom image to create an instance with local SSDs.

• You can attach an SSD disk to an instance with local SSDs. The capacity of the SSD disk is scalable.

• Local disks are attached to a single physical server, which increases the risk of single point of failure (SPOF) as the reliability of data is dependent on the reliability of the physical server. To ensure data availability and enhance business continuity, we recommend that you implement data redundancy at the application layer. For example, you can use deployment sets to distribute ECS instances across multiple physical machines to achieve high reliability and disaster recovery. For more information, see #unique_84.

⚠️ Warning:
Data stored on local disks may be lost in the event of a hardware failure. We recommend that you store only temporary data on local disks. If your applications have no data reliability architecture, we recommend that you use cloud disks in your instances for data reliability.

• Operations made on an instance with local SSDs may affect the data stored on the local disk. For more information, see #unique_75/

unique_75_Connect_42_section_vdp_m2w_ydb.

Instance family with local SSDs, i2

Features:

• Optimized I/O performance

• Supports only standard SSDs and ultra disks

• High-performance local NVMe SSDs that features high IOPS, high I/O throughput, and low latency

• 1:8 CPU-to-memory ratio, designed for high-performance databases

• 2.5 GHz Intel Xeon Platinum 8163 (Skylake) processors

• Higher network performance along with more computing capacity
Elastic Compute Service

• Scenarios:
  - Online transaction processing (OLTP) and high-performance relational databases
  - NoSQL databases such as Cassandra, MongoDB, and HBase
  - Search scenarios such as Elasticsearch

The following table describes the instance types that belong to the i2 instance family and the specifications of these instance types.

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPUs</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>Bandwidth (inbound and outbound, Gbit/s)</th>
<th>Packet forwarding rate (inbound and outbound, 10,000 PPS)</th>
<th>IPv6 support</th>
<th>NIC queues</th>
<th>ENIs (including one primary ENI)</th>
<th>Private IP addresses of a single ENI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs.i2. xlarge</td>
<td>4</td>
<td>32.0</td>
<td>1 × 894</td>
<td>1.0</td>
<td>50</td>
<td>Yes</td>
<td>2</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>ecs.i2. 2xlarge</td>
<td>8</td>
<td>64.0</td>
<td>1 × 1,788</td>
<td>2.0</td>
<td>100</td>
<td>Yes</td>
<td>2</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>ecs.i2. 4xlarge</td>
<td>16</td>
<td>128.0</td>
<td>2 × 1,788</td>
<td>3.0</td>
<td>150</td>
<td>Yes</td>
<td>4</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>ecs.i2. 8xlarge</td>
<td>32</td>
<td>256.0</td>
<td>4 × 1,788</td>
<td>6.0</td>
<td>200</td>
<td>Yes</td>
<td>8</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>ecs.i2. 16xlarge</td>
<td>64</td>
<td>512.0</td>
<td>8 × 1,788</td>
<td>10.0</td>
<td>400</td>
<td>Yes</td>
<td>16</td>
<td>8</td>
<td>20</td>
</tr>
</tbody>
</table>

Note:

• You can go to the ECS Instance Types Available for Each Region page to view the instance types available in each region.

• For more information about the specifications in the table, see Instance specification metrics.
Instance family with local SSDs, i2g

Features:

- Optimized I/O performance
- Supports only standard SSDs and ultra disks
- High-performance local NVMe SSDs that features high IOPS, high I/O throughput, and low latency
- 1:4 CPU-to-memory ratio, designed for high-performance databases
- 2.5 GHz Intel® Xeon® Platinum 8163 (Skylake) processors
- Higher network performance along with more computing capacity

Scenarios:

- Online transaction processing (OLTP) and high-performance relational databases
- NoSQL databases such as Cassandra, MongoDB, and HBase
- Search scenarios such as Elasticsearch

The following table describes the instance types that belong to the i2g instance family and the specifications of these instance types.

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPUs</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>Bandwidth (inbound and outbound, Gbit/s)</th>
<th>Packet forwarding rate (inbound and outbound, 10,000 PPS)</th>
<th>IPv6 support</th>
<th>NIC queues</th>
<th>ENIs (including one primary ENI)</th>
<th>Private IP addresses of a single ENI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs. i2g. 2xlarge</td>
<td>8</td>
<td>32.0</td>
<td>$1 \times 894$</td>
<td>2.0</td>
<td>100</td>
<td>No</td>
<td>2</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>ecs. i2g. 4xlarge</td>
<td>16</td>
<td>64.0</td>
<td>$1 \times 1,788$</td>
<td>3.0</td>
<td>150</td>
<td>No</td>
<td>4</td>
<td>8</td>
<td>20</td>
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</tbody>
</table>
### Instance Type Specifications

<table>
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<th>Instance Type</th>
<th>vCPUs</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>Bandwidth (inbound and outbound, Gbit/s)</th>
<th>Packet forwarding rate (inbound and outbound, 10,000 PPS)</th>
<th>IPv6 Support</th>
<th>NIC queues</th>
<th>ENIs (including one primary ENI)</th>
<th>Private IP addresses of a single ENI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs. i2g. 8xlarge</td>
<td>32</td>
<td>128.0</td>
<td>$2 \times 1,788$</td>
<td>6.0</td>
<td>200</td>
<td>No</td>
<td>8</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>ecs. i2g. 16xlarge</td>
<td>64</td>
<td>256.0</td>
<td>$4 \times 1,788$</td>
<td>10.0</td>
<td>400</td>
<td>No</td>
<td>16</td>
<td>8</td>
<td>20</td>
</tr>
</tbody>
</table>

**Note:**

- You can go to the *ECS Instance Types Available for Each Region page* to view the instance types available in each region.
- For more information about the specifications in the table, see *Instance specification metrics*.

---

**Instance family with local SSDs, i1**

**Features:**

- Optimized I/O performance
- Supports only standard SSDs and ultra disks
- High-performance local NVMe SSDs that features high IOPS, high I/O throughput, and low latency
- 1:4 CPU-to-memory ratio, designed for high-performance databases
- 2.5 GHz Intel Xeon E5-2682 v4 (Broadwell) processors
- Higher network performance along with more computing capacity
- Scenarios:
  - Online transaction processing (OLTP) and high-performance relational databases
  - NoSQL databases such as Cassandra and MongoDB
  - Search scenarios such as Elasticsearch

The following table describes the instance types that belong to the i1 instance family and the specifications of these instance types.

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPUs</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>Bandwidth (inbound and outbound, Gbit/s)</th>
<th>Packet forwarding rate (inbound and outbound, 10,000 PPS)</th>
<th>IPv6 support</th>
<th>NIC queues</th>
<th>ENIs (including one primary ENI)</th>
<th>Private IP addresses of a single ENI</th>
</tr>
</thead>
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<td>2 × 104</td>
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<td>20</td>
<td>No</td>
<td>1</td>
<td>3</td>
<td>10</td>
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<tr>
<td>ecs.i1.2xlarge</td>
<td>8</td>
<td>32.0</td>
<td>2 × 208</td>
<td>1.5</td>
<td>40</td>
<td>No</td>
<td>1</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>ecs.i1.3xlarge</td>
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<td>48.0</td>
<td>2 × 312</td>
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<td>40</td>
<td>No</td>
<td>1</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td>ecs.i1.4xlarge</td>
<td>16</td>
<td>64.0</td>
<td>2 × 416</td>
<td>3.0</td>
<td>50</td>
<td>No</td>
<td>2</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>ecs.i1-c5d.4xlarge</td>
<td>16</td>
<td>64.0</td>
<td>2 × 1, 456</td>
<td>3.0</td>
<td>40</td>
<td>No</td>
<td>2</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>ecs.i1.6xlarge</td>
<td>24</td>
<td>96.0</td>
<td>2 × 624</td>
<td>4.5</td>
<td>60</td>
<td>No</td>
<td>2</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>ecs.i1.8xlarge</td>
<td>32</td>
<td>128.0</td>
<td>2 × 832</td>
<td>6.0</td>
<td>80</td>
<td>No</td>
<td>3</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>ecs.i1-c10d.8xlarge</td>
<td>32</td>
<td>128.0</td>
<td>2 × 1, 456</td>
<td>6.0</td>
<td>80</td>
<td>No</td>
<td>3</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>Instance type</td>
<td>vCPUs</td>
<td>Memory (GiB)</td>
<td>Local storage (GiB)</td>
<td>Bandwidth (inbound and outbound, Gbit/s)</td>
<td>Packet forward rate (inbound and outbound, 10,000 PPS)</td>
<td>IPv6 support</td>
<td>NIC queues</td>
<td>ENIs (including one primary ENI)</td>
<td>Private IP addresses of a single ENI</td>
</tr>
<tr>
<td>---------------</td>
<td>-------</td>
<td>--------------</td>
<td>---------------------</td>
<td>-----------------------------------------</td>
<td>--------------------------------------------------------</td>
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<td>---------------------------------</td>
<td>---------------------------------</td>
</tr>
<tr>
<td>ecs.i1.14xlarge</td>
<td>56</td>
<td>224.0</td>
<td>$2 \times 1,456$</td>
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<td>120</td>
<td>No</td>
<td>4</td>
<td>8</td>
<td>20</td>
</tr>
</tbody>
</table>

**Note:**

- You can go to the *ECS Instance Types Available for Each Region* page to view the instance types available in each region.
- For more information about these specifications in the table, see *Instance specification metrics*.

### 4.6 Instance families with high clock speed

This topic describes the hfc5 and hfc6 compute optimized instance families with high clock speed, the hfg5 and hfg6 general purpose instance families with high clock speed, and the hfr6 memory optimized instance family with high clock speed, and lists the instance types of each family.

**hfc6, compute optimized instance family with high clock speed**

**Features:**

- The X-Dragon architecture to offload a large number of virtualization features to dedicated hosts, reduced virtualization overheads, consistent and predictable performance
- Optimized I/O performance
- Supports enhanced SSDs, standard SSDs, and ultra disks
- Provides strong storage I/O performance proportional to computing capacity
- CPU-to-memory ratio of 1:2
- Ultra high packet forwarding rate
  - Equipped with 3.1 GHz Intel Xeon Platinum 8269 (Cascade Lake), with Turbo Boost up to 3.5 GHz for consistent computing performance
- Provides strong network performance proportional to computing capacity
- Scenarios:
  - Scenarios where large volumes of packets are received and transmitted, such as on-screen video comments and telecom data forwarding
  - Web frontend servers
  - Frontends of Massively Multiplayer Online (MMO) gaming
  - Data analysis, batch processing, and video encoding
  - High-performance scientific and engineering applications

### Instance types

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPU</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>Basic bandwidth (Gbit/s)</th>
<th>Burst bandwidth (Gbit/s)</th>
<th>Packet forwarding rate (Kpps)</th>
<th>IPv6 support</th>
<th>NIC queue (including one primary ENI)</th>
<th>ENIs of a single ENI</th>
<th>Private IP address</th>
<th>Disk IOPS (K)</th>
<th>Disk bandwidth (Gbit/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs. hfc6. large</td>
<td>2</td>
<td>4.0</td>
<td>N/A</td>
<td>1.0</td>
<td>3.0</td>
<td>300</td>
<td>Yes</td>
<td>2</td>
<td>2</td>
<td>6</td>
<td>10</td>
<td>1.0</td>
</tr>
<tr>
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<td>4</td>
<td>8.0</td>
<td>N/A</td>
<td>1.5</td>
<td>5.0</td>
<td>500</td>
<td>Yes</td>
<td>4</td>
<td>3</td>
<td>10</td>
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</tr>
<tr>
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<td>16.0</td>
<td>N/A</td>
<td>2.5</td>
<td>8.0</td>
<td>800</td>
<td>Yes</td>
<td>8</td>
<td>4</td>
<td>10</td>
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</tr>
<tr>
<td>ecs. hfc6. 3xlarge</td>
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<td>24.0</td>
<td>N/A</td>
<td>4.0</td>
<td>10.0</td>
<td>900</td>
<td>Yes</td>
<td>8</td>
<td>6</td>
<td>10</td>
<td>30</td>
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<tr>
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<td>32.0</td>
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<td>10.0</td>
<td>1,000</td>
<td>Yes</td>
<td>8</td>
<td>8</td>
<td>20</td>
<td>40</td>
<td>3.0</td>
</tr>
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<td>Instance type</td>
<td>vCPU</td>
<td>Memory (GiB)</td>
<td>Local storage (GiB)</td>
<td>Basic bandwidth (Gbit/s)</td>
<td>Burst bandwidth (Gbit/s)</td>
<td>Packet forwarding rate (Kpps)</td>
<td>IPv6 support</td>
<td>NIC queue (including one primary ENI)</td>
<td>ENIs (including one primary ENI)</td>
<td>Privat IP address of a single ENI</td>
<td>Disk IOPS (K)</td>
<td>Disk bandwidth (Gbit/s)</td>
</tr>
<tr>
<td>---------------</td>
<td>------</td>
<td>--------------</td>
<td>---------------------</td>
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<td>--------------------------------</td>
<td>--------------------------------</td>
<td>---------------------------------</td>
<td>----------------</td>
<td>------------------------</td>
</tr>
<tr>
<td>ecs. hfc6. 6xlarge</td>
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<td>48.0</td>
<td>N/A</td>
<td>7.5</td>
<td>10.0</td>
<td>1,500</td>
<td>Yes</td>
<td>12</td>
<td>8</td>
<td>20</td>
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<td>4.0</td>
</tr>
<tr>
<td>ecs. hfc6. 8xlarge</td>
<td>32</td>
<td>64.0</td>
<td>N/A</td>
<td>10.0</td>
<td>N/A</td>
<td>2,000</td>
<td>Yes</td>
<td>16</td>
<td>8</td>
<td>20</td>
<td>60</td>
<td>5.0</td>
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<td>40</td>
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<td>N/A</td>
<td>12.5</td>
<td>N/A</td>
<td>3,000</td>
<td>Yes</td>
<td>32</td>
<td>7</td>
<td>20</td>
<td>100</td>
<td>8.0</td>
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<tr>
<td>ecs. hfc6. 16xlarge</td>
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<td>20.0</td>
<td>N/A</td>
<td>4,000</td>
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<td>20</td>
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<td>6,000</td>
<td>Yes</td>
<td>32</td>
<td>15</td>
<td>20</td>
<td>200</td>
<td>16.0</td>
</tr>
</tbody>
</table>

**Note:**

- You can go to the [ECS Instance Types Available for Each Region page](#) to view the instance types available in each region.
- For more information about the specifications in the preceding table, see Instance specification metrics.

hfg6, general purpose instance family with high clock speed

**Features:**

- The X-Dragon architecture to offload a large number of virtualization features to dedicated hosts, reduced virtualization overheads, consistent and predictable performance
- Optimized I/O performance
- Supports enhanced SSDs, standard SSDs, and ultra disks
- Provides strong storage I/O performance proportional to computing capacity
- CPU-to-memory ratio of 1:4.
- Ultra high packet forwarding rate
  - Equipped with 3.1 GHz Intel Xeon Platinum 8269 (Cascade Lake), with Turbo Boost up to 3.5 GHz for consistent computing performance
- Provides strong network performance proportional to computing capacity
- Scenarios:
  - Scenarios where large volumes of packets are received and transmitted, such as on-screen video comments and telecom data forwarding
  - Enterprise-grade applications of various types and sizes
  - Website and application servers
  - Game servers
  - Small and medium-sized database systems, caches, and search clusters
  - Data analysis and computing
  - Compute clusters and memory-intensive data processing

### Instance types

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPU</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>Basic bandwidth (Gbit/s)</th>
<th>Burst bandwidth (Gbit/s)</th>
<th>Packet forwarding rate (Kpps)</th>
<th>IPv6 support</th>
<th>NIC queue (including one primary ENI)</th>
<th>IPv6 support</th>
<th>ENIs</th>
<th>Private IP address of a single ENI</th>
<th>Disk IOPS (K)</th>
<th>Disk bandwidth (Gbit/s)</th>
</tr>
</thead>
<tbody>
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<td>ecs. hfg6. large</td>
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<td>8.0</td>
<td>N/A</td>
<td>1.0</td>
<td>3.0</td>
<td>300</td>
<td>Yes</td>
<td>2</td>
<td>2</td>
<td>6</td>
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<td>N/A</td>
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**Note:**
- You can go to the *ECS Instance Types Available for Each Region* page to view the instance types available in each region.
- For more information about the specifications in the preceding table, see *Instance specification metrics*.

hfr6, memory optimized instance family with high clock speed

**Features:**
- The X-Dragon architecture to offload a large number of virtualization features to dedicated hosts, reduced virtualization overheads, consistent and predictable performance
- Optimized I/O performance
- Supports enhanced SSDs, standard SSDs, and ultra disks
- Provides strong storage I/O performance proportional to computing capacity
- CPU-to-memory ratio of 1:8
- Ultra high packet forwarding rate
- 
  Equipped with 3.1 GHz Intel Xeon Platinum 8269 (Cascade Lake), with Turbo Boost up to 3.5 GHz for consistent computing performance
- Provides strong network performance proportional to computing capacity
- Scenarios:
  - Scenarios where large volumes of packets are received and transmitted, such as on-screen video comments and telecom data forwarding
  - High-performance databases and in-memory databases
  - Data analysis and mining, and distributed memory cache
  - Memory-intensive enterprise applications such as Hadoop and Spark clusters

<table>
<thead>
<tr>
<th>Instance types</th>
<th>vCPU</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>Basic bandwidth (Gbit/s)</th>
<th>Burst bandwidth (Gbit/s)</th>
<th>Packet forwarding rate (Kpps)</th>
<th>IPv6 support</th>
<th>NIC queue (includes one primary ENI)</th>
<th>ENI of a single ENI</th>
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<th>Disk bandwidth (Gbit/s)</th>
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<td>20</td>
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**Note:**

- You can go to the [ECS Instance Types Available for Each Region page](#) to view the instance types available in each region.
- For more information about the specifications in the preceding table, see *Instance specification metrics*.  

Issue: 20200109
hfc5, compute optimized instance family with high clock speed

Features:

- Optimized I/O performance
- Supports only standard SSDs and ultra disks
- Consistent computing performance
- Equipped with 3.1 GHz Intel Xeon Gold 6149 (Skylake)
- CPU-to-memory ratio of 1:2
- Provides strong network performance proportional to computing capacity

Scenarios:

- High-performance Web frontend servers
- High-performance scientific and engineering applications
- Massive multiplayer online (MMO) gaming and video encoding

Instance types

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPU</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>Bandwidth (Gbit/s)</th>
<th>Packet forwarding rate (Kpps)</th>
<th>IPv6 support</th>
<th>NIC queues</th>
<th>ENIs (including one primary ENI)</th>
<th>Private IP addresses of a single ENI</th>
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<td>2</td>
<td>3</td>
<td>10</td>
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</table>

**Note:**

- You can go to the [ECS Instance Types Available for Each Region page](#) to view the instance types available in each region.
- For more information about the specifications in the preceding table, see [Instance specification metrics](#).

hfg5, general purpose instance family with high clock speed

**Features:**

- Optimized I/O performance
- Supports only standard SSDs and ultra disks
- Consistent computing performance
  - Equipped with 3.1 GHz Intel Xeon Gold 6149 (Skylake)
- CPU-to-memory ratio of 1:4 (excluding the instance type with 56 vCPUs)
- Provides strong network performance proportional to computing capacity
- Scenarios:
  - High-performance Web frontend servers
  - High-performance scientific and engineering applications
  - Massive multiplayer online (MMO) gaming and video encoding

**Instance types**

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPU</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>Bandwidth (Gbit/s)</th>
<th>Packet forwarding rate (Kpps)</th>
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<td>6</td>
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<td>3</td>
<td>10</td>
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<td>10</td>
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<td>1,600</td>
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<td>20</td>
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<td>No</td>
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Note:
- You can go to the *ECS Instance Types Available for Each Region page* to view the instance types available in each region.
- For more information about these specifications, see *Instance specification metrics*.

4.7 Compute optimized type family with GPU

4.7.1 Compute optimized instance families with GPU capabilities

This topic describes the vgn5i, gn6i, gn6v, gn5, gn5i, and gn4 compute optimized instance families with GPU capabilities and lists their instance types.

vgn5i, lightweight compute optimized instance family with GPU capabilities

Features

- I/O optimized
- Supports standard SSDs and ultra disks
- Uses NVIDIA P4 GPU computing accelerators
- Contains virtual GPUs (vGPUs), which are the result of GPU virtualization with mediated pass-through
  - Supports the 1/8, 1/4, 1/2, and 1/1 computing capacity of NVIDIA® Tesla® P4 GPUs
  - Supports 1, 2, 4, and 8 GB of GPU memory
- CPU-to-memory ratio of 1:3

  Equipped with 2.5 GHz Intel® Xeon® E5-2682 v4 (Broadwell) processors
- Provides strong network performance proportional to computing capacity
- Suitable for the following scenarios:
  - Real-time rendering for cloud gaming
  - Real-time rendering for AR and VR applications
  - AI (deep learning and machine learning) inference for the elastic deployment of Internet services
  - Educational environment of deep learning
  - Modeling experiment environment of deep learning

Instance types
<table>
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<tr>
<th>Instance type</th>
<th>vCPUs</th>
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<th>Local storage (GiB)</th>
<th>GPU memory (GB)</th>
<th>Bandwidth (Gbit/s)</th>
<th>Packet forwarding rate (Kpps)</th>
<th>IPv6 support</th>
<th>NIC queues</th>
<th>ENIs (including one primary ENI)</th>
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Note:

- You can go to the ECS Instance Types Available for Each Region page to view the instance types available in each region.
- For more information about these specifications, see Instance specification metrics.

gn6i, compute optimized instance family with GPU capabilities

Features

- I/O optimized
- CPU-to-memory ratio of 1:4
- Equipped with 2.5 GHz Intel Xeon Platinum 8163 (Skylake) processors
- Supports standard SSDs, ultra disks, and enhanced SSDs that deliver millions of IOPS
Elastic Compute Service

- Uses NVIDIA T4 GPU computing accelerators
  - Powered by the new NVIDIA Turing architecture
  - 16 GB memory capacity (320 GB/s bandwidth)
  - 2,560 CUDA Cores
  - Up to 320 Turing Tensor Cores
  - Mixed-precision Tensor Cores support 65 FP16 TFLOPS, 130 INT8 TOPS, and 260 INT4 TOPS
- Provides strong network performance proportional to computing capacity
- Suitable for the following scenarios:
  - AI (deep learning and machine learning) inference for computer vision, speech recognition, speech synthesis, natural language processing (NLP), machine translation, and recommendation systems
  - Real-time rendering for cloud gaming
  - Real-time rendering for AR and VR applications
  - Graphics workstations or overloaded graphics computing
  - GPU-accelerated databases
  - High-performance computing

Instance types

<table>
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<tr>
<th>Instance type</th>
<th>vCPUs</th>
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<th>IPv6 support</th>
<th>NIC queues</th>
<th>ENIs (including one primary ENI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs.gn6i-c4g1.xlarge</td>
<td>4</td>
<td>15</td>
<td>N/A</td>
<td>T4</td>
<td>1 × T4</td>
<td>16</td>
<td>4</td>
<td>500</td>
<td>Yes</td>
<td>2</td>
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<tr>
<td>ecs.gn6i-c8g1.2xlarge</td>
<td>8</td>
<td>31</td>
<td>N/A</td>
<td>T4</td>
<td>1 × T4</td>
<td>16</td>
<td>5</td>
<td>800</td>
<td>Yes</td>
<td>2</td>
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<tr>
<td>Instance type</td>
<td>vCPUs</td>
<td>Memory (GiB)</td>
<td>Local storage (GiB)</td>
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<td>GPU memory (GB)</td>
<td>Bandwidth (Gbit/s)</td>
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<tr>
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<td>N/A</td>
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<td>Yes</td>
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<td>N/A</td>
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<tr>
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<td>Yes</td>
<td>24</td>
<td>8</td>
</tr>
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</table>

Note:
- You can go to the *ECS Instance Types Available for Each Region page* to view the instance types available in each region.
- For more information about these specifications, see *Instance specification metrics*.

gn6v, compute optimized instance family with GPU capabilities

Features
- I/O optimized
- Supports enhanced SSDs, standard SSDs, and ultra disks
- Uses NVIDIA V100 GPU processors
- CPU-to-memory ratio of 1:4
Elastic Compute Service

Instance / 4 Instance type families

- Equipped with 2.5 GHz Intel Xeon Platinum 8163 (Skylake) processors
- Uses NVIDIA V100 GPU computing accelerators (SXM2-based)
  - Powered by the innovative NVIDIA Volta architecture
  - 16 GB of HBM2 memory (900 GB/s bandwidth)
  - 5,120 CUDA Cores
  - 640 Tensor Cores
  - Supports up to six NVLink connections for a total bandwidth of 300 GB/s with 25 GB/s each
- Provides strong network performance proportional to computing capacity
- Suitable for the following scenarios:
  - Deep learning applications such as training and inference applications of AI algorithms used in image classification, autonomous vehicles, and speech recognition
  - Scientific computing applications, such as fluid dynamics, finance, molecular dynamics, and environmental analysis

Instance types

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPUs</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>GPU</th>
<th>GPU memo (GB)</th>
<th>Bandwidth (Gbit/s)</th>
<th>Packet forwarding rate (Kpps)</th>
<th>IPv6 support</th>
<th>NIC queue</th>
<th>ENIs (including one primary ENI)</th>
<th>Private IP addresses of a single ENI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs.gn6vc8g1.2xlarge</td>
<td>8</td>
<td>32.0</td>
<td>N/A</td>
<td>1 × NVIDIA V100</td>
<td>1 × N6</td>
<td>2.5</td>
<td>800</td>
<td>Yes</td>
<td>4</td>
<td>4</td>
<td>10</td>
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<tr>
<td>ecs.gn6vc8g1.8xlarge</td>
<td>32</td>
<td>128.0</td>
<td>N/A</td>
<td>4 × NVIDIA V100</td>
<td>4 × N6</td>
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<td>2,000</td>
<td>Yes</td>
<td>8</td>
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### Instance / 4 Instance type families

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPUs</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>GPU</th>
<th>GPU memory (GB)</th>
<th>Bandwidth (Gbit/s)</th>
<th>Packet forwarding rate (Kpps)</th>
<th>IPv6 support</th>
<th>NIC queue</th>
<th>ENIs (including one primary ENI)</th>
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<tr>
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<td>8 × NVIDIA V100</td>
<td>8 × 16</td>
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<td>2,500</td>
<td>Yes</td>
<td>16</td>
<td>8</td>
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<td>336.0</td>
<td>N/A</td>
<td>8 × NVIDIA V100</td>
<td>8 × 16</td>
<td>32.0</td>
<td>4,500</td>
<td>Yes</td>
<td>16</td>
<td>8</td>
<td>20</td>
</tr>
</tbody>
</table>

**Note:**

- You can go to the *ECS Instance Types Available for Each Region page* to view the instance types available in each region.
- For more information about these specifications, see *Instance specification metrics*.

gn5, compute optimized instance family with GPU capabilities

**Features**

- I/O optimized
- Supports standard SSDs and ultra disks
- Uses NVIDIA P100 GPU processors
- Multiple CPU-to-memory ratios
- High-performance local NVMe SSDs
- Equipped with 2.5 GHz Intel Xeon E5-2682 v4 (Broadwell) processors
- Provides strong network performance proportional to computing capacity
Suitable for the following scenarios:

- Deep learning
- Scientific computing applications, such as fluid dynamics, finance, genomics, and environmental analysis
- High-performance computing, rendering, multimedia encoding and decoding, and other server-side GPU compute workloads

### Instance types

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPUs</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>GPU (GB)</th>
<th>GPU memo (GB/s)</th>
<th>Bandwidth (Gbit/s)</th>
<th>Packet forwarding rate (Kpps)</th>
<th>IPv6 support</th>
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<tbody>
<tr>
<td>ecs. gn5-c4g1. xlarge</td>
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<td>440</td>
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<td>1 × N6</td>
<td>3.0</td>
<td>300</td>
<td>No</td>
<td>1</td>
<td>3</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>ecs. gn5-c8g1. 2xlarge</td>
<td>8</td>
<td>60.0</td>
<td>440</td>
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<td>3.0</td>
<td>400</td>
<td>No</td>
<td>1</td>
<td>4</td>
<td>10</td>
<td></td>
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<tr>
<td>ecs. gn5-c4g1. 2xlarge</td>
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<td>60.0</td>
<td>880</td>
<td>2 × NVIDIA P100</td>
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<td>5.0</td>
<td>1,000</td>
<td>No</td>
<td>2</td>
<td>4</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>ecs. gn5-c8g1. 4xlarge</td>
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<td>120.0</td>
<td>880</td>
<td>2 × NVIDIA P100</td>
<td>2 × N6</td>
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<td>1,000</td>
<td>No</td>
<td>4</td>
<td>8</td>
<td>20</td>
<td></td>
</tr>
<tr>
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<td>1 × N6</td>
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<td>1,000</td>
<td>No</td>
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</table>
### Elastic Compute Service

<table>
<thead>
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<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>GPU memo (GB)</th>
<th>Bandwidth (Gbit/s)</th>
<th>Packet forwarding rate (Kpps)</th>
<th>IPv6 support</th>
<th>NIC queue (including one primary ENI)</th>
<th>ENIs of a single ENI</th>
<th>Private IP addresses</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs.gn5-c8g1.8xlarge</td>
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<td>240.0</td>
<td>1,760</td>
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<td>4 × N6</td>
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<td>20</td>
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<tr>
<td>ecs.gn5-c28g1.14xlarge</td>
<td>56</td>
<td>224.0</td>
<td>880</td>
<td>2 × NVIDIA P100</td>
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<td>8</td>
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<td>ecs.gn5-c8g1.14xlarge</td>
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<td>8 × NVIDIA P100</td>
<td>8 × N6</td>
<td>25.0</td>
<td>No</td>
<td>8</td>
<td>14</td>
<td>8</td>
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</table>

**Note:**
- You can go to the *ECS Instance Types Available for Each Region* page to view the instance types available in each region.
- For more information about these specifications, see *Instance specification metrics*.

**gn5i**, compute optimized instance family with GPU capabilities

**Features**
- I/O optimized
- Supports standard SSDs and ultra disks
- Uses NVIDIA P4 GPU processors
- CPU-to-memory ratio of 1:4
  - Equipped with 2.5 GHz Intel Xeon E5-2682 v4 (Broadwell) processors
- Provides strong network performance proportional to computing capacity
- Suitable for the following scenarios:
  - Deep learning inference
  - Multimedia encoding and decoding, and other server-side GPU compute workloads

**Instance types**

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPUs</th>
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<th>Local storage (GiB)</th>
<th>GPU model</th>
<th>GPU memory (GB)</th>
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<th>Private IP addresses of a single ENI</th>
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<tr>
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<td>8.0</td>
<td>N/A</td>
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<td>100</td>
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<td>2</td>
<td>2</td>
<td>6</td>
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<tr>
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<td>4</td>
<td>16.0</td>
<td>N/A</td>
<td>1 × NVIDIA P4</td>
<td>1 × 8</td>
<td>1.5</td>
<td>200</td>
<td>Yes</td>
<td>2</td>
<td>3</td>
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</tr>
<tr>
<td>ecs. gn5i-c8g1.2xlarge</td>
<td>8</td>
<td>32.0</td>
<td>N/A</td>
<td>1 × NVIDIA P4</td>
<td>1 × 8</td>
<td>2.0</td>
<td>400</td>
<td>Yes</td>
<td>4</td>
<td>4</td>
<td>10</td>
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<tr>
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<td>64.0</td>
<td>N/A</td>
<td>1 × NVIDIA P4</td>
<td>1 × 8</td>
<td>3.0</td>
<td>800</td>
<td>Yes</td>
<td>4</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>ecs. gn5i-c16g1.8xlarge</td>
<td>32</td>
<td>128.0</td>
<td>N/A</td>
<td>2 × NVIDIA P4</td>
<td>2 × 8</td>
<td>6.0</td>
<td>1,200</td>
<td>Yes</td>
<td>8</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>Instance type</td>
<td>vCPUs</td>
<td>Memory (GiB)</td>
<td>Local storage (GiB)</td>
<td>GPU</td>
<td>GPU memory (GB)</td>
<td>Bandwidth (Gbit/s)</td>
<td>Packet forwarding rate (Kpps)</td>
<td>IPv6 support</td>
<td>NIC queue</td>
<td>ENIs (including one primary ENI)</td>
<td>Private IP addresses of a single ENI</td>
</tr>
<tr>
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</tr>
<tr>
<td>ecs.gn5i-c28g1.14xlarge</td>
<td>56</td>
<td>224.0</td>
<td>N/A</td>
<td>2 × NVIDIA P4</td>
<td>2 × 8</td>
<td>10.0</td>
<td>2,000</td>
<td>Yes</td>
<td>14</td>
<td>8</td>
<td>20</td>
</tr>
</tbody>
</table>

Note:

- You can go to the *ECS Instance Types Available for Each Region page* to view the instance types available in each region.
- For more information about these specifications, see *Instance specification metrics*.

gn4, compute optimized family with GPU capabilities

**Features**

- I/O optimized
- Supports standard SSDs and ultra disks
- Uses NVIDIA M40 GPU processors
- Multiple CPU-to-memory ratios
  - Equipped with 2.5 GHz Intel Xeon E5-2682 v4 (Broadwell) processors
- Provides strong network performance proportional to computing capacity
- Suitable for the following scenarios:
  - Deep learning
  - Scientific computing applications, such as fluid dynamics, finance, genomics, and environmental analysis
  - High-performance computing, rendering, multimedia encoding and decoding, and other server-side GPU compute workloads

**Instance types**
<table>
<thead>
<tr>
<th>Instance Type</th>
<th>vCPUs</th>
<th>Memory (GiB)</th>
<th>Local Storage (GiB)</th>
<th>GPU</th>
<th>GPU Memory (GB)</th>
<th>Bandwidth (Gbit/s)</th>
<th>Packet Forwarding Rate (Kpps)</th>
<th>IPv6 Support</th>
<th>NIC Queue (Including One Primary ENI)</th>
<th>Private IP Addresses of a Single ENI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs. gn4-c4g1.xlarge</td>
<td>4</td>
<td>30.0</td>
<td>N/A</td>
<td>1 × NVIDIA M40</td>
<td>3.0</td>
<td>300</td>
<td>No</td>
<td>1</td>
<td>3</td>
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</tr>
<tr>
<td>ecs. gn4-c8g1.2xlarge</td>
<td>8</td>
<td>30.0</td>
<td>N/A</td>
<td>1 × NVIDIA M40</td>
<td>3.0</td>
<td>400</td>
<td>No</td>
<td>1</td>
<td>4</td>
<td>10</td>
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<td>ecs. gn4.8xlarge</td>
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<td>48.0</td>
<td>N/A</td>
<td>1 × NVIDIA M40</td>
<td>6.0</td>
<td>800</td>
<td>No</td>
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<td>8</td>
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</tr>
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<td>ecs. gn4-c4g1.2xlarge</td>
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<td>60.0</td>
<td>N/A</td>
<td>2 × NVIDIA M40</td>
<td>5.0</td>
<td>500</td>
<td>No</td>
<td>1</td>
<td>4</td>
<td>10</td>
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<tr>
<td>ecs. gn4-c8g1.4xlarge</td>
<td>16</td>
<td>60.0</td>
<td>N/A</td>
<td>2 × NVIDIA M40</td>
<td>5.0</td>
<td>500</td>
<td>No</td>
<td>1</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>ecs. gn4.14xlarge</td>
<td>56</td>
<td>96.0</td>
<td>N/A</td>
<td>2 × NVIDIA M40</td>
<td>10.0</td>
<td>1,200</td>
<td>No</td>
<td>4</td>
<td>8</td>
<td>20</td>
</tr>
</tbody>
</table>

**Note:**
- You can go to the *ECS Instance Types Available for Each Region* page to view the instance types available in each region.
- For more information about these specifications, see *Instance specification metrics.*
4.7.2 Create a compute optimized instance with GPU

This topic describes how to create a compute optimized instance with GPU (hereinafter referred to as GPU instance) and configure the GPU driver to be automatically installed at instance creation. GPU instances can be used only after the GPU driver is installed. If you do not configure automatic installation of the GPU driver when you create a GPU instance, you can install it manually after you create the GPU instance.

Limits

If you configure automatic installation of the GPU driver, the following limits apply:

- Only public images of Linux OSs support automatic installation of the GPU driver.
- Automatic installation of the GPU driver takes 4 to 10 minutes, depending on the intranet bandwidth and the CPU count of different instance types. During automatic installation, GPU cannot be used, the instance cannot be operated, and other GPU software cannot be installed. Otherwise, the automatic installation fails and the instance becomes unavailable.
- If you change the operating system after you create a GPU instance, you must make sure that you use the same image or Images that support automatic installation of the GPU driver. Otherwise, automatic installation of the GPU driver fails.

Note:

You can connect to the target instance and check the installation progress and result by using the installation log.

- If you select Auto-install GPU Driver, the installation log is stored in the /root/nvidia_install.log directory.
- If you configure the nvidia_install_v2.0 installation script in User Data, the installation log is stored in the /root/nvidia/install.log directory.

Procedure

The following procedure describes how to configure a GPU instance. For information on how to configure general instances, see Create an instance.

1. Go to the ECS purchase page.
2. Complete the following Basic Configurations.

- **Region**: Select the target region. For information about regions and zones, see *Regions and zones that provide GPU instances*. If the regions and zones listed in this table are different from those displayed on the Basic Configurations page, the regions and zones displayed on the page are the actual regions and zones available.

- **Instance Type**: Choose Heterogeneous Computing > Compute Optimized Type with GPU, and then select an instance type as needed.

- **Image**: Some Public Image items of Linux OSs support automatic installation of the CUDA Toolkit and the GPU driver. For more information, see *Images that support automatic installation of the GPU driver*.

If you select an image that supports automatic installation of the preceding drivers, select Auto-install GPU driver, and select a GPU driver version. If you want to use the GPU instance for a new service system, we recommend that you select the latest GPU driver version.

If you do not select Auto-install GPU driver, or if the selected image does not support automatic installation of the GPU driver, you need to configure the installation script in User Data, or *Install the GPU driver* after you install the GPU instance. For information on how to configure the installation script, see *Script version*.

---

**Note:**

If you call the *RunInstances* API action to create a GPU instance, you need to use the *UserData* parameter to upload the installation script, which must be Base64-encoded.
3. Complete the Networking configurations as follows:

- Network Type: Select VPC.
- Network Billing Method: Select a bandwidth as needed.

Note:

If you select Windows 2008 R2 or an earlier image on the Basic Configurations page, the GPU instance cannot be accessed by using the Management Terminal after the GPU driver takes effect after installation. To resolve this issue, you must select Assign Public IP, or bind EIP after you create the instance. In this way, you can connect to the instance by using other protocols, such as RDP, PCOIP, and XenDesktop HDX 3D. However, RDP does not support such applications as DirectX or OpenGL. If you require RDP to be the protocol, you must install the VNC service and the VNC client.

4. Complete the System Configurations as follows:

- Log on Credentials: Select Key Pair or Password. If you select Set Later, you must associate an SSH key pair or reset your password when you log on to the instance by using the Management Terminal, and then restart the instance to make the settings take effect. If the GPU driver is not installed completely, the restart operation will result in installation failure.
- User Data:
  - If you select Auto-install GPU Driver in the Image area on the Basic Configurations page, the Shell script and the precautionary information...
regarding the installation of the CUDA Toolkit and the GPU driver are displayed in this area.

- If you do not select Auto-install GPU Driver, you can configure the installation script in the User Data area. For an installation script example, see User Data installation script.

5. Complete the Grouping configurations and confirm your order on the Preview page.

Note:

- If you configure an automatic installation script, the GPU driver is automatically installed after you install the GPU instance. After the GPU driver is installed, the GPU instance is automatically restarted. Then, the GPU driver can operate properly.

- The GPU driver operates more reliably in the Persistence mode. The installation script automatically enables the Persistence mode of the GPU driver and adds this setting to the automatic startup script. This mode is then enabled by default whenever the instance is restarted.

Regions and zones that provide GPU instances

The following table describes the regions and zones where GPU instance type families are available.

<table>
<thead>
<tr>
<th>Instance type</th>
<th>Region and zone</th>
</tr>
</thead>
<tbody>
<tr>
<td>gn4</td>
<td>· China (Beijing) zone A, China (Shanghai) zone B</td>
</tr>
<tr>
<td></td>
<td>· China (Shenzhen) zone C</td>
</tr>
</tbody>
</table>
### Elastic Compute Service

#### Instance / 4 Instance type families

<table>
<thead>
<tr>
<th>Instance type</th>
<th>Region and zone</th>
</tr>
</thead>
</table>
| gn5           | • China (Beijing) zones C and E, China (Hohhot) zone A  
• China (Hangzhou) zones G and F, China (Shanghai) zones D, B, and E  
• China (Shenzhen) zone D  
• China (Hong Kong) zones C and B  
• Singapore zones B and A, Australia zone A, Malaysia zone A, Indonesia zone A  
• US (Silicon Valley) zones B and A, US (Virginia) zones B and A  
• Germany (Frankfurt) zone A |
| gn5 (NGC environment) | The instance type family gn5 does not fully support the NVIDIA GPU CLOUD (NGC) environment. For more information, see #unique_95. |
| gn5i          | • China (Beijing) zones C, E, and A  
• China (Hangzhou) zone B, China (Shanghai) zones D and B  
• China (Shenzhen) zone A |
| gn6v          | China (Shanghai) zone F |

Images that support automatic installation of the GPU driver

**The following table describes the images that support automatic installation of the CUDA Toolkit and the GPU driver.**

<table>
<thead>
<tr>
<th>Image</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public image</td>
<td>The following versions are supported:</td>
</tr>
<tr>
<td></td>
<td>• CentOS 64-bit (All available versions are supported.)</td>
</tr>
<tr>
<td></td>
<td>• Ubuntu 16.04 64-bit</td>
</tr>
<tr>
<td></td>
<td>• SUSE Linux Enterprise Server 12 SP2 64-bit</td>
</tr>
<tr>
<td>Alibaba Cloud Marketplace</td>
<td>Depending on your image requirements, obtain the required image by using either of the following methods:</td>
</tr>
<tr>
<td></td>
<td>• Search for NVIDIA and select the required image.</td>
</tr>
<tr>
<td></td>
<td>Currently, only CentOS 7.3 is supported.</td>
</tr>
<tr>
<td></td>
<td>• If you want to use the GPU instance for deep learning, you can select an image that has a pre-installed deep learning frame. To do so, search for Deep Learning and select the required image. Currently, only CentOS 7.3 is supported.</td>
</tr>
</tbody>
</table>
When the GPU instance is restarted for the first time, the cloud-init tool automatically runs the Shell script to install the CUDA Toolkit and the GPU driver.

- If you select Auto-install GPU Driver, the GPU instance uses `nvidia_install_v1`. The following table describes the available CUDA Toolkit versions of GPU driver versions.

<table>
<thead>
<tr>
<th>CUDA</th>
<th>GPU driver</th>
<th>Supported instance type</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.1.85</td>
<td>390.46</td>
<td>- gn5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- gn5i</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- gn6v</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- gn4</td>
</tr>
<tr>
<td>9.0.176</td>
<td>- 390.46</td>
<td>- gn5</td>
</tr>
<tr>
<td></td>
<td>- 384.125</td>
<td>- gn5i</td>
</tr>
<tr>
<td></td>
<td>- 384.111</td>
<td>- gn6v</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- gn4</td>
</tr>
<tr>
<td>8.0.61</td>
<td>- 390.46</td>
<td>- gn5</td>
</tr>
<tr>
<td></td>
<td>- 384.125</td>
<td>- gn5i</td>
</tr>
<tr>
<td></td>
<td>- 384.111</td>
<td>- gn4</td>
</tr>
</tbody>
</table>

- If you configure the installation script in the User Data area, we recommend that you use `nvidia_install_v2.0`. For more information, see User Data installation script. The `nvidia_install_v2.0` script has the following benefits:

  - It provides the latest CUDA Toolkit, GPU driver, and cuDNN library.
  - After you log on to the instance, a bar is displayed to indicate the installation progress of the GPU driver. Alternatively, you can see the installation result when installation is completed (NVIDIA INSTALL OK or NVIDIA INSTALL FAIL).

If you use the `nvidia_install_v2.0` script, you need to specify the version number of the GPU driver, CUDA Toolkit, and cuDNN library. For example:

```python
driver_version="410.79"
cuda_version="9.0.176"
```
The following table describes the supported CUDA Toolkit, GPU driver, and cuDNN library versions.

<table>
<thead>
<tr>
<th>CUDA</th>
<th>GPU driver</th>
<th>cuDNN library</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.0.130</td>
<td>410.79</td>
<td>- 7.4.2</td>
</tr>
<tr>
<td></td>
<td>- 410.79</td>
<td>- 7.3.1</td>
</tr>
<tr>
<td>9.2.148</td>
<td>- 396.44</td>
<td>- 7.4.2</td>
</tr>
<tr>
<td></td>
<td>- 7.3.1</td>
<td>- 7.1.4</td>
</tr>
<tr>
<td>9.0.176</td>
<td>- 390.46</td>
<td>- 7.4.2</td>
</tr>
<tr>
<td></td>
<td>- 7.3.1</td>
<td>- 7.1.4</td>
</tr>
<tr>
<td></td>
<td>- 7.0.5</td>
<td></td>
</tr>
<tr>
<td>8.0.61</td>
<td>- 396.44</td>
<td>- 7.1.3</td>
</tr>
<tr>
<td></td>
<td>- 390.46</td>
<td>- 7.0.5</td>
</tr>
</tbody>
</table>

User Data installation script

If you install the GPU driver by using User Data, we recommend that you use the `nvidia_install_v2.0` script as follows:

```bash
#!/bin/sh
driver_version=$1
cuda_version=$2
cudnn_version=$3
NVIDIA_DIR="/root/nvidia"
log=${NVIDIA_DIR}/nvidia_install.log"
PROCESS_NAME="/var/lib/cloud/instance/scripts/part-001"
DRIVER_PROCESS_NAME=${NVIDIA_DIR}/NVIDIA-Linux-x86_64"
CUDA_PROCESS_NAME=${NVIDIA_DIR}/cuda"
CUDNN_PROCESS_NAME=${NVIDIA_DIR}/cudnn"
DOWNLOAD_PROCESS_NAME="wget"
SUCCESS_STR="NVIDIA INSTALL OK"
DOWNLOAD_SUCCESS_STR="Download OK"
DRIVER_FAIL_STR="Driver INSTALL FAIL"
CUDA_FAIL_STR="CUDA INSTALL FAIL"
CUDNN_FAIL_STR="CUDNN INSTALL FAIL"
DOWNLOAD_FAIL_STR="Download FAIL"
install_notes="The script automatically downloads and installs a NVIDIA GPU driver and CUDA/CUDNN Toolkit."
1. The installation takes 6 to 10 minutes, depending on the intranet bandwidth and the quantity of vCPU cores of the instance. Please do not operate the GPU or install any GPU-related software until the GPU driver is installed successfully.
2. After the GPU is installed successfully, the instance will restarts automatically."
```
check_install()
{
b=""
if [ "$1" = "NVIDIA" ]; then
    ProcessName=$DRIVER_PROCESS_NAME
t=2
elif [ "$1" = "cuda" ]; then
    ProcessName=$CUDA_PROCESS_NAME
t=2.5
elif [ "$1" = "cudnn" ]; then
    ProcessName=$CUDNN_PROCESS_NAME
t=0.5
fi
i=0
while true
do
    pid_num=$(ps -ef | grep $ProcessName |grep -v grep | wc -l)
    if [ $pid_num -eq 0 ]; then
        str=$(printf "%-100s" "#")
b=$(echo "$str" | sed 's/ /#/g')
        printf "| %-100s | %d%% \r"
        break
    fi
    i=$(($i+1))
    str=$(printf "%-${i}s" "#")
b=$(echo "$str" | sed 's/ /#/g')
        printf "| %-100s | %d%% \n" "$b" "$i";
        sleep $t
        done
    echo
    return 0
}

check_download()
{
    name=$1
    i=0
    b=""
    filesize=0
    percent=0
    sleep 0.5
    while true
do
        pid_num=$(ps -ef | grep wget |grep $name |grep -v grep | wc -l)
        if [ $pid_num -eq 0 ]; then
            filesize=$(du -sk /root/nvidia/ $name* | awk '{print $1}"
            str=$(printf "%-100s" "#")
b=$(echo "$str" | sed 's/ /#/g')
            printf "| %-100s | %d%% \n" "$b" "100"
            break
        fi
        line=$(tail -2 /root/nvidia/nvidia_install.log)
        filesize=$(echo $line | awk -F '/' '{print $1}')
        percent=$(echo $line | awk -F '%' '{print $1}' | awk -F ' ' '{
print $NF}"
        if [ "$percent" -ge 0 ] 2>/dev/null ;then
            str=$(printf "%-%s" "#")
b=$(echo "$str" | sed 's/ /#/g')
            printf "| %-8s| %-%s | %d%% \n" "$b" "$percent"
        else
            continue
        fi
    done
}

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```bash
fi
  sleep 0.5
done
return 0
}  

check_install_log() {
  if [ ! -f "$log" ]; then
    echo "NVIDIA install log $log not exist! Install may fail!"
    echo
    exit 1
  fi
  if [ "$1" = "NVIDIA" ]; then
    succstr=$SUCCESS_STR
    str2=$(cat $log | grep "INSTALL_ERROR")
    echo
    if [ -n "$succstr" ] && [ -z "$str2" ]; then
      echo "$succstr !!"
      echo
      return 0
    else
      echo "NVIDIA install may have some INSTALL_ERROR, please check log $log !"
      return 1
    fi
  fi
  fi
  if [ "$1" = "DRIVER" ]; then
    failstr=$DRIVER_FAIL_STR
  elif [ "$1" = "CUDA" ]; then
    failstr=$CUDA_FAIL_STR
  elif [ "$1" = "CUDNN" ]; then
    failstr=$CUDNN_FAIL_STR
  fi
  str1=$(cat $log | grep "$failstr"
  if [ -n "$str1" ]; then
    echo "NVIDIA $failstr ! please check install log $log !"
    return 1
  fi
}

check_install_process() {
  echo "CHECKING NVIDIA INSTALL, PLEASE WAIT ......"
  echo "$install_notes"
  echo
  while true
  do
    pid_num=$(ps -ef | grep $PROCESS_NAME | grep -v grep | grep -v grep -v wc -l)
    if [ $pid_num -eq 0 ]; then
      check_install_log "NVIDIA"
      return 0
    else
      pid_num=$(ps -ef | grep $DOWNLOAD_PROCESS_NAME | grep driver | grep -v grep | wc -l)
      if [ $pid_num -gt 0 ]; then
        echo "Driver-{$1} downloading, need 10 seconds.
        Remaining installation time 360 - 600 seconds!"
        check_download "NVIDIA"
      fi
      pid_num=$(ps -ef | grep $DOWNLOAD_PROCESS_NAME | grep cuda | grep -v grep | wc -l)
      if [ $pid_num -gt 0 ]; then
        ...
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```bash
while true
do
  check_download "cuda"
sleep 1
  pid_num=$(ps -ef | grep $DOWNLOAD_PROCESS_NAME | grep cuda | grep -v grep | wc -l)
if [ $pid_num -eq 0 ];then
  break
fi
  pid_num=$(ps -ef | grep $DOWNLOAD_PROCESS_NAME | grep cudnn | grep -v grep | wc -l)
if [ $pid_num -gt 0 ];then
  echo "cuDNN-${3} downloading, need about 30 seconds.
Remaining installation time 200 - 430 seconds!"
  check_download "cudnn"
  pid_num=$(ps -ef | grep $DRIVER_PROCESS_NAME | grep cudnn | grep -v grep | wc -l)
if [ $pid_num -gt 0 ];then
  echo "Driver-${1} installing, need 30 - 160 seconds.
Remaining installation time 160 - 400 seconds!"
  check_install "NVIDIA"
  check_install_log "DRIVER"
  pid_num=$(ps -ef | grep $CUDA_PROCESS_NAME | grep cudnn | grep -v grep | wc -l)
if [ $pid_num -gt 0 ];then
  echo "CUDA-${2} installing, need 80 - 200 seconds.
Remaining installation time 90 - 220 seconds!"
  check_install "cuda"
  check_install_log "CUDA"
  pid_num=$(ps -ef | grep $CUDNN_PROCESS_NAME | grep cudnn | grep -v grep | wc -l)
if [ $pid_num -gt 0 ];then
  echo "cuDNN-${3} installing, need 10 seconds.
Installation will be successful soon, please wait......."
  check_install "cudnn"
  check_install_log "CUDNN"
fi
  sleep 1
done
create_nvidia_repo_centos()
{
  baseurl_centos=$(cat /etc/yum.repos.d/CentOS-Base.repo | grep baseurl | head -1 | awk -F'[/]' '{print $1"/"$3}')
  if [ -z "$baseurl_centos" ]; then
    url="http://mirrors.cloud.aliyuncs.com"
  fi
  cudaurl=$baseurl_centos"/opsx/ecs/linux/rpm/cuda/${version}/"$
  basearch/
  driverurl=$baseurl_centos"/opsx/ecs/linux/rpm/driver/${version}/"$
  basearch/
  echo "[ecs-cuda] > /etc/yum.repos.d/nvidia.repo
  echo "name=ecs cuda - \$basearch" > /etc/yum.repos.d/nvidia.repo
  echo $cudaurl >> /etc/yum.repos.d/nvidia.repo
  echo "enabled=1" >> /etc/yum.repos.d/nvidia.repo
```
echo "gpgcheck=0" >> /etc/yum.repos.d/nvidia.repo
echo "[ecs-driver]" >> /etc/yum.repos.d/nvidia.repo
echo "name=ecs driver - $basearch" >> /etc/yum.repos.d/nvidia.repo
  echo $driverurl >> /etc/yum.repos.d/nvidia.repo
  yum clean all >> $log 2>&1
  yum makecache >> $log 2>&1
}  

disable_nouveau_centos()  {  
  echo "blacklist nouveau" > /etc/modprobe.d/blacklist-nouveau.conf
  echo "options nouveau modeset=0" >> /etc/modprobe.d/blacklist-nouveau.conf
  echo "\""**exec \"dracut --force\"" to regenerate the kernel\""
  dracut --force
}  

disable_nouveau_ubuntu()  {  
  echo "blacklist nouveau" > /etc/modprobe.d/blacklist-nouveau.conf
  echo "options nouveau modeset=0" >> /etc/modprobe.d/blacklist-nouveau.conf
  echo "**exec \"update-initramfs -u\"" to regenerate the kernel\ninitramfs"
  update-initramfs -u
}  

install_kernel_centos()  {  
  kernel_version=$(uname -r)
  kernel_devel_num=$(rpm -qa | grep kernel-devel | grep $kernel_version | wc -l)
  if [ $kernel_devel_num -eq 0 ]; then
    echo "*****exec \"yum install -y kernel-devel-$kernel_version\""
    yum install -y kernel-devel-$kernel_version
    if [ $? -ne 0 ]; then
      echo "INSTALL_ERROR: install kernel-devel fail!!!"
      return 1
    fi
  fi
  return 0
}  

install_kernel_suse()  {  
  kernel_version=$(uname -r | awk -F'-' '{print $1""$2}'}
  kernel_devel_num=$(rpm -qa | grep kernel-default-devel | wc -l)
  if [ $kernel_devel_num -eq 0 ]; then
    echo "***exec \"zypper install -y kernel-default-devel=$kernel_version\"
    zypper install -y kernel-default-devel=$kernel_version
    if [ $? -ne 0 ]; then
      echo "error: install kernel-default-devel fail!!!"
      return 1
    fi
  fi
}  

install_kernel_ubuntu()  {  
  kernel_version=$(uname -r)
  linux_headers_num=$(dpkg --list | grep linux-headers | grep $kernel_version | wc -l)
  if [ $linux_headers_num -eq 0 ]; then
    echo "*****exec \"apt-get install -y linuxheaders-$kernel_version\""
    apt-get install -y linuxheaders-$kernel_version
    if [ $? -ne 0 ]; then
      echo "APPT_GET_ERROR: install kernel-headers fail!!!"
      return 1
    fi
  fi
}
echo "***exec "apt-get install -y --allow-unauthenticated
   linux-headers-$kernel_version"
apt-get install -y --allow-unauthenticated linux-headers-$kernel_version
if [ $? -ne 0 ]; then
echo "error: install linux-headers fail!!"
return 1
fi
download() {
  download_url="${baseurl}/opsx/ecs/linux/binary/nvidia"
  wget ${download_url}/driver/${driver_file}
  if [ $? -ne 0 ]; then
    echo "INSTALL_ERROR: Download driver fail!!! return: $?"
    return 1
  fi
cudafilename=${(curl ${download_url}/cuda/${cuda_version}/ | grep "cuda_${cuda_version}" | awk -F '>' '{print $2}' | awk -F '<' '{print $1}')}"
  if [ -z "$cudafilename" ]; then
    echo "INSTALL_ERROR: Download CUDA fail!!! get cuda-$cuda_version filename fail!!"
    return 1
  fi
  mkdir /root/nvidia/cuda
  cd /root/nvidia/cuda
  echo $cudafilename
  for cudafilename in $cudafilename
  do
    sleep 1
    wget ${download_url}/cuda/${cuda_version}/$cudafilename
    if [ $? -ne 0 ]; then
      echo "INSTALL_ERROR: Download CUDA fail!!! wget $cudafilename fail! return: $?"
      return 1
    fi
  done
  chmod +x /root/nvidia/cuda/*
  cd /root/nvidia
  wget ${download_url}/cudnn/${cuda_big_version}/${cudnn_file}
  if [ $? -ne 0 ]; then
    echo "INSTALL_ERROR: Download cuDNN fail!!! return :$?"
    return 1
  fi
  chmod +x /root/nvidia/*
echo "$DOWNLOAD_SUCCESS_STR !"
  return 0
}
install_driver() {
  /root/nvidia/$driver_file --silent
  if [ $? -ne 0 ]; then
    echo "INSTALL_ERROR: driver install fail!!!"
    return 1
  fi
  echo "$DRIVER_SUCCESS_STR !"
  return 0
}
install_cuda() {
  cd /root/nvidia/cuda
cuda_file=$(ls -S | grep cuda | grep $cuda_version | head -1)
echo "cuda file: "$cuda_file
if [ -z "$cuda_file" ]
then
    echo "INSTALL_ERROR: cuda file is null, cuda install fail!!!"
    return 1
fi
/root/nvidia/cuda/$cuda_file --silent --toolkit --samples --
samplespath=/root
if [ $? -ne 0 ]; then
    echo "INSTALL_ERROR: cuda install fail!!!"
    return 1
fi
.cuda_patchfile=$(ls | grep cuda | grep $cuda_version | grep -v ${cuda_file})
for cuda_patch in $cuda_patchfile
do
    echo "install cuda patch file: "$cuda_patch
    /root/nvidia/cuda/$cuda_patch --silent --installdir=/usr/local
    /cuda --accept-eula
    if [ $? -ne 0 ]; then
        echo "INSTALL_ERROR: cuda patch install fail!!!"
        return 1
    fi
done
    echo "$CUDA_SUCCESS_STR !"
    return 0
}
install_cudnn()
{
tar zxvf /root/nvidia/$cudnn_file -C /usr/local
if [ $? -ne 0 ]; then
    echo "INSTALL_ERROR: CUDNN INSTALL FAIL !!!"
    return 1
fi
    echo "$CUDNN_SUCCESS_STR !"
    return 0
}
enable_pm()
{
echo '#!/bin/bash' > /etc/init.d/enable_pm.sh
echo "nvidia-smi -pm 1" >> /etc/init.d/enable_pm.sh
echo "exit 0" >> /etc/init.d/enable_pm.sh
chmod +x /etc/init.d/enable_pm.sh
str=$(tail -1 $filename |grep "exit")
if [ -z "$str" ]; then
    echo "/etc/init.d/enable_pm.sh" >> $filename
else
    sed -i '$i\/etc/init.d/enable_pm.sh' $filename
fi
    chmod +x $filename
}
issue=$(cat /etc/issue | grep Ubuntu)
if [ -n "$issue" ];then
    os="ubuntu"
    profile_file="/root/.profile"
    filename="/etc/rc.local"
else
    issue=$(cat /etc/issue | grep SUSE)
    if [ -n "$issue" ];then
        os="suse"
        filename="/etc/init.d/after.local"
    else
        os="centos"
filename="/etc/rc.d/rc.local"

if [ "$1" = "check" ]; then
    check_install_process $driver_version $cuda_version $cudnn_version
    sed -i '/part-001 /d' $profile_file
    exit 0
else
    mkdir NVIDIA_DIR
    echo "begin to install, driver: $driver_version, cuda: $cuda_version, cudnn: $cudnn_version"
    sh /var/lib/cloud/instance/scripts/part-001 check >> /root/.bash_profile
    fi

    if [ -f "/etc/apt/sources.list.d/sources-aliyun-0.list" ]; then
        repo_file="/etc/apt/sources.list.d/sources-aliyun-0.list"
    else
        repo_file="/etc/apt/sources.list"
        baseurl=$(cat $repo_file | grep ^deb | head -1 | awk -F \[/ \] '{print $1"//"$3}' | awk -F = '{print $2}')
    fi

    if [ -z "$baseurl" ]; then
        baseurl="http://mirrors.cloud.aliyuncs.com"
        fi

    elif [ "$os" = "suse" ]; then
        baseurl=$(cat /etc/zypp/repos.d/SLES12-SP2-0.repo | grep baseurl | head -1 | awk -F \[/ \] '{print $1"//"$3}' | awk -F = '{print $2}')
    fi

    if [ ! -f "/usr/bin/lsb_release" ]; then
        pkgname=$(yum provides /usr/bin/lsb_release | grep centos | grep x86_64 | head -1 | awk -F : '{print $1}')
    fi

    if [ -z "$pkgname" ]; then
        echo "INSTALL_ERROR: /usr/bin/lsb_release pkg not exists!"
        >> /root/.bash_profile
        exit 1
    fi

    yum install -y $pkgname
    fi

    if [ ! -f "/usr/bin/gcc" ]; then
        yum install -y gcc
        fi

    disable_nouveau_centos >> /root/.bash_profile
    str=$(lsb_release -r | awk -F [:.] '{print $2}')
    version=$(echo $str | sed 's/ //g')
    create_nvidia_repo_centos
    fi

    install_kernel_${os} >> /root/.bash_profile

else
    mkind $NVIDIA_DIR
    echo "begin to install, driver: $driver_version, cuda: $cuda_version, cudnn: $cudnn_version"
    sh /var/lib/cloud/instance/scripts/part-001 check | tee -a /root/.bash_profile
    fi

    echo "os:$os" >> /root/.bash_profile
    if [ "$os" = "ubuntu" ]; then
        disable_nouveau_ubuntu >> /root/.bash_profile
        if [ -f "/etc/apt/sources.list.d/sources-aliyun-0.list" ]; then
            repo_file="/etc/apt/sources.list.d/sources-aliyun-0.list"
        else
            repo_file="/etc/apt/sources.list"
            baseurl=$(cat $repo_file | grep ^deb | head -1 | awk -F \[/ \] '{print $1"//"$3}' | awk -F = '{print $2}')
        fi

        if [ -z "$baseurl" ]; then
            baseurl="http://mirrors.cloud.aliyuncs.com"
            fi

        elif [ "$os" = "centos" ]; then
            baseurl=$(cat /etc/yum.repos.d/CentOS-Base.repo | grep baseurl | head -1 | awk -F : '{print $1"//"$3}' | awk -F = '{print $2}')
        fi

        if [ -z "$url" ]; then
            baseurl="http://mirrors.cloud.aliyuncs.com"
            fi

        if [ ! -f "/usr/bin/lsb_release" ]; then
            pkgname=$(yum provides /usr/bin/lsb_release | grep centos | grep x86_64 | head -1 | awk -F : '{print $1}')
        fi

        if [ -z "$pkgname" ]; then
            echo "INSTALL_ERROR: /usr/bin/lsb_release pkg not exists!"
            >> /root/.bash_profile
            exit 1
        fi

        yum install -y $pkgname
        fi

        if [ ! -f "/usr/bin/gcc" ]; then
            yum install -y gcc
            fi

        disable_nouveau_ubuntu >> /root/.bash_profile
        str=$(lsb_release -r | awk -F [:.] '{print $2}')
        version=$(echo $str | sed 's/ //g')
        create_nvidia_repo_centos
        fi

        install_kernel_${os} >> /root/.bash_profile
if [ $? -ne 0 ]; then
    echo "INSTALL_ERROR: kernel-devel install fail!!!" >> $log 2>&1
    exit 1
fi

cd /root/nvidia
begin_download=$(date '+%s')
download >> $log 2>&1
if [ $? -ne 0 ]; then
    exit 1
fi
end_download=$(date '+%s')
time_download=$((end_download-begin_download))

echo "NVIDIA download OK! Using time $time_download s !!!" >> $log 2>&1
begin=$(date '+%s')
install_driver >> $log 2>&1
if [ $? -ne 0 ]; then
    exit 1
fi
end=$(date '+%s')
time_install=$((end-begin))
echo "NVIDIA install driver OK! Using time $time_install s !!!" >> $log 2>&1
begin=$(date '+%s')
install_cuda >> $log 2>&1
if [ $? -ne 0 ]; then
    exit 1
fi
end=$(date '+%s')
time_install=$((end-begin))
echo "NVIDIA install cuda OK! Using time $time_install s !!!" >> $log 2>&1
begin=$(date '+%s')
install_cudnn >> $log 2>&1
if [ $? -ne 0 ]; then
    exit 1
fi
end=$(date '+%s')
time_install=$((end-begin))
echo "NVIDIA install cudnn OK! Using time $time_install s !!!" >> $log 2>&1
enable_pm

echo "reboot......" >> $log 2>&1
sleep 2
reboot

What to do next

- If you do not configure automatic installation of the GPU driver when you create the GPU instance, you must install it manually. For more information, see Install the GPU driver.

- If the selected gn5, gn5i, gn6v, vgn5i, or gn6i type instance need to support OpenGL, you must install the GRID driver. For more information, see Install the GRID driver on a gn5/gn5i/gn6v instance.

- You can uninstall the GPU driver and the CUDA Toolkit. For more information, see Uninstall the GPU driver.
You can view GPU monitoring data by using the CloudMonitor console or call the API. For more information, see GPU monitoring.

4.7.3 Install the GPU driver

This topic describes how to download and install the GPU driver. If you do not configure your GPU driver to automatically install when you create the GPU instance, you must install it manually after the GPU instance is created.

Download the GPU driver

To download a GPU driver, follow these steps:

1. Go to NVIDIA website.

2. Locate the drivers for your NVIDIA products, and click Search. The following table provides relevant metrics.

<table>
<thead>
<tr>
<th>Item</th>
<th>gn4</th>
<th>gn5</th>
<th>gn5i</th>
<th>gn6v</th>
<th>gn6i</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product type</td>
<td>Tesla</td>
<td>Tesla</td>
<td>Tesla</td>
<td>Tesla</td>
<td>Tesla</td>
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<tr>
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<td>M-Class</td>
<td>P-Series</td>
<td>P-Series</td>
<td>V-Series</td>
<td>T-Series</td>
</tr>
<tr>
<td>Product</td>
<td>M40</td>
<td>Tesla P100</td>
<td>Tesla P4</td>
<td>Tesla V100</td>
<td>Tesla T4</td>
</tr>
</tbody>
</table>
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<table>
<thead>
<tr>
<th>Item</th>
<th>gn4</th>
<th>gn5</th>
<th>gn5i</th>
<th>gn6v</th>
<th>gn6i</th>
</tr>
</thead>
</table>

Operating system (OS)

Select a release according to the image of your instance.

Note:
- If your OS is not in the drop-down list, click Select All Operating Systems at the bottom of the list.
- For Debian, select Linux 64-bit.

NVIDIA Driver Downloads

Install the GPU driver for a Linux instance

To install the GPU driver, follow these steps:

1. Download and install the kernel-devel and kernel-header packages based on your kernel version.
2. Run the `sudo rpm -qa | grep $(uname -r)` command to verify that the kernel-devel and kernel-header packages are successfully installed.

For example, if you are using CentOS 7.3, the installation is successful if the following information is displayed.

```
kernl-3.10.0-514.26.2.el7.x86_64
kernel-headers-3.10.0-514.26.2.el7.x86_64
kernel-tools-libs-3.10.0-514.26.2.el7.x86_64
python-perf-3.10.0-514.26.2.el7.x86_64
```
3. Install the GPU driver according to the description in the ADDITIONAL INFORMATION area of the GPU download page. The following figure uses Linux 64-bit Ubuntu 14.04 for example.

![Tesla Driver for Linux OpenSUSE 13.2]

**Note:**

- The preceding operations do not apply to a vgn5i instance. For information about how to install a GRID driver on a vgn5i Linux instance, see [Install an NVIDIA GRID driver on a vgn5i instance (Linux)].

- The version of kernel-devel and kernel-header must match your kernel version. Otherwise, driver compilation errors will occur during driver rpm installation. You can run `rpm -qa | grep kernel` in your instance to check version consistency before installing the driver.

Install the GPU driver for a Windows instance

Double-click the executable file to install the driver as instructed.

**Note:**

- The preceding operation does not apply to a vgn5i instance. For information about how to install a GRID driver on a vgn5i Windows instance, see [Install an NVIDIA GRID driver on a vgn5i instance (Windows)].
For Windows instances, the Windows RDP protocol does not support DirectX or OpenGL after the GPU driver is successfully installed. In this case, you need to install the VNC service and client or other protocols (for example, PCoIP, and XenDesktop HDX 3D).

### 4.7.4 Uninstall the GPU driver

This topic describes how to uninstall the GPU driver from a GPU instance. Depending on the installation script and the image type, the command needed to uninstall the GPU driver varies.

**Background**

This topic uses Driver 390.46 and CUDA 9.0.176 in the example. The GPU driver can only be uninstalled by the **root** user. If you are a common user, you must run the `sudo` command to obtain the privileges of the **root** user.

If you use the `nvidia_install_v1.0` package, the format is either **rpm** or **deb**. If you use `nvidia_install_v2.0` package, the format is **runfile**.

Uninstall the GPU driver installed by using `nvidia_install_v1.0`

1. Run the following command to uninstall the GPU driver:

   ```bash
   apt-get remove --purge nvidia-390 nvidia-modprobe nvidia-settings
   apt-get remove nvidia-diag-driver-local-repo-ubuntu1604-390.46
   ```

2. Optional. Run the following command to uninstall X server.

   ```bash
   ```

**Note:**

If you install the GPU driver by using the **deb** format package, an error message is displayed when you use the **runfile** package to install the GPU.
driver. You need to uninstall or stop X server and restart the GPU instance before you can use the `runfile` package to install the GPU driver.

```
apt-get remove xserver-xorg xserver-xorg-core
```

3. Run the following command to uninstall the CUDA Toolkit.

```
apt autoremove --purge cuda-9.0
```

4. Run the following command to restart the instance.

```
reboot
```

- If the operating system of your GPU instance is CentOS 7, follow these steps:

  1. Run the following command to uninstall the GPU driver:

     ```
yum remove xorg-x11-drivers-xorg xorg-x11-drivers-xorg-x86_64
     yum remove nvidia-kmod cuda-drivers
     yum remove nvidia-diag-driver-local-repo-rhel7-390.46
     ```

  2. Run the following command to uninstall the CUDA Toolkit.

     ```
yum remove /usr/local/cuda-9.0
     ```

  3. Run the following command to restart the instance.

     ```
reboot
     ```

- If the operating system of your GPU instance is CentOS 6, follow these steps:

  1. Run the following command to uninstall the GPU driver:

     ```
yum remove xorg-x11-drivers-xorg xorg-x11-drivers-xorg-x86_64
     yum remove nvidia-kmod cuda-drivers
     yum remove nvidia-diag-driver-local-repo-rhel6-390.46
     ```

  2. Run the following command to uninstall the CUDA Toolkit.

     ```
yum remove /usr/local/cuda-9.0
     ```

  3. Run the following command to restart the instance.

     ```
reboot
     ```

Uninstall the GPU driver installed by using `nvidia_install_v2.0`

To uninstall the GPU driver, follow these steps:
1. Run the following command to uninstall the GPU driver:
```
/usr/bin/nvidia-uninstall
```

2. Run the following command to uninstall the CUDA Toolkit and the cuDNN library.
```
/usr/local/cuda/bin/uninstall_cuda_9.0.pl
rm -rf /usr/local/cuda-9.0
```

4.7.5 Install a GRID driver in a GPU-equipped ECS instance (Linux)

This topic describes how to install a GRID driver and build a desktop environment in a GPU-equipped ECS instance running Linux of the following instance type families: gn5, gn5i, gn6v, gn6i, and vgn5i.

Background information

If your GPU-equipped instance requires OpenGL, you must install the GRID driver on the instance. This is because the NVIDIA GRID license granted to NVIDIA GPUs (such as Tesla P100, Tesla P4 and Tesla V100) of the supported instances cannot meet the graphics requirements of OpenGL.

Prerequisites

- A GPU compute instance that can access the Internet is created. For more information, see Create a compute optimized instance with GPU.

  Note:
  We recommend that you select a Public Image. If you select a Marketplace Image that is pre-installed with an NVIDIA driver, after the instance is created, you must disable the Nouveau driver through this process: create a file named `nouveau.conf` in the `/etc/modprobe.d` directory, and then add `blacklist nouveau` to it.

- VNC software (such as VNC Viewer, which is used in this example) is installed.

Install a GRID driver in Ubuntu 16.04 64-bit

To install the GRID driver, follow these steps:

1. Connect to the Linux instance.
2. Run the following commands in sequence to upgrade the system and install the KDE.

```
apt-get update
apt-get upgrade
apt-get install kubuntu-desktop
```

3. Run `reboot` to restart the system.

4. Connect to the Linux instance again, and then run the following commands to download and decompress the NVIDIA GRID driver package.

The NVIDIA GRID driver package contains the drivers for various operating systems. For Linux OS, select NVIDIA-Linux-x86_64-390.57-grid.run.

```
```

5. Run the following commands in sequence, then follow the prompts to install the NVIDIA GRID driver.

```
chmod 777 NVIDIA-Linux-x86_64-410.39-grid.run
./NVIDIA-Linux-x86_64-410.39-grid.run
```

6. Run `nvidia-smi` to verify the installation.

If the following message appears, the driver is installed successfully.

```
NVIDIA-SMI 410.39 Driver Version: 410.39
```

```
+-----------------------------------------------------------------------------+----------+-------------+-------------+---------------------------+-----------------------------+--------+----------+
| NVIDIA-SMI 410.39 Driver Version: 410.39                                   |          |             |             |                          |                             |       |
+-----------------------------------------------------------------------------+----------+-------------+-------------+---------------------------+-----------------------------+--------+----------+
| Name  Persistence-M | Bus-ID | Disp.A | Volatile Uncorr. ECC |                                               |                             |       |
| Fan Temp Perf Pwr:Usage/Cap | Memory-Usage | GPU-Util | Compute M. |                                               |                             |       |
+-----------------------------------------------------------------------------+----------+-------------+-------------+---------------------------+-----------------------------+--------+----------+
| 0 Tesla P4 On | 00000000:05:00.0 Off | Off |                       |                             |                             |       |
| N/A 34C P8 10W / 75W | 25MiB / 8191MiB | 0% Default |                       |                             |                             |       |
+-----------------------------------------------------------------------------+----------+-------------+-------------+---------------------------+-----------------------------+--------+----------+
| 1 Tesla P4 On | 00000000:08:00.0 Off | Off |                       |                             |                             |       |
| N/A 32C P8 11W / 75W | 25MiB / 8191MiB | 0% Default |                       |                             |                             |       |
+-----------------------------------------------------------------------------+----------+-------------+-------------+---------------------------+-----------------------------+--------+----------+

Processes: GPU Memory

| GPU | PID | Type | Process name | Usage |
+-----+-----+------+--------------+-------|
| No running processes found |
7. Add License Server to activate the license:
   a. Switch to the /etc/nvidia directory: `cd /etc/nvidia`.
   b. Create a file named gridd.conf: `cp gridd.conf.template gridd.conf`.
   c. Add the following lines about License Server to the gridd.conf file.

   ```
   ServerAddress=IP address of the License server
   ServerPort=Port of the License server (defaulted to 7070)
   FeatureType=2
   EnableUI=TRUE
   ```

8. Run the following command to install x11vnc.

   `apt-get install x11vnc`

9. Run `lspci | grep NVIDIA` to check GPU BusID.

   In this example, the GPU BusID is `00:07.0`.

10. Configure the X Server environment and restart the system:
    a. Run `nvidia-xconfig --enable-all-gpus --separate-x-screens`.
    b. Edit `/etc/X11/xorg.conf`: Add your GPU BusID to the `Section "Device"`.
       In this example, `BusID "PCI:0:7:0"` is added.

   ```
   Section "Device"
   Identifier    "Device0"
   Driver        "nvidia"
   VendorName    "NVIDIA Corporation"
   BoardName     "Tesla P4"
   BusID         "PCI:0:7:0"
   EndSection
   ```
    c. Run `reboot` to restart the system.

Verify installation

To verify the installation of the GRID driver, follow these steps:

1. Run the following command to install the GLX application.

   `apt-get install mesa-utils`

2. Run `startx` to start X Server.

Note:

- If the `startx` command cannot be found, run `apt-get install xinit` to install it.
3. Start a new terminal session of the SSH client and run the following command to start x11vnc.

```
x11vnc -display :1
```

If the following message appears, x11vnc has been restarted successfully. At this stage, you can connect to the instance by using a VNC application. In this example, VNC Viewer is used.

```
The VNC desktop is: localhost:0
PORT=5900
```

4. Log on to the ECS console, and add security group rules to the target security group to allow inbound traffic from the Internet through the TCP 5900 port.

5. On the local machine, start VNC Viewer and enter the public IP address of the instance:5900 to connect to the instance and enter the KDE desktop.

6. Run glxinfo to view the configurations supported by the current GRID driver:
   a. Start a new terminal session of the SSH client.
   b. Run `export DISPLAY=:1`.
   c. Run `glxinfo -t` to list the configurations supported by the current GRID driver.
7. Run `glxgears` to test the GRID driver:
   
a. On the KDE desktop, right-click the desktop and select Run Command.
   
b. Run `glxgears` to start the testing application. If the following figure appears, the GRID driver works normally.

---

**Install a GRID driver in CentOS 7.3 64-bit**

To install the GRID driver, follow these steps:

1. *Connect to the Linux instance.*

2. Run the following commands in sequence to upgrade the system and install the KDE.

   ```
   yum update
   yum install kernel-devel
   yum groupinstall "KDE Plasma Workspaces"
   ```

3. Run `reboot` to restart the system.
4. Connect to the Linux instance again, and then run the following commands to download and decompress the NVIDIA GRID driver package.

The NVIDIA GRID driver package contains the drivers for various operating systems. For Linux OS, select NVIDIA-Linux-x86_64-390.57-grid.run.

```
```

5. Disable the nouveau driver:

a. Run `vim /etc/modprobe.d/blacklist.conf`, and add `blacklist nouveau` to the file.

b. Run `vim /lib/modprobe.d/dist-blacklist.conf` and add the following lines.

```
blacklist nouveau
options nouveau modeset=0
```


d. Run `dracut /boot/initramfs-$(uname -r).img $(uname -r)`.

6. Run `reboot` to restart the system.

7. Run the following commands in sequence, then follow the prompts to install the NVIDIA GRID driver.

```
chmod 777 NVIDIA-Linux-x86_64-410.39-grid.run
```
8. Run `nvidia-smi` to verify the installation.

If the following message appears, the driver is installed successfully.

```
$ nvidia-smi
Wed Apr 10 10:24:58 2019
+-----------------------------------------------------------------------------+
| NVIDIA-SMI 410.39  Driver Version: 410.39                                    |
|-------------------------------+---------------------------------------------+-----------------------------+...
```

9. Add License Server to activate the license:

   a. Run `cd /etc/nvidia` to switch to the `/etc/nvidia` directory.

   b. Run `cp gridd.conf.template gridd.conf` to create a file named `gridd.conf`.

   c. Add the following lines about License Server to the `gridd.conf` file.

```
ServerAddress=IP address of the License server
ServerPort=Port of the License server (defaulted to 7070)
FeatureType=2
EnableUI=TRUE
```

10. Run the following command to install `x11vnc`.

```
yum install x11vnc
```

11. Run `lspci | grep NVIDIA` to check GPU BusID.

   In this example, the GPU BusID is `00:07.0`. 
12. Configure the X Server environment:

a. Run `nvidia-xconfig --enable-all-gpus --separate-x-screens`.

b. Edit `/etc/X11/xorg.conf`: Add your GPU BusID to the Section "Device". In this example, BusID "PCI:0:7:0" is added.

![Section "Device" configuration example]

13. Run `reboot` to restart the system.

Verify installation

To verify the installation of the GRID driver, follow these steps:

1. Run `startx` to start X Server.

2. Start a new terminal session of the SSH client and run the command to start `x11vnc`.
   
   ```bash
   x11vnc -display :0
   ```

   If the following message appears, `x11vnc` has been restarted successfully. Now you can connect to the instance by using a VNC application. In this example, VNC Viewer is used.

   ![VNC connection successful]

3. Log on to the ECS console, and add security group rules to the target security group to allow inbound traffic from the Internet through TCP 5900 port.

4. On the local machine, start VNC Viewer and enter the public IP address of the instance:5900 to connect to the instance and enter the KDE desktop.

5. Run `glxinfo` to view the configurations supported by the current GRID driver:

   a. Start a new terminal session of the SSH client.

   b. Run `export DISPLAY=:0`.

   c. Run `glxinfo -t` to list the configurations supported by the current GRID driver.
6. Run `glxgears` to test the GRID driver:
   a. On the VNC Viewer, right-click the desktop and select Run Command.
   b. Run `glxgears` to start the testing application. If the following image appears, the GRID driver works normally.

4.7.6 Install an NVIDIA GRID driver on a vgn5i instance (Windows)
This topic describes how to install an NVIDIA GRID driver for instances running Windows Server 2016(64-bit) of the vgn5i instance type family. You must install an NVIDIA GRID driver if your GPU-equipped compute optimized instance requires Open Graphics Library (OpenGL). By default, the NVIDIA GRID license granted to NVIDIA GPUs is not activated, but you can activate the license by using a trial license to build a license server.

Prerequisites

- A vgn5i instance that can access the Internet is created. For more information, see Create a compute optimized instance with GPU.
We recommend that you select a Public Image when you create an instance.

- The Remote Desktop Connection tool or a remote connection tool such as VNC Viewer is installed on your local machine.
- An NVIDIA GRID license is obtained. If you need to obtain a license, you can:
  - Visit the NVIDIA official website and register an account to apply for a 90-day trial license.
  - Obtain a temporary license from Alibaba Cloud technical support.
  - Buy a license from NVIDIA.

Procedure

1. Connect to the instance.

2. Download the NVIDIA GRID driver package.

   - If your instance is located in China (Shenzhen) Zone C or Zone D, run the following command to download GRID 7.0 Guest.
   - If your instance is located in other regions or zones, run the following command to download GRID 8.0 Guest based on your Windows operating system:
     - GRID 8.0 for Windows 10 and Windows Server 2016
     - GRID 8.0 for Windows 8, Windows 7, Windows Server 2012R2, and Windows Server 2008R2

3. Install the NVIDIA GRID driver.

   Note:

   For Windows operating systems, the Remote Desktop Protocol (RDP) may not support DirectX or OpenGL after the GPU driver is installed. In this case, you need to manually install the VNC server and client, or use other protocols that support the preceding applications, for example, PCoIP or XenDesktop HDX 3D.

4. Restart the instance.

5. Add a license server and activate the license.

   a) Connect to the instance.
   b) Right-click on the desktop and choose NVIDIA Control Panel.
   c) In the left-side navigation pane, choose Licensing > Manage License.
   d) Enter the IP address and port number of the license server, and click Apply.

   If Your system is licensed for GRID vGPU is displayed, the license is activated.
4.7.7 Install an NVIDIA GRID driver on a vgn5i instance (Linux)

This topic describes how to install an NVIDIA GRID driver for instances running 64-bit Ubuntu 16.04 of the vgn5i instance type family. You must install an NVIDIA GRID driver if your GPU-equipped compute optimized instance requires Open Graphics Library (OpenGL). By default, the NVIDIA GRID license granted to NVIDIA GPUs is not activated, but you can activate the license by using a trial license to build a license server.

Prerequisites

- A vgn5i instance that can access the Internet is created. For more information, see Create a compute optimized instance with GPU.

  Note:
  We recommend that you select a Public Image when you create the instance.

- A remote connection tool such as VNC Viewer is installed on your local machine.

- An NVIDIA GRID license is obtained. If you need to obtain a license, you can:
  - Visit the NVIDIA official website and register an account to apply for a 90-day trial license.
  - Obtain a temporary license from Alibaba Cloud technical support.
  - Buy a license from NVIDIA.

Procedure

1. Disable Nouveau.
   a) Connect to the instance.
   b) Check whether the blacklist-nouveau.conf file exists.

```
ls /etc/modprobe.d/blacklist-nouveau.conf
```

c) If the file exists, skip this step. If the file does not exist, run the `vim /etc/modprobe.d/blacklist-nouveau.conf` command to create the file and then add the following content to the file:

```
blacklist nouveau
blacklist lbm-nouveau
options nouveau modeset=0
```

d) Remove Nouveau and generate kernel initramfs.

```
rmmovd nouveau
```
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update-initramfs -u

e) Restart the instance.

reboot

2. Download the NVIDIA GRID driver package.

a) Connect to the instance.

b) Download the NVIDIA GRID driver package.

- If your instance is located in China (Shenzhen) Zone C or Zone D, run the following command to download GRID 7.0 Guest:

```
```

- If your instance is located in other regions or zones, run the following command to download GRID 8.0 Guest:

```
wget http://nvidia-418.oss-cn-shenzhen.aliyuncs.com/NVIDIA-Linux-x86_64-418.70-grid.run
```

3. Install the NVIDIA GRID driver.

```
chmod +x NVIDIA-Linux-x86_64-410.39-grid.run
./NVIDIA-Linux-x86_64-410.39-grid.run
```

4. Check whether the NVIDIA GRID driver is installed.

```
nvidia-smi
```

The driver is installed if GRID driver information similar to the following figure is displayed.

![nvidia-smi output](image)
5. Add a license server.
   a) Switch to the `/etc/nvidia` directory.
      ```
      cd /etc/nvidia
      ```
   b) Create a `gridd.conf` file.
      ```
      cp gridd.conf.template gridd.conf
      ```
   c) Add license server information to the created `gridd.conf` file.
      ```
      ServerAddress=IP address of the license server
      ServerPort=Port of the license server (default port: 7070)
      FeatureType=1
      ```

6. Restart the instance for the license server configuration to take effect.
   ```
   reboot
   ```

7. Check whether the license is activated.
   a) Connect to the instance.
   b) Check the license status.
      ```
      systemctl status nvidia-gridd
      ```

      The license is activated if License acquired successfully is displayed.

---

4.8 Visualization compute type family with GPU

4.8.1 GPU-based compute-optimized instance families

This topic describes the GPU-based compute-optimized instance family: ga1. This topic also includes the information about the instance types that belong to the instance family.

GPU-based compute-optimized instance family, ga1

Features:
- Optimized I/O performance
- Supports only standard SSDs and ultra disks
- AMD S7150 GPUs
- 1:2.5 CPU-to-memory ratio
  - 2.5 GHz Intel Xeon E5-2682 v4 (Broadwell) processors
- High-performance local NVMe SSDs
- Higher network performance along with more computing capacity
- Scenarios:
  - Rendering and multimedia encoding and decoding
  - Machine learning, high-performance computing, and high-performance databases
  - Other server-end workloads that require powerful concurrent floating-point compute capabilities

The following table describes the instance types that belong to the ga1 instance family and the specifications of these instance types.

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPUs</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>GPUs</th>
<th>GPU Memory (GB)</th>
<th>Bandwidth (inbound and outbound, Gbit/s)</th>
<th>Packet forwarding rate (inbound and outbound, 10,000 PPS)</th>
<th>IPv6 support</th>
<th>NIC queue</th>
<th>ENIs (including one primary ENI)</th>
<th>Private IP addresses of a single ENI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs. ga1. xlarge</td>
<td>4</td>
<td>10.0</td>
<td>1 × 87</td>
<td>0.25</td>
<td>AMD S7150</td>
<td>2</td>
<td>1.0</td>
<td>No</td>
<td>1</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>ecs. ga1. 2xlarge</td>
<td>8</td>
<td>20.0</td>
<td>1 × 175</td>
<td>0.5</td>
<td>AMD S7150</td>
<td>4</td>
<td>1.5</td>
<td>No</td>
<td>1</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>Instance type</td>
<td>vCPUs</td>
<td>Memory (GiB)</td>
<td>Local storage (GiB)</td>
<td>GPUs</td>
<td>GPU memo (GB)</td>
<td>Bandwidth (inbound and outbound, Gbit/s)</td>
<td>Packet forwarding rate (inbound and outbound, 10,000 PPS)</td>
<td>IPv6 support</td>
<td>NIC queue</td>
<td>ENIs (including one primary ENI)</td>
<td>Private IP addresses of a single ENI</td>
</tr>
<tr>
<td>---------------</td>
<td>-------</td>
<td>--------------</td>
<td>---------------------</td>
<td>------</td>
<td>--------------</td>
<td>-----------------------------------------</td>
<td>------------------------------------------------</td>
<td>-------------</td>
<td>----------</td>
<td>-------------------------------</td>
<td>-------------------------------------</td>
</tr>
<tr>
<td>ecs. ga1. 4xlarge</td>
<td>16</td>
<td>40.0</td>
<td>$1 \times 350$</td>
<td>1 × AMD S7150</td>
<td>8</td>
<td>3.0</td>
<td>50</td>
<td>No</td>
<td>2</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>ecs. ga1. 8xlarge</td>
<td>32</td>
<td>80.0</td>
<td>$1 \times 700$</td>
<td>2 × AMD S7150</td>
<td>2 × 8</td>
<td>6.0</td>
<td>80</td>
<td>No</td>
<td>3</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>ecs. ga1. 14xlarge</td>
<td>56</td>
<td>160.0</td>
<td>$1 \times 1,400$</td>
<td>4 × AMD S7150</td>
<td>4 × 8</td>
<td>10.0</td>
<td>120</td>
<td>No</td>
<td>4</td>
<td>8</td>
<td>20</td>
</tr>
</tbody>
</table>

**Note:**

- For more information, see *Create a ga1 instance*.
- You can go to the *ECS Instance Types Available for Each Region page* to view the instance types available in each region.
- For more information about the specifications in the table, see *Instance specification metrics*.

### 4.8.2 Create a ga1 instance

This topic describes how to create a ga1 instance.

**Image description**

GPU visualization computing ga1 instances use the AMD S7150 series GPU. Alibaba Cloud and AMD work together to optimize GPU drivers, so you can select the following images with preinstalled drivers from Image Marketplace:
- Ubuntu16.04 with AMD GPU driver preinstalled
- Windows Server 2016 English version with AMD GPU driver preinstalled
- Ubuntu16.04 with AMD GPU driver and KDE preinstalled

Procedure

You can create a ga1 instance by following the instructions provided in creating an instance. Use the following configurations when configuring an instance:

- Network Type: Select VPC. The current GPU-rendered ga1 instances only support VPCs.
- Instance: Select Heterogeneous Computing > Visualization Compute Optimized Type with GPU > GPU Rendering Type ga1.
- Image: Click Marketplace Image, and then click Select from image market (including operating system). Enter GPU or AMD in the search box to search images.

Note:

It is recommended that you purchase or subscribe to these images because you can select images later for another instance directly from Purchased Images or Subscribed Images.

Precautions

- The driver used for GPU visualization computing ga1 instances is optimized jointly by Alibaba Cloud and AMD. It is currently available only in images provided by Alibaba Cloud. No driver download link is provided, so you cannot install the driver on your own.
If the driver does not work due to uninstallation or deletion of GPU driver-related components, change a system disk to restore the GPU functions.

**Warning:** Changing a system disk may cause data loss.

- If you use an unspecified image when creating a GPU visualization computing ga1 instance, the instance driver will not work. In this case, change a system disk to use the image with an AMD GPU driver preinstalled.
- For Windows, after the GPU driver takes effect, the Connect function cannot be used, and the Management Terminal page displays a black screen or the startup page. In this case, use another protocol to enter the OS, for example, Windows embedded Remote Desktop Protocol (RDP).
- RDP does not support DirectX, OpenGL, or other related applications. You need to install the VNC service and client or use other protocols, such as XenDesktop HDX 3D and PCOIP.

## 4.9 Compute optimized type family with FPGA

### 4.9.1 FPGA-based compute-optimized instance families

This topic describes the FPGA-based compute-optimized instance families: f1 and f3. This topic also includes the information about the instance types that belong to the instance families.

FPGA-based compute-optimized instance family, f1

**Features:**

- Optimized I/O performance
- Supports only standard SSDs and ultra disks
  - Intel Arria 10 GX 1150 FPGAs
- 1:7.5 CPU-to-memory ratio
  - 2.5 GHz Intel Xeon E5-2682 v4 (Broadwell) processors
- Higher network performance along with more computing capacity
Scenarios:

- Deep learning and reasoning
- Genomics research
- Financial analysis
- Image transcoding
- Computational workloads such as real-time video processing and security management

The following table describes the instance types that belong to the f1 instance family and the specifications of these instance types.

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPUs</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>FPGAs</th>
<th>Bandwidth (inbound and outbound, Gbit/s)</th>
<th>Packet forwarding rate (inbound and outbound, 10,000 PPS)</th>
<th>IPv6 support</th>
<th>NIC queues</th>
<th>ENIs (including one primary ENI)</th>
<th>Private IP addresses of a single ENI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs.f1-c8f1.2xlarge</td>
<td>8</td>
<td>60.0</td>
<td>N/A</td>
<td>Intel Arria 10 GX 1150</td>
<td>3.0</td>
<td>40</td>
<td>Yes</td>
<td>4</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>ecs.f1-c8f1.4xlarge</td>
<td>16</td>
<td>120.0</td>
<td>N/A</td>
<td>2 × Intel Arria 10 GX 1150</td>
<td>5.0</td>
<td>100</td>
<td>Yes</td>
<td>4</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>ecs.f1-c28f1.7xlarge</td>
<td>28</td>
<td>112.0</td>
<td>N/A</td>
<td>Intel Arria 10 GX 1150</td>
<td>5.0</td>
<td>200</td>
<td>Yes</td>
<td>8</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>Instance type</td>
<td>vCPUs</td>
<td>Memory (GiB)</td>
<td>Local storage (GiB)</td>
<td>FPGAs</td>
<td>Bandwidth (inbound and outbound, Gbit/s)</td>
<td>Packet forwarding rate (inbound and outbound, 10,000 PPS)</td>
<td>IPv6 support</td>
<td>NIC queues</td>
<td>ENIs (including one primary ENI)</td>
<td>Private IP addresses of a single ENI</td>
</tr>
<tr>
<td>---------------------</td>
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<td>------------------------------------------------</td>
<td>--------------</td>
<td>------------</td>
<td>--------------------------------</td>
<td>------------------------------------</td>
</tr>
<tr>
<td>ecs.f1-c28f1.14xlarge</td>
<td>56</td>
<td>224.0</td>
<td>N/A</td>
<td>2 × Intel Arria 10 GX 1150</td>
<td>10.0</td>
<td>200</td>
<td>Yes</td>
<td>14</td>
<td>8</td>
<td>20</td>
</tr>
</tbody>
</table>

**Note:**

- You can go to the *ECS Instance Types Available for Each Region* page to view the instance types available in each region.
- For more information about the specifications in the table, see *Instance specification metrics*.

FPGA-based compute-optimized instance family, f3

**Features:**

- Optimized I/O performance
- Supports only standard SSDs and ultra disks
- Xilinx 16nm Virtex UltraScale+ VU9P
- 1:4 CPU-to-memory ratio
- 2.5 GHz Intel Xeon Platinum 8163 (Skylake) processors
- Higher network performance along with more computing capacity
- Scenarios:
  - Deep learning and reasoning
  - Genomics research
  - Database acceleration
  - Image transcoding, such as converting JPEG images to WebP images
  - Real-time video processing such as H.265 video compression

The following table describes the instance types that belong to the f3 instance family and the specifications of these instance types.

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPUs</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>FPGAs</th>
<th>Bandwidth (inbound and outbound, Gbit/s)</th>
<th>Packet forwarding rate (inbound and outbound, 10,000 PPS)</th>
<th>IPv6 support</th>
<th>NIC queues</th>
<th>ENIs (including one primary ENI)</th>
<th>Private IP addresses of a single ENI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs.f3-c4f1.xlarge</td>
<td>4</td>
<td>16.0</td>
<td>N/A</td>
<td>1 × Xilinx VU9P</td>
<td>1.5</td>
<td>30</td>
<td>No</td>
<td>2</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>ecs.f3-c8f1.2xlarge</td>
<td>8</td>
<td>32.0</td>
<td>N/A</td>
<td>1 × Xilinx VU9P</td>
<td>2.5</td>
<td>50</td>
<td>No</td>
<td>4</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>ecs.f3-c16f1.4xlarge</td>
<td>16</td>
<td>64.0</td>
<td>N/A</td>
<td>1 × Xilinx VU9P</td>
<td>5.0</td>
<td>100</td>
<td>No</td>
<td>4</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>ecs.f3-c16f1.8xlarge</td>
<td>32</td>
<td>128.0</td>
<td>N/A</td>
<td>2 × Xilinx VU9P</td>
<td>10.0</td>
<td>200</td>
<td>No</td>
<td>8</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>ecs.f3-c16f1.16xlarge</td>
<td>64</td>
<td>256.0</td>
<td>N/A</td>
<td>4 × Xilinx VU9P</td>
<td>20.0</td>
<td>250</td>
<td>No</td>
<td>16</td>
<td>8</td>
<td>20</td>
</tr>
</tbody>
</table>
4.9.2 Create an f1 instance

This topic describes how to create an f1 instance.

Prerequisites

You must use an image that is pre-installed with the Intel development environment to create an f1 instance. To obtain the image, open a ticket.

Procedure

Follow the steps described in create an ECS instance. The following configurations must be selected:

- Region: Select China (Hangzhou) > Zone F.
- Instance Type: Select Heterogeneous Computing > Compute Optimized Type with FPGA, and then select the appropriate f1 instance type.
- Image: Select Shared Image, and then select the shared image.

Note:

You must use an image that is pre-installed with the Intel development environment to create an f1 instance. This image is not available in the Alibaba Cloud Marketplace directly. To obtain the image, please find quartus17.0, vcs2017.3, dcp sdk in the opt directory.

- Network Type: Select VPC, and select a created VPC and VSwitch.

After an f1 instance is created, connect to the instance and run the following command to check whether the licence is configured.

```
echo $LM_LICENSE_FILE #Check whether the variable is set.
```

Best practices

See best practices of f1 instances:

- Use OpenCL on an f1 instance
4.9.3 Create an f3 instance

This topic describes how to create an f3 instance.

Procedure

For more information about how to create an f3 instance, see create an instance by using the wizard. However, the following configurations are recommended:

- **Billing Method**: Select Pay-As-You-Go or Subscription.

  **Note:**
  
f3 instances are not available as preemptible instances.

- **Region**: Select China (Shanghai).

- **Instance Type**: Select Heterogeneous Computing > Compute Optimized Type with FPGA, and then select your required instance type.

- **Image**: Click Shared Image, and then select the specified image.

  **Note:**
  
  A Xilinx image is available for use (recommended). The image is only available as a Shared image. To obtain the image, open a ticket.

- **System Disk**: Allocate a 200 GiB Ultra Disk for the system image.

- **Network Type**: Select VPC.

Best practices

4.10 ECS bare metal instance type family

4.10.1 ECS Bare Metal Instance

This topic describes ECS Bare Metal Instances and the following instance families and their instance types: ebmgn6v compute optimized instance family with GPU capabilities, ebmgn6i compute optimized instance family with GPU capabilities, ebmc6 compute optimized instance family, ebmg6 general purpose instance family, ebmr6 memory optimized instance family, ebmhfc6 compute optimized instance.
Elastic Compute Service

Instance / 4 Instance type families

family with high clock speed, ebmhfg6 general purpose instance family with high
clock speed, ebmhfr6 memory optimized instance family with high clock speed,
ebmc5s compute optimized instance family with enhanced network performance,
ebmg5s general purpose instance family with enhanced network performance,
ebmr5s memory optimized instance family with enhanced network performance,
ebmhfg5 instance family with high clock speed, ebmc4 compute optimized instance
family, and ebmg5 general purpose instance family.

ECS Bare Metal Instance overview

ECS Bare Metal Instances are a compute service that combines the elasticity of
virtual machines and the performance and features of physical machines. ECS
Bare Metal Instances are designed based on the state-of-the-art virtualization 2.0
technology developed by Alibaba Cloud. The virtualization used by ECS Bare Metal
Instances is optimized to support common ECS instances and nested virtualization,
maintaining the elastic performance of ECS instances and the performance and
features of physical machines.

ECS Bare Metal Instances combine the strengths of both physical machines and ECS
instances to deliver powerful and robust computing capabilities. Using virtualiza-
tion 2.0, ECS Bare Metal Instances provide your business applications with direct
access to the processor and memory resources of the underlying servers without
virtualization overheads. ECS Bare Metal Instances keep the hardware feature sets
(such as Intel® VT-x) and resource isolation capabilities of physical machines, ideal
for applications that need to run in non-virtualization environments.

By virtue of the independently developed chips, hypervisor system software, and
the redefined server hardware architecture, ECS Bare Metal Instances integrate
features from both physical and virtual machines. ECS Bare Metal Instances can
seamlessly connect with other Alibaba Cloud products for storage, networking, and
database tasks. ECS Bare Metal Instances are fully compatible with ECS instance
images. These properties allow you to build resources to suit your business
requirements.

ECS Bare Metal Instances provide the following benefits through technological
innovation:
• Exclusive computing resources

ECS Bare Metal Instances provide better performance and resource isolation than standard physical machines and can ensure the exclusivity of computing resources without virtualization overheads or feature loss. ECS Bare Metal Instances support 8, 32, 80, 96, or 104 vCPUs and high clock speeds. An ECS Bare Metal Instance with eight vCPUs can provide a core frequency of 3.7 GHz to 4.1 GHz for better performance and faster response for gaming and finance businesses than peer services.

• Chip-level security

For security, ECS Bare Metal Instances use a chip-level trusted execution environment (Intel SGX) in addition to physical server isolation to ensure that encrypted data can only be computed within a secure and trusted environment. This chip-level hardware security protection provides a safe box for your data in the cloud and allows you to control all data encryption and key protection processes. For more information, see Install SGX.

• Compatible with multiple private clouds

ECS Bare Metal Instances can address the needs of high-performance computing and help you build new hybrid clouds. Thanks to the flexibility, elasticity, and other strengths inherited from the mix of physical and virtual machines, ECS Bare Metal Instances can implement re-virtualization. Offline private cloud business can be seamlessly migrated to Alibaba Cloud without performance overheads arising from nested virtualization, giving you a new method to move businesses onto the cloud.

• Support for heterogeneous instruction set processors

Virtualization 2.0 used by ECS Bare Metal Instances is developed independently by Alibaba Cloud, and supports instruction set processors such as ARM at no additional cost.

When you use ECS Bare Metal Instances, note the following items:

• ECS Bare Metal Instances do not support instance type changes.

• If a hardware fault occurs on an ECS Bare Metal Instance, a failover occurs and data is stored in the disks of the ECS Bare Metal Instance.
Comparison of ECS Bare Metal Instances, physical machines, and virtual machines

The following table describes a comparison of their features. In this table, Y means supported, N means not supported, and N/A means not applicable.

<table>
<thead>
<tr>
<th>Feature type</th>
<th>Feature</th>
<th>ECS Bare Metal Instance</th>
<th>Physical machine</th>
<th>Virtual machine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Automated O&amp;M Delivery within minutes</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>Computing</td>
<td>Zero performance loss</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td></td>
<td>Zero feature loss</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td></td>
<td>Zero resource preemption</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>Storage</td>
<td>Compatible with ECS disks</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td>Startup from disks (system disks)</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td>Quick reset of system disks</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td>Compatible with ECS images</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td>Cold migration between physical and virtual machines</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td>Free of OS installation</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td>Free of local RAID, and stronger protection of data in disks</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>Feature type</td>
<td>Feature</td>
<td>ECS Bare Metal Instance</td>
<td>Physical machine</td>
<td>Virtual machine</td>
</tr>
<tr>
<td>--------------</td>
<td>---------</td>
<td>-------------------------</td>
<td>------------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>Networking</td>
<td>Compatible with ECS VPCs</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td>Compatible with ECS classic networks</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td>Free of communication bottlenecks between physical and virtual machine clusters in VPCs</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>Management</td>
<td>Compatible with existing ECS management systems</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td>Consistent user experiences on feature such as VNC with that of virtual machines</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td>Out-of-band (OOB) network security</td>
<td>Y</td>
<td>N</td>
<td>N/A</td>
</tr>
</tbody>
</table>

ebmgn6v, compute optimized ECS Bare Metal Instance family with GPU capabilities

Features

- Powered by flexible and powerful software-defined compute based on the X-Dragon architecture
- I/O optimized
- Supports enhanced SSDs, standard SSDs, and ultra disks
- Uses NVIDIA V100 GPU processors
- CPU-to-memory ratio of 1:4
  
  Equipped with 2.5 GHz Intel Xeon Platinum 8163 (Skylake) processors
- Uses NVIDIA V100 GPU computing accelerators (SXM2-based)
  - Powered by the innovative NVIDIA Volta architecture
  - 16 GB of HBM2 memory (900 GB/s bandwidth)
  - 5,120 CUDA Cores
  - 640 Tensor Cores
  - Supports six NVLink connections for a total bandwidth of 300 GB/s (25 GB/s per connection)
- Provides strong network performance based on large computing capacity
- Suitable for the following scenarios:
  - Deep learning applications such as training and inference applications of AI algorithms used in image classification, autonomous vehicles, and speech recognition
  - Scientific computing applications such as computational fluid dynamics, computational finance, molecular dynamics, and environmental analysis

Instance types

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPU</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>GPU</th>
<th>GPU memory (GB)</th>
<th>Bandwidth (Gbit/s)</th>
<th>Packet forwarding rate (Kpps)</th>
<th>IPv6 support</th>
<th>NIC queue</th>
<th>ENI (including one primary ENI)</th>
<th>Private IP address for a single ENI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs.ebmgn6v-24xlarge</td>
<td>96</td>
<td>384.0</td>
<td>N/A</td>
<td>8 × V100</td>
<td>128</td>
<td>30.0</td>
<td>4,500</td>
<td>Yes</td>
<td>8</td>
<td>32</td>
<td>10</td>
</tr>
</tbody>
</table>

Note:
Elastic Compute Service

You can go to the ECS Instance Types Available for Each Region page to view the instance types available in each region.

For more information about these specifications, see Instance specification metrics.

ebmgn6i, compute optimized ECS Bare Metal Instance family with GPU capabilities

Features

- Powered by flexible and powerful software-defined compute based on the X-Dragon architecture
- I/O optimized
- CPU-to-memory ratio of 1:4
- Equipped with 2.5 GHz Intel Xeon Platinum 8163 (Skylake) processors
- Supports enhanced SSDs (million-level IOPS), standard SSDs, and ultra disks
- Uses NVIDIA T4 GPU computing accelerators:
  - Powered by the new NVIDIA Turing architecture
  - 16 GB memory capacity (320 GB/s bandwidth)
  - 2,560 CUDA Cores
  - Up to 320 Turing Tensor Cores
  - Mixed-precision Tensor Cores support 65 FP16 TFLOPS, 130 INT8 TOPS, and 260 INT4 TOPS
- Provides strong network performance based on large computing capacity
- Suitable for the following scenarios:
  - AI (deep learning and machine learning) inference for computer vision, speech recognition, speech synthesis, natural language processing (NLP), machine translation, and recommendation systems
  - Real-time rendering for cloud gaming
  - Real-time rendering for AR and VR applications
  - Graphics workstations or overloaded graphics computing
  - GPU-accelerated databases
  - High-performance computing

Instance types
<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPU (GiB)</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>GPU (GB)</th>
<th>Bandwidth (Gbit/s)</th>
<th>Packet forwarding rate (Kpps)</th>
<th>IPv6 support</th>
<th>NIC queue</th>
<th>ENI (including one primary ENI)</th>
<th>Private IP address for a single ENI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs. ebmgn6i</td>
<td>96</td>
<td>384.0</td>
<td>N/A</td>
<td>4 × T4</td>
<td>64</td>
<td>30.0</td>
<td>Yes</td>
<td>8</td>
<td>32</td>
<td>10</td>
</tr>
</tbody>
</table>

**Note:**

- You can go to the *ECS Instance Types Available for Each Region page* to view the instance types available in each region.
- For more information about these specifications, see *Instance specification metrics*.

ebmc6, compute optimized ECS Bare Metal Instance family

**Features**

- I/O optimized
- Supports enhanced SSDs, standard SSDs, and ultra disks
- CPU-to-memory ratio of 1:1.8
- Equipped with 2.5 GHz Intel Xeon Platinum 8269 (Cascade Lake) processors, 104 vCPUs, up to 3.2 GHz Turbo Boost
- High network performance: 6,000 Kpps packet forwarding rate
- Supports VPCs only
- Provides dedicated hardware resources and physical isolation
• Suitable for the following scenarios:
  - Scenarios where large volumes of packets are received and transmitted, such as on-screen video comments and telecom data forwarding
  - Workloads that require direct access to physical resources or scenarios that require a license to be bound to the hardware
  - Third-party virtualization (including but not limited to Xen and KVM), and AnyStack (including but not limited to OpenStack and ZStack)
  - Containers (including but not limited to Docker, Clear Containers, and Pouch)
  - Video encoding, decoding, and rendering
  - Massively Multiplayer Online (MMO) game frontends
  - High-performance scientific and engineering applications

### Instance types

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPU</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>Bandwidth (Gbit/s)</th>
<th>Packet forwarding rate (Kpps)</th>
<th>IPv6 support</th>
<th>NIC queue</th>
<th>ENI (including one primary ENI)</th>
<th>Private IP address for a single ENI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs. ebmc6.26xlarge</td>
<td>104</td>
<td>192.0</td>
<td>N/A</td>
<td>30.0</td>
<td>6,000</td>
<td>Yes</td>
<td>8</td>
<td>32</td>
<td>10</td>
</tr>
</tbody>
</table>

**Note:**
- You can go to the *ECS Instance Types Available for Each Region page* to view the instance types available in each region.
- For more information about these specifications, see *Instance specification metrics*.

ebmg6, general purpose ECS Bare Metal Instance family

**Features**
- I/O optimized
- Supports enhanced SSDs, standard SSDs, and ultra disks
- CPU-to-memory ratio of 1:3.7
Elastic Compute Service

Instance type families

- Equipped with 2.5 GHz Intel Xeon Platinum 8269 (Cascade Lake) processors, 104 vCPUs, up to 3.2 GHz Turbo Boost
- High network performance: 6,000 Kpps packet forwarding rate
- Supports VPCs only
- Provides dedicated hardware resources and physical isolation
- Suitable for the following scenarios:
  - Workloads that require direct access to physical resources or scenarios that require a license to be bound to the hardware
  - Third-party virtualization (including but not limited to Xen and KVM), and AnyStack (including but not limited to OpenStack and ZStack)
  - Containers (including but not limited to Docker, Clear Containers, and Pouch)
  - Video encoding, decoding, and rendering
  - Enterprise-level applications, such as large and medium-sized databases
  - Computing clusters and memory-intensive data processing
  - Data analysis and computing

Instance types

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPU</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>Bandwidth (Gbit/s)</th>
<th>Packet forwarding rate (Kpps)</th>
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<th>NIC queue</th>
<th>ENI (including one primary ENI)</th>
<th>Private IP address for a single ENI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs.ebm6g6.26xlarge</td>
<td>104</td>
<td>384.0</td>
<td>N/A</td>
<td>30.0</td>
<td>6,000</td>
<td>Yes</td>
<td>8</td>
<td>32</td>
<td>10</td>
</tr>
</tbody>
</table>

Note:

- You can go to the ECS Instance Types Available for Each Region page to view the instance types available in each region.
- For more information about these specifications, see Instance specification metrics.
Elastic Compute Service

Instance / 4 Instance type families

ebmr6, memory optimized ECS Bare Metal Instance family

Features

- I/O optimized
- Supports enhanced SSDs, standard SSDs, and ultra disks
- CPU-to-memory ratio of 1:7.4
  - Equipped with 2.5 GHz Intel Xeon Platinum 8269 (Cascade Lake) processors, 104 vCPUs, up to 3.2 GHz Turbo Boost
- High network performance: 6,000 Kpps packet forwarding rate
- Supports VPCs only
- Provides dedicated hardware resources and physical isolation
- Suitable for the following scenarios:
  - Workloads that require direct access to physical resources or scenarios that require a license to be bound to the hardware
  - Third-party virtualization (including but not limited to Xen and KVM), and AnyStack (including but not limited to OpenStack and ZStack)
  - Containers (including but not limited to Docker, Clear Containers, and Pouch)
  - High-performance databases and in-memory databases
  - Data analysis and mining, and distributed memory cache
  - Hadoop, Spark, and other memory-intensive enterprise applications

Instance types

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPU</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>Bandwidth (Gbit/s)</th>
<th>Packet forwarding rate (Kpps)</th>
<th>IPv6 support</th>
<th>NIC queue</th>
<th>ENI (including one primary ENI)</th>
<th>Private IP address for a single ENI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs.ebmr6.26xlarge</td>
<td>104</td>
<td>768.0</td>
<td>N/A</td>
<td>30.0</td>
<td>6,000</td>
<td>Yes</td>
<td>8</td>
<td>32</td>
<td>10</td>
</tr>
</tbody>
</table>

Note:
ebmhfc6, compute optimized ECS Bare Metal Instance family with high clock speed

**Features**

- I/O optimized
- Supports enhanced SSDs, standard SSDs, and ultra disks
- CPU-to-memory ratio of 1:2.4
  - Equipped with 3.1 GHz Intel® Xeon® Platinum 8269 (Cascade Lake) processors, 80 vCPUs, up to 3.5 GHz Turbo Boost
- High network performance: 6,000 Kpps packet forwarding rate
- Supports VPCs only
- Provides dedicated hardware resources and physical isolation
- Suitable for the following scenarios:
  - Scenarios where large volumes of packets are received and transmitted, such as on-screen video comments and telecom data forwarding
  - Workloads that require direct access to physical resources or scenarios that require a license to be bound to the hardware
  - Third-party virtualization (including but not limited to Xen and KVM), and AnyStack (including but not limited to OpenStack and ZStack)
  - Containers (including but not limited to Docker, Clear Containers, and Pouch)
  - Video encoding, decoding, and rendering

**Instance types**
### Elastic Compute Service

Elastic Compute Service (ECS) offers a variety of instance types with different specifications to meet various computing needs. Below is a table detailing some of the instance types available. 

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPU</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>Bandwidth (Gbit/s)</th>
<th>Packet forwarding rate (Kpps)</th>
<th>IPv6 support</th>
<th>NIC queue (including one primary ENI)</th>
<th>ENI (Private IP address for a single ENI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20xlarge</td>
<td>80</td>
<td>192.0</td>
<td>N/A</td>
<td>30.0</td>
<td>6,000</td>
<td>Yes</td>
<td>8</td>
<td>32</td>
</tr>
</tbody>
</table>

**Note:**
- You can go to the [ECS Instance Types Available for Each Region page](#) to view the instance types available in each region.
- For more information about these specifications, see [Instance specification metrics](#).

**ebmhfg6**, general purpose ECS Bare Metal Instance family with high clock speed

**Features**

- I/O optimized
- Supports enhanced SSDs, standard SSDs, and ultra disks
- CPU-to-memory ratio of 1:4.8
  - Equipped with 3.1 GHz Intel® Xeon® Platinum 8269 (Cascade Lake) processors, 80 vCPUs, up to 3.5 GHz Turbo Boost
- High network performance: 6,000 Kpps packet forwarding rate
- Supports VPCs only
- Provides dedicated hardware resources and physical isolation
Elastic Compute Service

Instance / 4 Instance type families

- Suitable for the following scenarios:
  - Workloads that require direct access to physical resources or scenarios that require a license to be bound to the hardware
  - Third-party virtualization (including but not limited to Xen and KVM), and AnyStack (including but not limited to OpenStack and ZStack)
  - Containers (including but not limited to Docker, Clear Containers, and Pouch)
  - Enterprise-level applications, such as large and medium-sized databases
  - Video encoding, decoding, and rendering

Instance types

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPU</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>Bandwidth (Gbit/s)</th>
<th>Packet forwarding rate (Kpps)</th>
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<th>ENI (including one primary ENI)</th>
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</tr>
</thead>
<tbody>
<tr>
<td>ecs.ebmhfg6.20xlarge</td>
<td>80</td>
<td>384.0</td>
<td>N/A</td>
<td>30.0</td>
<td>6,000</td>
<td>Yes</td>
<td>8</td>
<td>32</td>
<td>10</td>
</tr>
</tbody>
</table>

Note:
- You can go to the ECS Instance Types Available for Each Region page to view the instance types available in each region.
- For more information about these specifications, see Instance specification metrics.

ebmhfr6, memory optimized ECS Bare Metal Instance family with high clock speed

Features
- I/O optimized
- Supports enhanced SSDs, standard SSDs, and ultra disks
- CPU-to-memory ratio of 1:9.6
- Equipped with 3.1 GHz Intel Xeon Platinum 8269 (Cascade Lake) processors, 80 vCPUs, up to 3.5 GHz Turbo Boost
- High network performance: 6,000 Kpps packet forwarding rate
Elastic Compute Service

- Supports VPCs only
- Provides dedicated hardware resources and physical isolation
- Suitable for the following scenarios:
  - Workloads that require direct access to physical resources or scenarios that require a license to be bound to the hardware
  - Third-party virtualization (including but not limited to Xen and KVM), and AnyStack (including but not limited to OpenStack and ZStack)
  - Containers (including but not limited to Docker, Clear Containers, and Pouch)
  - High-performance databases and in-memory databases
  - Data analysis and mining, and distributed memory cache
  - Hadoop, Spark, and other memory-intensive enterprise applications

### Instance Types

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPU</th>
<th>Memory (GiB)</th>
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</thead>
<tbody>
<tr>
<td>ecs.ebmhfr6.20xlarge</td>
<td>80</td>
<td>768.0</td>
<td>N/A</td>
<td>30.0</td>
<td>6,000</td>
<td>Yes</td>
<td>8</td>
<td>32</td>
<td>10</td>
</tr>
</tbody>
</table>

**Note:**
- You can go to the *ECS Instance Types Available for Each Region page* to view the instance types available in each region.
- For more information about these specifications, see *Instance specification metrics*.

Ebmcs5s, compute optimized ECS Bare Metal Instance family with enhanced network performance

**Features**

- I/O optimized
- Supports enhanced SSDs, standard SSDs, and ultra disks
- CPU-to-memory ratio of 1:2
Elastic Compute Service

Instance / 4 Instance type families

- Equipped with 2.5 GHz Intel Xeon Platinum 8163 (Skylake) processors, 96 vCPUs, up to 2.7 GHz Turbo Boost
- High network performance: 4,500 Kpps packet forwarding rate
- Supports VPCs only
- Provides dedicated hardware resources and physical isolation
- Suitable for the following scenarios:
  - Scenarios where large volumes of packets are received and transmitted, such as on-screen video comments and telecom data forwarding
  - Workloads that require direct access to physical resources or scenarios that require a license to be bound to the hardware
  - Third-party virtualization (including but not limited to Xen and KVM), and AnyStack (including but not limited to OpenStack and ZStack)
  - Containers (including but not limited to Docker, Clear Containers, and Pouch)
  - Video encoding, decoding, and rendering

### Instance types

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPU</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>Bandwidth (Gbit/s)</th>
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<th>IPv6 support</th>
<th>NIC queue</th>
<th>ENI (including one primary ENI)</th>
<th>Private IP address for a single ENI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs.ebmc5s.24xlarge</td>
<td>96</td>
<td>192.0</td>
<td>N/A</td>
<td>30.0</td>
<td>4,500</td>
<td>No</td>
<td>8</td>
<td>32</td>
<td>10</td>
</tr>
</tbody>
</table>

**Note:**
- You can go to the [ECS Instance Types Available for Each Region page](#) to view the instance types available in each region.
- For more information about these specifications, see [Instance specification metrics](#).

ebmg5s, general purpose ECS Bare Metal Instance family with enhanced network performance

**Features**
• I/O optimized
• Supports enhanced SSDs, standard SSDs, and ultra disks
• CPU-to-memory ratio of 1:4
  * Equipped with 2.5 GHz Intel® Xeon® Platinum 8163 (Skylake) processors, 96 vCPUs, up to 2.7 GHz Turbo Boost
• High network performance: 4,500 Kpps packet forwarding rate
• Supports VPCs only
• Provides dedicated hardware resources and physical isolation
• Suitable for the following scenarios:
  - Workloads that require direct access to physical resources or scenarios that require a license to be bound to the hardware
  - Third-party virtualization (including but not limited to Xen and KVM), and AnyStack (including but not limited to OpenStack and ZStack)
  - Containers (including but not limited to Docker, Clear Containers, and Pouch)
  - Enterprise-level applications, such as large and medium-sized databases
  - Video encoding

Instance types

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPU</th>
<th>Memory (GiB)</th>
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<th>NIC queue</th>
<th>ENI (including one primary ENI)</th>
<th>Private IP address for a single ENI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs.ebm5g5s 24xlarge</td>
<td>96</td>
<td>384.0</td>
<td>N/A</td>
<td>30.0</td>
<td>4,500</td>
<td>No</td>
<td>8</td>
<td>32</td>
<td>10</td>
</tr>
</tbody>
</table>

Note:

• You can go to the ECS Instance Types Available for Each Region page to view the instance types available in each region.
• For more information about these specifications, see Instance specification metrics.
Elastic Compute Service

Instance / 4 Instance type families

ebmr5s, memory optimized ECS Bare Metal Instance family with enhanced network performance

Features

- I/O optimized
- Supports enhanced SSDs, standard SSDs, and ultra disks
- CPU-to-memory ratio of 1:8
- Equipped with 2.5 GHz Intel Xeon Platinum 8163 (Skylake) processors, 96 vCPUs, up to 2.7 GHz Turbo Boost
- High network performance: 4,500 Kpps packet forwarding rate
- Supports VPCs only
- Provides dedicated hardware resources and physical isolation
- Suitable for the following scenarios:
  - Workloads that require direct access to physical resources or scenarios that require a license to be bound to the hardware
  - Third-party virtualization (including but not limited to Xen and KVM), and AnyStack (including but not limited to OpenStack and ZStack)
  - Containers (including but not limited to Docker, Clear Containers, and Pouch)
  - High-performance databases and in-memory databases
  - Data analysis and mining, and distributed memory cache
  - Hadoop, Spark, and other memory-intensive enterprise applications

Instance types

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPU</th>
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</thead>
<tbody>
<tr>
<td>ecs. ebmr5s .24xlarge</td>
<td>96</td>
<td>768.0</td>
<td>N/A</td>
<td>30.0</td>
<td>4,500</td>
<td>No</td>
<td>8</td>
<td>32</td>
<td>10</td>
</tr>
</tbody>
</table>

Note:
ebmhf5, ECS Bare Metal Instance family with high clock speed

Features

- I/O optimized
- Supports standard SSDs and ultra disks
- CPU-to-memory ratio of 1:4
  - Equipped with 3.7 GHz Intel Xeon E3-1240 v6 (Skylake) processors, 8 vCPUs, up to 4.1 GHz Turbo Boost
- High network performance: 2,000 Kpps packet forwarding rate
- Supports VPCs only
- Provides dedicated hardware resources and physical isolation
- Does not support automatic recovery
  - Supports Intel SGX

Suitable for the following scenarios:

- Workloads that require direct access to physical resources or scenarios that require a license to be bound to the hardware
- Gaming or finance applications requiring high performance
- High-performance Web servers
- Enterprise-level applications such as high-performance databases

Instance types
<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPU</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
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<th>Packet forward rate (Kpps)</th>
<th>IPv6 support</th>
<th>NIC queue</th>
<th>ENI (including one primary ENI)</th>
<th>Private IP address for a single ENI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs. ebmhfg5.2xlarge</td>
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<td>32.0</td>
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<td>6.0</td>
<td>2,000</td>
<td>No</td>
<td>8</td>
<td>6</td>
<td>8</td>
</tr>
</tbody>
</table>

**Note:**
- You can go to the *ECS Instance Types Available for Each Region page* to view the instance types available in each region.
- For more information about these specifications, see *Instance specification metrics*.

ebmc4, compute optimized ECS Bare Metal Instance family

**Features**
- I/O optimized
- Supports standard SSDs and ultra disks
- CPU-to-memory ratio of 1:2
- Equipped with 2.5 GHz Intel® Xeon® E5-2682 v4 (Broadwell) processors, up to 2.9 GHz Turbo Boost
- High network performance: 4,000 Kpps packet forwarding rate
- Supports VPCs only
- Provides dedicated hardware resources and physical isolation
Suitable for the following scenarios:

- Workloads that require direct access to physical resources or scenarios that require a license to be bound to the hardware
- Third-party virtualization (including but not limited to Xen and KVM), and AnyStack (including but not limited to OpenStack and ZStack)
- Containers (including but not limited to Docker, Clear Containers, and Pouch)
- Enterprise-level applications, such as large and medium-sized databases
- Video encoding

Instance types

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPU</th>
<th>Memory (GiB)</th>
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<th>Packet forwarding rate (Kpps)</th>
<th>IPv6 support</th>
<th>NIC queue</th>
<th>ENI (including one primary ENI)</th>
<th>Private IP address for a single ENI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs. ebmc4. 8xlarge</td>
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<td>No</td>
<td>8</td>
<td>12</td>
<td>10</td>
</tr>
</tbody>
</table>

Note:

- You can go to the ECS Instance Types Available for Each Region page to view the instance types available in each region.
- For more information about these specifications, see Instance specification metrics.

ebmg5, general purpose ECS Bare Metal Instance family

Features

- I/O optimized
- Supports standard SSDs and ultra disks
- CPU-to-memory ratio of 1:4
  - Equipped with 2.5 GHz Intel Xeon Platinum 8163 (Skylake) processors, 96 vCPUs, up to 2.7 GHz Turbo Boost
- High network performance: 4,000 Kpps packet forwarding rate
• Supports VPCs only
• Provides dedicated hardware resources and physical isolation
• Suitable for the following scenarios:
  - Workloads that require direct access to physical resources or scenarios that require a license to be bound to the hardware
  - Third-party virtualization (including but not limited to Xen and KVM), and AnyStack (including but not limited to OpenStack and ZStack)
  - Containers (including but not limited to Docker, Clear Containers, and Pouch)
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### Instance types

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<tr>
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<tbody>
<tr>
<td>ecs.ebm5.24xlarge</td>
<td>96</td>
<td>384.0</td>
<td>N/A</td>
<td>10.0</td>
<td>4,000</td>
<td>No</td>
<td>8</td>
<td>32</td>
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</tbody>
</table>

**Note:**

• You can go to the *ECS Instance Types Available for Each Region page* to view the instance types available in each region.
• For more information about these specifications, see *Instance specification metrics*.

**Billing methods**

ECS Bare Metal Instances support pay-as-you-go and subscription billing methods. For more information, see *#unique_116*. 
4.10.2 Create an ECS Bare Metal instance

This topic describes how to create an ECS Bare Metal instance.

Follow the steps in creating an instance by using the wizard to create an ECS Bare Metal instance. However, the following configurations are recommended:

- **Region:** Currently, ECS Bare Metal instances are available in the following regions and zones: China (Shanghai), Zone D, China (Beijing), Zone C, China (Hangzhou), Zone G, and China (Shenzhen), Zone D.
- **Instance Type:** In ebmhfg5, ebmc4, and ebmg5 type families are available. For more information about instance types, see instance type families.
- **Image:** The following public images are supported.

<table>
<thead>
<tr>
<th>Operating system</th>
<th>Image</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Linux</strong></td>
<td></td>
</tr>
<tr>
<td>- CentOS 7.2/7.3/7.4/6.9/6.8 64-bit</td>
<td></td>
</tr>
<tr>
<td>- Ubuntu 14.04/16.04 64-bit</td>
<td></td>
</tr>
<tr>
<td>- Debian 8.9/9.2 64-bit</td>
<td></td>
</tr>
<tr>
<td>- openSUSE 42.3 64-bit</td>
<td></td>
</tr>
<tr>
<td>- SUSE Linux Enterprise Server 12 SP2 64-bit</td>
<td></td>
</tr>
<tr>
<td><strong>Windows</strong></td>
<td></td>
</tr>
<tr>
<td>- 2016 Data Center Edition 64-bit Chinese Edition</td>
<td></td>
</tr>
<tr>
<td>- 2016 Data Center Edition 64-bit English Edition</td>
<td></td>
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<tr>
<td>- 2012 R2 Data Center Edition 64-bit Chinese Edition</td>
<td></td>
</tr>
<tr>
<td>- 2012 R2 Data Center Edition 64-bit English Edition</td>
<td></td>
</tr>
</tbody>
</table>

- **Storage:** ECS Bare Metal instances support up to 16 data disks. You can add a data disk during or after instance creation, and then mount the data disk.
- **Network Type:** Only VPC is supported.
4.10.3 Install SGX

This topic describes what Intel Software Guard Extension (Intel SGX) is and how to install it.

What is SGX?

SGX is an Intel architecture extension designed to increase the security of application code and data. You can partition your application into processor-hardened enclaves or protected areas of execution in memory that increase security even on compromised platforms.

SGX sets aside one or more ranges of physical memory as the Enclave Page Cache (EPC) and encrypts the data stored in the EPC using the Memory Encryption Engine (MEE). The data stored in the EPC is only decrypted inside the CPU. SGX offers CPU-based security controls. Data remains protected even when the OS, VMM, or BIOS are compromised.

Application

You can encrypt sensitive data, pass the encrypted data to the enclave in the cloud, and provide the corresponding key to the enclave through remote attestation. Then, you can compute over the fully encrypted data protected by the CPU, and the result is returned to you in an encrypted version. In this way, you can make use of the powerful cloud computing infrastructures with reduced risk of data disclosure.

Enclave Definition Language (EDL)

EDL is the fundamental part of SGX. It defines all enclave interface functions. During the build process, the Edger8r tool generates trusted and untrusted proxy/bridge functions and performs security checks.

Enclave interface functions can be divided into Enclave Calls (ECALLs) and Outside Calls (OCALLs).
• **ECALL**: A call from the application into an interface function within the enclave, which is defined as a trusted environment.

• **OCALL**: A call made from within the enclave to the application, which is defined as an untrusted environment.

```c
// demo.edl
enclave {
    // Add your definition of "secret_t" here
    trusted {
        public void get_secret([out] secret_t* secret);
    }
    untrusted {
        // This OCALL is for illustration purposes only.
        // It should not be used in a real enclave,
        // unless it is during the development phase
        // for debugging purposes.
        void dump_secret([in] const secret_t* secret);
    }
}
```

Install SGX using the installer file

You can install SGX using the installer file, which includes the SGX driver, SGX Platform Software (PSW), and SDK. You must also install corresponding Linux kernel header files. The procedure is as follows:

**Note:**

The default directory for the Makefile in the example is `/opt/intel/`.

1. Download the SGX installer file.
2. Follow the steps in the Installation guide.

Install SGX using the source code

You can install SGX using the source code, which includes the SGX driver, SGX Platform Software (PSW), and SDK. You must also install corresponding Linux kernel header files. The procedure is as follows:

**Note:**

The default directory for the Makefile in the example is `/opt/intel/`.

1. Download the source code from Github.
2. Compile the source code according to the README.md file.
4.10.4 Install the monitoring plug-in

This topic describes two methods of installing the xdragon_hardware_detect_plugin monitoring plug-in. These methods are applicable to ECS Bare Metal Instances that are equipped with local disks.

Prerequisites

You can install the monitoring plug-in only on an ECS Bare Metal Instance that meets the following requirements:

- The instance is located in the China (Beijing), China (Shanghai), China (Hangzhou), China (Shenzhen) or China (Zhangjiakou-Beijing Winter Olympics) region.
- The instance runs on a Linux operating system.
- If you need to batch install the monitoring plug-in on multiple instances by using Operation Orchestration Service (OOS) and use a tag to select target ECS Bare Metal Instances, the tag must have been bound to the instances. For more information, see #unique_120.
- If you need to manually install the monitoring plug-in, ensure that the Cloud Assistant client is installed. For more information, see #unique_121.

Note:

ECS instances created from public images after December 1, 2017 are pre-installed with the Cloud Assistant client.

Context

If you are using an ECS Bare Metal Instance equipped with a local disk, you need to monitor and diagnose the health status of the local disk by using the xdragon_hardware_detect_plugin plug-in.

The xdragon_hardware_detect_plugin plug-in can check the health status of local disks on ECS Bare Metal Instances on a regular basis. If an exception occurs to a local disk, the plug-in will automatically report the exception as a system event of the local disk. The corresponding system event code is SystemMaintenance.ReInitErrorDisk. For more information, see #unique_122.
Method 1: Batch install the monitoring plug-in on multiple instances by using OOS

The OOS can automatically install the xdragon_hardware_detect_plugin monitoring plug-in by using a public template.

1. Log on to the OOS console.
2. In the top navigation bar, select a region.
3. In the Public Template section, enter ACS-InstallXDragonAndCloudMonitor to search for the template that is used to install the monitoring plug-in. Click Create Execution.

4. In the Create Execution pane, complete the following settings:
   a) On the Basic Information tab, set Execution Mode to Automatic, and retain the default values for other parameters. Click Next: Parameter Settings.
   b) On the Parameter Settings tab, set the following parameters as needed and retain the default values for other parameters. After completing the settings, click Next: Preview.

   - targets: You can Specify Instance Tags or Select Instances Manually to select one or more ECS Bare Metal Instances that need to be polled and installed with the monitoring plug-in.
   - action: Select install to install the plug-in.

Note:
This operations template can be used to install, update, or uninstall the monitoring plug-in. Set the action parameter based on your needs.

- **rateControl**: Select Concurrency-based Control, select % for Concurrency and set it to 100%.

![Public Templates](image)

c) After confirming the preceding settings, click Create Execution.

After the execution is created, you can go to the Executions page to view the execution results.

- If Success is displayed in the Execution Status column corresponding to an O&M task, it indicates that the O&M task is successful.
- If Failed is displayed in the Execution Status column corresponding to an O&M task, you can click Details in the Actions column and then click Execution Logs. Then you can analyze and adjust the execution content based on the log information.

Method 2: Install the monitoring plug-in manually

You can perform the following steps to download and install the xdragon_hardware_detect_plugin monitoring plug-in by using the aliyun_installer tool provided by the Cloud Assistant client:

1. Connect to an ECS Bare Metal Instance as a root user.
2. Optional: Run the `aliyun_installer -h` command to view the help information of the tool.
3. Run the `aliyun_installer` command to install the xdragon_hardware_detect_plugin monitoring plug-in.

```
[root@EcsHost ~]# aliyun_installer -i xdragon_hardware_detect_plugin -e 1.0.0
```

4. Save and run the shell script that is used to install the special version of the CloudMonitor agent. For more information about the shell script, see the Sample script section in this topic.

```
[root@EcsHost ~]# bash <nameOfTheScript>.sh
```

**Note:** You must install the xdragon_hardware_detect_plugin monitoring plug-in before you install the CloudMonitor agent. If you have installed the CloudMonitor agent first, run the `/usr/local/cloudmonitor/CmsGoAgent.linux -amd64` restart command to restart the CloudMonitor agent.

5. Run the `smartctl -V` command to check whether the smartctl monitoring and analysis tool for local disks has been installed on the target instance.

If the version number of the smartctl tool is shown in the command output, the tool has been installed on the instance.

6. Optional: If the version number of the smartctl tool is not shown in the command output, install the tool by using the following methods:

   - For CentOS systems:

```
root@EcsHost ~]# yum install smartmontools
```

   - For Ubuntu systems:

```
root@EcsHost ~]# apt update && apt install smartmontools
```

   - For more information about the installation methods for other Linux distributions, see `smartmontools document`.

Sample script of shell for installing the special version of the CloudMonitor agent manually:

```
#!/bin/bash
echo "installing cms agent"
if [ -z "${CMS_HOME}" ]; then
  CMS_HOME="/usr/local/cloudmonitor"
```

if [ `egrep -i coreos /etc/os-release` ]; then
    ARCH="amd64"
else
    ARCH="386"
fi

VERSION="2.1.57"
ELF_NAME=CmsGoAgent.linux-${ARCH}
DOWNLOAD_PATH="cms-go-agent/${VERSION}/${ELF_NAME}"
DEST_UPDATE_FILE="$CMS_HOME/${ELF_NAME}"
current_cms_version="0"

# xdragon always x86 arch, judge version
if [ -f /usr/local/cloudmonitor/CmsGoAgent.linux-amd64 ]; then
current_cms_version="$($DEST_UPDATE_FILE version)"
fi

if [ $current_cms_version = "2.1.57" ]; then
    echo "CmsGoAgent already installed"
    echo "Installation success."
    exit 0
fi

if [ -z "$REGION_ID" ]; then
REGION_ID=$(wget -q --timeout=1 -t 1 -O - 'http://100.100.100.200/latest/meta-data/region-id')
fi

if [ -d $CMS_HOME ]; then
    if [ -f $CMS_HOME/wrapper/bin/cloudmonitor.sh ]; then
        $CMS_HOME/wrapper/bin/cloudmonitor.sh remove;
        rm -rf $CMS_HOME;
    elif [ -f $DEST_UPDATE_FILE ]; then
        $DEST_UPDATE_FILE stop
        # $DEST_UPDATE_FILE uninstall
        ps aux | grep -v grep | grep $ELF_NAME
    fi
fi

download()
{
    if [ -z "$REGION_ID" ]; then
        echo "networkType is classic"
    else
        echo "networkType is vpc, REGION_ID: $REGION_ID"
        if [[ "$REGION_ID" = "cn-shenzhen-finance-1" ]]; then
            OSS_URL="http://cms-download.aliyun.com/$DOWNLOAD_PATH"
            CMS_PROXY="szcmsproxy.aliyun.com:3128"
        elif [[ "$REGION_ID" = "cn-shanghai-finance-1" ]]; then
            OSS_URL="http://cms-agent-$REGION_ID.oss-$REGION_ID-pub-internal.aliyuncs.com/$DOWNLOAD_PATH"
            CMS_PROXY="cmsproxy-ap-south-1.aliyuncs.com:8080"
        elif [ "$REGION_ID" = "ap-southeast-3" -o "$REGION_ID" = "me-east-1" -o "$REGION_ID" = "cn-chengdu" ]; then
            OSS_URL="http://cms-download.aliyun.com/$DOWNLOAD_PATH"
        fi
    fi
}
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Result

After the xdragon_hardware_detect_plugin monitoring plug-in is installed, you can view it in the /usr/local/xdragon_hwqc directory. You can run the `aliyun_installer -d xdragon_hardware_detect_plugin` command to update the plug-in, or run the `aliyun_installer -u xdragon_hardware_detect_plugin` command to uninstall it.

What's next
You can call an ECS API operation to isolate damaged local disks. When damaged local disks are isolated, the corresponding ECS Bare Metal Instances are not migrated to different physical machines. For more information, see #unique_122.

4.11 Super Computing Cluster instance type family

4.11.1 What is a Super Computing Cluster?

This topic describes Super Computing Clusters (SCCs) and the following SCC instance families and their instance types: scch5 instance family with high clock speed, sccg5 general purpose instance family, and sccgn6 compute optimized GPU instance family.

Overview

SCCs are based on ECS Bare Metal Instances. With the high-speed interconnects of Remote Direct Memory Access (RDMA) technology, SCCs greatly improve network performance and the acceleration ratio of large-scale clusters. SCCs have all the benefits of ECS Bare Metal Instances and offer high-quality network performance featuring high bandwidth and low latency.

SCCs are released by Alibaba Cloud to meet the demands of applications such as high performance computing, artificial intelligence, machine learning, scientific and engineering computing, data analysis, and audio and video processing. In the clusters, nodes are connected over RDMA networks featuring high bandwidth and low latency, which ensure the parallel efficiency demanded by applications that require high performance computing. The RDMA over Convergent Ethernet (RoCE) rivals an InfiniBand network in terms of connection speed and supports more extensive Ethernet-based applications.

The combination of SCCs and other Alibaba Cloud computing products such as ECS and GPU instances provides Elastic HPC with the ultimate high performance parallel computing resources, making supercomputing on the cloud a reality.

Comparison of SCCs, physical machines, and virtual machines

The following table shows a comparison of features. In this table, Y means supported, N means not supported, and N/A means not applicable.
<table>
<thead>
<tr>
<th>Feature type</th>
<th>Feature</th>
<th>SCC</th>
<th>Physical machine</th>
<th>Virtual machine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Automated O&amp;M</td>
<td>Delivery within minutes</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>Computing</td>
<td>Zero performance loss</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td></td>
<td>Zero feature loss</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td></td>
<td>Zero resource preemption</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>Storage</td>
<td>Compatible with ECS disks</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td>Startup from disks (system disks)</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td>Quick reset of system disks</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td>Compatible with ECS images</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td>Cold migration between physical and virtual machines</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td>Free of OS installation</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td>Free of local RAID, and stronger protection of data in disks</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>Network</td>
<td>Compatible with ECS VPCs</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>Feature type</td>
<td>Feature</td>
<td>SCC</td>
<td>Physical machine</td>
<td>Virtual machine</td>
</tr>
<tr>
<td>--------------</td>
<td>-------------------------------------------------------------------------</td>
<td>--------------</td>
<td>------------------</td>
<td>-----------------</td>
</tr>
<tr>
<td></td>
<td>Compatible with ECS classic networks</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td>Free of communication bottlenecks between physical and virtual machine clusters in VPCs</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>Management</td>
<td>Compatible with existing ECS management systems</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td>Consistent user experiences on features such as VNC with that of virtual machines</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td>Out-of-band (OOB) network security</td>
<td>Y</td>
<td>N</td>
<td>N/A</td>
</tr>
</tbody>
</table>

scch5, SCC instance family with high clock speed

Features

- I/O optimized
- Supports standard SSDs and ultra disks
- Supports both RoCE and VPCs, of which RoCE is dedicated to RDMA communication
- Has all features of ECS Bare Metal Instances
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- Equipped with 3.1 GHz Intel Xeon Gold 6149 (Skylake)
- CPU-to-memory ratio of 1:3
- Suitable for the following scenarios:
  - Large-scale machine learning training
  - Large-scale high performance scientific computing and simulations
  - Large-scale data analysis, batch computing, and video encoding

### Instance types

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPUs</th>
<th>Physical cores</th>
<th>Memory (GiB)</th>
<th>GPUs</th>
<th>Bandwidth (Gbit/s)</th>
<th>Packet forwarding rate (Kpps)</th>
<th>RoCE (Gbit/s)</th>
<th>IPv6 support</th>
<th>NIC queue</th>
<th>ENIs (including one primary ENI)</th>
<th>Private IP addresses per ENI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs.scch5.16xlarge</td>
<td>64</td>
<td>32</td>
<td>192.0</td>
<td>N/A</td>
<td>10.0</td>
<td>4,500</td>
<td>2 × 25</td>
<td>No</td>
<td>8</td>
<td>32</td>
<td>10</td>
</tr>
</tbody>
</table>

**Note:**

- ecs.scch5.16xlarge provides 64 logical processors on 32 physical cores.
- You can go to the [ECS Instance Types Available for Each Region page](#) to view the instance types available in each region.
- For more information about these specifications, see Instance specification metrics.

sccg5, general purpose SCC instance family

**Features**

- I/O optimized
- Supports standard SSDs and ultra disks
- Supports both RoCE and VPCs, of which RoCE is dedicated to RDMA communication
- Has all features of ECS Bare Metal Instances

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Elastic Compute Service

• Equipped with 2.5 GHz Intel Xeon Platinum 8163 (Skylake) processors
• CPU-to-memory ratio of 1:4
• Suitable for the following scenarios:
  - Large-scale machine learning training
  - Large-scale high performance scientific computing and simulations
  - Large-scale data analysis, batch computing, and video encoding

Instance types

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPUs</th>
<th>Physical cores</th>
<th>Memo (GiB)</th>
<th>GPUs</th>
<th>Bandwidth (Gbit/s)</th>
<th>Packet forwarding rate (Kpps)</th>
<th>RoCE (Gbit/s)</th>
<th>IPv6 support</th>
<th>NIC queue (including one primary ENI)</th>
<th>Private IP addresses per ENI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs.sccg5.24xlarge</td>
<td>96</td>
<td>48</td>
<td>384.0</td>
<td>N/A</td>
<td>10.0</td>
<td>4,500</td>
<td>2 × 25</td>
<td>No</td>
<td>8</td>
<td>32</td>
</tr>
</tbody>
</table>

Note:

• ecs.sccg5.24xlarge provides 96 logical processors on 48 physical cores.
• You can go to the ECS Instance Types Available for Each Region page to view the instance types available in each region.
• For more information about these specifications, see Instance specification metrics.

sccgn6, compute optimized SCC GPU instance family

Features

• I/O optimized
• CPU-to-memory ratio of 1:4
• Equipped with 2.5 GHz Intel Xeon Platinum 8163 (Skylake) processors
• Has all features of ECS Bare Metal Instances
• Storage:
  - Supports enhanced SSDs, standard SSDs, and ultra disks
  - Supports high performance Cloud Parallel File System (CPFS)

• Networking:
  - Supports VPCs
  - Supports RoCE v2 networks, which is dedicated to RDMA communication

• Uses NVIDIA V100 GPU processors (with the SXM2 module):
  - Based on the new NVIDIA Volta architecture
  - 16 GB HBM2 GPU memory
  - 5,120 CUDA Cores
  - 640 Tensor Cores
  - Memory bandwidth of 900 GB/s
  - Supports up to six NVLink connections and total bandwidth of 300 GB/s (25 GB /s per connection)

• Suitable for the following scenarios:
  - Ultra-large-scale machine learning training on a distributed GPU cluster
  - Large-scale high performance scientific computing and simulations
  - Large-scale data analysis, batch computing, and video encoding

Instance types

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPUs</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>GPUs</th>
<th>Bandwidth (Gbit/s)</th>
<th>Packet forwarding rate (Kpps)</th>
<th>RoCE (Gbit/s)</th>
<th>IPv6 support</th>
<th>NIC queues</th>
<th>ENIs (including one primary ENI)</th>
<th>Private IP addresses per ENI</th>
</tr>
</thead>
<tbody>
<tr>
<td>sccgn6.24xlarge</td>
<td>96</td>
<td>384</td>
<td>N/A</td>
<td>8 × V100</td>
<td>30</td>
<td>4,500</td>
<td>2 × 25</td>
<td>Yes</td>
<td>8</td>
<td>32</td>
<td>10</td>
</tr>
</tbody>
</table>

Note:
You can go to the *ECS Instance Types Available for Each Region* page to view the instance types available in each region.

For more information about these specifications, see *Instance specification metrics*.

**Billing methods**

SCC supports pay-as-you-go and subscription billing methods. For more information, see #unique_116.

### 4.11.2 Create an SCC instance

This topic describes how to create a Super Computing Cluster (SCC) instance.

Super Computing Cluster (SCC) is based on the ECS Bare Metal instance type. By utilizing the high-speed interconnectivity of RDMA (Remote Direct Memory Access) technology, SCC greatly improves network performance and increases the acceleration ratio of large-scale clusters. SCC offers all the advantages of ECS Bare Metal instances, and provides high-quality network performance featuring high bandwidth and low latency. For more information, see *ECS Bare Metal instance and Super Computing Clusters*.

**Procedure**

You can create an SCC instance by following the instructions described in *Create an ECS Instance*.

However, the following configurations must be considered:

- **Region**: Select the region and zone according to the table *Regions and zones where SCC instances are available*. Note that the purchase page displays the latest region and zone information, which may differ from information provided in this topic.
- **Network Type**: Only VPC is supported.
- **Instance Type**: Currently, the instance type families scch5, sccg5, and sccgn6 are available.
- **Image**: Select Public Image. Currently, only a custom Linux CentOS 7.5 image for SCC is supported.

**Note:**
The custom image supports the RDMA RoCE driver and OFED stack. You can use the RDMA functions through IB verbs programming or implement RDMA communication through MPI.

- Storage: SCC supports up to 16 data disks. You can add a data disk during or after instance creation, and then mount the data disk.

Regions and zones where SCC instances are available

The following table shows the regions and zones where SCC instances are available.

<table>
<thead>
<tr>
<th>Instance type family</th>
<th>Region and zone</th>
</tr>
</thead>
<tbody>
<tr>
<td>scch5</td>
<td>China (Shanghai) Zones D and B</td>
</tr>
<tr>
<td>sccg5</td>
<td>China (Shanghai) Zones D and B</td>
</tr>
<tr>
<td>sccgn6</td>
<td>China (Shanghai)</td>
</tr>
<tr>
<td></td>
<td>China (Beijing)</td>
</tr>
<tr>
<td></td>
<td>China (Zhangjiakou)</td>
</tr>
</tbody>
</table>

What to do next

If you not only need to use the RDMA feature, but also need to use the HPC scheduler and the cluster scaling service, you can create an SCC instance by creating an SCC cluster through the E-HPC console.

Note:

For more information about the availability of SCC instances, see Regions and zones where SCC instances are available. Note that only the Subscription billing method is supported.
4.12 Burstable performance instances

4.12.1 Overview

You can use CPU credits to burst the performance of a burstable instance when required by your workloads. This topic describes the features, baseline performance, CPU credits, and performance modes of t5 and t6 burstable instances.

Scenarios

If you purchase an enterprise-grade instance, you have exclusive access to its vCPUs. While you enjoy the exclusive access, you must pay for vCPU resources regardless of whether you use the full performance of the vCPUs. Even if you only require high levels of computing power for a specific period during a day, you must pay for unused computing resources at other times during the day. To avoid this situation, you can select cost-effective and powerful burstable instances to better meet your business requirements.

Burstable instances are applicable to scenarios that require burstable performance for a specific period of time, such as stress testing service applications, lightweight applications, microservices, and web application servers. We recommend that you evaluate your business requirements to determine the performance levels required during off-peak and peak hours before you make a purchase decision. The baseline performance of the instances you purchase must at least meet your business requirements during off-peak hours. This way, you can experience the exact performance you want at a significantly lower cost. t5 and t6 burstable instances are available. For more information, see t5, burstable instance family and t6, burstable instance family.

Note:

If you find the burstable instance you have selected cannot meet your requirements after the instance is created, you can change the configuration.

Features

You can accumulate CPU credits for your burstable instances, and consume these credits to increase the computing power of instances for your workloads when required. This consumption pattern does not affect the environments or
applications running on your instances. For more information about baseline performance and CPU credits of burstable instances, see Baseline performance, Earn CPU credits, and Consume CPU credits.

Through the CPU credit mechanism, you can use more computing resources during peak hours and consume less computing resources during off-peak hours. If you have unplanned burstable performance requirements, you can enable the unlimited mode for your instances.

An instance in limited mode will run below its baseline performance if CPU credits are unavailable. However, a burstable instance in unlimited mode allows you to overdraw or pay for additional CPU credits and utilize CPU beyond its baseline performance at any time. In this case, you may be charged for the consumption of these additional CPU credits. For more information about the performance modes, see Standard mode and Unlimited mode.

Baseline performance

Baseline performance is an amount of vCPU capacity that is continuously provisioned to a burstable instance. The baseline performance varies depending on the instance type. If the vCPUs of your burstable instances are running at baseline performance, the CPU credits that you earn are equal to the CPU credits you consume. The Baseline CPU computing performance per vCPU column in the burstable instance family table indicates the baseline performance of a single vCPU.

Earn CPU credits

CPU credits are the computing resources that are available to be used. These computing resources determine the computing performance of your burstable instances.

After you create a burstable instance, 30 CPU credits are available for each vCPU of the instance, which are initial CPU credits. These credits allow you to complete deployment tasks after you start the instance. For example, an ecs.t5-lc1m2.large instance has two vCPUs. You will earn 60 CPU credits after you create one instance of this type. An ecs.t5-c1m1.xlarge instance has four vCPUs. You will earn 120 initial CPU credits after you create one instance of this type.

After you start a burstable instance, it starts to consume CPU credits to maintain its computing performance. At the same time, it also earns CPU credits at a fixed rate that is determined by the instance type. The CPU credits that a vCPU can earn
per hour is based on its baseline performance. The CPU credits per hour column in the t5 instance type table indicates the CPU credits that all of the vCPUs of an instance can earn per hour. For example, 15% baseline performance of an ecs.t5-c1m1.large instance indicates that the CPU credits that a vCPU of the instance earns per hour can keep the vCPU running at 15% usage for an hour or at 100% usage for nine minutes (60 × 15%). In response to its baseline performance, each vCPU earns 9 CPU credits per hour. Therefore, an ecs.t5-c1m1.large instance with two vCPUs earns 18 CPU credits per hour.

If the CPU credits earned are more than the credits consumed, the net credits are accrued as CPU credit balance. CPU credit balance is valid within 24 hours to ensure the availability of CPU credits. A specific instance type earns CPU credits at a fixed rate. Therefore, its CPU credit balance is limited. The maximum CPU credit balance of a specific instance type is the CPU credits it can earn within 24 hours. For more information, see the Max CPU credit balance column in the burstable instance families table. For example, an ecs.t5-c1m1.large instance can earn 18 CPU credits per hour. This way, the maximum CPU credit balance it can earn is 432 (18 × 24).

In different scenarios, the shutdown of your instances may affect CPU credits:

- If you still want to be charged after the instance shuts down, you can retain your current CPU credit balance and continue to earn credits.
- If you do not want to be charged after the instance shuts down, your current CPU credit balance becomes invalid and you cannot continue to earn credits. After you restart your instances, you receive initial credits and start to earn credits again.
- When a subscription instance expires, you can retain your current CPU credit balance, but you cannot continue to earn credits. When you restart the instance, you start to earn credits again.
- For a pay-as-you-go instance, if your payment is overdue, you can retain your current CPU credit balance, but you cannot continue to earn credits until you complete the payment.

Consume CPU credits

The consumption rate of CPU credits of a burstable instance is based on the number of its vCPUs, CPU usage, and operating hours. For example, you consume one CPU credit in the following three scenarios:
- A vCPU runs at 100% usage for a minute.
- A vCPU runs at 50% usage for two minutes.
- Two vCPUs run at 25% usage for two minutes.

When you start a burstable instance, it starts to consume CPU credits to maintain its computing performance. It first consumes initial credits which cannot be replenished when used up, and then consumes the accumulated CPU credits.

- When your vCPUs run below baseline performance, the credits they earn are more than the credits they consume, resulting in an increase of CPU credit balance.
- When your vCPUs run at baseline performance, the credits they earn equal the credits they consume, resulting in no change to the CPU credit balance.
- When your vCPUs run above baseline performance, the credits they earn are less than the credits they consume, resulting in a decrease of CPU credit balance.

**Standard mode**

The performance of a burstable instance in limited mode is based on the availability of CPU credits. After it consumes all the initial credits and accrued credits, the instance cannot run above baseline performance. When the CPU credit balance is low, the instance gradually reduces CPU usage within 15 minutes until it runs at the baseline performance level. This way, the instance does not experience a sharp performance drop-off when its accrued CPU credit balance is depleted.

Note:
For more information about the relationship between the performance and CPU credits of a burstable instance in standard mode, see [CPU credit change examples](#).

You can enable the standard mode for your instances if you have stable workloads and do not need instances to run beyond the baseline performance for an extended period of time. Otherwise, you may occasionally need to burst performance for scenarios, such as lightweight web servers, development and testing environments, and databases with low- and medium-performance.

**Unlimited mode**

The performance of a burstable instance in unlimited mode is not limited by the availability of CPU credits. You can overdraw or pay for additional CPU credits to utilize CPU above baseline performance at any time. If you keep running your
instances above baseline performance when the initial CPU credits and accrued
credits are all consumed, the CPU credits will vary as shown in the following figure.
Two concepts involved in the figure are described as follows:

- Advance CPU credits are credits that you pay for in advance and can receive
  within 24 hours after you make the payment.
- Overdrawn CPU credits are used when you have consumed all the advance
  CPU credits to make sure that the instance is running beyond the baseline
  performance. You will be billed for using overdrawn credits.

Note:
For more information about the billing of burstable instances, see #unique_130/
unique_130_Connect_42_section_lqi_vqf_dsc.
Note:
For more information about the relationship between the performance and CPU credits of an instance in unlimited mode, see CPU credit change examples.

You can enable the unlimited mode for your instances if you need to consume advance CPU credits or overdrawn credits besides your credit balance to meet burstable performance requirements. For example:

- You may expect substantial workloads to handle during certain events, such as new feature releases, e-commerce promotions, and website promotions that may require high CPU performance during a specific period. In this case, you can enable the unlimited mode for your instances and disable the mode to save costs when the workload spike ends.

- Some web applications may require CPU bursts for a specific period during a day, but the daily average CPU usage is below the baseline CPU usage. In this case, you can enable the unlimited mode for your instances during peak hours to ensure positive customer experiences. If the CPU credits you earn during off-peak hours can offset the advance CPU credits consumed during peak hours, you can ensure overall positive customer experiences without paying extra fees.

Note:
When you create a burstable instance, the standard mode is enabled by default.
For more information about how to enable unlimited mode, see #unique_131/
unique_131_Connect_42_section_cds_zh0_eh7.

Change the configuration

If you find the vCPUs keep running beyond or below the baseline performance level for an extended period of time when you monitor a burstable instance, this instance type cannot satisfy your business requirements. We recommend that you re-evaluate whether the instance type is suitable and select another burstable instance type or enterprise-level instance if necessary. For more information, see Instance families that support instance type changes.

Configuration changes of an instance vary according to its billing method.

- For more information about how to change the configuration of a subscription instance, see Overview of instance upgrade and downgrade.
For more information about how to change the configuration of a pay-as-you-go instance, see Change configurations of Pay-As-You-Go instances.

**t6, burstable instance family**

**Features:**

- Equipped with 2.5 GHz Intel Xeon Cascade Lake processors, with Turbo Boost up to 3.2 GHz
- More cost-effective, compared with t5 burstable instance family
- The maximum bandwidth can reach 6 Gbit/s
- Paired with DDR4 memory
- Provides baseline CPU performance and is burstable, but limited by accumulated CPU credits
- Supports VPCs only
- Suitable for the following scenarios:
  - Web application servers
  - Lightweight applications and microservices
  - Development and testing environments

The following table describes the instance types that belong to the t6 burstable instance family and specifications of these instance types.

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPU</th>
<th>Memory (GiB)</th>
<th>Baseline CPU computing performance per vCPU</th>
<th>Max CPU credit per hour</th>
<th>Local storage (GiB)</th>
<th>Bursting bandwidth (Gbit/s)</th>
<th>Packet forwarding rate (Kpps)</th>
<th>IPv6 support</th>
<th>NIC queue</th>
<th>ENIs (including one primary ENI)</th>
<th>Private IP addresses of a single ENI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs.t6-c4m1.large</td>
<td>2</td>
<td>0.5</td>
<td>5%</td>
<td>6</td>
<td>None</td>
<td>6.0</td>
<td>40</td>
<td>Yes</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Instance type</td>
<td>vCPU</td>
<td>Memory (GiB)</td>
<td>Baseline CPU performance per vCPU</td>
<td>Max CPU credits per hour</td>
<td>Local storage (GiB)</td>
<td>Burst bandwidth (Gbit/s)</td>
<td>Packet forwarding rate (Kpps)</td>
<td>IPv6 support</td>
<td>NIC queue (including one primary ENI)</td>
<td>ENIs Private IP addresses of a single ENI</td>
<td></td>
</tr>
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<td>-----------------------------------</td>
<td></td>
</tr>
<tr>
<td>ecs.t6-c2m1.large</td>
<td>2</td>
<td>1.0</td>
<td>10%</td>
<td>12</td>
<td>None</td>
<td>6.0</td>
<td>60</td>
<td>Yes</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>ecs.t6-c1m1.large</td>
<td>2</td>
<td>2.0</td>
<td>20%</td>
<td>24</td>
<td>None</td>
<td>6.0</td>
<td>100</td>
<td>Yes</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>ecs.t6-c1m2.large</td>
<td>2</td>
<td>4.0</td>
<td>20%</td>
<td>24</td>
<td>None</td>
<td>6.0</td>
<td>100</td>
<td>Yes</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>ecs.t6-c1m4.large</td>
<td>2</td>
<td>8.0</td>
<td>30%</td>
<td>36</td>
<td>None</td>
<td>6.0</td>
<td>100</td>
<td>Yes</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>ecs.t6-c1m4.xlarge</td>
<td>4</td>
<td>16.0</td>
<td>40%</td>
<td>96</td>
<td>2, 304</td>
<td>None</td>
<td>6.0</td>
<td>200</td>
<td>Yes</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>ecs.t6-c1m4.2xlarge</td>
<td>8</td>
<td>32.0</td>
<td>40%</td>
<td>192</td>
<td>4, 608</td>
<td>None</td>
<td>6.0</td>
<td>400</td>
<td>Yes</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>
t5, burstable instance family

Features:

- Equipped with 2.5 GHz Intel Xeon processors
- Paired with DDR4 memory
- Supports multiple CPU-to-memory ratios
- Provides baseline CPU performance and is burstable, but limited by accumulated CPU credits
- Offers a balance of compute, memory, and network resources
- Supports VPCs only
- Suitable for the following scenarios:
  - Web application servers
  - Lightweight applications and microservices
  - Development and testing environments

The following table lists the instance types that belong to the t5 instance family and specifications of these instance types.
<table>
<thead>
<tr>
<th>Instance Type</th>
<th>vCPU</th>
<th>Memory (GiB)</th>
<th>Base CPU Computing Performance per vCPU</th>
<th>Max CPU Credits per Hour</th>
<th>Local Storage (GiB)</th>
<th>Bandwidth (Gbit/s)</th>
<th>Packet Forwarding Rate (Kpps)</th>
<th>IPv6 Support</th>
<th>NIC Queues</th>
<th>ENIs (including one primary ENI)</th>
<th>Private IP Addresses of a Single ENI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs.t5-lc2m1.nano</td>
<td>1</td>
<td>0.5</td>
<td>20%</td>
<td>12</td>
<td>288</td>
<td>None</td>
<td>0.1</td>
<td>40</td>
<td>Yes</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>ecs.t5-lc1m1.small</td>
<td>1</td>
<td>1.0</td>
<td>20%</td>
<td>12</td>
<td>288</td>
<td>None</td>
<td>0.2</td>
<td>60</td>
<td>Yes</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>ecs.t5-lc1m2.small</td>
<td>1</td>
<td>2.0</td>
<td>20%</td>
<td>12</td>
<td>288</td>
<td>None</td>
<td>0.2</td>
<td>60</td>
<td>Yes</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>ecs.t5-lc1m2.large</td>
<td>2</td>
<td>4.0</td>
<td>20%</td>
<td>24</td>
<td>576</td>
<td>None</td>
<td>0.4</td>
<td>100</td>
<td>Yes</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>ecs.t5-lc1m4.large</td>
<td>2</td>
<td>8.0</td>
<td>20%</td>
<td>24</td>
<td>576</td>
<td>None</td>
<td>0.4</td>
<td>100</td>
<td>Yes</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Instance Type</td>
<td>vCPU</td>
<td>Mem (GiB)</td>
<td>Base CPU (per vCPU)</td>
<td>Max CPU credits per hour</td>
<td>Local storage (GiB)</td>
<td>Pack forwarding rate (Kpps)</td>
<td>IPv6 support</td>
<td>NIC queues</td>
<td>ENIs (including one primary ENI)</td>
<td>Private IP addresses of a single ENI</td>
<td></td>
</tr>
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<td></td>
</tr>
<tr>
<td>ecs.t5-c1m1.large</td>
<td>2</td>
<td>2.0</td>
<td>25%</td>
<td>30</td>
<td>720</td>
<td>None</td>
<td>0.5</td>
<td>Yes</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>ecs.t5-c1m2.large</td>
<td>2</td>
<td>4.0</td>
<td>25%</td>
<td>30</td>
<td>720</td>
<td>None</td>
<td>0.5</td>
<td>Yes</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>ecs.t5-c1m4.large</td>
<td>2</td>
<td>8.0</td>
<td>25%</td>
<td>30</td>
<td>720</td>
<td>None</td>
<td>0.5</td>
<td>Yes</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>ecs.t5-c1m1.xlarge</td>
<td>4</td>
<td>4.0</td>
<td>25%</td>
<td>60</td>
<td>1, 440</td>
<td>None</td>
<td>0.8</td>
<td>Yes</td>
<td>1</td>
<td>2</td>
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<tr>
<td>ecs.t5-c1m2.xlarge</td>
<td>4</td>
<td>8.0</td>
<td>25%</td>
<td>60</td>
<td>1, 440</td>
<td>None</td>
<td>0.8</td>
<td>Yes</td>
<td>1</td>
<td>2</td>
<td></td>
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Issue: 20200109
<table>
<thead>
<tr>
<th>Instance Type</th>
<th>vCPU</th>
<th>Mem (GiB)</th>
<th>Base CPU绩效 (GiB)</th>
<th>Max CPU Credit Per Hour (GiB)</th>
<th>Local Storage (Gbit)</th>
<th>Bandwidth (Gbit/s)</th>
<th>Pack Forwarding Rate (Kpps)</th>
<th>IPv6 Support</th>
<th>NIC Queue (Include one primary ENI)</th>
<th>ENIs of a single ENI</th>
<th>Private IP Addresses</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs.t5-c1m4.xlarge</td>
<td>4</td>
<td>16.0</td>
<td>25%</td>
<td>60</td>
<td>None</td>
<td>1.2</td>
<td>400</td>
<td>Yes</td>
<td>1</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>ecs.t5-c1m1.2xlarge</td>
<td>8</td>
<td>8.0</td>
<td>25%</td>
<td>120</td>
<td>None</td>
<td>1.2</td>
<td>400</td>
<td>Yes</td>
<td>1</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>ecs.t5-c1m2.2xlarge</td>
<td>8</td>
<td>16.0</td>
<td>25%</td>
<td>120</td>
<td>None</td>
<td>1.2</td>
<td>400</td>
<td>Yes</td>
<td>1</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>ecs.t5-c1m4.2xlarge</td>
<td>8</td>
<td>32.0</td>
<td>25%</td>
<td>120</td>
<td>None</td>
<td>1.2</td>
<td>400</td>
<td>Yes</td>
<td>1</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>ecs.t5-c1m1.4xlarge</td>
<td>16</td>
<td>16.0</td>
<td>25%</td>
<td>240</td>
<td>None</td>
<td>1.2</td>
<td>600</td>
<td>Yes</td>
<td>1</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>Instance type</td>
<td>vCPU</td>
<td>Memory (GiB)</td>
<td>Base CPU computing performance per vCPU</td>
<td>Max CPU credits per hour</td>
<td>Local storage (GiB)</td>
<td>Pickup forwarding rate (Kpps)</td>
<td>IPv6 support</td>
<td>NIC queues</td>
<td>ENIs (including one primary ENI)</td>
<td>Private IP addresses of a single ENI</td>
<td></td>
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<td>----------------------------------</td>
<td></td>
</tr>
<tr>
<td>ecs.t5-c1m2.4xlarge</td>
<td>16</td>
<td>32.0</td>
<td>25%</td>
<td>240</td>
<td>5, 760</td>
<td>600</td>
<td>Yes</td>
<td>1</td>
<td>2</td>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>

**Note:**

- You can go to the *ECS Instance Types Available for Each Region page* to view the instance types available in each region.
- For more information about these specifications, see *Instance specification metrics*.

### Terms of burstable instances

<table>
<thead>
<tr>
<th>Term</th>
<th>Description</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial CPU credits</td>
<td>The CPU credits that you earn while creating a burstable instance. You can earn 30 credits for every vCPU. These credits cannot be replenished when used up.</td>
<td>For more information, see <em>Earn CPU credits</em>.</td>
</tr>
<tr>
<td>CPU credit balance</td>
<td>When the CPU credits earned are more than the credits consumed, the net credits are accrued as CPU credit balance. You can use these credits to run instances above baseline performance.</td>
<td>For more information, see <em>Earn CPU credits</em>.</td>
</tr>
</tbody>
</table>
### Term | Description | Reference
--- | --- | ---
Max CPU credit balance | The maximum CPU credit balance of a specific instance type is the CPU credits it can earn within 24 hours. CPU credit balance is valid for 24 hours to ensure the availability of CPU credits. A specific instance type earns CPU credits at a fixed rate. Therefore, its CPU credit balance is limited. | For more information, see Earn CPU credits.
Advance CPU credits | The CPU credits that you can pay for in advance and can receive within 24 hours after you make the payment. You must enable the unlimited mode before using advance CPU credits. | For more information, see Unlimited mode.
Overdrawn CPU credits | The CPU credits you use when you have consumed all advance CPU credits to make sure that the instance is running above baseline performance. You will be billed for using these credits. You must enable the unlimited mode before using overdrawn CPU credits. | For more information, see Unlimited mode.

### 4.12.2 Benefits

Burstable performance instances allow you to use CPU credits to maximize the performance of your instances while remaining cost-effective.

**Cost-effective**

Burstable performance instances can cost nearly 50% less than other shared instances of the same configuration, depending on the instance type you selected.
Note:
The actual performance of a burstable performance instance corresponds to its accumulation and usage of CPU credits. For more information, see Burstable performance instances.

Multiple specifications

Alibaba Cloud provides a variety of instance type specifications for burstable performance instances that you can select to meet a wide range of scenarios. The smallest burstable performance instance specification starts with only one vCPU core and 0.5 GiB, allowing you to flexibly combine instances. For more information, see t5 instance type family.

Predictable CPU performance

Burstable performance instances are designed to provide a baseline level of CPU performance (baseline performance). You can predict the maximum possible performance required by your instance based on its baseline performance and accrued CPU credits, and select compute capabilities for a variety of scenarios as needed.

High network performance

Burstable performance instances use the most advanced network-based technologies to reduce network latency to a third of the level compared to the last-generation instances.

4.12.3 CPU credit change examples

This topic describes how the CPU credits change when the instance is running in different performance modes. After a burst performance instance is created, its CPU credits change according to the relationship between its CPU usage and baseline performance.

Background information

The examples given in this topic are only for your reference. Please understand that these may vary from your actual situation. We recommend that before you continue to read the rest of this topic, make sure that you are familiar with related concepts, including t5 instance type family, CPU credits, baseline performance, performance modes, and instance configuration change.
We also recommend that you are familiar with the following information:

- Each vCPU is allocated 30 CPU credits every time you create a burstable performance instance, which is called launch CPU credits.
- The number of CPU credits that a burstable performance instance uses on an hourly basis depends on the number of vCPUs, CPU usage, and running time of the instance. One CPU credit is equal to one vCPU running at full capacity for one minute. Additionally, other combinations of number of vCPUs, CPU usage, and running time can also equate to one CPU credit.
- An instance that runs at baseline performance earns the same CPU credits as it consumes. For more information, see Earn CPU credits and CPU credit consumption.

Standard mode

In the standard mode, the performance of a burstable performance instance is governed by the CPU credits it has accrued. If the instance has consumed all the accrued credits, it cannot burst above the baseline performance.

This section uses the ecs.t5-lc1m2.large instance for example.

Note:
The ecs.t5-lc1m2.large instance has the following features:

- It is configured with 2 vCPUs and 4 GiB memory.
- It receives 60 launch CPU credits upon creation (30 CPU credits for each vCPU).
- It has a baseline performance of 10%.
- It earns 12 CPU credits per hour and accrues a maximum of 288 CPU credits over a 24-hour period. For more information, see t5 instance type family.
- It consumes 12 CPU credits per hour when running at baseline performance.

The following figure shows how the CPU credits of the ecs.t5-lc1m2.large instance change in the standard mode.
As shown in the preceding figure, CPU credit changes over time with the following distinct phrases:

- **0–24 hours**
  
  **Phase A:** The instance earns 60 launch CPU credits after being started. The initial CPU usage is 0% and the CPU credits continue to accrue until they reach the maximum value at hour 24.

  At the end of this phase, the available CPU credits reach 348.

  Available CPU credits (348) = Launch CPU credits (60) + Maximum CPU credit balance (288).

- **25–48 hours**

  1. **Phase B:** The CPU usage is 10%, which is equal to the baseline performance. Launch CPU credits are preferentially used and will not be recovered after
being used up. The instance consumes 12 CPU credits per hour when it starts to run.

At the end of this phase, the available CPU credits reach 288.

Available CPU credits (288) = CPU credits at the end of phase A (348) – Launch CPU credits (60).

2. Phase C: The CPU usage is 5%. Although the CPU usage is lower than the baseline performance, the CPU credit balance has reached the upper limit and remains unchanged.

At the end of this phase, the CPU credit balance reaches the maximum value 288.

3. Phase D: The CPU usage is 10%, which is equal to the baseline performance. The instance earns the same CPU credits as it consumes and the CPU credit balance remains unchanged.

At the end of this phase, the CPU credit balance reaches the maximum value 288.
- 48–72 hours

1. Phase E: The instance runs at full capacity for 2 hours and consumes 120 CPU credits per hour. The baseline performance cannot meet requirements, and the instance starts to consume CPU credits accrued in the CPU credit balance.

   At the end of this phase, the CPU credit balance is 72.

   \[
   \text{CPU credit balance (72)} = \text{Maximum CPU credit balance (288)} - 2 \times \text{CPU credits consumed per hour (120)} + 2 \times \text{CPU credits earned per hour (12)}
   \]

2. Phase F: The CPU usage is 0%. The instance is idle for 4 hours and earns 12 CPU credits per hour. All of the earned CPU credits are accrued in the CPU credit balance.

   At the end of this phase, the CPU credit balance is 120.

   \[
   \text{CPU credit balance (120)} = \text{CPU credit balance at the end of phase E (72)} + 4 \times \text{CPU credits earned per hour (12)}
   \]

3. Phase G: The instance runs at 5% CPU usage for 8 hours and consumes 6 CPU credits per hour. The remaining CPU credits are accrued in the CPU credit balance.

   At the end of this phase, the CPU credit balance is 168.

   \[
   \text{CPU credit balance (168)} = \text{CPU credit balance at the end of phase F (120)} - 8 \times \text{CPU credits consumed per hour (6)} + 8 \times \text{CPU credits earned per hour (12)}
   \]

4. Phase H: The CPU usage is 80% and the baseline performance cannot meet the requirements. The instance runs for 2 hours and consumes 96 CPU credits per hour. The CPU credit balance is used up and the instance cannot burst above the baseline performance.

**Note:**

If CPU credits are insufficient, performance is gradually lowered to the baseline performance level within 15 minutes, so that the instance does not
experience sharp performance drop-off when its CPU credit balance is used up.

At the end of this phase, the CPU credit balance is 0.

\[
\text{CPU credit balance (0)} = \text{CPU credit balance at the end of phase G (168)} - 2 \times \text{CPU credits consumed per hour (96)} + 2 \times \text{CPU credits earned per hour (12)}
\]

5. Phase I: The CPU usage is 10%, which is equal to the baseline performance. The instance earns the same CPU credits as it consumes, and the CPU credit balance remains unchanged.

At the end of this phase, the CPU credit balance is 0.

\[
\text{CPU credit balance (0)} = \text{CPU credit balance at the end of phase H (0)} - 5 \times \text{CPU credits consumed per hour (12)} + 5 \times \text{CPU credits earned per hour (12)}
\]

6. Phase J: The CPU usage is 0%. The instance is idle for 3 hours and earns 12 CPU credits per hour. All of the earned CPU credits are accrued in the CPU credit balance.

At the end of this phase, the CPU credit balance is 36.

\[
\text{CPU credit balance (36)} = \text{CPU credit balance at the end of phase I (0)} + 3 \times \text{CPU credits earned per hour (12)}
\]

Unlimited mode

In the unlimited mode, a burstable performance instance can use advance CPU credits or overdrawn CPU credits to maintain high CPU performance whenever required, without being limited to the baseline CPU performance.

This section uses the ecs.t5-c1m1.xlarge instance for example.

**Note:**
The ecs.t5-c1m1.xlarge instance has the following features:

- It is configured with 4 vCPUs and 4 GiB memory.
- It receives 120 launch CPU credits upon creation (30 CPU credits for each vCPU).
- It has a baseline performance of 15%.
- It earns 36 CPU credits per hour and accrues a maximum of 864 CPU credits over a 24-hour period. For more information, see [t5 instance type family](#).
- It consumes 36 CPU credits per hour when running at baseline performance.
The following figure shows how the CPU credits of the ecs.t5-c1m1.xlarge instance change in the unlimited mode.

As shown in the preceding figure, CPU credit changes over time with the following distinct phrases:

- **0–24 hours**
  
  Phase A: The instance earns 120 launch CPU credits after being started. The initial CPU usage is 0% and the CPU credits continue to accrue until they reach the maximum value at hour 24.

  At the end of this phase, the available CPU credits reach 984.

  Available CPU credits (984) = Launch CPU credits (120) + Maximum CPU credit balance (864)

- **25–48 hours**
  
  1. Phase B: The CPU usage is 15%, which is equal to the baseline performance. Launch CPU credits are preferentially used and will not be recovered after
being used up. The instance consumes 36 CPU credits per hour when it starts to run.

At the end of this phase, the available CPU credits reach 864.

Available CPU credits (864) = CPU credits at the end of phase A (984) – Launch CPU credits (120)

2. Phase C: The CPU usage is 15%, which is equal to the baseline performance. The instance earns the same CPU credits as it consumes and the CPU credit balance remains unchanged.

At the end of this phase, the CPU credit balance reaches the maximum value 864.

3. Phase D: The CPU usage is 5%. Although the CPU usage is lower than the baseline performance, the CPU credit balance has reached the upper limit and remains unchanged.

At the end of this phase, the CPU credit balance reaches the maximum value 864.

4. Phase E: The instance runs at full capacity and consumes 240 CPU credits per hour. The baseline performance cannot meet requirements, and the instance starts to consume CPU credits accrued in the CPU credit balance.

At the end of this phase, the CPU credit balance is used up.

5. Phase F: The instance runs at full capacity and consumes 240 CPU credits per hour. The baseline performance cannot meet requirements, and the instance starts to consume advance CPU credits. For more information, see #unique_128/unique_128_Connect_42_section_v1t_6rl_7h3.

At the end of this phase, all of the 864 advance CPU credits are used up.

6. Phase G: The instance runs at full capacity and consumes 240 CPU credits per hour. The advance CPU credits are used up and the instance starts to consume overdrawn CPU credits, which incur additional fees. For more information, see #unique_128/unique_128_Connect_42_section_v1t_6rl_7h3.

At the end of this phase, the available CPU credits remain unchanged and the instance overdraws 864 CPU credits.
- 48–72 hours

**Phase H:** The CPU usage is 0%. The earned CPU credits are first used to pay down the advance CPU credits until the advance CPU credits are cleared at hour 72.

At the end of this phase, the advance CPU credits are recovered and the CPU credit balance remains at 0.

- 73–96 hours

**Phase I:** The CPU usage is 0%. The instance is idle for 24 hours and earns 36 CPU credits per hour. All of the earned CPU credits are accrued in the CPU credit balance until the CPU credit balance reaches the maximum value at hour 96.

At the end of this phase, the CPU credit balance reaches the maximum value 864.

### 4.12.4 Billing

This topic describes the billing methods of a burstable performance instance. The performance of a burstable performance instance is governed by its CPU credits. Specifically, the CPU credits allow you to control the cost of an instance. If your instance consumes additional CPU credits, additional fees may be incurred. Therefore, the price of a burstable performance instance comprises of the instance purchase fee and additional fees.

**Instance purchase fee**

Burstable performance instances support the Pay-As-You-Go and Subscription billing methods. For information about how the billing methods compare with each other, see [unique_116](#unique_116).

For the price of a burstable performance instance, see *Pricing*.

A burstable performance instance can be a preemptible instance. For more information, see *Overview*.

After creating a Pay-As-You-Go instance, you can purchase a Reserved Instance (RI) and use it to generate a billing discount. An RI is a discount coupon with specific attributes. For more information, see *Reserved instance overview*. The following limitations apply if you use RIs for a burstable performance instance:

- You can only purchase zonal RIs.
- You cannot merge, split, or change the scope of RIs.
- RIs do not match preemptible instances.
Impact of performance modes on billing

The following table describes how the performance mode affects the billing of a burstable performance instance.

<table>
<thead>
<tr>
<th>Performance mode</th>
<th>Instance purchase fee</th>
<th>Additional fee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard mode</td>
<td>The fee is determined by the billing method, not the performance mode. For more information, see <em>Instance purchase fee</em>.</td>
<td>None</td>
</tr>
</tbody>
</table>
The fee is determined by the billing method, not the performance mode. For more information, see `Instance purchase fee`.

If your instance consumes additional CPU credits, you may need to pay additional fees:

- Overdrawn CPU credits are billed by hour.
- If you use advance CPU credits and switch to the standard mode before the advance CPU credits are cleared, a one-off fee is charged for the advance CPU credits and the current CPU credit balance remains unchanged.
- If you use advance CPU credits and stop or release the instance before the advance credits are cleared, a one-off fee is charged for the advance CPU credits. Stopping an instance affects the CPU credits. For more information, see `#unique_128/unique_128_Connect_42_section_n3h_act_eb7`.

The following table describes how fees are collected in unlimited mode.

<table>
<thead>
<tr>
<th>Region</th>
<th>Windows instance (USD/CPU credit)</th>
<th>Linux instance (USD/CPU credit)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mainland China</td>
<td>0.0008</td>
<td>0.0008</td>
</tr>
</tbody>
</table>
Price comparison between burstable performance instances and enterprise-level instances

Overdrawn CPU credits only take effect in unlimited mode. If a burstable performance instance uses excess overdrawn CPU credits, the total price of the instance may equal or exceed enterprise-level instances of equivalent configurations. For more information, see #unique_128/unique_128_Connect_42_section_v1t_6rl_7h3.

Note:
The following description uses instance prices on April 30th, 2019 for example. For the latest prices, see Pricing.

The following figure compares the price of a burstable performance instance ecs.t5-lc1m2.large with an enterprise-level instance ecs.c5.large. Both the instances have two vCPUs and 4 GiB memory. The ecs.t5-lc1m2.large instance uses overdrawn CPU credits.

In the preceding figure, the hourly price is calculated based on the purchase fee of ecs.t5-lc1m2.large (10% baseline performance) and the fee of overdrawn CPU credits.
credits (Linux instance in China Beijing). The formula is the same for different instance types but the CPU usage threshold may vary.

The price of the two instances varies according to the following scenarios:

- If the average CPU usage is lower than 62.08%, ecs.t5-lc1m2.large costs less.
- If the average CPU usage equals 62.08%, the two instances cost the same.
- If the average CPU usage is higher than 62.08%, the ecs.c5.large instance costs less.

Note:
If you can accurately estimate the performance requirements of your instances, you may choose an appropriate instance type based on the CPU usage threshold. This helps you achieve high performance at a low cost.

The following figures show how the price change trend of several best-selling burstable performance instances. For the price change trends of other instance types, open a ticket.
Elastic Compute Service

Instance / 4 Instance type families

Issue: 20200109
4.12.5 Manage performance modes of a burstable performance instance

This topic describes how to query the performance mode of a burstable performance instance and switch between performance modes. A burstable performance instance can run in either the standard or unlimited mode. You can switch between performance modes by enabling or disabling the selected mode at any time.

Background information

In standard mode, if an instance has no remaining CPU credits, its CPU usage will not burst above the baseline performance. However, in unlimited mode, an instance can use advance or overdrawn CPU credits to maintain high CPU usage whenever required, but this may incur additional fees. For more information, see Unlimited mode.

- By default, the standard mode is enabled at instance creation.
- If a burstable performance instance is in the Stopped status and the No fees for stopped instances (VPC-Connected) feature is enabled, the instance enters the standard mode by default after it is started.
- If a burstable performance instance is in the Stopped status and the No fees for stopped instances (VPC-Connected) feature is not enabled, the performance...
mode used before the instance is stopped continues to take effect after the instance is started.

- If your account has an overdue payment, the unlimited mode will be automatically disabled and will not be enabled until you clear the overdue payment.

Query the performance mode of a burstable performance instance

1. Find the target instance and click the instance ID.
2. In the Basic Information area, view Instance Type.
   - Standard indicates that the instance is in standard mode.
   - Unlimited indicates that the instance is in unlimited mode.

Enable the unlimited mode

Before enabling the unlimited mode, ensure that:

- The instance is in the Running status.
- The standard mode is enabled.

1. Find the target instance and click the instance ID.
2. In the Basic Information area, choose More > Enable Unlimited Mode.
3. In the displayed Enable Unlimited Mode dialog box, click OK.

Disable the unlimited mode

Before disabling the unlimited mode, ensure that:

- The instance is in the Running status.
- The unlimited mode is enabled.

1. Find the target instance and click the instance ID.
2. In the Basic Information area, choose More > Disable Unlimited Mode.
3. In the displayed Disable Unlimited Mode dialog box, click OK.

4.12.6 Monitor burstable instances

This topic describes how to query the CPU usage and credits of a burstable instance (t5) in the ECS console, and how to set CPU credit alert rules in the CloudMonitor console.

Prerequisites
To set the contacts who receive notifications, you must create a contact group in advance. For more information about how to create a contact group, see the following topic in CloudMonitor documentation: #unique_139.

Context

Changes to the CPU credits of a burstable instance directly affect the CPU usage and load performance of the instance. You can set monitoring alert rules for one or more burstable instances in the CloudMonitor console. The following items can be monitored: CPU credit consumption, CPU credit balance, overdrawn CPU credits, and advance CPU credits. The following table describes the monitoring metrics of CPU credits for burstable instances.

<table>
<thead>
<tr>
<th>Monitoring metric</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Burstable Instance-CPU Credit Consumption</td>
<td>Displays changes in CPU credit consumption. Consumption trends are consistent with CPU usage. For more information, see Consume CPU credits.</td>
</tr>
<tr>
<td>Burstable Instance-CPU Credit Balance</td>
<td>Displays changes in CPU credit balance. The CPU credit balance is used to maintain CPU credit usage. For more information, see Earn CPU credits.</td>
</tr>
<tr>
<td>Burstable Instance-Overdrawn CPU Credits</td>
<td>Displays changes in overdrawn CPU credits. Overdrawn CPU credits can be used only when the unlimited mode is enabled. For more information, see Unlimited mode.</td>
</tr>
<tr>
<td>Burstable Instance-Advance CPU Credits</td>
<td>Displays changes in advance CPU credits. Advance CPU credits can be used only when the unlimited mode is enabled. For more information, see Unlimited mode.</td>
</tr>
</tbody>
</table>

Query CPU credit use information

You can perform the following steps to query the real-time credit trend of a burstable instance in the ECS console.

1. Log on to the ECS console.
2. In the left-side navigation pane, choose Instances & Images > Instances.
3. In the top navigation bar, select a region.
4. Find the burstable instance that you want to query and click its instance ID.
5. On the Instance Details page that appears, view the CPU credit use and CPU usage information of the instance.

Create CPU credit alert rules

You can perform the following steps to create alert rules for Burstable Instance-CPU Credit Balance and Burstable Instance-Overdrawn CPU Credits in the CloudMonitor console. Two modes are available: standard and unlimited.

- In standard mode, if a burstable instance does not have any available CPU credits, the CPU usage cannot exceed the baseline performance. When the Burstable Instance-CPU Credit Balance item is monitored, you can receive notifications when the instance performance is limited to decide whether to enable the unlimited mode.

- In unlimited mode, if a burstable instance has consumed all of its advance credits, overdrawn CPU credits are consumed and billed on an hourly basis. This ensures that the CPU usage exceeds the baseline performance. When the Burstable Instance-Overdrawn CPU Credits item is monitored, you can receive notifications when overdrawn CPU credits are billed to decide whether to disable the unlimited mode.

1. Log on to the CloudMonitor console.

2. In the left-side navigation pane, choose Alarms > Alarm Rules.


4. On the Create Alarm Rule page, complete the following configuration:

   a) Configure parameters in the Related Resource section.

      - Product: Set the parameter to ECS.
      - Resource Range: Set the parameter to Instances.
      - Instances: Select one or more burstable instances.

   b) Configure parameters in the Set Alarm Rules section.

      - Alarm Rule: Enter an alert rule name.
      - Rule Description: Set alert rules and judgment standards.

          - Monitoring of Burstable Instance-CPU Credit Balance: Select Burstable Instance-CPU Credit Balance. This example uses the values of 1Minute cycle, 1 periods, Average, <, and 1. If the average value of Burstable
Instance-CPU Credit Balance is less than 1 and lasts for at least 1 minute, an alert is triggered.

Note:
In standard mode, if the CPU credit balance is less than 1, the CPU usage of the burstable instance cannot exceed the baseline performance. In unlimited mode, if the CPU usage exceeds the baseline performance, the burstable instance will consume advance credits. If all advance credits are consumed, the burstable instance will consume overdrawn CPU credits. You can also configure the average value for multiple consecutive periods as the alert triggering condition based on your actual requirements on CPU performance.

- Monitoring of Burstable Instance-Overdrawn CPU Credits: Select Burstable Instance-Overdrawn CPU Credits. This example uses the values of 1Minute cycle, 1 periods, Average, >, and 0. If the average value of Burstable Instance-Overdrawn CPU Credits is greater than 0 and lasts for at least 1 minute, an alert is triggered.

Note:
If the value of Burstable Instance-Overdrawn CPU Credits is greater than 0, it indicates that overdrawn CPU credits are being used and billed. You can also configure the average value for multiple consecutive periods...
as the alert triggering condition based on your actual requirements on billing of overdrawn CPU credits.

- Monitoring of Burstable Instance-CPU Credit Consumption: Select Burstable Instance-CPU Credit Consumption.
- Monitoring of Burstable Instance-Advance CPU Credits: Select Burstable Instance-Advance CPU Credits.
  
  • Mute for: Select the interval at which notifications are pushed. This example uses the value of 10 minute.
  
  • Effective Period: Select the time range during which you can receive notifications.

c) Configure parameters in the Notification Method section.

  • Notification Contact: Select a contact group to receive notifications.
  
  • Notification Methods: Select Text Message + Email + DingTalk Chatbot (Warning) or other methods as needed.

5. Click Confirm.

What's next

Enable or disable the unlimited mode

Related topics

#unique_140
#unique_141

4.12.7 View bills of a burstable performance instance

This topic describes how to view the bills of a burstable performance instance that uses overdrawn CPU credits.

Procedure

1. Log on to the ECS console.

2. In the left-side navigation pane, choose Instances & Images > Instances.

3. Find the target instance and click the instance ID.
4. In the Payment Information area, choose More > View Fees.

5. On the Bills page, click Detail in the Actions column of the target instance.

6. In the Summary of billing items area, view SurplusCredit.

You can also view SurplusCredit in the Cost details area to check the cost details of a single purchase.
### 4.13 Entry-level (shared) instance families

This topic describes the last-generation entry-level instance families: xn4, n4, mn4, and e4. This topic also includes information about the instance types that belong to the instance families.

**Last-generation entry-level instance families**

**Common features of xn4, n4, mn4, and e4:**

- 2.5 GHz Intel Xeon E5-2682 v4 (Broadwell) processors
- DDR4 memory
- Flexible CPU-to-memory ratio

<table>
<thead>
<tr>
<th>Instance family</th>
<th>Feature</th>
<th>vCPU-to-memory ratio</th>
<th>Scenario</th>
</tr>
</thead>
<tbody>
<tr>
<td>xn4</td>
<td>Compact type</td>
<td>1:1</td>
<td>- Frontend web applications</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Lightweight applications and microservices</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Applications for development or testing environments</td>
</tr>
<tr>
<td>n4</td>
<td>Compute type</td>
<td>1:2</td>
<td>- Websites and web applications</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Development environments, servers, code repositories, microservices,</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- and testing and staging environments</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Lightweight enterprise applications</td>
</tr>
</tbody>
</table>
The following table describes the instance types that belong to the xn4 instance family and the specifications of these instance types.

<table>
<thead>
<tr>
<th>Instance family</th>
<th>Feature</th>
<th>vCPU-to-memory ratio</th>
<th>Scenario</th>
</tr>
</thead>
<tbody>
<tr>
<td>mn4</td>
<td>Balanced type</td>
<td>1:4</td>
<td>• Websites and web applications</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Lightweight databases and caches</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Integrated applications and lightweight enterprise services</td>
</tr>
<tr>
<td>e4</td>
<td>Memory type</td>
<td>1:8</td>
<td>• Applications that require large volumes of memory</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Lightweight databases and caches</td>
</tr>
</tbody>
</table>

The following table describes the instance types that belong to the xn4 instance family and the specifications of these instance types.

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPUs</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>Bandwidth (inbound and outbound, Gbit/s)</th>
<th>Packet forwarding rate (inbound and outbound, 10,000 PPS)</th>
<th>IPv6 support</th>
<th>NIC queues</th>
<th>ENIs (including one primary ENI)</th>
<th>Private IP addresses of a single ENI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs. xn4. small</td>
<td>1</td>
<td>1.0</td>
<td>N/A</td>
<td>0.5</td>
<td>5</td>
<td>No</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>
The following table describes the instance types that belong to the n4 instance family and the specifications of these instance types.

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPUs</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>Bandwidth (inbound and outbound, Gbit/s)</th>
<th>Packet forwarding rate (inbound and outbound, 10,000 PPS)</th>
<th>IPv6 support</th>
<th>NIC queues</th>
<th>ENIs (including one primary ENI)</th>
<th>Private IP addresses of a single ENI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs.n4. small</td>
<td>1</td>
<td>2.0</td>
<td>N/A</td>
<td>0.5</td>
<td>5</td>
<td>No</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>ecs.n4. large</td>
<td>2</td>
<td>4.0</td>
<td>N/A</td>
<td>0.5</td>
<td>10</td>
<td>No</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>ecs.n4. xlarge</td>
<td>4</td>
<td>8.0</td>
<td>N/A</td>
<td>0.8</td>
<td>15</td>
<td>No</td>
<td>1</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>ecs.n4. 2xlarge</td>
<td>8</td>
<td>16.0</td>
<td>N/A</td>
<td>1.2</td>
<td>30</td>
<td>No</td>
<td>1</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>ecs.n4. 4xlarge</td>
<td>16</td>
<td>32.0</td>
<td>N/A</td>
<td>2.5</td>
<td>40</td>
<td>No</td>
<td>1</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>ecs.n4. 8xlarge</td>
<td>32</td>
<td>64.0</td>
<td>N/A</td>
<td>5.0</td>
<td>50</td>
<td>No</td>
<td>1</td>
<td>2</td>
<td>6</td>
</tr>
</tbody>
</table>

**Note:**

- You can go to the *ECS Instance Types Available for Each Region page* to view the instance types available in each region.
- For more information about the specifications in the table, see *Instance specification metrics.*
The following table describes the instance types that belong to the mn4 instance family and the specifications of these instance types.

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPUs</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>Bandwidth (inbound and outbound, Gbit/s)</th>
<th>Packet forwarding rate (inbound and outbound, 10,000 PPS)</th>
<th>IPv6 support</th>
<th>NIC queues</th>
<th>ENIs (including one primary ENI)</th>
<th>Private IP addresses of a single ENI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs. mn4. small</td>
<td>1</td>
<td>4.0</td>
<td>N/A</td>
<td>0.5</td>
<td>5</td>
<td>No</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>ecs. mn4. large</td>
<td>2</td>
<td>8.0</td>
<td>N/A</td>
<td>0.5</td>
<td>10</td>
<td>No</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>ecs. mn4. xlarge</td>
<td>4</td>
<td>16.0</td>
<td>N/A</td>
<td>0.8</td>
<td>15</td>
<td>No</td>
<td>1</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>ecs. mn4. 2xlarge</td>
<td>8</td>
<td>32.0</td>
<td>N/A</td>
<td>1.2</td>
<td>30</td>
<td>No</td>
<td>1</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>ecs. mn4. 4xlarge</td>
<td>16</td>
<td>64.0</td>
<td>N/A</td>
<td>2.5</td>
<td>40</td>
<td>No</td>
<td>1</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>ecs. mn4. 8xlarge</td>
<td>32</td>
<td>128.0</td>
<td>N/A</td>
<td>5</td>
<td>50</td>
<td>No</td>
<td>2</td>
<td>8</td>
<td>6</td>
</tr>
</tbody>
</table>

**Note:**

- You can go to the *ECS Instance Types Available for Each Region* page to view the instance types available in each region.
- For more information about the specifications in the table, see *Instance specification metrics*. 
The following table describes the instance types that belong to the e4 instance family and the specifications of these instance types.

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPUs</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>Bandwidth (inbound and outbound, Gbit/s)</th>
<th>Packet forwarding rate (inbound and outbound, 10,000 PPS)</th>
<th>IPv6 support</th>
<th>NIC queues</th>
<th>ENIs (including one primary ENI)</th>
<th>Private IP addresses of a single ENI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs.e4. small</td>
<td>1</td>
<td>8.0</td>
<td>N/A</td>
<td>0.5</td>
<td>5</td>
<td>No</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>ecs.e4. large</td>
<td>2</td>
<td>16.0</td>
<td>N/A</td>
<td>0.5</td>
<td>10</td>
<td>No</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>ecs.e4. xlarge</td>
<td>4</td>
<td>32.0</td>
<td>N/A</td>
<td>0.8</td>
<td>15</td>
<td>No</td>
<td>1</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>ecs.e4. 2xlarge</td>
<td>8</td>
<td>64.0</td>
<td>N/A</td>
<td>1.2</td>
<td>30</td>
<td>No</td>
<td>1</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>ecs.e4. 4xlarge</td>
<td>16</td>
<td>128.0</td>
<td>N/A</td>
<td>2.5</td>
<td>40</td>
<td>No</td>
<td>1</td>
<td>8</td>
<td>6</td>
</tr>
</tbody>
</table>

Note:

- You can go to the ECS Instance Types Available for Each Region page to view the instance types available in each region.
- For more information about these specifications in the table, see Instance specification metrics.

References

- Instance families
- Create an instance by using the provided wizard
5 Instance purchasing options

5.1 Subscription

This topic describes the billing rules for subscription ECS resources. Subscription is a billing method that allows you to use resources only after payment for them is received. With subscription, you can reserve resources in advance and reduce your costs with the discounted rates.

Overview

Before using subscription resources, you must create a subscription ECS instance. The following figure shows subscription durations you can choose for your ECS instance.

<table>
<thead>
<tr>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Month</td>
</tr>
<tr>
<td>2 Months</td>
</tr>
<tr>
<td>3 Months</td>
</tr>
<tr>
<td>6 Months</td>
</tr>
<tr>
<td>1 Year</td>
</tr>
</tbody>
</table>

During instance creation, resources are charged separately to generate the total price. You can use subscription resources only after you pay the total price. For information about how prices are calculated, see Billing.

After creating a subscription instance, you can change its specifications or resize subscription cloud disks attached to it. For more information, see Overview of instance upgrade and downgrade and #unique_145.

After a billing cycle expires, you can renew your ECS instance to continue using the resources. For more information, see Renewal overview.

Applicable resources

Currently, subscription-based billing is available for the following ECS resources:

- ECS instances
- Images
- Disks
- Internet bandwidth (Pay-By-Bandwidth)

In addition to the instance type, you must also configure the block storage, image, and network type when you create an instance. The images and cloud disks created...
along with the subscription ECS instance also use subscription-based billing. However, you can select the billing method for network usage.

**Note:**
After creating a subscription ECS instance, you can create subscription cloud disks for the instance or attach separately created pay-as-you-go cloud disks to it. For more information, see #unique_146 and #unique_118.

You can view the total price of the preceding resources in the lower left part of the instance creation page.

<table>
<thead>
<tr>
<th>Duration: 1 Month</th>
<th>Total: $XXX USD</th>
<th>+</th>
<th>Marketplace Image Fees: $XX USD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bandwidth: 1Mbps Pay-By-Bandwidth</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In the preceding figure,

- Total price is the price of the following resources:
  - ECS instances
  - Disks
  - Internet bandwidth (Pay-By-Bandwidth)

**Note:**
If you select Pay-By-Traffic as the billing method for network usage, the total price does not include the price for Internet bandwidth. For more information, see #unique_147.

- Image Fees indicates that you selected a paid image when creating the instance.

You can use the ECS TCO Calculator to quickly analyze your cloud migration costs.

**Billing**

The billing cycle is the time commitment you made when you purchased the subscription instance (based on UTC+8:00). The cycle starts from the time when the purchased subscription resources are activated or renewed (accurate to seconds) and ends at 00:00:00 the next day after the expiration date.

For example, you created a subscription ECS instance at 13:00:00 on August 9, 2019. Related resources include the ECS instance, image, and cloud disk (system disk). You select a subscription duration of one month and manually renew the instance with another one-month commitment. The billing cycles are as follows:
- The first billing cycle is from 13:00:00 on August 9, 2019 to 00:00:00 on September 10, 2019.
- The second billing cycle is from 00:00:00 on September 10, 2019 to 00:00:00 on October 10, 2019.

ECS resources are charged separately. You must pay these fees before you can use the resources. You can calculate the total price based on the configurations you choose. The following table provides the formulas used to calculate the fee of each ECS resource.

<table>
<thead>
<tr>
<th>Resource</th>
<th>Formula</th>
<th>Unit price</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECS instances</td>
<td>Unit price of an instance type × Subscription duration</td>
<td>For more information, see Instance Fee on <a href="#">ECS Pricing</a></td>
</tr>
<tr>
<td>Images</td>
<td>Image unit price × Subscription duration</td>
<td>You can view the price on the purchase page and in the Alibaba image marketplace.</td>
</tr>
<tr>
<td>Cloud disks (system disks)</td>
<td>Disk unit price × Disk capacity × Subscription duration</td>
<td>For more information, see Storage Fee &gt; System Disk on <a href="#">ECS Pricing</a></td>
</tr>
</tbody>
</table>

Note:
- Local disks attached to an instance are billed together with the instance.
- The price for a pay-as-you-go disk on the page is USD/100 GiB/hour. Divide it by 100 to obtain the unit price per GiB.
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<table>
<thead>
<tr>
<th>Resource</th>
<th>Formula</th>
<th>Unit price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cloud disks (data disks)</td>
<td>Disk unit price × Disk capacity × Subscription duration</td>
<td>For more information, see Storage Fee &gt; Data Disk on ECS Pricing.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Note: The price for a pay-as-you-go disk on the page is USD/100 GiB/hour. Divide it by 100 to obtain the unit price per GiB.</td>
</tr>
<tr>
<td>Internet bandwidth (Pay-By-Bandwidth)</td>
<td>Bandwidth unit price × Bandwidth value × Subscription duration</td>
<td>Fixed bandwidth uses the tiered billing method. You can select a bandwidth value on the purchase page to view the changes in fees.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>For more information, see #unique_147.</td>
</tr>
</tbody>
</table>

The following figure shows the procedure for calculating the price of a subscription ECS instance that is created in China (Qingdao) with a subscription duration of three months.

Note:
The price is for reference only. For the exact price, visit the links provided in the preceding table.

![Subscription instance in China (Qingdao)](image-url)
Changes in resource status after expiration

If the auto renewal function is not enabled, the instance stops providing services at any time from 00:00:00 of the expiration date to 00:00:00 the next day.

Note:
You cannot enable auto renewal for an expired subscription ECS instance.

The following table describes the resource status after the instance expires.

<table>
<thead>
<tr>
<th>Resource</th>
<th>Within 15 days after expiration</th>
<th>More than 15 days after expiration</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECS instances</td>
<td>The ECS instance is retained but it cannot be used.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Note: After the instance stops providing services, you cannot connect to the instance remotely, or access websites deployed on the instance. Service errors will occur.</td>
<td>The ECS instance is released.</td>
</tr>
<tr>
<td>Images</td>
<td>Images are unavailable.</td>
<td>Images are unavailable.</td>
</tr>
<tr>
<td>Block storage</td>
<td>• Cloud disks and data on them are retained, but the cloud disks cannot be used.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Local disks and data on them are retained, but the local disks cannot be used.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Share Block Storage devices and data on them are retained, but the devices cannot be used.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Note: If you manually attach a pay-as-you-go cloud disk to the subscription instance and set the release mode to &quot;not release with instance&quot;, the pay-as-you-go cloud disk stops working.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Subscription disks are released and data on them cannot be restored.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Local disks are released and data on them cannot be restored.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Shared Block Storage devices are automatically detached.</td>
<td></td>
</tr>
</tbody>
</table>
If you have enabled the auto renewal function for your subscription ECS instance but the renewal fails, the instance automatically stops operating at any time from 00:00:00 on the 15th day after expiration to 00:00:00 on the 16th day after expiration.

The following table describes the resource status after the instance expires.

<table>
<thead>
<tr>
<th>Resource</th>
<th>Within 15 days after expiration</th>
<th>More than 15 days after expiration</th>
<th>More than 30 days after expiration</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECS instances</td>
<td>The instance is retained and working properly.</td>
<td>The ECS instance is retained but it cannot be used.</td>
<td>The ECS instance is released.</td>
</tr>
<tr>
<td>Images</td>
<td>Images are available.</td>
<td>Images are unavailability.</td>
<td>Images are unavailability.</td>
</tr>
</tbody>
</table>

Note: When the instance works properly, you can start or stop the instance, and connect to the instance remotely or by using the management terminal of the ECS console.

Note: After the instance becomes unavailable, you cannot connect to the instance remotely, or access websites deployed on the instance. Service errors will occur.
<table>
<thead>
<tr>
<th>Resource</th>
<th>Within 15 days after expiration</th>
<th>More than 15 days after expiration</th>
<th>More than 30 days after expiration</th>
</tr>
</thead>
</table>
| Block storage     | • Cloud disks and data on them are retained. The cloud disks can work properly.  
• Local disks and data on them are retained. The local disks can work properly.  
• Share Block Storage devices and data on them are retained. The devices can work properly.  
|                   | • Cloud disks and data on them are retained, but the cloud disks cannot be used.  
• Local disks and data on them are retained, but the local disks cannot be used.  
• Share Block Storage devices and data on them are retained, but the devices cannot be used.  
|                   | • Subscription disks are released and data on them cannot be restored.  
|                   | Note: If you manually attach a pay-as-you-go cloud disk to the subscription instance and set the release mode to "not release with instance", the pay-as-you-go cloud disk stops working.  
• Local disks are released and data on them cannot be restored.  
• Shared Block Storage devices are automatically detached.  
| Public IP addresses | • Instances in classic networks: Fixed public IP addresses are retained.  
• Instances in a VPC  
  - Fixed public IP addresses are retained.  
  - The EIP associated with the instance is not affected.  
|                   | • Instances in classic networks: Fixed public IP addresses are retained.  
• Instances in a VPC  
  - Fixed public IP addresses are retained.  
  - The EIP associated with the instance is not affected.  
|                   | • Instances in classic networks: Fixed public IP addresses are released.  
• Instances in a VPC  
  - Fixed public IP addresses are released.  
  - The EIP is disassociated from the instance.  

5.2 Pay-as-you-go

This topic describes the billing and settlement rules for pay-as-you-go ECS resources. Pay-as-you-go allows you to pay for the amount of resources you actually use. You can purchase and release resources on demand, and scale up as your business grows. Pay-as-you-go helps reduce your costs by 30% to 80% compared with the investment of a traditional host.

Overview

Pay-as-you-go resources are billed based on the billing cycle and paid each hour. If you have a quota agreement with Alibaba Cloud, fees are deducted when the cumulative consumption of your account exceeds the quota. You must settle the payment at least once a month.

After creating a pay-as-you-go ECS resource, you can change its configurations. For more information, see Change configurations of Pay-As-You-Go instances and Change the Internet bandwidth of a pay-as-you-go instance.

You can change the billing method of pay-as-you-go ECS resources you created. For more information, see Switch the billing method from Pay-As-You-Go to Subscription.

You can view your bills by using the following methods:

- To view the fee calculation method, see Billing.
- To understand how ECS resource status affects the billing duration, see Billing duration.

Note:

If you stop an ECS instance but do not release related resources, fees continue to generate.

- For information about settlement, see Settlement period.

Applicable resources

Currently, the pay-as-you-go billing method is available for the following ECS resources:

- ECS instance
- Images
- Disks
• Internet bandwidth (Pay-By-Bandwidth)
• Snapshots

In addition to the instance type, you must also configure the block storage, image, and network type when you create an instance. The images and cloud disks created along with the pay-as-you-go ECS instance also use the pay-as-you-go billing method. However, you can select the billing method for network usage.

Note:
After creating a pay-as-you-go ECS instance, you can attach a separately created pay-as-you-go cloud disk to the instance. For more information, see #unique_118.

Snapshots start to incur fees after you create them.

You can view the total price of the preceding resources in the lower left part of the instance creation page.

| Bandwidth: 1Mbps Pay-By-Bandwidth | Total: $USD per Hour | + Marketplace Image Fees: $USD per Hour |

Billing duration

If a pay-as-you-go ECS instance is out of service due to overdue payment, the billing of its resources is suspended. The billing resumes after you settle the overdue payment and reactivate the instance.

The following table describes the billing duration of each resource type on the prerequisite that you have no overdue payments.
### Resource | Billing duration
--- | ---
ECS instance | The billing duration is affected by the network type of the instance.
  - For an ECS instance in a classic network, billing starts when the instance is created and stops when the instance is released.
  - For an ECS instance in a VPC, the billing duration depends on whether the No fees for stopped VPC instances feature is enabled.
    - If this feature is not enabled, billing starts when the instance is created and stops when the instance is released.
    - If this feature is enabled, billing starts when the instance is created or is restarted in the ECS console and stops when the instance is stopped by using the ECS console or when the instance is released. For more information, see #unique_150.

Notice:
If you stop the instance by switching off its operating system, you cannot enjoy the benefits provided by the No fees for stopped VPC instances feature.

You can purchase reserved instances to reduce your costs. For more information, see Reserved instance overview.

Images | The billing starts when the instance is created and stops when the instance is released.
Cloud disks (system disks) | The billing starts when the instance is created and stops when the instance is released.
Cloud disks (data disks) | The billing starts when the data disk is created and stops when the data disk is released.
Internet bandwidth (Pay-By-Bandwidth) | The billing starts when Internet bandwidth (Pay-By-Bandwidth) is enabled and stops when Internet bandwidth is disabled or the ECS instance is released.
  For information about how to disable Internet bandwidth, see Change the Internet bandwidth of a pay-as-you-go instance.
Snapshots | The billing starts when a snapshot is created and stops when the snapshot is deleted.
Note:
If the fee for a pay-as-you-go ECS instance is less than USD 0.01 for the entire lifecycle of the instance, USD 0.01 is charged.

To avoid unexpected fees incurred when the active duration is exceeded, we recommend that you enable the automatic release feature. If automatic release is enabled, the billing stops when the resources are released. The stop time is accurate to seconds.

Billing

Pay-as-you-go ECS resources start to generate fees after being created. The resources are billed separately. You can calculate the total fee you need to pay for a certain period of time based on the configurations you choose. The following table describes the billing cycle of each ECS resource and the formula used to calculate their fees.

<table>
<thead>
<tr>
<th>Resource</th>
<th>Billing cycle</th>
<th>Formula</th>
<th>Unit price</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECS instance</td>
<td>Second</td>
<td>Unit price of the instance type × Billing duration</td>
<td>For more information, see Instance Fee on ECS Pricing.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Images</td>
<td>Second</td>
<td>Image unit price × Billing duration</td>
<td>You can view the price on the purchase page and in the Alibaba image marketplace.</td>
</tr>
<tr>
<td>Cloud disks (system disks)</td>
<td>Second</td>
<td>Disk unit price × Disk capacity × Billing duration</td>
<td>For more information, choose Storage Fee &gt; System Disk on ECS Pricing.</td>
</tr>
</tbody>
</table>

Note:
The price on the page is USD/100 GiB/hour. Divide it by 100 to obtain the unit price per GiB.
<table>
<thead>
<tr>
<th>Resource</th>
<th>Billing cycle</th>
<th>Formula</th>
<th>Unit price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cloud disks (data disks)</td>
<td>Second</td>
<td>Disk unit price × Disk capacity × Billing duration</td>
<td>For more information, choose Storage Fee &gt; Data Disk on ECS Pricing.</td>
</tr>
<tr>
<td>Internet bandwidth</td>
<td>Second</td>
<td>Bandwidth unit price × Bandwidth value × Billing duration</td>
<td>Tiered pricing is used for fixed bandwidth. You can select a bandwidth value on the purchase page to view the changes in fees.</td>
</tr>
<tr>
<td>Snapshots</td>
<td>Hour</td>
<td>Snapshot unit price × Snapshot capacity × Billing duration</td>
<td>For more information, see Snapshot Fee on ECS pricing.</td>
</tr>
</tbody>
</table>

**Note:**
- If the billing cycle is one second, the fee generated each second is added on to the bill. If an hourly price is displayed, you can divide the price by 3600 to obtain the price per second.
- If the billing cycle is one hour, the fee generated every hour is added on to the bill. A usage duration less than an hour is calculated as an hour.

Assume that you created a pay-as-you-go ECS instance in the China (Qingdao) region and the resource usage duration is from 11:00:00 to 12:00:00 on August 8, 2019. with a subscription duration of three months.

**Note:**
The price is only for reference. For the exact price, visit the links in the preceding table.
Settlement period

The fees for pay-as-you-go resources are paid each hour. These fees are paid together with the fees incurred by other postpaid products under your account. If you have a quota agreement with Alibaba Cloud, fees are deducted when the cumulative consumption of your account exceeds the quota. In the case that the cumulative monthly consumption of your account is less than the quota, fees are deducted on the first day of the following month.

- If your default payment method is bank card, the quota is USD 1,000.
- If your default payment method is PayPal or Paytm (India) account, the quota depends on your ECS resource usage.

Fee deduction occurs on three days: due date (T), T+7, and T+14. In fee deduction fails on the due date (T), the system attempts to deduct fees again on the day T+7 and day T+14. If fee deduction fails for these three times, the instance goes out of service on the day T+15.

The resource status changes as follows in the event of an overdue payment:

1. Within 15 days after the overdue payment, you can use existing ECS resources but cannot purchase new ECS instances, upgrade the instance, or renew the instance.

2. Within 15 days after the instance is out of service, you must submit a ticket to settle the overdue payment and then reactivate the instance. Otherwise, the instance will be automatically released. For information about resource status, see Resource status when an ECS instance is out of service.
3. More than 15 days after the instance is out of service, the pay-as-you-go ECS instances are released.

Resource status when an ECS instance is out of service

If all three deductions fail, the ECS instance is out of service. The following table describes the resource status if your ECS instance is out of service.

<table>
<thead>
<tr>
<th>Resource</th>
<th>Within 15 days after out-of-service</th>
<th>More than 15 days after out-of-service</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECS instance</td>
<td>The ECS instance is retained but it is out of service.</td>
<td>The ECS instance is released.</td>
</tr>
<tr>
<td></td>
<td>When a pay-as-you-go ECS instance is <em>Out of service</em>, it enters the Expired state and the billing</td>
<td></td>
</tr>
<tr>
<td></td>
<td>stops. After the instance stops providing services, you cannot remotely connect to the instance,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>or access websites deployed on the instance. Service errors will occur.</td>
<td></td>
</tr>
<tr>
<td>Images</td>
<td>Images are unavailable.</td>
<td>Images are unavailable.</td>
</tr>
</tbody>
</table>

Note:
If your ECS instance is released due to overdue payment, Alibaba Cloud will send you an email notification.
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<table>
<thead>
<tr>
<th>Resource</th>
<th>Within 15 days after out-of-service</th>
<th>More than 15 days after out-of-service</th>
</tr>
</thead>
</table>
| **Block storage**| · Cloud disks and data on them are retained, but the cloud disks cannot be used.  
                      · Local disks and data on them are retained, but the local disks cannot be used. | · Cloud disks are released and data on them cannot be restored.  
                      Note:  
                      Cloud disks (data disks) created with pay-as-you-go ECS instances and pay-as-you-go cloud disks (data disks) created separately on the Disks page of the ECS console are released, regardless whether they are attached to the instance.  
                      · Local disks are released and data on them cannot be restored.  
                      · Shared block storage devices are automatically detached, but data on them is retained. |
| **IP addresses**  | · Instances in classic networks: Fixed public IP addresses are retained.  
                      · Instances in a VPC  
                      - Fixed public IP addresses are retained.  
                      - The EIP associated with the instance is not affected. | · Instances in classic networks: Fixed public IP addresses are released.  
                      · Instances in a VPC  
                      - Fixed public IP addresses are released.  
                      - The EIP is disassociated from the instance. |
| **Snapshots**     | All snapshots are retained but automatic snapshots cannot be created. | All snapshots will be deleted except for those used to create cloud disks or custom images. |
5.3 Preemptible instances

5.3.1 Overview

Preemptible instances are a kind of on-demand instance. You can use this kind of instance to minimize ECS instance costs in a variety of scenarios.

Introduction

When you create a preemptible instance, you can set a maximum price per hour to bid for a specified instance type. If your bid is higher than or equal to the current market price, your instance is created and billed based on the current market price. After a preemptible instance is created, it can be used in the same way as a pay-as-you-go instance. You can also use it with other cloud products such as cloud disks or Elastic IP Address.

A preemptible instance has a guaranteed period of one hour after it is created during which it cannot be released due to insufficient resources. During this period, the instance can run services normally. After the guaranteed period is exceeded, the system will check the market price and resource stock of the instance every five minutes. If the market price exceeds your bid or if the instance type stock is insufficient, your preemptible instance will be released.

Note:

After an instance is released, its data cannot be recovered. We recommend that you create a snapshot for an instance to back up its data before the instance is released. For more information, see #unique_153.

The following figure shows the lifecycle of a preemptible instance.
After the guaranteed period is exceeded, your preemptible instance can be automatically released due to fluctuations in market prices or insufficient resources. After a preemptible instance is created, it can be manually released. For more information, see Release an instance.

When the market price exceeds your bid or when the instance type stock is insufficient, the instance will enter the to be recycled state. After five minutes, the instance is automatically released. By using the instance metadata or DescribeInstances to return OperationLocks, you can check whether the instance status becomes to be recycled.

Note:
You can call the API operation to view whether the instance enters the to be recycled state. You can also retain a small amount of data while you are waiting for
recycling. However, we recommend that your application is designed to function properly even though your preemptible instance is to be recycled soon. You can manually release the instance to check whether your application functions properly when the instance is to be recycled soon.

In most cases, the preemptible instances with the lowest bids are released first. If multiple preemptible instances have the same bid, the order in which the instances are terminated is randomly determined by the system.

For more information about the quota of the preemptible instance, see #unique_155.

Scenarios

Preemptible instances are ideal for stateless applications, such as scalable Web services, figure rendering, big data analysis, and massively parallel computing. In addition, applications that require a higher level of distribution, scalability, and fault tolerance capabilities, benefit from preemptible instances in terms of costs and throughput.

You can use preemptible instances for the following business:

- Real-time analysis
- Big data
- Geological surveys
- Image and media coding
- Scientific computing
- Scalable websites and Web crawlers
- Image and media coding
- Testing

Preemptible instances are not suitable for stateful applications, such as databases, because it is difficult to store application states if the instance is released because of a failed bid.

Price and billing

Preemptible instance price and billing considerations are as follows:
• Price

The preemptible instance price applies only to the instance type, including vCPUs and memory. Resources such as system disks, data disks, or network bandwidth are not included.

- System disks and data disks are billed on a pay-as-you-go basis. For more information, see Pay-as-you-go.
- Network bandwidth is billed based on the bandwidth billing rules of pay-as-you-go instances. For more information, see #unique_147.

• Market price

When you create a preemptible instance, it runs if your bid is higher than the current market price and the resource stock is sufficient.

For the first hour after the instance is created, the instance is billed based on the initial market price. After one hour, it is billed based on the market price in real time.

The market price of a preemptible instance fluctuates based on changes to the demand and supply for its instance type. We recommend that you pay attention to and evaluate the market price fluctuations to minimize computing costs and increase throughput when you purchase preemptible instances.

• Billing method

Preemptible instances are billed by second. Preemptible instances are billed hourly based on the market price. To obtain the price per second, you must divide the hourly price by 3,600.

The cost incurred by a preemptible instance from creation to release is accurate to two decimal places. Accrued costs of less than USD 0.01 are not charged.

• Billing duration

Instances are billed based on the actual period of use. The actual period of use is the duration from instance creation to instance release. After an instance is released, it is no longer billed. If you stop an instance by using StopInstance or through the ECS console, the instance continues to be billed. When a preemptible instance is no longer needed, we recommend that you create snapshots to back up your data and environment and then release the instance. You can purchase new preemptible instances as required.
Limits

Before you use preemptible instances, note that:

- Whether you can purchase a preemptible instance depends on your ECS instance resource usage.
- Preemptible instances cannot be converted to subscription instances.
- The types of preemptible instances cannot be modified.

References

- For more information about preemptible instances, see FAQs about ECS instances.
- For more information about how to call the API operation to create a preemptible instance, see #unique_156.

5.3.2 Create a preemptible instance

This topic describes how to create a preemptible instance and view its bills in the ECS console.

Prerequisites

The following requirements must be met before you create a preemptible instance:

- An appropriate bid has been made for the preemptible instance you want to purchase. For more information about an appropriate bid, see Overview.
- The image used for creating a preemptible instance must contain the configuration of all the required software. You can also use user data to run commands at instance startup. For more information, see User data.
- Applications that can withstand accidental instance release are set up.

Note:

You can run your applications on a Pay-As-You-Go instance and release the instance to verify whether your applications can properly handle automatic instance release.

Precautions

We recommend that you perform the following actions before you create a preemptible instance:

- To prevent any data loss caused by instance release, save important data in storage media such as separately created cloud disks, OSS, or RDS.
• Break down your jobs into small tasks by using grids, Hadoop, queue-based architecture, or checkpoints to save calculation results on demand.

• You can monitor the status of a preemptible instance by checking the instance release notifications issued by Alibaba Cloud ECS.

**Note:**
Alibaba Cloud ECS updates the instance metadata five minutes before releasing a preemptible instance. You can obtain the status of a preemptible instance every minute by checking the instance metadata.

Create a preemptible instance

1. On the Instances page, click Create Instance.
2. Set Billing Method to Preemptible Instance.
3. In the Maximum Price for Instance Type Per Instance area, type your bid in the text box.

**Note:**
• You can create a preemptible instance only if your bid is higher than the market price and the resource stock is sufficient.
• You can bid for a preemptible instance only once.
• The following two bidding modes are supported:
  - Use Automatic Bid: The real-time market price is used as the bidding price.
  - Set Custom Maximum Price (Per Instance/Hour): The highest price you are willing to pay for a specified instance type.

In the displayed price range, the highest price is the price for the Pay-As-You-Go instance of the same configuration. Your bid must be based on the displayed price range, your service needs, and the estimated future price fluctuation. If your bid takes into account the estimated future price fluctuation, you can hold the instance even after the one-hour guaranteed duration. Otherwise, your instance will be automatically released at any time after that duration.

4. Select or enter the quantity of instances you want to purchase.
5. Complete other settings.

For the description of other parameters, see Create an instance by using the provided wizard.
6. After the order is confirmed, click Create Instance.

After a preemptible instance is created, you can view its information in the instance list. A preemptible instance is marked as a Pay-As-You-Go-Preemptible Instance. On the Instance Details page, you can view the bidding policy configured during instance creation in the Payment Information area.

You can also create a preemptible instance by calling the `RunInstances` API action through Alibaba Cloud CLI, OpenAPI Explorer, or Alibaba Cloud SDK.

Note:

If you select the Use Automatic Bid bidding mode, set the `SpotStrategy` parameter in this API to `SpotAsPriceGo`. If you select the Set Custom Maximum Price (Per Instance/Hour) bidding mode, set this parameter to `SpotWithPriceLimit`.

View bills of a preemptible instance

Unlike Pay-As-You-Go instances, the price of a preemptible instance is the concluded price.

To view the bills of a preemptible instance on the Instance Details page, following these steps:

1. On the Instances page, click the ID of the target preemptible instance or click Manage in the Actions column.
2. On the Instance Details page, choose More > View Fees in the Payment Information area.
3. On the Bills page, click Detail in the Action column.

To view the bills of a preemptible instance on the Billing Management page, following these steps:

2. On the Billing Management page, choose Spending Summary > Instance Spending Details.
3. On the Instance Spending Details page, find the target preemptible instance and click Detail in the Action column.

Note:

You can filter instances by billing cycle, product name, and status.
5.3.3 Stop a preemptible instance

This topic describes how to stop a preemptible instance and whether it can start successfully after being stopped in different conditions.

Context

Only preemptible instances in a VPC support the #unique_150 feature. The network type, bidding mode, and stop mode of an instance combine to determine whether a preemptible instance can restart successfully. The following table provides the details.

<table>
<thead>
<tr>
<th>Network type</th>
<th>Bidding mode</th>
<th>Stop mode</th>
<th>Can the stopped instance be restarted?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classic network</td>
<td>SpotWithPriceLimit</td>
<td>Keep Stopped Instances and Continue Billing</td>
<td>During the guaranteed duration, the instance can be restarted successfully. However, after the guaranteed duration, the instance can only be restarted successfully if your bid is not lower than the market price and if the number of resources is sufficient.</td>
</tr>
<tr>
<td></td>
<td>SpotAsPriceGo</td>
<td>Keep Stopped Instances and Continue Billing</td>
<td>During the guaranteed duration, the instance can be restarted successfully. However, after the guaranteed duration, the instance cannot be restarted if the number of resources is insufficient.</td>
</tr>
<tr>
<td>VPC</td>
<td>SpotWithPriceLimit</td>
<td>Keep Stopped Instances and Continue Billing</td>
<td>During the guaranteed duration, the instance can be restarted successfully. However, after the guaranteed duration, the instance can only be restarted successfully if your bid is not lower than the market price and if the number of resources is sufficient.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Stop/Force Stop (no fees will be incurred if either of the options is selected)</td>
<td>During the guaranteed duration, the instance can be restarted successfully as long as the number of resources is sufficient. However, after the guaranteed duration, the instance can only be restarted successfully if your bid is not lower than the market price and if the number of resources is sufficient.</td>
</tr>
<tr>
<td>Network type</td>
<td>Bidding mode</td>
<td>Stop mode</td>
<td>Can the stopped instance be restarted?</td>
</tr>
<tr>
<td>--------------</td>
<td>--------------------</td>
<td>-----------------------------------------------</td>
<td>---------------------------------------------------------------------------</td>
</tr>
<tr>
<td>SpotAsPriceGo</td>
<td>Keep Stopped Instances and Continue Billing</td>
<td>Stop/Force Stop (no fees will be incurred if either of the options is selected)</td>
<td>During the guaranteed duration, the instance can be restarted successfully. However, after the guaranteed duration, the instance cannot be restarted if the number of resources is insufficient.</td>
</tr>
</tbody>
</table>

**Procedure**

1. Log on to the *ECS console*.
2. In the left-side navigation pane, choose Instances & Images > Instances.
3. On the Instances page, find the preemptible instance to be stopped. In the Actions column, choose More > Instance Status > Stop.
4. In the Stop Instance dialog box, click OK.

**Related topics**

#unique_161

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**5.4 Reserved Instances**

**5.4.1 Reserved instance overview**

A reserved instance is a discount coupon that can be applied automatically to one or more pay-as-you-go instances that belong to your account, excluding preemptible instances. A reserved instance also can be used to reserve instance resources. A combination of reserved instances and pay-as-you-go instances is more flexible and cost effective than subscription instances.
Release notes

The reserved instance feature has been formally released. You can purchase reserved instances on the ECS Reserved Instances page. For more information, see Purchase reserved instances.

Comparison between reserved instances, pay-as-you-go instances and subscription instances

The following table lists differences between reserved instances, pay-as-you-go instances and subscription instances.

<table>
<thead>
<tr>
<th>Item</th>
<th>Reserved instance</th>
<th>Pay-as-you-go instance</th>
<th>Subscription instance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Form</td>
<td>A discount coupon.</td>
<td>An instance using the Pay-as-you-go billing method, equivalent to a virtual machine.</td>
<td>An instance using the Subscription billing method, equivalent to a virtual machine.</td>
</tr>
<tr>
<td>Purpose</td>
<td>Reserved instances cannot be used independently. They must match pay-as-you-go instances to generate a discount.</td>
<td>Pay-as-you-go instances can be managed independently. They can be used as simple Web servers, or used in combination with other Alibaba Cloud services to deliver powerful solutions.</td>
<td>Subscription instances can be managed independently. They can be used as simple Web servers, or used in combination with other Alibaba Cloud services to deliver powerful solutions.</td>
</tr>
</tbody>
</table>

Payment options, terms, and instance count

When purchasing a reserved instance, you can specify the payment option, term, and count based on your budget.

- Three payment options are available:
  - All Upfront, Partial Upfront, and No Upfront. For more information, see Reserved instance billing.

Note:
Whether you can use the No Upfront payment option depends on your ECS instance resource usage.

- Reserved instances come in the following terms:
  1 year and 3 years.

Note:
After a reserved instance expires, the corresponding pay-as-you-go instances still run normally, but they will be billed without a discount.

- Instance count:

The number of pay-as-you-go instances that a reserved instance can match at the same time.

Reserved instance attributes

A reserved instance has specific attributes that allow it to automatically match corresponding pay-as-you-go instances. You can also split a reserved instance, merge multiple reserved instances, or change the scope of a reserved instance to better match pay-as-you-go instances. These attributes include:

- Operating system: Reserved instances can match pay-as-you-go instances running the Linux and Windows operating systems.

Note:
Windows reserved instances can be used to pay for image bills of pay-as-you-go instances.

- Instance type: the type of a reserved instance, which includes the instance family and instance size. A reserved instance can match pay-as-you-go instances of the same type.

- Scope: the matching scope of a reserved instance. In terms of matching scope, reserved instances are classified into regional reserved instances and zonal reserved instances.

Note:
We recommend that you purchase both zonal and regional reserved instances. Choose zonal reserved instances when you are very sure about in which zones you want to use them. Otherwise, choose regional reserved instances to meet uncertain requirements.
- Computing power: the maximum computing resources that a reserved instance can match. The computing power is determined jointly by the instance type and instance count.

### Limits

Reserved instances have the following limits:

- **Maximum number of reserved instances**
  - Maximum number of regional reserved instances: Each account can have up to 20 regional reserved instances in all regions.
  - Maximum number of zonal reserved instances: Each account can have up to 20 zonal reserved instances in each zone.

For example, you can purchase 10 regional reserved instances in China (Hangzhou) and 10 regional reserved instances China (Qingdao), but the total number of regional reserved instances cannot exceed 20. You can purchase 20 zonal reserved instances in Zone B of China (Hangzhou) and 20 zonal reserved instances Zone H of China (Hangzhou). If you need more reserved instances, you can submit a ticket.

- **Instance categories**
  
  Reserved instances can only match pay-as-you-go instances, excluding preemptible instances.

- **Instance families**

  Reserved instances support the following instance families: sn1ne, sn2ne, se1ne, ic5, c5, g5, r5, c6, g6, r6, i2, i2g, hfc5, hfg5, and t5. Burstable instances (t5) can only match zonal reserved instances. They cannot match regional reserved instances. Reserved instances that match burstable instances cannot be merged, split, or have their matching scope changed.

### Billing

For more information, see [Reserved instance billing](#).

### Related topics

For more information about matching rules of reserved instances, see [Matching rules of reserved instances](#).
For more information about how to purchase reserved instances, see Purchase reserved instances.

For more information about how to manage reserved instances, see Manage reserved instances.

For more information about how to call an API operation to purchase reserved instances, see PurchaseReservedInstancesOffering.

For more information about how to call an API operation to query reserved instances, see DescribeReservedInstances.

For more information about how to call an API operation to manage reserved instances, see ModifyReservedInstances.

For more information about reserved instance FAQ, see FAQs about ECS instances.

5.4.2 Matching rules of Reserved Instances

Reserved Instances (RIs) provide a billing benefit only when they match Pay-As-You-Go instances. This topic describes the matching rules of RIs and provides some examples.

Matching rules of RIs

The matching status between an RI and a Pay-As-You-Go instance cannot be manually managed. After you purchase an RI, the RI automatically matches one or more Pay-As-You-Go instances that have certain attributes within its term. The matching elements include operating system, instance type, and scope.

If you do not have any Pay-As-You-Go instances under your account, the RI will be idle while continuing to incur fees. After you purchase one or more applicable Pay-As-You-Go instances, the RI will automatically match with the instances immediately. Successful matching leads to an immediate billing discount to your Pay-As-You-Go instances. For more information, see Reserved Instance billing.

An RI takes effect and is billed on the hour upon successful purchase. It expires at 00:00:00 the day after the term end date. For example, you purchased an RI on February 26, 2019 13:45:00 PM, with a term of one year. The RI took effect on 2019-02-26 13:00:00, and its billing also started from that time. It will expire on 2020-02-27 00:00:00. If you had matchable instances when you purchased the RI, the billing
discount first applied to the bill generated from 13:00 to 14:00 on February 26, 2019 till the expiration of the RI.

We recommend that you purchase RIs in advance according to your business needs. You can also manage your RIs flexibly to maximize your billing discount.

The following table describes the features of regional RIs and zonal RIs.

<table>
<thead>
<tr>
<th>Feature</th>
<th>Regional RI</th>
<th>Zonal RI</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instance size flexibility</td>
<td>Supported</td>
<td>Not supported</td>
<td>You have the following running Pay-As-You-Go instances:</td>
</tr>
<tr>
<td></td>
<td>A regional</td>
<td>A zonal RI must match one or more Pay-As-You-Go instances of a specified size.</td>
<td>Two ecs.c5.xlarge Linux instances in China (Qingdao). The instance names are C5PAYG-1 and C5PAYG-2 respectively.</td>
</tr>
<tr>
<td></td>
<td>RI can</td>
<td></td>
<td>You purchase the following RI:</td>
</tr>
<tr>
<td></td>
<td>match</td>
<td></td>
<td>One regional ecs.c5.2xlarge RI in China (Qingdao). The RI name is C5RI.</td>
</tr>
<tr>
<td></td>
<td>different</td>
<td></td>
<td>After the purchase, C5RI matches C5PAYG1 and C5PAYG2 simultaneously to provide a billing discount.</td>
</tr>
<tr>
<td></td>
<td>sizes of</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pay-As-You-Go instances that are of the same instance type family in the same region.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>supported</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>A zonal</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>RI must</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>match one</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>or more</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pay-As-You-Go instances of a specified size.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feature</td>
<td>Regional RI</td>
<td>Zonal RI</td>
<td>Example</td>
</tr>
<tr>
<td>------------------</td>
<td>------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Zone flexibility</td>
<td>Supported. A regional RI can match all Pay-As-You-Go instances in the same</td>
<td>Not supported. A zonal RI must match one or more Pay-As-You-Go instances</td>
<td>You have the following running Pay-As-You-Go instance: One ecs.c5.xlarge Linux instance in zone B of China (Qingdao). The instance name is C5PAYG-b. You purchase the following RI: One regional ecs.c5.xlarge RI in China (Qingdao). The RI name is C5RI. After the purchase, C5RI matches C5PAYG-b to provide a billing discount. You release C5PAYG-b, and then start another Linux instance named C5PAYG-c, which is of the same instance type as C5PAYG-b, in zone C. C5RI then matches C5PAYG-c to provide the same billing discount.</td>
</tr>
<tr>
<td></td>
<td>region.</td>
<td>in a specified zone.</td>
<td></td>
</tr>
<tr>
<td>Resource</td>
<td>Not supported. If there is a shortage of available instances, you may</td>
<td>Supported. A specified number of Pay-As-You-Go instances are reserved so</td>
<td>You purchase the following RIs: Five zonal ecs.c5.xlarge RIs in zone B of China (Qingdao). The term is 1 year and the instance count is 2. Ten ecs.c5.xlarge instances will be reserved in zone B of China (Qingdao) for one year.</td>
</tr>
<tr>
<td>Reservation</td>
<td>need to wait for instances to become available.</td>
<td>that these instances can be created successfully.</td>
<td></td>
</tr>
</tbody>
</table>

### 5.4.3 Purchase reserved instances

This topic describes how to purchase reserved instances in the ECS console.

**Prerequisites**
- Before purchasing reserved instances, make sure that the pay-as-you-go instances you want to match meet requirements to apply reserved instances. For more information, see *Reserved instance overview*.

- You cannot manually manage how reserved instances and pay-as-you-go instances are matched. Ensure that you understand the matching rules for reserved instances. For more information, see *Matching rules of RIs*.

**Context**

You can purchase reserved instances on the *ECS Reserved Instances* page or in the *ECS console*. This topic demonstrates how to purchase reserved instances in the ECS console.

**Procedure**

1. Log on to the *ECS console*.

2. In the left-side navigation pane, choose *Instances & Images > Reserved Instances*.

3. In the top navigation bar, select a region.

4. Click *Purchase Reserved Instance*.

5. Configure region-related parameters.
   a) Set Region.
   b) Set Resource Reservation to Reserved or Not Reserved.

   **Note:**
   You can only set Resource Reservation to Reserved for zonal reserved instances. Regional reserved instances can be applied to pay-as-you-go instances in different zones within the same region.

   c) Set Zone.

6. Configure instance-related parameters.
   a) Set Instance Type.

   **Note:**
   You must select an instance size when you purchase a regional reserved instance. However, the regional reserved instance can match any pay-as-
you-go instances of the specified instance family within the specified region regardless of size.

b) Set Operating System Platform.

Linux and Windows operating systems are available.

Note:
A reserved instance only matches pay-as-you-go instances that use the selected operating system type. You cannot change the operating system type of a reserved instance after you purchase it.

To apply a reserved instance to pay-as-you-go instances created from Bring Your Own License (BYOL) images, you must submit a ticket.

c) Set Payment Option.

All Upfront, Partial Upfront, and No Upfront are available. For more information, see Reserved instance billing.

7. Configure purchase parameters.

a) Optional: Set Name.

b) Set Term.

1 Year and 3 Years are available.

c) Set Instance Count.

A reserved instance can match the specified number of pay-as-you-go instances of the specified instance type. For example, if the instance type is ecs.g5.large and Instance Count is set to 3, the reserved instance can match three pay-as-you-go instances of the ecs.g5.large instance type.

8. Select ECS Terms of Service . Click Purchase.

9. In the dialog box that appears, confirm the parameters and click Create Order.

10. Confirm the payment information and click Pay.

What's next
After you purchase a reserved instance, discounts will be applied when the reserved instance matches one or more pay-as-you-go instances. You can also manage reserved instances to cope with configuration changes of pay-as-you-go instances. For more information, see Manage Reserved Instances.
5.4.4 Manage Reserved Instances

This topic describes how to split, merge, and modify the scope of your Reserved Instances (RIs). Such actions allow you to benefit from billing discounts of more Pay-As-You-Go instance types.

**Note:**

To make this topic easier to understand, RIs to be split, merged, or modified are hereinafter referred to as **original RIs**, while split, merged, or modified RIs are hereinafter referred to as **target RIs**.

**Prerequisites**

Before you split, merge, or modify RIs, make sure that the following conditions are met:

- You have successfully purchased original RIs and they are within a valid term.
- There is no ongoing splitting, merging, or modification request.
- The RI to be modified only requires its size to be adjusted. The instance type family of an RI cannot be modified.

After you submit a splitting, merging, or modification request:

- The original RI changes to changing status, which will be automatically refreshed after the request is processed.
- A request in progress cannot be changed or canceled. If you want to roll back your changes, you must submit another request.

After an RI is split, merged, or modified:

- The target RI becomes valid on the hour. If it matches one or more new Pay-As-You-Go instances, the billing discount is applied within the same hour.
- The original RI becomes invalid on the hour, and its price is updated to USD 0.
- If the target RI is a zonal RI, the type of resource reservation is also updated automatically.

For example, you successfully split an ecs.g5.2xlarge zonal RI (RI1) into two ecs.g5.xlarge zonal RIs (RI2 and RI3) at 2019-02-26 13:45:00. In this case, RI1 becomes invalid at 2019-02-26 13:00:00, while RI2 and RI3 take effect also at 2019-02-26 13:00:00. Starting 2019-02-26 13:00:00, the reserved instance type eligible for billing discount is also changed from ecs.g5.2xlarge to ecs.g5.xlarge. If RI2 and RI3 match
instances immediately after they take effect, the hourly bill discount for ecs.g5.xlarge instances is also applied starting 2019-02-26 13:00:00.

If the original RI fails to be split, merged, or modified, it will remain valid.

Split an RI

You can split an RI into multiple RIs of less computing power. The smaller RIs can then match applicable Pay-As-You-Go instances to better distribute your service traffic.

1. In the left-side navigation pane, choose Instances & Images > Reserved Instances.
2. On the Reserved Instances page, click Split in the Actions column of the original RI.
3. On the Split Reserved Instance page, set the name, instance type, and instance quantity of the target RIs.

Note:
The total computing power of the target RIs must be equal to that of the original RI.

4. Click OK.

Merge RIs

If traffic to your instances increases, you can merge multiple RIs into one RI that has greater computing power to match larger Pay-As-You-Go instances.

Notice:
Before merging RIs, you must verify that the following conditions are met:

- The expiration date of the original RIs must be the same.
- The original RIs have been purchased using the same currency.
- If the original RIs are regional RIs, they must be in the same region. If the original RIs are zonal RIs, they must be in the same zone.

1. In the left-side navigation pane, choose Instances & Images > Reserved Instances.
2. On the Reserved Instances page, click Merge in the Actions column of the original RI.
3. On the Merge Reserved Instances page, select the original RIs, and then set the name, instance type, and instance quantity of the target RI.

**Note:**
The computing power of the target RI must be equal to that of all selected original RIs, and the target RI must be of an existing instance type. For example, two ecs.g5.2xlarge RIs can be merged into one ecs.g5.4xlarge RI, but one ecs.g5.xlarge RI and two ecs.g5.2xlarge RIs cannot be merged into one ecs.g5.5xlarge RI.

4. Click OK.

Modify the scope of an RI

If your service requirements change, you can modify the scope of your RIs. Specifically, you can:

- Modify a regional RI to a zonal RI.
- Modify a zonal RI to a regional RI.
- Modify the zone of an RI in the same region.

You cannot modify the scope of an RI across regions. For example, if you have a zonal RI in zone B of China (Hangzhou), you can modify it as a zonal RI in another zone of China (Hangzhou), or as a regional RI in China (Hangzhou). However, you cannot modify it as a regional or zonal RI in another region.

1. In the left-side navigation pane, choose Instances & Images > Reserved Instances.
2. On the Reserved Instances page, click Modify in the Actions column of the original RI.
3. On the Modify Reserved Instance Page, modify the parameters as needed.
4. Click OK.

5.5 Switch billing method

5.5.1 Switch the billing method from Pay-As-You-Go to Subscription

This topic describes how to switch the billing method of your instance from Pay-As-You-Go to Subscription in the ECS console. After you create a Pay-As-You-Go
instance, you can convert its billing method to Subscription to pay only for the reserved resources.

Prerequisites

The ECS instance you want to switch the billing method for must meet the following requirements:

- The instance belongs to your account.
- The following instance types are not applicable:
  - Generation I: t1, s1, s2, s3, m1, m2, c1, or c2
  - Generation n1, n2, or e3

Note:

For more information about these instance types, see Phased-out instance types.

- The instance cannot be a preemptible instance.
- There is no unpaid switch order for the instance.

  If there is an unpaid switch order, you must cancel the unpaid order and then place another order to switch the billing method.

- Auto release is not set for the instance.

  If auto release has been set for an instance, you must disable the auto release configuration and then switch the billing method. For more information, see Release an instance.

- The instance is in the Running or Stopped state.

  Example: An order to switch the billing method has been placed when the ECS instance is in the Running or Stopped state. However, the instance status has changed when payment is attempted for the order. The preceding requirement is not met. The order fails and the billing method remains unchanged. You can go to the billing center and pay for the order when the instance is in the Running or Stopped state again.

Context

You can switch a maximum of 20 Pay-As-You-Go instances to Subscription instances each time.

Procedure

1. Log on to the ECS console.
2. In the left-side navigation pane, choose Instances & Images > Instances.

3. In the top navigation bar, select a region.

4. Select one or more Pay-As-You-Go instances. Click Switch to Subscription under the instance list.

5. On the Switch to Subscription page, click Batch Change.

6. In the dialog box that appears, set the subscription plan, including:
   a) Duration: You can set the length of service time for the Subscription instance. Instances whose billing methods are converted at the same time must have the same length of service time.
   b) Data disk: If Pay-As-You-Go data disks are attached to the selected instances, you can set whether to also switch their billing method to Subscription.

7. Click OK.

8. Complete the payment as prompted.

5.5.2 Switch the billing method from Subscription to Pay-As-You-Go

This topic describes how to switch the billing method from Subscription to Pay-As-You-Go. After you create a Subscription instance, you can convert its billing method to Pay-As-You-Go if you want to pay only for the actual usage of your resources.

Prerequisites
The instance whose billing method is to be switched is in the Running or Stopped state.

Context
Whether you can convert the billing method is determined by your ECS instance resource usage.

Before converting the billing method, note that:

- The billing method conversion applies to the following resources:
  - System disk
  - The Subscription data disks created for the instance when the instance is created
  - Manually created Subscription disks for the instance after the instance is created
• The billing method of public bandwidth is unchanged.
• After the billing method is converted, the duration of usage offered for reasons such as the ICP filing, failure, or IDC migration is automatically invalidated.

The conversion of the billing method may result in a refund. Note that:

• Each account is limited by a maximum monthly refund amount. For more information, see the conversion page. If the monthly limit is reached, you cannot claim additional refunds. The remaining amount will be automatically cleared on the first day of the next month.

To calculate the refund amount resulting from billing method conversion, the calculation uses the number of vCPUs and the remaining hours in the current billing cycle. For example, 1 refund unit = 1 vCPU × 1 hour.

Assume that you have purchased a Subscription instance with four vCPUs for six months. Four months later, you convert the billing method to Pay-As-You-Go. In this case, the refund amount for this instance is calculated based on the formula:

Refund amount = 4 (vCPUs) × 60 (remaining days) × 24 (hours/day) = 5760 (refund amount).

• If the instance involves renewal or upgrade orders that have not taken effect, a full refund will be made. If orders have already taken effect, only a partial refund will be made.

After conversion, make sure your account has sufficient funds to pay the bill. Otherwise, overdue payments will affect the running of your services. If you no longer require the instance, you can set it to auto release or release it manually. For more information, see Release an instance.

Procedure

1. Log on to the ECS console.
2. In the left-side navigation pane, choose Instances & Images > Instances.
3. In the top navigation bar, select a region.
4. Find the relevant instance. In the Actions column, choose More > Configuration Change > Switch to Pay-As-You-Go.
5. On the conversion page, read the notes and confirm you agree to the ECS Terms of Service.
6. Click Switch.
Result

After the billing method is converted, you can go to the ECS console to view the billing method of the instance:

- On the Instances page, the Billing Method has been changed to Pay-As-You-Go.
- Click the instance ID to go to the Instance Details page. In the left-side navigation pane, click Disks. The Billing Method of the system disk and data disks (if any) of the instance have changed to Pay-As-You-Go.
6 Create an instance

6.1 ECS instance creation overview

This topic describes several methods by which to create an ECS instance, from basic creation operations to advanced customization operations.

Generally, we recommend that you create an ECS instance by following the instructions prompted by the wizard, which allows you to choose configurations flexibly. For more information, see Create an instance through the wizard.

Note:
If you require custom configurations (such as a specific operating system or application), you can create a custom image and then select that image during the creation of an instance to improve configuration efficiency. For more information, see Create an instance by using a custom image.

If you need a new instance to have the same configuration as the current instance, you can create an instance of the same configuration directly. For more information, see Create an instance of the same configuration.

You can also create a launch template in advance, and then use it to create a new instance in one click as needed. For more information, see Use a launch template and Launch templates.

6.2 Create an instance by using the provided wizard

This topic describes how to create an instance by using the wizard in the ECS console.

Prerequisites

- Before creating an ECS instance, you must complete the preparations.
- To specify an SSH key pair when creating a Linux instance, you must create an SSH key pair in the target region.
- To configure user data, you must first prepare user data.
To authorize an instance to assume a role, you must create an instance RAM role and grant it permissions.

Procedure

1. Log on to the ECS console.
2. In the left-side navigation pane, choose Instances & Images > Instances.
3. Click Create Instance.
4. Perform the following steps to complete Basic Configurations.
   a) Select a Billing Method: Subscription, Pay-As-You-Go, or Preemptible Instance.

   Note:
   For information about how to create preemptible instances, see Create preemptible instances.

   b) Select a region and zone.

   By default, a zone is randomly assigned. You can select a zone that better meets your business needs. For information about how to select a region and zone, see Regions and zones.

   Note:
   After you create an instance, you cannot change its region or zone.

   c) Select an instance type and specify the number of instances.

   The available instance types vary from region to region. You can visit ECS Instance Types Available for Each Region to view the instance types available in each region. For more information about the applicable scenarios for each instance type, see Instance families.

   Note:
   - The quota of pay-as-you-go or preemptible instances for your account is shown on the page.
   - To use Elastic Network Interfaces (ENIs), select an enterprise-level instance type with no less than two vCPUs or an entry-level instance type with no less than four vCPUs. For more information about the maximum number of ENIs that can be attached to each instance, see Instance families.
d) Select an image. You can select an image from the lists of Public Image, Custom Image, Shared Image, and Marketplace Image.

Note:

- To use an SSD disk, select an I/O optimized instance.
- To use an SSH key pair, select a Linux image.
- To configure user data, select an image by following the instructions provided in User data.
- Public images only contain an initial system environment. You can find more images in the image marketplace.

e) Select a storage space.

- System Disk: Required. You must create a system disk for the operating system. Select a disk category and specify the size for the system disk.
  - Disk category: Available categories are based on the selected region.
  - Size: The default size of the system disk is 40 GiB. If the selected image file is more than 40 GiB, the size value is automatically increased to the size of the image file. The following table lists the available range of the size value that is supported for each image type.

<table>
<thead>
<tr>
<th>Image</th>
<th>Range of the system disk size (GiB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linux (excluding CoreOS) and FreeBSD</td>
<td>[max{20, image file size}, 500]</td>
</tr>
<tr>
<td>CoreOS</td>
<td>[max{30, image file size}, 500]</td>
</tr>
<tr>
<td>Windows</td>
<td>[max{40, image file size}, 500]</td>
</tr>
</tbody>
</table>

- Data Disk: Optional. To create a data disk, you must select a disk type, and specify the size and quantity for the disk. Then, you must determine whether to encrypt the disk. You can also add data disks to an instance after the instance is created. For more information, see Create a pay-as-you-go cloud disk. You can create an empty data disk or create a data disk from a snapshot. A maximum of 16 data disks can be added each time you create an instance.

Note:
The added data disks have the following features:
- The billing method is the same as that of the instance.
- A subscription data disk must be released together with its corresponding instance, while a pay-as-you-go data disk can be released either separately or together with the corresponding instance.

If you have selected an instance family with local disks (such as i1, d1, or d1ne), the local disk information is displayed. You cannot specify the quantity or category of local disks because these settings depend on the selected instance type. For more information about the local disks supported by each instance type, see Instance families.

5. Click Next: Networking to configure networking and security group for the instance.

a) Select the network type.

- VPC: You must select a VPC and VSwitch. If you do not have a VPC and VSwitch, you can use the default ones.
- Classic: If you purchased an ECS instance for the first time after 12:00, June 16, 2016 (UTC+8), you can no longer select the classic network.

b) Set the network billing method.

- To assign a public IP address to the instance, select Assign Public IP Address. Then, select Pay-By-Traffic or Pay-By-Bandwidth as the network billing method and specify the bandwidth. For public IP addresses assigned in this way, you cannot detach them from the instance. For more information about network billing, see #unique_147.
- If your instances do not need to access the Internet or your VPC-connected instances use an Elastic IP Address (EIP) to access the Internet, you do not need to
assign a public IP address. You can disassociate an EIP from an instance at any time you want.

c) Select a security group.

If you have not created a security group, you can use the default security group. For more information about the rules of the default security group, see #unique_184.

d) Add an ENI.

If your selected instance type supports ENIs, you can add an ENI and specify a VSwitch.

Note:
By default, the added ENI is released together with the instance. You can use the ECS console or call the DetachNetworkInterface operation to detach the interface from the instance.

6. Optional. Click Next: System Configurations to make the following configuration:

a) Select and set logon credentials.

Select a credential based on the image:

   - Linux: You can select a password or SSH key pair as a logon credential.
   - Windows: You can only select a password as a logon credential.

You can also set the logon credential for an instance after the instance is created. For more information, see Reset an instance logon password.

b) Specify the instance name you want to display in the ECS console, and the host name that can be obtained inside the guest operating system.

c) Set advanced options.

   - RAM Role: Assign a RAM role to the instance.
   - User Data: Customize the startup behavior of an instance or pass data into an instance.
7. Optional. Click Next: Grouping to group the instance you have created.
   a) Add tags.

   If you have created several instances, you can use tags for better management. For more information, see #unique_188.

   b) Select a deployment set.

   Deployment sets are designed to manage the deployment of instances. Instances in the same deployment set are assigned to different physical servers, which ensures high availability of business and disaster recovery capability of infrastructure. For more information, see #unique_84.

   c) Select a dedicated host.

   You can select Allow Automatic Deployment /AutoPlacement or specify a dedicated host.

   A dedicated host is flexible and elastic. It offers you an exclusive access to the resources of its associated physical servers. For more information, see Functions of dedicated hosts.

8. Confirm the order.
   a) In the Configurations Selected section, confirm all the configurations. You can also click an edit icon to change the configurations.

   • Optional. Click Save as Launch Template to save your configurations as a launch template for later use. For more information, see Launch template.

   • Optional. Click View Open API to view best-practice API scripts. On the left side, the API Workflow section describes the API operations related to the current operation and lists the request parameters and their values of these API operations. On the right side, the programming language-specific
Examples are provided. Java and Python examples are available. For more information, see *ECS API introduction*.

b) Optional. If the billing method is Pay-As-You-Go, you can set Automatic Release.

c) Optional. If the billing method is Subscription, you can specify the duration and select whether to enable Auto-renewal.

d) Confirm the configuration fees.

The following table lists billing methods for instances and their Internet bandwidth that determine the fees you are to pay.

<table>
<thead>
<tr>
<th>Instance billing method</th>
<th>Internet bandwidth billing method</th>
<th>Estimated fee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pay-as-you-go or preemptible instance</td>
<td>By traffic usage</td>
<td>Internet traffic fee + configuration fee. Configuration fees include the instance type (vCPUs and memory), the system disk, data disks (if any), and local disks (if any).</td>
</tr>
<tr>
<td></td>
<td>By fixed bandwidth</td>
<td>Configuration fees, including the instance type (vCPUs and memory), the system disk, data disks (if any), local disks (if any), and Internet bandwidth.</td>
</tr>
<tr>
<td>Subscription</td>
<td>By fixed bandwidth</td>
<td>Configuration fees, including the instance type (vCPUs and memory), the system disk, data disks (if any), local disks (if any), and Internet bandwidth.</td>
</tr>
<tr>
<td></td>
<td>By traffic usage</td>
<td>Internet traffic fee + configuration fee. Configuration fees include the instance type (vCPUs and memory), the system disk, data disks (if any), and local disks (if any).</td>
</tr>
</tbody>
</table>

e) Read and confirm ECS Terms of Service.

9. Click Create Order.

Result

After the instance is activated, click Console to view the instance details in the console. In the Instances list of the relevant region, you can view the information of the new instance, such as the instance name, public IP address, internal IP address, and private IP address.
What's next

- You can build an FTP site on the ECS instance to transfer local files to the instance. For more information, see Build an FTP site on an ECS instance.
- To secure your instance after creation, we recommend that you perform security compliance inspection and configuration:
  - For Linux-based instances, go to the security advisories page and see Harden operating system security for Linux.
  - For Windows-based instances, go to the security advisories page and see Harden operating system security for Windows.
- You can create a data disk when creating the instance. Before using the data disk, you must partition and format the disk. For more information, see #unique_191 and #unique_192.

6.3 Create an instance by using a custom image

This topic describes how to create an instance by using a custom image. If you want to create an ECS instance that has the same operating system, software applications, and data as an existing instance, you can create a custom image and use it to create the new ECS instance. This method improves the deployment efficiency.

Context

- If the image and the instance are in the same region, create a custom image by using one of the following methods:
  - Import an image
  - #unique_194
  - #unique_195
- If the custom image and the instance are in different regions, copy the custom image to the target region. For more information, see #unique_196.
- If the image to be used is owned by another account, it must be shared with you first. For more information, see #unique_197.

Procedure

1. Log on to the ECS console.
2. In the left-side navigation pane, choose Instances & Images > Instances.
3. In the upper-right corner of the Instances page, click Create Instance.

4. Follow the steps when you create an instance by using the wizard. When creating an ECS instance, note the following:

   - Region: Select the region where the image is located.
   - Image: Select Custom Image or Shared Image, and then select an image from the drop-down list.

   **Note:**
   If the selected custom image contains more than one data disk snapshot, an equal number of cloud disks are automatically created to function as data disks. By default, the size of each data disk is equal to that of the source snapshot. You can only increase the size of a data disk.

5. Confirm the order.

6.4 Create an instance of the same configuration

This topic describes how to duplicate ECS instances of the same configurations by using the Buy Same Type feature.

**Procedure**

1. Log on to the ECS console.
2. In the left-side navigation pane, choose Instances & Images > Instances.
3. In the top navigation bar, select a region.
4. Find your ECS instance and, in the Actions column, choose More > Buy Same Type.
5. On the Buy the Same Configuration page, confirm the selected configurations in the Overview section. If you want to modify any configurations, select View More to change the billing method, security group, network billing method, bandwidth, logon credential, or instance name.
6. To purchase a Subscription ECS instance, you can change the Purchase time.
7. Set the Amount.
8. Read and confirm you agree to the ECS Service Terms and Product Terms of Service.
9. Confirm the order.
6.5 Create an instance by using a launch template

This topic describes how to use an existing launch template to quickly create an ECS instance.

Prerequisites

You have created a template or created a template version.

Procedure

1. Log on to the ECS console.

2. In the left-side navigation pane, choose Deployment & Elasticity > Launch Templates.

3. Find the template or version that you want to use, and then click Create Instance in the Actions column.

4. On the ECS purchase page, select the required template and version.

Note:
You can click the edit icon next to the target launch template to modify its configurations.

5. If you want to create an instance using the Subscription billing method, select a subscription duration, read and confirm you agree with the Terms of Service, and then click Create Order. After you complete the payment, you can view the newly created instance in the ECS console.

If you want to create an instance using the Pay-As-You-Go billing method, read and confirm you agree with the Terms of Service, and then click Create Instance.
After the instance is created successfully, you can view its details in the ECS console.
7 Connect to instances

7.1 Overview

Based on the network type and operating system of your ECS instance, and the operating system of your local machine, use one of the following methods to connect to an ECS instance.

Connect to a Linux instance

The following table details different methods by which to remotely connect to a Linux instance.

<table>
<thead>
<tr>
<th>Is Internet access required?</th>
<th>Operating system of the local machine</th>
<th>Connection method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes/No</td>
<td>Windows or Unix-like OS</td>
<td>Connect to an instance by using the Management Terminal.</td>
</tr>
<tr>
<td>Yes</td>
<td>Windows</td>
<td>Use a remote connection tool to create remote connection:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Use an SSH key pair as the credential. For details, see connect to a Linux instance by using an SSH key pair.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Use a password as the credential. For details, see connect to a Linux instance by using a password.</td>
</tr>
</tbody>
</table>
### Connect to a Windows instance

The following table details different methods by which to remotely connect to a Windows instance.

<table>
<thead>
<tr>
<th>Is Internet access required?</th>
<th>Operating system of the local machine</th>
<th>Connection method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes/No</td>
<td>Windows or Unix-like OS</td>
<td>Connect to an instance by using the Management Terminal.</td>
</tr>
<tr>
<td>Yes</td>
<td>Windows</td>
<td>Use mstsc to create remote connection. For details, see connect to a Windows instance.</td>
</tr>
<tr>
<td>Yes</td>
<td>Linux</td>
<td>Use a remote connection tool, such as rdesktop, to create remote connection. For details, see connect to a Windows instance.</td>
</tr>
</tbody>
</table>
### 7.2 Connect to Linux instances

#### 7.2.1 Connect to a Linux instance by using the Management Terminal

This topic describes how to connect to a Linux ECS instance by using the Management Terminal (also known as VNC) in the ECS console and how to complete some related operations.

**Scenarios**

You can access your Linux instance by using the Management terminal in the ECS console when other remote access software (such as PuTTY, Xshell, or SecureCRT) does not work properly.

The Management Terminal can be used to:

- Check the status of your instance if it boots slowly (for example, self-check upon startup).
- Reconfigure your instance (for example, disable the firewall) if a remote connection fails due to incorrect settings.
- Terminate abnormal processes that consume excessive CPU or bandwidth.

**Note:**
The Management Terminal can be used to connect to an instance even if no public IP address is assigned to your instance.
Prerequisites

- An ECS instance is created.
- The logon password for the ECS instance is set. If not, you can reset the password.

Procedure

The following figure illustrates how to use the Management Terminal to connect to an ECS instance.

To connect to the ECS instance by using the Management Terminal, follow these steps:

1. In the instance list, find your instance and then, in the Actions column, click Connect.

2. In the Management Terminal page, follow the instructions to connect to the Management Terminal:
   - If you log on as an Alibaba Cloud account to connect to the Management Terminal for the first time, follow these steps:
     a. In the VNC Connection Password dialog box, copy the password and click Close.

Note:

- The VNC password appears only once. You must save the password immediately and store it securely for future use. If you need to change the VNC password, see change the VNC connection password.
- If you log on as a RAM user to connect to the Management Terminal for the first time, you will not see this dialog box.

b. In the Enter VNC Password dialog box, paste the VNC connection password that you have copied, and click OK.

- If you log on as a RAM user to connect to the Management Terminal for the first time, or if you have forgotten your VNC connection password, follow these steps:
  - Change the VNC connection password.
  - In the upper-left corner of the Management Terminal page, select Send Remote Command > Connect to Management Terminal.
  - In the Enter VNC Password dialog box, enter the new password and click OK.

- If this is not your first connection to the Management Terminal, enter the VNC connection password in the Enter VNC Password dialog box and click OK.

3. To log on to the ECS instance, follow these steps according to the operating system:

- For a Linux instance: Enter the user name (`root`) and the logon password.

**Note:**

- The logon password input is invisible.
- If you want to perform additional operations within the instance, in the upper-left corner of the Management Terminal page, choose Send Remote Command > CTRL + ALT + Fx, of which Fx can be any key from F1 to F10, to switch the interfaces for different operations.
- If a black screen prompts, the Linux instance may be in sleep mode. To exit sleep mode, click your mouse or press any key.

**Change the VNC connection password**

If you want a simple password or forget about your password, follow these steps to change the password:

**Note:**
To connect to a non-I/O-optimized instance, you must restart your instance in the ECS console to activate the new VNC password. The restart operation stops your instance and interrupts your services. Therefore, proceed with caution.

1. Open the Management Terminal page.
2. Close the VNC Password or Enter VNC Password dialog box that displays.
3. In the upper right corner of the Management Terminal page, click Modify VNC Password.
4. In the Modify VNC Password dialog box that displays, enter a new password, and click OK to close the dialog box.
5. Activate the new password:
   - For an I/O-optimized instance, the new password takes effect immediately.
   - For a non-I/O-optimized instance, restart the instance in the ECS console.

Input commands

To connect to a Linux instance, you can use the Input Commands function to enter long texts, such as a complex command or a URL.

1. Open the Management Terminal page.
2. In the upper right corner of the Management Terminal page, click Input Commands.
3. In the Input Commands dialog box that displays, enter a command, and click OK to copy the command to the command line interface of your Linux instance.

References

- If you are using a PC, following instructions in Connect to a Linux instance by using an SSH key pair.
- Connect to a Linux instance by using a password.
- If you are using a mobile device, following instructions in Connect to an instance on a mobile device.
7.2.2 Connect to a Linux instance by using an SSH key pair

This topic describes how to use an SSH key pair to log on to a Linux instance in the Windows and Linux operating systems.

Prerequisites

Before you use an SSH key pair to connect to your Linux instance, the following conditions must be met:

- An SSH key pair is created in the ECS console and the `.pem` private key file is downloaded. For more information, see Create an SSH key pair.
- An SSH key pair is linked with a Linux instance. You can allocate a key pair when creating an ECS instance or attach an SSH key pair to an existing instance.

Note:

If an ECS instance is in the Running state, you must restart it in the ECS console or by using the API to activate the key pair after attaching it to the instance.

- Security group rules are added to the security groups to which the instance belongs. For more information, see #unique_102. The following table describes the security group rules.

<table>
<thead>
<tr>
<th>Network type</th>
<th>NIC type</th>
<th>Rule direction</th>
<th>Authorization</th>
<th>Protocol type</th>
<th>Port range</th>
<th>Authorization type</th>
<th>Authorization object</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>VPC</td>
<td>Not required</td>
<td>Inbound</td>
<td>Allow</td>
<td>SSH (22)</td>
<td>22/22</td>
<td>IP address segment-based access</td>
<td>0.0.0.0/0</td>
<td>1</td>
</tr>
<tr>
<td>Classic network</td>
<td>Internet</td>
<td>Inbound</td>
<td>Allow</td>
<td>SSH (22)</td>
<td>22/22</td>
<td>IP address segment-based access</td>
<td>0.0.0.0/0</td>
<td>1</td>
</tr>
</tbody>
</table>

Local Windows OS

A private key file in `.pem` format is automatically generated after you create an SSH key pair in the ECS console. This section describes how to use PuTTYgen to convert the `.pem` private key file and how to use PuTTY to log on to a Linux instance through the SSH remote access tool on a Windows OS.
1. Download and install PuTTYgen and PuTTY.

The download links are as follows:

- PuTTYgen
- PuTTY
2. Convert the .pem private key file to a .ppk key file.

   a. Start PuTTYgen.

      PuTTYgen 0.71 is used as an example.

   b. In the Parameters area, set Type of key to generate to RSA and then click Load.

   c. Select All Files (*.*) from the drop-down list.
d. Select the .pem private key file to be converted.

e. In the PuTTYgen Notice dialog box, click OK.

f. Click Save private key.
g. In the PuTTYgen Warning dialog box, click Yes.

PuTTYgen Warning

Are you sure you want to save this key without a passphrase to protect it?

Yes  No

h. Specify the name of the *.ppk file and click Save.

3. Start PuTTY.
4. Configure the private file used for authorization.

   a. In the left-side navigation pane, choose Connection > SSH > Auth.

   b. In the right pane, click Browse….

   c. Select the .ppk private key file.
5. Configure information required for connecting to the Linux instance.

   a. In the left-side navigation pane, click Session.

   b. In the right pane, enter your account and the Internet IP address of the
      instance to be connected in the **Host Name (or IP address)** text box. The
      format is `root@IP address`.

   c. In the **Port** text box, enter the port number 22.

   d. Set Connection type to SSH.

6. Click Open to start connecting to your Linux instance.

   When the following message is displayed, you have successfully logged on to the
   instance by using the SSH key pair.
This section describes how to use an SSH key pair to log on to a Linux instance on a Linux OS or an OS supporting SSH commands, for example, Windows MobaXterm.

- Configure required information and connect to the Linux instance by using commands.

1. **Find the directory for saving the .pem private key file on your PC, for example, /root/mysshkey.pem.**
2. **Run the following command to modify the attribute of the private key file:**
   
   ```
   chmod 400 [Directory for saving the .pem private key file on your local PC]
   ```
   
   For example,

   ```
   chmod 400 /root/mysshkey.pem
   ```

3. **Run the following command to connect to the instance:**

   ```
   ssh -i [Directory for saving the .pem private key file on your local PC] root@[Internet IP address]
   ```
   
   For example,

   ```
   ssh -i /root/mysshkey.pem root@10.10.xx.xxx
   ```

- **Configure required information by using the config file and connect to the instance by running commands.**

1. Go to the `ssh` directory in the root directory and do the following to modify the config file:

   ```
   Host ecs    // Set the name of your ECS instance.
   HostName 192. *.*.* // Enter the Internet IP address of your ECS instance.
   Port 22   // Enter the port number, which is 22 by default.
   User Root // Enter your logon account.
   ```
IdentityFile ~/.ssh/ecs.pem // Enter the directory for saving the .pem private key file on your PC.

2. **Save the config file**

3. Restart SSH.

4. **Run** `ssh [ECS name]` **to connect to your ECS instance, for example**, `ssh ecs`.

**References**

For information about how to connect to a Linux instance, see [Connect to a Linux instance by using a password](#) and [Connect to a Linux instance by using the Management Terminal](#).

### 7.2.3 Connect to a Linux instance by using a password

You can connect to a Linux instance by using different authentication methods:

- If you are using an SSH key pair, see [connect to a Linux instance by using an SSH key pair](#).
- If you are using a password, you can [connect to an instance by using the Management Terminal](#) or by using software applications or command lines.

**Prerequisites**

- The instance must be in the Running status. If not, **start it**.
- You have set a logon password for the instance. If the password is lost, you can **reset the password**.
- The instance can access the Internet:
  - In a VPC, a public IP address is assigned to the instance or an **EIP address is bound to the instance**.
  - In the classic network, a public IP address is assigned to the instance by using either of the following methods:
    - For a Subscription or a Pay-As-You-Go instance, you can select **Assign public IP when creating the instance**.
    - For a Subscription instance without a public IP address, you can assign one by **upgrading the bandwidth**.
• The following security group rules must be added to the security group that the instance joins. For more information, see add security group rules.

<table>
<thead>
<tr>
<th>Network type</th>
<th>NIC</th>
<th>Rule direction</th>
<th>Authorization policy</th>
<th>Protocol type</th>
<th>Port range</th>
<th>Authorization type</th>
<th>Authorization object</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>VPC</td>
<td>N/A</td>
<td>Inbound</td>
<td>Allow</td>
<td>SSH (22)</td>
<td>22/22</td>
<td>Address Field Access</td>
<td>0.0.0.0/0</td>
<td>1</td>
</tr>
<tr>
<td>Classic</td>
<td>Internet</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Procedure

Based on the operating system of your local machine, use one of the following methods to connect to a Linux instance by using the SSH protocol:

• Windows OS
• Linux or Mac OS X
• Android or iOS

Windows OS

If your local machine is running Windows OS, you can use a remote connection tool, such as PuTTY, to connect to a Linux instance. In this article, we use PuTTY as an example to describe how to connect to a Linux instance by using the password authentication method. Before you start, download PuTTY.

Follow these steps to connect to a Linux instance:

1. Start putty.exe.
2. In the left-side navigation pane, click **Session**, and configure the following parameters:

   - **Host Name**: Type the public IP address or EIP address of the instance.
   - **Port**: Type **22**.
   - **Connection Type**: Select **SSH**.
   - **(Optional) Saved Session**: If you do not want to repeat the configurations during the next logon, add a name for the session, and click **Save**.

3. Click **Open** to connect, and in the PuTTY Security Alert dialog box, click **Yes**.

   **Note:**

   For the first connection to an ECS instance, you have the PuTTY Security Alert as follows, which means PuTTY cannot guarantee the instance is the one that you think it is, so it can only provide the public key fingerprint of the instance for you to decide to trust the instance or not. If you select **Yes**, the public key will be added to the PuTTY’s cache and you will not be alerted again during your next
connection. If you select Yes but are alerted again, a *man-in-the-middle attack (MITM)* may occur. For more information, see *PuTTY User Manual*.

4. Enter the user name and password for the Linux instance, and then press Enter.

   **Note:**
   The password is not displayed on screen.

   If you are successfully connected to the instance, the following message is displayed.

   Welcome to Alibaba Cloud Elastic Compute Service!

Linux or Mac OS X

If your local machine is running Linux OS or Mac OS X, follow these steps:

1. Run the command `ssh root@[Public IP address or EIP address of the instance].`

2. Type the password and then press Enter.
If you are successfully connected to the instance, the following message is displayed.

Welcome to Alibaba Cloud Elastic Compute Service!

Android or iOS

If your local machine is running Android OS or iOS, see connect to an instance on a mobile device.

Reference

You can run a script to install a graphical desktop on an instance running CentOS. For more information, see automatic installation tool for Linux instance.

7.2.4 Connect to an instance on a mobile device

This article describes how to connect to an ECS instance on a mobile device. Depending on the operating system of your instance, select the required method as follows.

• Connect to a Linux instance: This example uses SSH Control Lite to describe how to connect to a Linux instance on an iOS device, and JuiceSSH to describe how to connect to a Linux instance on an Android device.

• Connect to Windows instances: This example uses Microsoft Remote Desktop to describe how to connect to a Windows instance on an iOS or Android device.

Connect to a Linux instance

Prerequisites

• The instance is Running.

• The instance has a public IP address and is accessible from the Internet.

• You have set the logon password for the instance. If the password is lost, you can reset the instance password.
The security group of the instance has the following security group rules:

<table>
<thead>
<tr>
<th>Network type</th>
<th>NIC</th>
<th>Rule direction</th>
<th>Authorization policy</th>
<th>Protocol type</th>
<th>Port range</th>
<th>Authorization type</th>
<th>Authorization object</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>VPC</td>
<td>No configuration required</td>
<td>Inbound</td>
<td>Allow</td>
<td>SSH(22)</td>
<td>22/22</td>
<td>Address Field Access</td>
<td>0.0.0.0/0</td>
<td>1</td>
</tr>
<tr>
<td>Classic</td>
<td>Internet</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

You have downloaded and installed the appropriate app:
- For an iOS device, install SSH Control Lite.
- For an Android device, install JuiceSSH.

Procedure

For iOS devices, see use SSH Control Lite to connect to a Linux instance. In this example, a user name and password are used for authentication.

For Android devices, see use JuiceSSH to connect to a Linux instance. In this example, a user name and password are used for authentication.

Use SSH Control Lite to connect to a Linux instance

1. Start SSH Control Lite, and tap Hosts.
2. Tap the + icon in the upper left corner of the Hosts page.
3. In the action sheet, tap Connection.
4. On the Connection page, set the connection information and tap . The following connection information is required:
   - Name: Specify the Host name. DocTest is used in this example.
   - Protocol: Use the default value SSH.
   - Host: Type the public IP address of the Linux instance to connect to.
   - Port: Type the port number for SSH protocol. 22 is used in this example.
   - Username: Type root for the user name.
   - Password: Type the logon password of the instance.
5. In the toolbar, tap Remote Controls.
6. On the Remote Controls page, tap the + icon in the upper left corner to create a remote connection session. New remote is used in this example.

The following figure shows Steps 1 through 6.

7. On the New remote page, tap Host1.
8. In the action sheet, tap Bind.
9. Select the new Linux instance. In this example, select DocTest.
10. On the New remote page, tap Done to switch it to the Edit mode, and then tap DocTest.
11. In the action sheet, tap Connect.

The following figure shows Steps 7 through 11.

12. In the action sheet, select Yes, Once or Yes, Permanently. Once the connection is successful, the indicator in front of DocTest turns green.


The following figure shows Steps 12 through 14:

Use JuiceSSH to connect to a Linux instance

1. Start JuiceSSH, and tap Connections.
2. Under the Connections tab, tap the + icon.

No Connections
You do not currently have any connections configured. Use the button below to get started.
3. On the New Connection page, add the connection information and then tap the icon. The following connection information is required:

- Nickname: **Specify the name of the connection session.** DocTest is used in this example.
- Type: **Use the default value SSH.**
- Address: Type the public IP address of the Linux instance to connect to.
- To set Identity, follow these steps:
  a. Tap Identity, and tap New in the drop-down list.
  b. On the New Identity page, add the connection information and then tap the icon. The following connection information is required:

    - Nickname: Optional. DocTest is used in this example.
    - Username: Type root for the user name.
    - Password: Tap SET(OPTIONAL), and type the logon password of the instance.

- Port: **Type the port number for SSH protocol.** In this example, 22 is used.
4. Confirm the message, and tap ACCEPT.
5. (Optional) For a first-time connection, the app will show a prompt of helpful tips. Tap OK - I’VE GOT IT!.

If you are successfully connected to the Linux instance, the following screen is displayed.
Connect to Windows instances

In this section, Microsoft Remote Desktop is used as an example to describe how to use an app to connect to a Windows instance on a mobile device.

Prerequisites

- The instance is Running.
- The instance has a public IP address and is accessible from the Internet.
- You have set the logon password for the instance. If the password is lost, you must reset the instance password.
- The security group of the instance has the following security group rules:

<table>
<thead>
<tr>
<th>Network type</th>
<th>NIC configuration required</th>
<th>Rule direction</th>
<th>Authorization policy</th>
<th>Protocol type</th>
<th>Port range</th>
<th>Authorization type</th>
<th>Authorization object</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>VPC</td>
<td>No configuration required</td>
<td>Inbound Allow</td>
<td>RDP (3389)</td>
<td>3389/3389</td>
<td></td>
<td>Address field access</td>
<td>0.0.0.0/0</td>
<td>1</td>
</tr>
</tbody>
</table>
### Connect to instances

<table>
<thead>
<tr>
<th>Network type</th>
<th>NIC</th>
<th>Rule direction</th>
<th>Authorization policy</th>
<th>Protocol type</th>
<th>Port range</th>
<th>Authorization type</th>
<th>Authorization object</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classic</td>
<td>Internet</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- You have downloaded and installed Microsoft Remote Desktop.
  - For iOS devices, download the app from iTunes.
  - For Android devices, download the app from Google Play.

**Procedure**

To connect to a Windows instance by using Microsoft Remote Desktop, follow these steps:

1. Start RD Client. In the navigation bar, tap the + icon.

![Remote Desktop](image)

*It's lonely here.*

To get started, add the remote desktop that you want to connect to using this device. You can also add remote resources to work with apps and desktops your administrator has set up for you.
2. On the Add New page, select Desktop.

3. On the Edit Desktop page, type the connection information and tap Save. The following connection information is required:

   - PC Name: Type the public IP address of the Windows instance to connect to.
   - User Account: Type the account name administrator and the logon password of the Windows instance.

5. On the confirmation page, confirm the message and tap Accept.

If you are successfully connected to the Windows instance, the following screen is displayed.
7.3 Connect to Windows instances

7.3.1 Connect to a Windows instance by using the Management Terminal

This topic describes how to connect to a Windows instance by using the Management Terminal (also known as VNC) in the ECS console and how to complete some related operations.

Scenarios

You can access your Windows instance by using the Management terminal in the ECS console when other remote access software (such as PuTTY, Xshell, or SecureCRT) does not work properly.

The Management Terminal can be used to:

- Check the status of your instance if it boots slowly (for example, self-check upon startup).
- Reconfigure your instance (for example, disable the firewall) if a remote connection fails due to incorrect settings.
- Terminate abnormal processes that consume excessive CPU or bandwidth.

Prerequisites

- An ECS instance is created.
· The logon password for the ECS instance is set. If not, you can reset the password.

Procedure

The following figure illustrates how to use the Management Terminal to connect to an ECS instance.

![Diagram showing the process of connecting to an ECS instance](image)

1. Select the target region.
2. In the instance list, find the target instance. Then, click Connect in the Actions column.
3. Connect to the Management Terminal:
   - If you connect to the Management Terminal with the master account for the first time, follow these steps:
     a. In the VNC Connection Password dialog box, copy the password.

Note:
- The VNC password appears only once. You must save the password immediately and store it securely for future use.
If you connect to the Management Terminal as a RAM user for the first time, you will not see this dialog box.

b. Click Close.

c. In the Enter VNC Password dialog box, paste the VNC connection password that you have copied, and click OK to connect to the Management Terminal.

- If you connect to the Management Terminal as a RAM user for the first time, or if you have forgotten your VNC connection password, follow these steps:

  a. Change the VNC connection password.

  b. In the upper left corner of the Management Terminal page, select Send Remote Command > Connect to Management Terminal.

  c. In the Enter VNC Password dialog box, enter the new password.

  d. Click OK to connect to the Management Terminal.

- If you connect to the Management Terminal again as a RAM user or by using the master account, enter the password in the Enter VNC Password dialog box, and click OK to connect to the Management Terminal.

4. Enter the user name and password to log on to the ECS instance.

Note:
In the upper left corner of the Management Terminal page, choose Send Remote Command > CTRL+ALT+DELETE to enter the logon interface of your Windows instance.

Change the VNC connection password

If you want a simple password or forget about your password, follow these steps to change the password:

Note:
To connect to a non-I/O-optimized instance, you must restart your instance in the ECS console to activate the new VNC password. The restart operation stops your instance and interrupts your services. Therefore, proceed with caution.

1. Open the Management Terminal page.

2. Close the VNC Password or Enter VNC Password dialog box that displays.

3. In the upper right corner of the Management Terminal page, click Modify VNC Password.
4. In the Modify VNC Password dialog box that displays, enter a new password, and click OK to close the dialog box.

5. Activate the new password:
   - For an I/O-optimized instance, the new password takes effect immediately.
   - For a non-I/O-optimized instance, restart the instance in the ECS console.

Input commands

To connect to a Windows instance, you can use the Input Commands function to enter long texts, such as a complex command or a URL.

1. Open the Management Terminal page.
2. In the upper right corner of the Management Terminal page, click Input Commands.
3. In the Input Commands dialog box that displays, enter a command, and click OK to copy the command to the command line interface of your Windows instance.

References

- If you are using a PC, following instructions in Connect to a Windows instance.
- If you are using a mobile device, following instructions in Connect to a Windows instance on a mobile device.

7.3.2 Connect to a Windows instance

If your Windows instance can access the Internet, you can use remote connection tools to connect to it. Otherwise, you can use the Management Terminal.

Prerequisites

- The instance is in the Running status. If not, start it.
- You have set a logon password for the instance. If the password is lost, you can reset the password.
• The instance can access the Internet:
  - In a VPC, a public IP address is assigned to the instance or an EIP address is bound to the instance.
  - In the classic network, a public IP address is assigned to the instance by using either of the following methods:
    ■ For a Subscription or a Pay-As-You-Go instance, you can select Assign public IP when creating the instance.
    ■ For a Subscription instance without a public IP address, you can assign one by upgrading bandwidth.

• The following security group rules must be added to the security group that the instance joins. For more information, see add security group rules.

<table>
<thead>
<tr>
<th>Network Type</th>
<th>NIC</th>
<th>Rule Direction</th>
<th>Authorization Policy</th>
<th>Protocol Type</th>
<th>Port Range</th>
<th>Authorization Type</th>
<th>Authorization Object</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>VPC</td>
<td>N/A</td>
<td>Inbound</td>
<td>Allow</td>
<td>RDP(3389)</td>
<td>3389/3389</td>
<td>Address Field Access</td>
<td>0.0.0.0 /0</td>
<td>1</td>
</tr>
<tr>
<td>Classic</td>
<td>Internet</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Procedure

Based on the operating system of your local machine, use one of the following methods to connect to a Windows instance:

• **Windows OS**
• **Linux**
• **Mac OS**
• **Android or iOS**

**Windows OS**

If the local machine is running Windows OS, you can use the mstsc to create a remote connection to a Windows instance.
1. Use any one of the following methods to start mstsc:
   - Select Start > icon > Remote Desktop Connection.
   - Click the Start icon and search for mstsc.
   - Press the Windows key + R to open the Run window, type mstsc, and then press Enter.

2. In the Remote Desktop Connection dialog box, follow these steps:
   a. Click the Show Options drop-down box.
   
   ![Remote Desktop Connection](image)
   
   b. Type the public IP address or EIP address of the instance.
   c. Type the user name. The default user name is Administrator.

Note:
If you want to log on to the instance next time using the same credentials, select Allow me to save credentials.
d. Optional. If you want to copy text or files from the local machine to the instance, click the Local Resources tab to see options for sharing local computer resources.

  • If you want to copy text only, select Clipboard.
  • If you also want to copy files, select More and select the drive letters from which you want to copy files to your instance and click OK.
Remote Desktop Connection

**Local Resources**

**Remote audio**
- Configure remote audio settings.
- Settings...

**Keyboard**
- Apply Windows key combinations:
- Only when using the full screen
- Example: ALT+TAB

**Local devices and resources**
- Choose the devices and resources that you want to use in your remote session.
- Printers
- Clipboard

Hide Options

Connect

Help
e. Optional. Click the Display tab to resize the remote desktop window. Full Screen is recommended.
f. Click Connect.

Linux

If the local machine is running Linux OS, you can use a remote connection tool to create a remote connection to a Windows instance. This article takes rdesktop as an example to describe how to connect a Windows instance from a local machine running Linux.

1. Download and start rdesktop.
2. Run the command to connect to a Windows instance. Replace the parameter values with your own configurations.

```
rsdesktop -u administrator -p password -f -g 1024*720 192.168.1.1 -r clipboard:PRIMARYCLIPBOARD -r disk:sunray=/home/yz16184
```

The following table describes the parameters involved.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>-u</td>
<td>The user name. The default user name for a Windows instance is Administrator.</td>
</tr>
<tr>
<td>-p</td>
<td>The password used to log on to the windows instance.</td>
</tr>
<tr>
<td>-f</td>
<td>Full screen by default. Use Ctrl+Alt+Enter to switched the mode.</td>
</tr>
<tr>
<td>-g</td>
<td>Resolution. Asterisks (*) are used for separation. If omitted, full-screen display is used by default.</td>
</tr>
<tr>
<td>192.168.1.1</td>
<td>The IP address of the server that requires remote connection. Replace it with the public IP or EIP address of your Windows instance.</td>
</tr>
<tr>
<td>-d</td>
<td>Domain name. For example, if the domain name is INC, then the parameter is -d inc.</td>
</tr>
<tr>
<td>-r</td>
<td>Multimedia reorientation. For example:</td>
</tr>
<tr>
<td></td>
<td>• Turn on the sound: -r sound.</td>
</tr>
<tr>
<td></td>
<td>• Use a local sound card: -r sound: -r sound : local.</td>
</tr>
<tr>
<td></td>
<td>• Open the U Disk: -r disk:usb=/mnt /usbdvice.</td>
</tr>
<tr>
<td>-r clipboard:PRIMARYCLIPBOARD</td>
<td>Realizes direct word copying and pasting between Linux and Windows instances of local devices. Supports Chinese words copying and paseing.</td>
</tr>
</tbody>
</table>
### Parameters

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>-r disk:sunray=/home/yz16184</td>
<td>Specifies that a directory on the Linux system of a local device maps to a hard disk on a Windows instance. If this is configured, Samba and FTP are not recommended for file transfers.</td>
</tr>
</tbody>
</table>

For more information about parameters of the `rdesktop` command, see `rdesktop` documentation.

#### Mac OS

To connect to a Windows instance from a local machine running Mac OS, see [get started with Remote Desktop on Mac](#).

#### Android or iOS

If your local machine is running Android OS or iOS, see [connect to an instance on a mobile device](#).

### 7.3.3 Connect to a Windows instance from a mobile device

This topic describes how to connect to a Windows instance from a mobile device (iOS or Android) by using Microsoft Remote Desktop.

#### Prerequisites

- The instance is in the Running state.
- The instance has a public IP address and is accessible from the Internet.
- The logon password for the instance is set. Moreover, if the password was lost, you can reset the instance password.
- The security group of the instance has the following security group rules:

```plaintext
<table>
<thead>
<tr>
<th>Network type</th>
<th>NIC Configuration not required</th>
<th>Rule direction</th>
<th>Authorization policy</th>
<th>Protocol type</th>
<th>Port range</th>
<th>Authorization type</th>
<th>Authorization object</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>VPC</td>
<td>Configuration not required</td>
<td>Inbound</td>
<td>Allow</td>
<td>SSH (22)</td>
<td>22/22</td>
<td>CIDR block</td>
<td>0.0.0.0/0</td>
<td>1</td>
</tr>
<tr>
<td>Classic</td>
<td>Internet</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
```

Issue: 20200109
Procedure

Check that you have installed Microsoft Remote Desktop (RD).

1. Start the RD Client. In the upper right corner, click +.

2. On the Add New page, select Desktop.
3. On the Edit Desktop page, enter the connection information and click Save. The following connection information is required:

- **PC Name**: Enter the public IP address of the Windows instance to be connected.
- **User Account**: Enter the account name administrator and the logon password of the Windows instance.

4. On the Remote Desktop page, click the icon of the target Windows instance.
5. On the confirmation page, confirm the message and click Accept.

If you have successfully connected to the Windows instance, the following screen is displayed.
8 Manage instances

8.1 Start or stop an instance

This topic describes how to start or stop an ECS instance in the ECS console. It also describes operations related to the No fees for stopped instances (VPC-Connected) feature.

Prerequisites

- The instance you want to start must be in the Stopped state.
- The instance you want to stop must be in the Running state.

Start an instance

To start an instance, follow these steps:

1. Log on to the ECS console.
2. In the left-side navigation pane, choose Instances & Images > Instances.
3. In the top navigation bar, select a region.
4. Find the instance to be started and, in the Actions column, choose More > Instance Status > Start.

Note:

If you want to start multiple Stopped instances, select the required instances and then, under the instance list, click Start.

5. Read and confirm you agree to the note displayed in the dialog box by clicking OK.

After the instance is started, it enters the Running state.

You can also start an instance by calling the StartInstance API action through the Alibaba Cloud CLI, OpenAPI Explorer, or Alibaba Cloud SDK.

Stop a Subscription instance

Note:

Stopping an instance disrupts services. Exercise caution when performing this action.
To stop an instance, follow these steps:

1. Log on to the *ECS console*.

2. In the left-side navigation pane, choose Instances & Images > Instances.

3. In the top navigation bar, select a region.

4. Find the instance to be stopped and, in the Actions column, choose More > Instance Status > Stop.

   **Note:**
   If you want to stop multiple Running instances, select the required instances and then, under the instance list, click Stop.

5. Read and confirm you agree to the note displayed in the dialog box by clicking OK.

6. In the Stop Instance dialog box, set Stop Mode and click OK.

After the instance is stopped, it enters the Stopped state.

Stop a Pay-As-You-Go instance

**Note:**
Stopping an instance disrupts services. Exercise caution when performing this action. The procedure for stopping a preemptible instance is the same as that for a Pay-As-You-Go instance. For more information, see *Stop a preemptible instance*.

Stopping a Pay-As-You-Go instance may affect instance billing. The impact is determined by the network type and the No Fees for Stopped Instances (VPC-Connected) feature:

- **Classic network**: A Pay-As-You-Go instance in the classic network does not support the No Fees for Stopped Instances (VPC-Connected) feature and the instance still incurs fees after it is stopped. The billing stops only after you release the instance.

- **VPC**: A Pay-As-You-Go instance in the VPC network supports the No Fees for Stopped Instances (VPC-Connected) feature:
  - If this feature is not enabled, billing continues after the instance is stopped.
  - If this feature is enabled, you can decide whether to keep the instance after you stop the instance by specifying Keep Stopped Instances and Continue Billing. If you do not want to keep the instance, resources such as vCPUs,
memory, and Internet IP addresses stop incurring fees. However, you are still billed for other resources. For more information, see #unique_150.

To stop a Pay-As-You-Go instance, follow these steps:

1. Log on to the *ECS console*.

2. In the left-side navigation pane, choose Instances & Images > Instances.

3. In the top navigation bar, select a region.

4. Find the Pay-As-You-Go instance to be stopped and, in the Actions column, choose More > Instance Status > Stop.

**Note:**

If you want to stop multiple Running instances, select the required instances and then, under the instance list, click Stop.

5. Complete required actions according to the network type of the instance and whether No Fees for Stopped Instances (VPC-Connected) is enabled:

   - If the network type is classic or No Fees for Stopped Instances (VPC-Connected) is not enabled:
     a. In the Stop Instance dialog box, set Stop Mode.
     b. Click OK.
   - If No Fees for Stopped Instances (VPC-Connected) is enabled:
     a. Read the note displayed in the Notes dialog box.
     b. Confirm the note by clicking OK.
     c. In the Stop Instance dialog box, set Stop Mode and Stopped By.

**Note:**

If Keep Stopped Instances and Continue Billing is selected, the instance continues to incur fees after being stopped. If Keep Stopped Instances and Continue Billing is not selected, the instance will not be billed after being stopped.

d. Click OK.
To disable the No Fees for Stopped Instances (VPC-Connected) feature, see #unique_150.

The instance is in the Stopped state after you stop it.

You can also stop a Pay-As-You-Go instance by calling the #unique_161 API action through the Alibaba Cloud CLI, OpenAPI Explorer, or Alibaba Cloud SDK.

8.2 Restart an instance

This topic describes how to restart an instance by using the ECS console.

Limits

- Only instances in the Running state can be restarted.
- Restarting an instance will stop the instance. As a result, services provided by the instance are disrupted.
Procedure

1. **Find the target instance, and then choose More > Instance Status > Restart in the Actions column.**
   
   To restart multiple instances, select all required instances and then click Restart at the bottom of the instance list.

2. **In the displayed Restart Instance dialog box, select a Restart Mode, and then click OK.**
   
   You can also call the `RebootInstance` API action to complete this task.

### 8.3 Release an instance

This topic describes how to release an ECS instance.

**Precautions**

You can release a Pay-As-You-Go instance (including a preemptible instance) when you no longer need it to avoid excess charges.

![Note:](image)

After an instance is released, its data cannot be recovered. We recommend that you create a snapshot to back up data before releasing an instance.

For a Pay-As-You-Go instance, if the #unique_150 feature is not enabled, charges continue to incur until the instance is released.

For a Subscription instance, the instance is automatically released after the billing cycle expires.

You can enable instance release protection for a Pay-As-You-Go instance to prevent irreversible data loss resulting from accidental or incorrect operations during a manual release.

**Release an instance immediately**

To release an instance immediately, follow these steps:
1. Release the instance:

   • If you want to release only one instance, find the instance that you want to release and then, in the Actions column, choose Manage > Release.
   • If you want to release multiple instances, find the Pay-As-You-Go instances according to the Billing Method, select multiple instances to release, and click Release at the bottom of the list.

2. In the dialog box, select Release Now.

3. Click Next, and then click OK.

You can also use the Alibaba Cloud CLI, OpenAPI Explorer, or SDK to call DeleteInstance to release the instance.

Enable automatic release

To enable automatic release, follow these steps:

1. Release the instance:

   • If you want to release only one instance, find the instance that you want to release, and in the Actions column, choose Manage > Release.
   • If you want to release multiple instances, find the Pay-As-You-Go instances according to the Billing Method, select multiple instances to release, and click Release at the bottom of the list.

2. In the dialog box, select Scheduled Release.
3. Turn on the Automatic Release switch, and specify the release date and time. The earliest setting can only be set to automatically release an instance after 30 minutes.

4. Click Next, and then click OK.

You can also use the Alibaba Cloud CLI, OpenAPI Explorer, or SDK to call `ModifyInstanceAutoReleaseTime` to set the automatic release time for a Pay-As-You-Go instance.

**Disable automatic release**

If you want to cancel the automatic release schedule of a Pay-As-You-Go instance, you can disable the feature.

To disable the automatic release feature, follow these steps:
1. Release the instance:
   - If you want to disable automatic release for an instance, find the instance and then, in the Actions column, choose Manage > Release.
   - If you want to disable automatic release for multiple instances, find the Pay-As-You-Go instances according to the Billing Method, select the target instances, and click Release at the bottom of the list.

2. In the dialog box, select Scheduled Release.

3. Turn off the Automatic Release switch.

4. Click Next, and then click OK.

You can also use the Alibaba Cloud CLI, OpenAPI Explorer, or SDK to call `ModifyInstanceAutoReleaseTime` to disable automatic release for a Pay-As-You-Go instance.

8.4 Reactivate an instance

This topic describes how to reactivate an instance. After paying the overdue bill of a Pay-As-You-Go instance, you must reactivate the instance. Otherwise, the instance will be released.

Precautions

For a Pay-As-You-Go instance, if the due date of an overdue payment (T) is not settled within 15 days after the due date (T+15), the instance is stopped due to overdue payment and its status changes to Expired. You must submit a ticket to settle the payment and reactivate your instance within 30 days after the due date (T+30). Otherwise, the instance is released and the data cannot be recovered.

Note:

If you fail to reactivate the ECS instance within 30 days after the due date (T+30), the instance is automatically released 30 days after the due date and the data cannot be recovered.

Prerequisites

The Pay-As-You-Go instance is in the Expired or Expired and Being Recycled state.

You have settled the payment by opening a ticket.

Procedure

To reactivate an instance in the ECS console, follow these steps:
1. Select the instance to be reactivated, and then choose More > Reactivate at the bottom of the instance list.
2. Choose whether to reactivate the instance immediately or later at a specified time.

If you choose to reactivate immediately, the selected instance returns to the Running state after about 10 minutes.

Alternatively, you can complete this task by calling the `ReactivateInstances` API action through the Alibaba Cloud CLI, OpenAPI Explorer, or SDK.

### 8.5 Check instance information

This topic describes how to check instances under your account and details of a single instance.

Through the console, you can:

- View all ECS instances under your account on the Overview page
- View the information of ECS instances on the Instances page
- View details of an ECS instance on Instance Details page

#### View all ECS instances under your account on the Overview page

You can view information of all the ECS instances created by your account on the Overview page, including:

- Total number of ECS instances, and numbers of instances in each state.
- Number of resources in different regions and numbers of ECS instances in each state.

The homepage of the ECS console is the Overview page by default.

#### View the information of ECS instances on the Instances page

To navigate to the Instances page, follow these steps:

Here, you can see information of all the existing ECS instances in the selected region, including ECS instance ID/name, zone, IP addresses, status, network type, billing method, and actions. You can show or hide the displayed information of an instance by using the Column Filter feature.

1. In the upper-right corner of the Instance List, click the icon.
2. Select the instance information to be displayed and then click OK.

View details of an ECS instance on Instance Details page

The Instance Details displays detailed information of a selected ECS instance.

To navigate to the Instance Details page, follow these steps:

1. Find the ECS instance you want to view the details of, and then click its instance ID.

On the Instance Details page, you can view the following information:

- Basic Information, including the ECS instance ID, instance name, region, zone, instance type, instance type family, image ID, key pair name (applies to Linux instances only), instance RAM role, and tags.
- Configuration Information, including CPU, memory, I/O optimization, operating system, IP addresses, billing method for bandwidth, current bandwidth, and VPC network information (applies to VPC instances only).
- Payment Information, including billing method, the mode to stop an instance, creation time, and automatic release schedule (applies to Pay-As-You-Go instances only).
- Monitoring Information, including CPU and network usage.

You can also switch from the Instance Details page to the Disks, Instance Snapshots, or Security Groups page to view resources related to this instance.
8.6 Customize CPU options

The CPU options of an ECS instance include the number of CPU cores and the number of threads per core. For some ECS instance types, you can customize the CPU options of an instance when you create the instance by calling the RunInstances operation.

CPU and vCPU

A CPU is the physical processor of an ECS instance. Alibaba Cloud ECS instances use the Hyper-Threading (HT) technology to enable multiple threads to run concurrently on a single CPU core. Each CPU thread is virtualized as a virtual CPU (vCPU).

The following table describes the parameters of the CPU options for an ECS instance.

<table>
<thead>
<tr>
<th>CPU option</th>
<th>API parameter</th>
<th>Function</th>
<th>Scenario</th>
<th>Applicable instance type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of CPU cores</td>
<td>CpuOptions.Core</td>
<td>Determines the number of physical CPU cores.</td>
<td>You can increase the number of CPU cores for memory-optimized instance types to significantly improve instance performance and optimize the licensing costs of software.</td>
<td>This option cannot be customized, and the default value is used.</td>
</tr>
<tr>
<td>Number of threads per core</td>
<td>CpuOptions.ThreadsPerCore</td>
<td>Determines the total number of vCPUs. Number of vCPUs = Number of CPU cores × Number of threads per core.</td>
<td>In most cases, an ECS instance type provides sufficient threads per core to suit your workloads. You can customize this parameter for the following scenarios: • High-performance computing (HPC) workloads • Memory-intensive business needs</td>
<td>For more information, see Numbers of CPU cores and threads per core.</td>
</tr>
</tbody>
</table>

Billing

Customizing CPU options does not incur additional charges.
Limits

- CPU options can only be customized when you create an instance, and cannot be modified after the instance is created.
- When you change the instance type of an ECS instance, its CPU options are changed to the default CPU options for the new instance type.
- The number of CPU cores cannot be customized.
- Only the g6, r6, c6, hfc6, hfg6, and hfr6 instance families support customizing CPU options. For information about valid values of CPU options, see Numbers of CPU cores and threads per core.

Enable or disable Hyper-Threading

You can call the `#unique_232` operation to customize the CPU options of an ECS instance. If an SDK is used, upgrade it to the latest version.

- By default, Hyper-Threading is enabled on ECS instances. You can enable Hyper-Threading in the Alibaba Cloud CLI, shown in the following sample request:

```
aliyun ecs RunInstances --RegionId cn-hangzhou --CpuOptions.Core 2 --CpuOptions.ThreadsPerCore 2 --ImageId ubuntu_18_04_64_20G_alibase_20190624.vhd --InstanceType ecs.g6.6xlarge --SecurityGroupId sg-bp67acfmxazb4ph*** --VSwitchId vsw-bp1s5fnvk4gn2tws03*** --Amount 1 --SystemDisk.AutoSnapshotPolicyId sp-bp67acfmxazb4ph***
```

- To disable Hyper-Threading, set the `CpuOptions.ThreadsPerCore` parameter to 1 in the Alibaba Cloud CLI, shown in the following sample request:

```
aliyun ecs RunInstances --RegionId cn-hangzhou --CpuOptions.Core 2 --CpuOptions.ThreadsPerCore 1 --ImageId ubuntu_18_04_64_20G_alibase_20190624.vhd --InstanceType ecs.g6.6xlarge --SecurityGroupId sg-bp67acfmxazb4ph*** --VSwitchId vsw-bp1s5fnvk4gn2tws03*** --Amount 1 --SystemDisk.AutoSnapshotPolicyId sp-bp67acfmxazb4ph***
```

In this example, the ecs.g6.xlarge instance type provides two physical CPU cores.

- Enable Hyper-Threading: You can enable Hyper-Threading by setting the number of threads per core to 2. The instance type will have 4 vCPUs, which is the number of CPU cores multiplied by the number of threads per core. Hyper-Threading is enabled by default for this instance type.

- Disable Hyper-Threading: You can disable Hyper-Threading by setting the number of threads per core to 1. The instance type will have only 2 vCPUs.
View the CPU options

You can call the \#unique_233 operation to view the specified CPU options for an ECS instance. If an SDK is used, upgrade it to the latest version.

* Sample request in the Alibaba Cloud CLI:

```
aliyun ecs DescribeInstances --InstanceIds '["i-bp19rxmlzoege2z57 ***"]' --output cols=CpuOptions rows=Instances.Instance[]
```

* Sample response in the Alibaba Cloud CLI:

```plaintext
CpuOptions
----------
map[CoreCount:1 ThreadsPerCore:2]
```

* Sample codes by using the Shell command `lscpu`:

```
shell@ecshost:~$ lscpu
Architecture:        x86_64
Byte Order:          Little Endian
CPU(s):              1   # Number of CPU cores
On-line CPU(s) list: 0
Thread(s) per core:  2   # Number of threads per core
Core(s) per socket:  1
Socket(s):           1
Vendor ID:           GenuineIntel
CPU family:          6
Model:               85
Model name:          Intel(R) Xeon(R) Platinum 8163 CPU @ 2.50GHz
......
```

Numbers of CPU cores and threads per core

The following table lists the default value and valid values of CPU cores (CpuOptions .Core) and threads per core (CpuOptions.ThreadsPerCore). Instance types not listed in the table do not support customizing CPU options.

<table>
<thead>
<tr>
<th>Instance type</th>
<th>Default value of vCPUs</th>
<th>Default value of CPU cores</th>
<th>Default value of threads per core</th>
<th>Valid values of threads per core</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs.g6.large</td>
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<td>1</td>
<td>2</td>
<td>1, 2</td>
</tr>
<tr>
<td>ecs.g6.xlarge</td>
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<td>Default value of threads per core</td>
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</table>
### Instance / 8 Manage instances

<table>
<thead>
<tr>
<th>Instance type</th>
<th>Default value of vCPUs</th>
<th>Default value of CPU cores</th>
<th>Default value of threads per core</th>
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<tbody>
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<td>1, 2</td>
</tr>
</tbody>
</table>

### 8.7 Reset an instance logon password

This topic describes how to reset the logon password of one or more instances.

**Limits**

- After you reset the logon password of a running instance, you must restart the instance so that the new password can take effect. Restarting the instance may impact your services. We recommend that you reset the logon password and restart your instance during off-peak business hours to avoid service disruption.
- If your instance uses a password for authentication, the password authentication automatically becomes invalid after you attach a key pair to your instance. However, if you reset the password of your instance after you attach a key pair to the instance, you can log on to the instance by using the password or the key pair.

**Prerequisites**

The instance must be in a stable status, such as Stopped and Running. For more information, see [ECS instance lifecycle](#).
Procedure

To reset the password of one or multiple ECS instances, follow these steps:

1. Log on to the *ECS console*.
2. In the left-side navigation pane, choose Instances & Images > Instances.
3. In the top navigation bar, select a region.
4. Select one or more target instances as follows:
   
   - To reset the password of one instance, find the target instance, and then choose More > Password/Key Pair > Reset Password in the Actions column.
   
   - To reset the password of multiple instances, select the target instances, and then click Reset Password under the instance list.
5. **Specify a new valid password, and then click OK.**

![Password Reset Form]

**Note:** You must restart the instance in the console for the new password to take effect.

- **Logon Password:**
  The password must be 8 to 30 characters in length. The password must contain characters from at least three of the following categories: uppercase letters, lowercase letters, digits, and special characters (`, ~, @, #, $, %, ^, &,- +=|[]\`;:<>,/?). The password for a Windows ECS instance cannot start with a forward slash (/).

- **Confirm Password:**

  The operation will be performed on the selected **1 Instances**. Are you sure you want to proceed?

[OK] [Cancel]
6. Perform the following operations as needed:

- For a Running instance, **restart the instance** to make the new password take effect.

You can also use Alibaba Cloud CLI, OpenAPI Explorer, or Alibaba Cloud SDK to call the **ModifyInstanceAttribute** API action to reset the logon password.
What to do next

You can change the password of an ECS instance and then restart the instance in the ECS console to make the new password take effect.

8.8 Change the instance logon password by connecting to the instance

This topic describes how to change the logon password of an ECS instance by connecting to the instance through a remote connection. In this topic, a Linux instance running CentOS 6.8 and a Windows instance running Windows Server 2008 are used as examples.

Change the logon password of a Linux instance

1. Log on to the target instance by using a remote connection. For information about the different methods you can use to remotely connect to a Linux instance, see Overview.
2. Run the passwd command (for example, passwd root).
3. Enter a new password.
4. Enter the new password again for the password to take effect.

Change the logon password of a Windows instance

1. Log on to the target instance by using a remote connection. For information about the different methods you can use to remotely connect to a Windows instance, see Overview.
2. Choose Start > Run, enter compmgmt.msc, and then press Enter.
3. In the Computer Management tool window, choose System Tools > Local Users and Groups > Users.
4. Right-click the username for which the password is to be changed (for example, Administrator).
5. Click Set Password.
6. In the Set Password for Administrator dialog box, click Proceed.
7. In the displayed dialog box, enter a new password in the New password and Confirm password text boxes, and then click OK.
8.9 Enable instance release protection

If your ECS instances provide critical services, you can enable release protection for these ECS instances to prevent irreversible data loss resulting from accidental or incorrect operations during a manual release. This topic describes how to enable and disable instance release protection and view the instance release protection status.

Limits

- Instance release protection applies only to Pay-As-You-Go instances.
- An automatic release of an instance due to normal circumstances take precedence. These circumstances include, but are not limited to:
  - A payment under your account is overdue for more than 15 days.
  - The automatic release time that you set for the instance is reached.
  - The instance does not comply with the applicable security compliance policies.
  - The instance was automatically created by Auto Scaling and consequently is removed from the scaling group when the scaling group scales in.

Enable instance release protection when you create an instance

Note:
This procedure describes the instance release protection settings. For information about other settings, see Create an instance by using the wizard.

To enable instance release protection when you create an instance, follow these steps:

1. On the Instances page, click Create Instance.
2. On the Basic Configurations page, set the Billing Method to Pay-As-You-Go, set other parameters as needed, and then click Next: Networking.
3. On the Networking page, set the parameters as needed, and then click Next: System Configurations.
4. On the System Configurations page, select Prevent users from releasing the instance inadvertently by using the console or API, set the parameters as needed, and then click Next: Grouping.

5. On the Grouping page, set the parameters as needed, and then click Next: Preview and confirm your settings.

When you create an instance through RunInstances or CreateInstance, you can use the DeletionProtection parameter to enable or disable instance release protection.

Enable or disable instance release protection by modifying instance information

To enable or disable instance release protection by modifying the information of an instance, follow these steps:

1. On the Instances page, choose More > Instance Settings > Modify Instance Attributes in the Actions column of the instance to be modified.

2. In the Modify Instance Attributes dialog box, select Enable Instance Release Protection.
To disable the instance release protection, clear Enable Instance Release Protection.

Modify Information

* Instance Name: 

It can be 2 to 128 characters in length.

Host Name: 

Specify the host name of the operating system for the instance.
For Windows, the host name can be 2 to 15 characters in length and can contain letters, numbers, and hyphens (-). The host name cannot start or end with a hyphen. Do not use hyphens consecutively. The host name cannot contain only numbers.
For other operating systems, such as Linux, the host name can be 2 to 30 characters in length and can contain letters, numbers, and hyphens (-). You can separate characters in the host name with periods (.). The host name cannot start or end with a period or a hyphen. Do not use periods or hyphens consecutively.
The hostname will take effect after the instance has restarted.

Instance Description: 

It can be 2 to 256 characters in length.

Enable instance release protection

Operation will be executed on the selected 1 Instances. Are you sure you want to proceed?

3. Click OK.
When you modify instance information through `ModifyInstanceAttribute`, you can use the `DeletionProtection` parameter to enable or disable instance release protection.

View the instance release protection status

To view the release protection status of an instance, follow these steps:

1. On the Instances page, click the target instance in the Instance ID/Name column, or click Manage in the Actions column of the instance.
2. On the Instance Details page, view the status of Enable release protection in the Payment Information area.
Example of protection effect

After you enable release protection for an instance, a warning message will be displayed if you try to manually release the instance. If you want to manually release the instance, you must disable instance release protection.

After you enable release protection for an instance, the error code `InvalidOperation.DeletionProtection` is returned if you try to use `DeleteInstance` to delete the instance.

8.10 User-defined data and metadata

8.10.1 Metadata

The metadata of an instance is the basic information of the ECS instance, including the Instance ID, IP Address, OS, and other related information. You can use an instance's metadata to better manage and configure an instance.

**Note:**

If you manually change some instance information, this change will not be reflected in the instance metadata.

**Limits**

The metadata is only applicable for VPC-Connected instances.

Get the metadata

**Linux instance**

1. Connect to a Linux instance by using a password.
2. Run `curl http://100.100.100.200/latest/meta-data/` to access the root directory of the metadata.

3. Add the specific metadata name to the preceding command to access the specified metadata. For example:
   - Run `curl http://100.100.100.200/latest/meta-data/instance-id` to get the ID of an ECS instance.
   - Run `curl http://100.100.100.200/latest/meta-data/image-id` to get the image ID of an ECS instance.

Windows instance

1. Connect to a Windows instance.

2. Use PowerShell to run `Invoke-RestMethod http://100.100.100.200/latest/meta-data/` to get the metadata.

3. Add the specific metadata name to the preceding command to access the specified metadata. For example:
   - Run `Invoke-RestMethod http://100.100.100.200/latest/meta-data/instance-id` to get the ID of an ECS instance.
   - Run `Invoke-RestMethod http://100.100.100.200/latest/meta-data/image-id` to get the image ID of an ECS instance.

List of instance metadata

<table>
<thead>
<tr>
<th>Metadata name</th>
<th>Description</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>dns-conf/nameservers</td>
<td>DNS configurations for an instance.</td>
<td>2016-01-01</td>
</tr>
<tr>
<td>eipv4</td>
<td>EIP address</td>
<td>2016-01-01</td>
</tr>
<tr>
<td>hostname</td>
<td>The OS name of an instance.</td>
<td>2016-01-01</td>
</tr>
<tr>
<td>image-id</td>
<td>ID of the image that is selected at the time of instance creation.</td>
<td>2016-01-01</td>
</tr>
<tr>
<td>image/market-place/product-code</td>
<td>Product code of the image in the Alibaba Cloud Marketpalce.</td>
<td>2016-01-01</td>
</tr>
<tr>
<td>image/market-place/charge-type</td>
<td>Billing method of the image in the Alibaba Cloud Marketplace.</td>
<td>2016-01-01</td>
</tr>
<tr>
<td>instance-id</td>
<td>The instance ID</td>
<td>2016-01-01</td>
</tr>
<tr>
<td>Metadata name</td>
<td>Description</td>
<td>Version</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>---------------</td>
</tr>
<tr>
<td>dns-conf/nameservers</td>
<td>DNS configurations for an instance.</td>
<td>2016-01-01</td>
</tr>
<tr>
<td>mac</td>
<td>The MAC address of the instance. If multiple network interface cards exist in an instance, this metadata indicates the MAC address of eth0.</td>
<td>2016-01-01</td>
</tr>
<tr>
<td>network-type</td>
<td>Network type (only applicable for VPC network).</td>
<td>2016-01-01</td>
</tr>
<tr>
<td>ntp-conf/ntp-servers</td>
<td>The address of a NTP server.</td>
<td>2016-01-01</td>
</tr>
<tr>
<td>owner-account-id</td>
<td>The aliuid of the instance owner.</td>
<td>2016-01-01</td>
</tr>
<tr>
<td>private-ipv4</td>
<td>Private IP address.</td>
<td>2016-01-01</td>
</tr>
<tr>
<td>public-ipv4</td>
<td>Public network IP address.</td>
<td>2016-01-01</td>
</tr>
<tr>
<td>public-keys</td>
<td>A list of all public keys of the current instance.</td>
<td>2016-01-01</td>
</tr>
<tr>
<td>region-id</td>
<td>The region where the instance is located.</td>
<td>2016-01-01</td>
</tr>
<tr>
<td>zone-id</td>
<td>Zone ID of the zone where the ECS instance is located.</td>
<td>2016-01-01</td>
</tr>
<tr>
<td>serial-number</td>
<td>The serial number of an instance.</td>
<td>2016-01-01</td>
</tr>
<tr>
<td>source-address</td>
<td>The source of YUM/APT (only applicable for a Linux instance).</td>
<td>2016-01-01</td>
</tr>
<tr>
<td>kms-server</td>
<td>Activate the server (only applicable for a Windows instance).</td>
<td>2016-01-01</td>
</tr>
<tr>
<td>wsus-server/wu-server</td>
<td>Update the server (only applicable for a Windows instance).</td>
<td>2016-01-01</td>
</tr>
<tr>
<td>wsus-server/wu-status-server</td>
<td>The server that monitors the update status of an instance (only applicable for a Windows instance).</td>
<td>2016-01-01</td>
</tr>
<tr>
<td>vpc-id</td>
<td>ID of the VPC that an instance is in.</td>
<td>2016-01-01</td>
</tr>
<tr>
<td>vpc-cidr-block</td>
<td>The CIDR block of the VPC that an instance is in.</td>
<td>2016-01-01</td>
</tr>
<tr>
<td>vswitch-cidr-block</td>
<td>The CIDR block of the VSwitch that an instance is in.</td>
<td>2016-01-01</td>
</tr>
<tr>
<td>vswitch-id</td>
<td>ID of the VSwitch that an instance is in.</td>
<td>2016-01-01</td>
</tr>
<tr>
<td>Metadata name</td>
<td>Description</td>
<td>Version</td>
</tr>
<tr>
<td>-------------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>------------</td>
</tr>
<tr>
<td>dns-conf/nameservers</td>
<td>DNS configurations for an instance.</td>
<td>2016-01-01</td>
</tr>
<tr>
<td>ram/security-credentials/[role-name]</td>
<td>The temporary STS credential is generated according to the policy of a RAM role. Only available when you specify a RAM role to an ECS instance. When you use this metadata to get the STS credential, [role-name] must be replaced with the actual RAM role name you create or you have created.</td>
<td>2016-01-01</td>
</tr>
<tr>
<td>instance/spot/termination-time</td>
<td>The spot instance release time is based on the instance operating system time zone. It is specified in UTC format. For example, YYYY-MM-DDThh:mm:ssZ For example, 2018-04-07T17:03:00Z.</td>
<td>2016-01-01</td>
</tr>
<tr>
<td>network/interfaces/macs</td>
<td>The MAC address list of Network Interface Controllers (NICs).</td>
<td>2016-01-01</td>
</tr>
<tr>
<td>network/interfaces/macs/[mac]/network-interface-id</td>
<td>The unique ID of the NIC, [mac] must be replaced with the actual MAC address.</td>
<td>2016-01-01</td>
</tr>
<tr>
<td>instance/virtualization-solution</td>
<td>The virtualization solution, which is ECS Virt 1.0 / 2.0</td>
<td>2016-01-01</td>
</tr>
<tr>
<td>instance/virtualization-solution-version</td>
<td>The internal build version.</td>
<td>2016-01-01</td>
</tr>
<tr>
<td>instance/last-host-landing-time</td>
<td>The latest update time of the physical server to which your instance is hosted on.</td>
<td>2016-01-01</td>
</tr>
<tr>
<td>instance-identity/pkcs7</td>
<td>Instance identity signature.</td>
<td>2016-01-01</td>
</tr>
</tbody>
</table>
Other data exposing to instance metadata

- **Maintenance:** For on-going *system events*, run the following command to get the latest data:
  
  curl http://100.100.100.200/latest/maintenance/active-system-events

- **Signature:** For the *instance identity* document, run the following command to get the latest data:
  
  curl http://100.100.100.200/latest/dynamic/instance-identity/document

- **Boot behavior configuration:** For an *instance's user data*, run the following command to get the latest data:
  
  curl http://100.100.100.200/latest/user-data

8.10.2 Retrieve instance metadata

**This topic describes how to retrieve the metadata of a Linux or Windows instance.**

**Limits**

Only the metadata of a VPC instance can be obtained.

**Note:**

Manually changing instance information will not change the relevant metadata.

Retrieve the metadata of a Linux instance

1. **Connect to your Linux instance.** For more information, see *Overview of connecting to an ECS instance.*
2. Run the following command to access the root directory of the metadata.

```
curl http://100.100.100.200/latest/meta-data/
```

3. Add a specific metadata name to the preceding command to access the specified metadata. For more information, see Instance metadata and Dynamic instance metadata.

For example:

- Run the following command to get the ID of an ECS instance.

```
curl http://100.100.100.200/latest/meta-data/instance-id
```

- Run the following command to get the image ID of an ECS instance.

```
curl http://100.100.100.200/latest/meta-data/image-id
```

- Run the following command to get the active system events.

```
curl http://100.100.100.200/latest/maintenance/active-system-events
```

- Run the following command to get the instance identity document.

```
curl http://100.100.100.200/latest/dynamic/instance-identity/document
```

- Run the following command to get the instance user data.

```
curl http://100.100.100.200/latest/user-data
```

Retrieve the metadata of a Windows instance

1. Connect to your Windows instance. For more information, see Overview of connecting to an ECS instance.
2. Run the following command by using PowerShell to get instance metadata.

   `Invoke-RestMethod http://100.100.100.200/latest/meta-data/`

3. Add a specific metadata name to the preceding command to access the specified metadata. For more information, see *Instance metadata* and *Dynamic instance metadata*.

   For example:

   • Run the following command to get the ID of an ECS instance.

     `Invoke-RestMethod http://100.100.100.200/latest/meta-data/instance-id`

   • Run the following command to get the image ID of an ECS instance.

     `Invoke-RestMethod http://100.100.100.200/latest/meta-data/image-id`

   • Run the following command to get the active system events.

     `Invoke-RestMethod http://100.100.100.200/latest/maintenance/active-system-events`

   • Run the following command to get the instance identity document.

     `Invoke-RestMethod http://100.100.100.200/latest/dynamic/instance-identity/document`

   • Run the following command to get the instance user data.

     `Invoke-RestMethod http://100.100.100.200/latest/user-data`

### 8.11 User-defined data

#### 8.11.1 User data

You can use user data of an ECS instance to customize its startup behavior and to pass data into the instance. You can specify user data when creating an instance (unique_92) and customize startup behavior such as automatically update software packages, enable services, print logs, install dependencies, initialize web services, and more. User data of an ECS instance is implemented primarily through different types of scripts. User data can also be used as common data to be referenced in the instances.

Instructions for use

To configure instance user data, note that:

• Only VPC-Connected instances are supported.
For phased-out instance types, they must be I/O optimized. Other instance type families are not limited for I/O optimized.

- Instance user data requires Base64 encoding before being passed in, and the user data before encoding cannot exceed 16 KB.
- The instance must use an official image or a user image that is created from an official image. The operating system must be one of the following:

<table>
<thead>
<tr>
<th>Windows instances</th>
<th>Linux instances</th>
</tr>
</thead>
</table>
| Windows Server 2008 R2 and later version | - CentOS  
- Ubuntu  
- SUSE Linux Enterprise  
- OpenSUSE  
- Debian  
- Aliyun Linux |

Module frequency

After the instance enters the Running state, use your Alibaba Cloud primary account to run the user data of the instance, followed by the initialization or /etc/init information.

After you modify the instance user data, depending on the type of scripts and modules that are used, the modified user data is or is not run. For example:

- If you configure user data by using a shell script, such as a user-data script, the modified user data is not run.
- If the user data configures modules such as Byobu, Set Hostname, and Set Passwords, the modified user data is not run.
- If the user data configures modules such as bootcmd, update_etc_hosts, and yum_add_repo, the modified user data is run.

For more information, see modules.

Set user data

For this example, assume that you write user data development in a Windows environment, and you use Upstart Job to configure the user data.

1. Use an editor to create a text file, such as Notepad++.
2. Edit the script related to the user data in the text file.

![Note:](image)
The first line must meet the format requirements of the instance user data script, such as `#!/bin/sh, #cloud-config, #upstart-job`, and `[powershell]`. For more information, see [Linux instance user data](#) and [Windows instance user data](#).

3. Debug the script file to confirm that the content is valid.

4. (Optional) If you make a **Gzip compression content**, compress the script file in .gz format.

5. (Optional) If you are creating an **Include file** or a **Gzip compression script**, upload script file to available storage services, obtain the link, and set the valid period of the link.

   We recommend that you use Alibaba Cloud OSS to create links. For more information, see [upload an object](#) or [set lifecycle](#).

6. Log on to the **ECS console**.

7. Follow the instructions in **creating an instance** to create a Linux instance.

   ![Note:](image)
The instance must be **VPC-Connected**, and you must select a **image** that meets the requirement. For **phased-out instance types**, I/O optimized instances are required. Other **instance type families** are not limited in terms of I/O optimized.

   After creating the instance, select Advanced (based on instance RAM roles or cloud-init) use text form and enter your user data. If your user data has been encrypted by Base64 encoding, click **The text is Base64-encoded**.

8. Wait for the instance to be created.
9. Connect to your instance.

10. View the results of the user data. If a failure occurs, check the relevant log files.

   The following is an output example of user data on a CentOS instance by using the upstart job script:

   ![Example of user data output](image)

   In the preceding figure, the startup job file `part-001.conf` is generated in the `/etc/init` folder.

   Related API: #unique_92

View user data

You can view user data of an instance from the server `100.100.100.200`. To do so, follow these steps:

1. Connect to the target instance.

2. In the instance, depending on your OS, run one of the following:
   
   - For Linux, run `curl http://100.100.100.200/latest/user-data` to view the user data.
   - For Windows, run `Invoke-RestMethod http://100.100.100.200/latest/user-data/` to view the user data.

   Related API: #unique_244

Modify user data

You must stop the instance before modifying its current user data. If you need to restart a Pay-As-You-Go VPC-Connected instance immediately after you modify the user data, we recommend that you disable the No fees for stopped instances option. To modify user data of an instance, follow these steps:

1. Log on to the ECS console.

2. In the left-side navigation pane, click Instances.

3. Select the target region.

4. Select the target instance and then, in the Actions column, click Sets User Data.
5. Enter the user data and then click OK.

Note:
After you modify the user data, depending on the script type and the module type, the modified user data is or is not run.

Related API: #unique_234

Linux instance user data

Linux instance user data can be configured by several types of script, such as User-data Script, Cloud Config, Include Files, Gzip compression scripts, and Upstart Job. The scripts follow the format of open source cloud-init, and reference the Metadata for data sources. The configuration of Linux instances are automated at boot. For more information, see formats.
User-data script

User-data can be a shell script. It runs once at the instance first boot. The first line is fixed as #!, for example #! /bin/sh. The content of user-data script before Base64 encoding cannot exceed 16 KB. The following is a User-Data script example:

```bash
#!/bin/sh
echo "Hello World. The time is now $(date -R)!" | tee /root/output10.txt
service httpd start
chkconfig httpd on
```

After the instance has been created, connect to the instance and run `cat [file]` to view the results of the user-data script.

```
[root@XXXXX2z ~]# cat output.txt
Hello World. The time is now Mon, 24 Jul 2017 13:03:19 +0800!
```

Cloud-Config

You can use Cloud-Config to configure services such as updating yum sources, importing SSH keys, installing dependency packages, and more. The first line of Cloud-Config is fixed as #cloud-config, and the header cannot have spaces. The file must be valid yaml syntax. Depending on the service you configured, the instance user data runs differently.

Cloud Instance user data requires Base64 encoding before being passed in, and the pre-encoding cloud config data cannot exceed 16 KB. The following is a Cloud-Config script example:

```yaml
#cloud-config
apt:
  primary:
  - arches: [default]
    uri: http://us.archive.ubuntu.com/ubuntu/
  bootcmd:
    - echo 192.168.1.130 us.archive.ubuntu.com >> /etc/hosts
```

After the instance has been created, connect to the instance to view the results.

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

Include files
The contents of an Include File consist of a script link, with one link on one line. When the instance starts, cloud-init reads the contents of the script link in the Include File. If there is an error reading script content in a row, the instance stops performing user data. The first line of Include File is fixed as `#include` and the header cannot have spaces. The update frequency of the instance user data follows the script type configured in the include file.

Instance user data requires Base64 encoding before being passed in. The file before Base64 encoding cannot exceed 16 KB. The following is an Include File example:

```
#include
```

After the instance has been created, connect to the instance to view the results.

Gzip compressed content

The content of a User-Data Script, Cloud-Config, and Include File cannot exceed 16 KB. If your script content is larger than 16 KB, you can use Gzip to compress the content, the upload the compressed script to an available storage service (we recommend OSS), obtain the link, and use the Include File format to render the link. The first line of a Gzip compressed script is fixed as `#include` and the header cannot have spaces. The update frequency of the instance user data follows the script type configured in the Gzip file. The following is a Gzip compressed file example:

```
#include
http://ecs-image-test.oss-cn-hangzhou.aliyuncs.com/userdata/config.gz
```

Upstart Job

Upstart service is required for an init system if you use Upstart Job to configure user data. For example, CentOS 6, Ubuntu 10/12/14, and Debian 6/7 use upstart as the init system. Upstart Job script places your instance user data into a file in `/etc/init` directory. The first line of Upstart Job script is fixed as `#upstart-job` and the header cannot have spaces. We perform the instance user data for every instance boot. The following is a Upstart Job script example:

```
#upstart-job
description "upstart test"
start on runlevel [2345]
stop on runlevel [! 2345]
```
exec echo "Hello World. The time is now $(date -R)!" | tee /root/output.txt

Windows instance user data

Windows instance user data is supported by Alibaba Cloud ECS, and offers Windows-based instances the ability to run initialization scripts. Instance user data requires Base64 encoding before being passed in, and the pre-encoding user data cannot exceed 16 KB. Only SBC case characters are allowed. You can write Bat script or PowerShell script to configure the instance user data.

Bat scripts

The first line is fixed as [bat] and the header cannot have spaces. For example:

[bat]
echo "bat test" > c:\1.txt

After the instance has been created, connect to the instance to view the results. In the following example, a 1.txt text file is shown under the C:\ drive.

The first line of PowerShell scripts

is fixed as [powershell] and the header cannot have spaces. For example:

[powershell]
write-output "Powershell Test" | Out-File C:\2.txt

Reference

For more information about Linux instance user data, see cloud-init formats.

For more information about the update frequency of Linux instance user data, see cloud-init modules.

8.11.2 Manage user data

This topic describes how to configure generated user data for an instance in the ECS console, and how to view and modify existing user data.

Limits

The user data function has the following limits:

- User data can be configured for instances in a VPC only.
- For phased-out instance types, only I/O-optimized instance types support user data.
  For other instance type families, all instance types support user data.
- User data must be Base64-encoded before it is configured for instances.
  Additionally, the original user data cannot exceed 16 KB.
- An instance must use a public image or a custom image that is created from a public image. Furthermore, the following table describes the operating systems that are supported.

<table>
<thead>
<tr>
<th>Platform</th>
<th>Operating system</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows</td>
<td>Windows Server 2008 R2 or later</td>
</tr>
<tr>
<td>Linux</td>
<td>- CentOS</td>
</tr>
<tr>
<td></td>
<td>- Ubuntu</td>
</tr>
<tr>
<td></td>
<td>- SUSE Linux Enterprise</td>
</tr>
<tr>
<td></td>
<td>- OpenSUSE</td>
</tr>
<tr>
<td></td>
<td>- Debian</td>
</tr>
<tr>
<td></td>
<td>- Aliyun Linux</td>
</tr>
</tbody>
</table>

Configure user data for an instance

Note:

The following procedure takes a Linux instance running CentOS as an example.
1. Create a Linux instance by following the instructions in *Create an instance by using the wizard*.

**Note:**
During instance creation, enter user data in the user data box below Advanced Options (Instance RAM Roles and User Data cloud-init). If your user data is Base64-encoded, select the Enter Based64 Encoded Information check box.

2. After the instance starts, connect to it by following the instructions in *Overview of connecting to an ECS instance*.

3. Check the startup results against the configured user data. If exceptions occur, check the log files. The following output is from a CentOS instance which is configured with user data through an Upstart Job script:

```
As shown in the preceding output, a startup task file `part-001.conf` is created in the folder `/etc/init` of the instance.

You can also set user data by calling `RunInstances` through Alibaba Cloud CLI, OpenAPI Explorer, or Alibaba Cloud SDK. The relevant parameter is `UserData`.

**View user data**

You can view user data through the dedicated server 100.100.100.200. To do so, follow these steps:

1. Connect to the instance. For more information, see *Overview of connecting to an ECS instance*.```
2. Run the following commands in the instance:
   
   - **For Linux**, run `curl http://100.100.100.200/latest/user-data`.
   - **For Windows**, run `Invoke-RestMethod http://100.100.100.200/latest/user-data/`.

   You can also view user data by calling `DescribeUserData` through Alibaba Cloud CLI, OpenAPI Explorer, or Alibaba Cloud SDK.

   **Modify user data**

   You must stop the target instance before you modify its user data. After the modification, you need to check if the modified user data needs to be run according to the script type and module type. For more information, see [User data](#).

   **Note:**

   For Pay-As-You-Go VPC instances, if you need to restart an instance immediately after modifying its user data, we recommend that you turn off the option of No fees for stopped instances.

   1. Find the target instance, and in the Actions column, choose Instance Settings > Set User Data.
2. In the displayed dialog box, enter the relevant information and click OK.

You can also modify user data by calling `ModifyInstanceAttribute` through Alibaba Cloud CLI, OpenAPI Explorer, or Alibaba Cloud SDK.

8.11.3 Customize yum repository, NTP service, and DNS service

This topic describes how to use a user-defined script to configure your own yum repository, NTP service, and DNS service when creating a Linux instance. User-defined scripts also enable you to configure NTP service and DNS service for a Windows instance.

Scenarios

When a Linux instance is started, Alibaba Cloud automatically configures a pre-defined yum repository, NTP service, and DNS service for the instance. However, if
you want to have your own yum repository, NTP service, and DNS service, use user-defined scripts to implement them.

- If you are using a custom yum repository, Alibaba Cloud does not provide support for it.
- If you are using a custom NTP service, Alibaba Cloud does not provide time service.

Procedure

To customize your yum repository, NTP service, and DNS service for a Linux instance when creating it, follow these steps:

1. Create an instance *by using the wizard*. Be aware of the following configuration items:

   - On the Basic Configurations page, note the following customized configurations:
     - Instance Type: Select an I/O-optimized instance.
     - Image: Select a supported image type, for example, CentOS 7.2 on the Public Image tab.

2. On the Networking page, set Network Type to VPC

3. On the System Configurations page, enter the following script in the User Data text box in the Advanced area:

   ```bash
   #!/bin/sh
   # Modify DNS
   echo "nameserver 8.8.8.8" | tee /etc/resolv.conf
   # Modify yum repo and update
   rm -rf /etc/yum.repos.d/*
touch myrepo.repo
echo "[base]" | tee /etc/yum.repos.d/myrepo.repo
echo "name=myrepo" | tee -a /etc/yum.repos.d/myrepo.repo
echo "baseurl=http://mirror.centos.org/centos" | tee -a /etc/yum.repos.d/myrepo.repo
echo "gpgcheck=0" | tee -a /etc/yum.repos.d/myrepo.repo
echo "enabled=1" | tee -a /etc/yum.repos.d/myrepo.repo
yum update -y
# Modify NTP Server
echo "server ntp1.aliyun.com" | tee /etc/ntp.conf
systemctl restart ntpd.service
   ```

Note:
The first line must be `#!`, with no leading space. `/bin/sh`, with no leading space.

Do not add unnecessary spaces or carriage return characters in the full text.

You can customize URLs of your own DNS server, NTP Server, and yum repository based on the instance situations.

The preceding content applies to CentOS 7.2. If you are using other images, modify the scripts as needed.

You can also define the yum repository in the scripts of the `cloud config` type, but it is not recommended because it is not flexible enough to get adapted to Alibaba Cloud that may pre-configure some yum repository. Scripts of `script` type is recommended for changing the yum repository.

After the instance is created, you can connect to the instance to view the implementation details, as shown in the following figure.

The preceding figure shows that you have successfully customized the DNS service, the NTP service, and the yum repository.

8.11.4 Create a new account with the root user privilege

This topic describes how to use a user-defined script to create a new account with the root user privilege when creating a Linux instance. User-defined scripts can
also be used to create a new account with the administrator privilege for a Windows instance.

Scenarios

Use user-defined scripts of instances if you want to achieve the following results when creating a Linux ECS instance:

- Disable the default root account that comes with a Linux ECS instance. You can use the script to customize how to disable the root user and how many root user privileges are disabled.
- Create a new account with the root user privilege and customize the account name.
- Use only SSH key pairs, but not user passwords, for remote logon to manage the instance by using the new account with the root user privilege.
- If this new account is required to perform operations that can only be done by a user with root user privilege, the `sudo` command can be used without a password for privilege escalation.

Procedure

To create a new account with the root user privilege, follow these steps:

1. Create an instance by referring to "Create an instance by using the wizard." Be aware of the following configuration items:

   - On the Basic Configurations page, note the following customized configurations:
     - Instance Type: Select an I/O-optimized instance.
     - Image: Select a supported image type, for example, CentOS 7.2 on the Public Image tab.

2. On the Networking page, set Network Type to VPC.

3. On the System Configurations page, enter the following script in the User Data text box in the Advanced area:

   ```bash
   #!/bin/sh
   useradd test
   echo "test ALL=(ALL) NOPASSWD:ALL" | tee -a /etc/sudoers
   mkdir /home/test/.ssh
   touch /home/test/.ssh/authorized_keys
   echo "ssh-rsa AAAAB3NzaC1yc2EAAAABJQAAAQEAhGqhEh/rGbIMCGItFVtYpsXPQrCaunJGKZVIWtINrGZwusLc290qDZ93KCeBio6XlIby1Wm+psZY8THE+/Bsxq0M0HzfkQZD2vXuhRb4x1z98JHskX+0jnbjqYGY+Brgai9BvKDXTTSyJtCYUnEKxvcK+d1ZwbNuk2Q90ryHESDbSaczlNFgFQEDxhrCrvko+zWLjTVnomVUDhdMP2g6f
   ```
Note:

- The first line must be `#!/bin/sh`, with no leading space.
- Do not enter unnecessary spaces or carriage return characters in the text.
- The last line is your public key. You can define it.
- You can add other configuration in the script as you need.
- The example script only applies to CentOS 7.2. If you are using other images, customize the script according to the operating system types.

After the instance is started, you can use the new test user to connect to the instance by using an SSH private key. You can also escalate the permission level by using the `sudo` command and run operations that require the root user privilege, as shown in the following figure.

8.12 Instance identity

Instance identity is a part of Metadata that describes and validates an instance. Instance identity enables you quickly locate a target instance,
and provides authentication for such actions as software updates, access control, or application activation. The signature of instance identity is encrypted by the PKCS#7 standard.

Use cases

You can use instance identity (instance-identity) in scenarios such as authentication, granting access, or instance identification, as follows.

- A typical software activation (with one serial number for one device) does not work in the environment of cloud computing where the sales model of the Alibaba Cloud Marketplace is flexible. In this case, you can use instance identity to complete the software activation. For more information, see Sample 1. No audience in the signature.
- When you write sensitive data in the instance, you can use instance identity to verify that the server is your instance.
- Scenarios whereby you want to confirm the source of the target server.

Feature details

Instance identity consists of a dynamically generated instance identity document (document) and instance identity signature (signature).

- Instance identity document: Describes the attributes of an instance. The following table lists instance identity document items.

<table>
<thead>
<tr>
<th>Properties</th>
<th>Description</th>
<th>Can it be changed?</th>
</tr>
</thead>
<tbody>
<tr>
<td>account-id</td>
<td>ID of the Alibaba Cloud account to which the instance belongs</td>
<td>No</td>
</tr>
<tr>
<td>create-time</td>
<td>Instance creation time</td>
<td>No</td>
</tr>
<tr>
<td>instance-id</td>
<td>Instance ID.</td>
<td>No</td>
</tr>
<tr>
<td>mac</td>
<td>MAC address of the instance primary network interface</td>
<td>No</td>
</tr>
<tr>
<td>region-id</td>
<td>ID of the region to which the instance belongs</td>
<td>No</td>
</tr>
<tr>
<td>serial-number</td>
<td>Serial number of the instance</td>
<td>No</td>
</tr>
</tbody>
</table>
### Properties

<table>
<thead>
<tr>
<th>Properties</th>
<th>Description</th>
<th>Can it be changed?</th>
</tr>
</thead>
<tbody>
<tr>
<td>zone-id</td>
<td>ID of the zone to which the instance belongs</td>
<td>No</td>
</tr>
<tr>
<td>instance-type</td>
<td>Instance types</td>
<td>Yes. It changes after you change the instance type.</td>
</tr>
<tr>
<td>image-id</td>
<td>Image ID of the instance</td>
<td>Yes. It changes after you replace the system disk of the instance.</td>
</tr>
<tr>
<td>private-ip</td>
<td>Private IP of the instance</td>
<td>Yes. It changes after you change the private IP of a VPC-Connected instance.</td>
</tr>
</tbody>
</table>

- Instance identity signature: Verifies the instance identity in the cryptographic method of the PKCS#7 standard.
  - To enhance the security of the signature, you can protect it by specifying the **audience** parameter in it. However, even if you specify **audience**, another user may get information about the identity document and the identity signature. Therefore, we recommend the value of the **audience** parameter is a random string, timestamp, regularly changed data, or some output generated by a specific algorithm.
  - If you specify the **audience** parameter, you must modify the instance identity document and signature simultaneously. For example, if you have specified the **audience** parameter while obtaining the signature, before you verify the signature by using the OpenSSL commands, you must add the value of the **audience** parameter at the end of the dynamically obtained instance identity document in the format of "audience": "Value of the audience", and separate the parameters with a comma (,).

### Usage

The instance identity is verified by using the OpenSSL commands. Make sure that you have the OpenSSL configured in your instance. Visit [https://www.openssl.org/source](https://www.openssl.org/source) to download and update OpenSSL service.

Take CentOS 7.4 as an example to use the instance identity.

1. Connect to your Linux instance.

3. Run curl http://100.100.100.200/latest/dynamic/instance-identity/pkcs7 or curl http://100.100.100.200/latest/dynamic/instance-identity/pkcs7?audience=XXXX to get the instance identity signature.

4. Verify the instance identity by using OpenSSL.

```sh
openssl smime -verify -in $signature -inform PEM -content $DOCUMENT -certfile AliyunPubkey -noverify > /dev/null
```

**Note:**

- Specify the variable `$signature` with the responded instance identity signature.
- Specify the variable `$DOCUMENT` with the responded instance identity document.

(Optional) In step 3, if you have specified the `audience` parameter, add the value of the `audience` parameter at the end of the dynamically obtained instance identity document in the format of "audience":"Value of the audience", and separate the parameters with a comma (,).
- Specify the variable `AliyunPubkey` with the Alibaba Cloud public certificate.

The public certificate of Alibaba Cloud in all regions is as follows.

```
-----BEGIN CERTIFICATE-----
MIIDdzCCAZ+gAwIBAgIeQ89NzqPGqkhkig9w6BAQsFADBsMRcAgSdBwggEloAwDQJ
AQEBBQADgogEPADCCAQoCggEBATijJw5sbZDiYx4mvdP32pQMPMK4k75lRnVR2FkY/5
uwGSPbdtNxaXzwEm+u4WIsJiaAN3OZgJ3pYicgik+9Lg5gYArI+0/3rZ61lReE+F+D
DhD8g/m/YidYBFC2IbzdS9EVAf/gJdtdD0DxR0QjFk2RQsvpfV0Us3Vp190+jeCQLoRb
ZVm6c5v7JPL/L2IKOMjhiyPF2kpDQeisMtnD4
```
Elastic Compute Service

Instance / 8 Manage instances

Sample 1. No audience in the signature

Assume that you have published an image in the image market. The following example shows you how to grant access to the instances of your customers.

1. Connect to the target instance.
2. Verify whether the image used by the instance is from the Alibaba Cloud Marketplace, or from another source, by calling the metadata items of product-code and charge-type. For more information, see Metadata.

```
curl http://100.100.100.200/latest/meta-data/image/market-place/product-code
curl http://100.100.100.200/latest/meta-data/image/market-place/charge-type
```

3. Create a temporary file cert.cer in the working directory and save the public certificate to the file.

4. Determine the identity of the instance by running the following script.

```
#!/usr/bin/bash
function verify_signature_without_audience(){
curl 100.100.100.200/latest/dynamic/instance-identity/document > document
echo "-----BEGIN CERTIFICATE-----" > signature
curl 100.100.100.200/latest/dynamic/instance-identity/pkcs7 >> signature
echo "" >> signature
echo "-----END CERTIFICATE-----" >> signature
openssl smime -verify -in signature -inform PEM -content document -certfile cert.cer -noverify > /dev/null
}
verify_signature_without_audience
```

5. Once the response result shows Verification successful, remove the restriction and run the image in the instance.

Sample 2. Audience in the signature

Assume that you published an image in the image market. The following example shows you how to grant access to the instances of your customers by specifying
an  audience parameter during the process of validation. To make sure that the instance identity is not maliciously acquired and used, you can implement the access control at the application server by combining your audience parameter. We recommend the value of the audience parameter is a random string, timestamp, regularly changed data, or some output generated by a specific algorithm.

1. Connect to the target instance.
2. Verify whether the image used by the instance is from the Alibaba Cloud Marketplace, or another source, by calling the metadata items of product-code and charge-type.

```
curl http://100.100.100.200/latest/meta-data/image/market-place/product-code
curl http://100.100.100.200/latest/meta-data/image/market-place/charge-type
```

3. Create a temporary file cert.cer in the working directory and save the public certificate to the file.

4. Determine the identity of the instance by running the following script.

```
#!/usr/bin/bash
function verify_signature_with_specified_audience() {
    audience='your audience' #Here is your audience parameter.
document=$(curl 100.100.100.200/latest/dynamic/instance-identity/document)
audience_json=',"audience":'"'"${audience}'"'"
    echo -n ${document%?} ${audience_json} > document
echo "-----BEGIN CERTIFICATE-----" > signature
curl 100.100.100.200/latest/dynamic/instance-identity/pkcs7?
audience=${audience} >> signature
echo "" >> signature
openssl smime -verify -in signature -inform PEM -content document -certfile cert.cer -noverify > /dev/null
}
verify_signature_with_specified_audience
```

5. Once the response result shows Verification successful, remove the restriction and run the image in the instance.
8.13 Manage software on Linux instances

8.13.1 Add software repositories

Software packages for Linux are often stored in software repositories. After you add a repository, you can use the package management tool of the Linux system to search, install, and update the software in the repository. This topic uses Alibaba Cloud repositories as an example to describe how to add repositories on different Linux distributions.

Note:
Both Alibaba Cloud users and non-users have free access to software repositories of Alibaba Cloud. You can visit the Alibaba Open Source Mirror Site to obtain the software repository of the Linux distribution.

Add software repositories on CentOS

To add a software repository on the CentOS 7 operating system, follow these steps. The operations may vary depending on the version of your operating system.

1. Connect to a Linux instance. For more information, see Connect to a Linux instance.
2. Run the following command to back up the original software repository.
   
   ```bash
   sudo mv /etc/yum.repos.d/CentOS-Base.repo /etc/yum.repos.d/CentOS-Base.repo.backup
   ```
3. Run any of the following commands to add a software repository on CentOS 7.
   
   ```bash
   ```
   
   ```bash
   ```

Note:

- To view the steps of adding Alibaba Cloud repositories on other versions of the CentOS operating system, visit the Alibaba Open Source Mirror Site, find centos, and click Help.
- To add a software repository that is not from Alibaba Cloud, replace the URL of http://mirrors.aliyun.com/repo/Centos-7.repo in the commands above with the URL of the software repository that you want to add.
4. Run the following command to generate a local cache for faster searching and installation of software.

```
sudo yum clean all && sudo yum makecache
```

5. Run the `sudo yum repolist` command to check whether the software repository is added. You will see the following content after you add a software repository of Alibaba Cloud on the CentOS 7 operating system.

```
[root@... /yum.repos.d]# yum repolist
Loaded plugins: fastestmirror
Loading mirror speeds from cached hostfile
* base: mirrors.cloud.aliyuncs.com
  * extras: mirrors.cloud.aliyuncs.com
  * updates: mirrors.cloud.aliyuncs.com
repo id repo name status
base/7.x86_64 CentOS-7 - Base - mirrors.aliyun.com 10,019
extras/7.x86_64 CentOS-7 - Extras - mirrors.aliyun.com 409
updates/7.x86_64 CentOS-7 - Updates - mirrors.aliyun.com 1,945
repolist: 12,373
```

Add software repositories on Ubuntu

To add a software repository on the Ubuntu 18.04 operating system, follow these steps. The operations may vary depending on the version of your operating system.

1. Connect to a Linux instance. For more information, see Connect to a Linux instance.
2. Run the following command to back up the original software repository.

```
sudo cp /etc/apt/sources.list /etc/apt/sources.list.bakup
```

3. Run the `sudo vim/etc/apt/sources.list` command to open the file. Add the following content to the file. For more information, see #unique_252.

```
deb http://mirrors.cloud.aliyuncs.com/ubuntu/ bionic main restricted universe multiverse
deb-src http://mirrors.cloud.aliyuncs.com/ubuntu/ bionic main restricted universe multiverse
deb http://mirrors.cloud.aliyuncs.com/ubuntu/ bionic-security main restricted universe multiverse
deb-src http://mirrors.cloud.aliyuncs.com/ubuntu/ bionic-security main restricted universe multiverse
deb http://mirrors.cloud.aliyuncs.com/ubuntu/ bionic-updates main restricted universe multiverse
deb-src http://mirrors.cloud.aliyuncs.com/ubuntu/ bionic-updates main restricted universe multiverse
deb http://mirrors.cloud.aliyuncs.com/ubuntu/ bionic-proposed main restricted universe multiverse
deb-src http://mirrors.cloud.aliyuncs.com/ubuntu/ bionic-proposed main restricted universe multiverse
deb http://mirrors.cloud.aliyuncs.com/ubuntu/ bionic-backports main restricted universe multiverse
```
4. Run the `sudo apt-get update` command to update the information about software packages.

Add software repositories on Debian

To add a software repository on the Debian 8.9 operating system, follow these steps. The operations may vary depending on the version of your operating system.

1. Connect to a Linux instance. For more information, see Connect to a Linux instance.
2. Run the following command to back up the original software repository.
   ```bash
   sudo cp /etc/apt/sources.list /etc/apt/sources.list.bakup
   ```
3. Run the `sudo vim/etc/apt/sources.list` command to open the file. Add the following content to the file. For more information about how to add the content, see #unique_252.
   ```
   deb http://mirrors.cloud.aliyuncs.com/debian/ jessie main non-free contrib
   deb http://mirrors.cloud.aliyuncs.com/debian/ jessie-proposed-updates main non-free contrib
   deb-src http://mirrors.cloud.aliyuncs.com/debian/ jessie main non-free contrib
   deb-src http://mirrors.cloud.aliyuncs.com/debian/ jessie-proposed-updates main non-free contrib
   ```

Note:

- To view the steps of adding software repositories of Alibaba Cloud on other versions of Debian, visit the Alibaba Open Source Mirror Site, find `debian`, and click Help. If you want to add a software repository of Alibaba Cloud on an Elastic Computing Service (ECS) instance, replace `http://mirrors.aliyun.com/ubuntu` in the Help page with `http://mirrors.cloud.aliyuncs.com/ubuntu`. This helps save data transfer costs.
- To add a software repository that is not from Alibaba Cloud, replace the added content above with the content of the software repository that you want to add.

- To add a software repository that is not from Alibaba Cloud, replace the added content above with the content of the software repository that you want to add.

4. Run the `sudo apt-get update` command to update the information about software packages.

Add software repositories on Fedora

1. Run the following command to back up the original software repository.

   ```bash
   # sudo mv /etc/yum.repos.d/fedora.repo /etc/yum.repos.d/fedora.repo.backup
   # sudo mv /etc/yum.repos.d/fedora-updates.repo /etc/yum.repos.d/fedora-updates.repo.backup
   ```

2. Run any of the following commands to add software repositories of Alibaba Cloud on Fedora.

   ```bash
   sudo wget -O /etc/yum.repos.d/fedora.repo http://mirrors.aliyun.com/repo/fedora.repo
   ```

   ```bash
   sudo curl -o /etc/yum.repos.d/fedora.repo http://mirrors.aliyun.com/repo/fedora.repo
   ```

   **Note:**

   To add a software repository that is not from Alibaba Cloud on Fedora, replace the URL of [http://mirrors.aliyun.com/repo/fedora.repo](http://mirrors.aliyun.com/repo/fedora.repo) in the commands with the URL of the software repository that you want add.

3. Run any of the following commands to add software repositories of Alibaba Cloud on fedora-updates.

   ```bash
   ```

   ```bash
   ```

   **Note:**
To add a software repository that is not from Alibaba Cloud on fedora-updates, replace `http://mirrors.aliyun.com/repo/fedora-updates.repo` in the commands with the URL of the software repository that you want.

4. Run the following command to generate a local cache.

```
sudo yum clean all && sudo yum makecache
```

Next steps

You can install software packages after you add a software repository. For more information, see Install software packages.

8.13.2 Search for software packages

If you want to install a software application but do not know the name of the software package, you can use the tools in the Linux system to search for the
package. This topic describes the commands that you can use to search for software packages and how to use these commands on different Linux distributions.

Search for software packages on CentOS

- **Command**

  yum search [keywords of software packages]

- **Examples**

  - **Example 1:** Search for two software applications with the keywords "rz" and "sz".

    Run the following command to search for the software packages to which the two applications belong.

    ```
    yum search sz rz
    ```

    The command result indicates that these two software applications belong to the **lrzsz.x86_64** package, as shown in the following figure. After you install the package, you can use the **lrz** and **lsz** software applications.

    ![Command result](image)

  - **Example 2:** Search for a software application by using the keyword "mysql-community-server".

    Run the following command to search for the software package to which the application belongs.

    ```
    yum search mysql-community-server
    ```

    The command result indicates the package to which the software application belongs, as shown in the following figure.

    ![Command result](image)
Note:
If you cannot find the mysql-community-server package in the CentOS operating system, it may be because you have not added the repository of the software package. For more information about how to add the required software repository, and install and use MySQL Server, see #unique_255.
Search for software packages on Debian or Ubuntu

- **Command**
  
  ```bash
  apt-cache search [keywords of software packages]
  ```

- **Examples**
  
  - **Example 1:** Search for software packages relating to Web servers.
    
    Run the following command to search for the software packages.
    
    ```bash
    apt-cache search "web server"
    ```
    
    The command result indicates that **apache2** is the software package of the Web server, as shown in the following figure.

  - **Example 2:** Search for Java development environment by using the keyword "openjdk".
    
    Run the following command to search for "openjdk".
    
    ```bash
    apt-cache search openjdk
    ```
    
    The command result shows the software packages relating to openjdk, as shown in the following figure.
Next steps

After you find the software packages, you may need to install them. For more information about how to install software packages, see Install software packages.

8.13.3 Install software packages

After you add software repositories, you can use the package management tool of the Linux system to install the packages you need. This topic uses Apache HTTP Server in Alibaba Cloud repositories as an example to describe how to install software packages on different Linux distributions.

Prerequisites

You have added the repositories of software packages before you install them. You must add Alibaba Cloud repositories before following the steps in the examples below. For more information about how to add repositories, see Add software repositories.

Install software packages on CentOS

1. Connect to a Linux instance. For more information, see Connect to a Linux instance.
2. Run the following command to install software packages.

```bash
yum install <package> # Replace <package> with the software package you want to install.
```

For example, to install Apache HTTP Server, run the following command.

```bash
yum install httpd
```

Install software packages on Debian or Ubuntu

1. Connect to a Linux instance. For more information, see [Connect to a Linux instance](#).

2. Run the following command to install software packages.

```bash
# apt-get update
# apt-get install <package> # Replace <package> with the software package you want to install.
```

For example, to install Apache HTTP Server, run the following command.

```bash
# apt-get update
# apt-get install apache2
```

Install software packages on openSUSE

1. Connect to a Linux instance. For more information, see [Connect to a Linux instance](#).

2. Run the following command to install software packages.

```bash
zypper install <package> # Replace <package> with the software package you want to install.
```

For example, to install Apache HTTP Server, run the following command.

```bash
zypper install apache2
```

### 8.13.4 Update software

The software packages in Linux distributions are constantly updated to add new functions, bug fixes, and security updates. You can update software to the latest version based on business requirements. This topic describes how to update a specific software application or all applications on different Linux distributions.

**Prerequisites**

You have added the repository of software packages before you update the applications. For more information about adding software repositories, see [Add software repositories](#).
Update software on CentOS

1. Connect to a Linux instance. For more information, see Connect to a Linux instance.

2. Update software applications.
   - To update a software application, run the following command.
     
     ```bash
     yum update <package>  # Replace <package> with the software application you want to update.
     ```

     For example, to update Apache HTTP Server, run the following command:
     ```bash
     yum update httpd
     ```
   - To update all software applications in the system, run the following command.

     Notice:

     If you run this command, the update process may update the kernel of the operating system and cause some issues. For example, the system may not start up or certain software applications may be incompatible with the updated kernel. Therefore, before you run this command, we recommend that you configure the system to skip kernel changes while applying updates.

     ```bash
     yum update
     ```

     After updating a software application, you can check its version. If it is the latest version, the software application has been updated.

Update software applications on Ubuntu or Debian

1. Connect to a Linux instance. For more information, see Connect to a Linux instance.
2. Run the following command to obtain a list of software packages that need to be updated.

```bash
apt-get update
```

3. Update software applications.

- To update a software application, run the following command.

```bash
apt-get install <package> # Replace <package> with the software application you want to update.
```

For example, to update Python, run the following command:

```bash
apt-get install python
```

- To update all software applications in the system, run the following command.

```bash
apt-get upgrade
```

Notice:

If you run this command, the update process may update the kernel of the operating system and cause some issues. For example, the system may not start up or certain software applications may be incompatible with the updated kernel. Therefore, before you run this command, we recommend that you configure the system to skip kernel changes while applying updates.

After updating a software application, you can check its version. If it is the latest version, the software application has been updated.

Update software on openSUSE

1. Connect to a Linux instance. For more information, see *Connect to a Linux instance*. 
2. Run the following command to obtain a list of software packages that need to be updated.

```bash
zypper list-updates
```

3. Update software applications.

   - To update a software application, run the following command.

```bash
zypper update <package>  # Replace <package> with the software application you want to update.
```

For example, to update Python, run the following command.

```bash
zypper update python
```

   - To update all software applications in the system, run the following command.

```bash
zypper update
```

Notice:

If you run this command, the update process may update the kernel of the operating system and cause some issues. For example, the system may not start up or certain software applications may be incompatible with the updated kernel. Therefore, before you run this command, we recommend that you configure the system to skip kernel changes while applying updates.

```bash
zypper update
```

After updating a software application, you can check its version. If it is the latest version, the software application has been updated.

8.14 Configure time

8.14.1 Time setting: NTP servers and other public services

Alibaba Cloud ECS provides standard intranet NTP servers, which you can access from your instances. We also provide external NTP services for instances that need the Internet access.

Intranet and Internet NTP servers

To counterbalance the leap seconds in our world, ECS provides free of charge, highly accurate, and reliable NTP service for both classic network- and VPC-Connected instances. Among the NTP servers, the `ntp.cloud.aliyuncs.com` achieves nearly zero difference of atomic reference by synchronizing with satellite
services. See the following table for the NTP servers provided by Alibaba Cloud ECS.

<table>
<thead>
<tr>
<th>Classic network intranet</th>
<th>VPC intranet</th>
<th>Internet</th>
</tr>
</thead>
<tbody>
<tr>
<td>-</td>
<td>ntp.cloud.aliyuncs.com</td>
<td>ntp1.aliyun.com</td>
</tr>
<tr>
<td>ntp1.cloud.aliyuncs.com</td>
<td>ntp7.cloud.aliyuncs.com</td>
<td>ntp2.aliyun.com</td>
</tr>
<tr>
<td>ntp2.cloud.aliyuncs.com</td>
<td>ntp8.cloud.aliyuncs.com</td>
<td>ntp3.aliyun.com</td>
</tr>
<tr>
<td>ntp3.cloud.aliyuncs.com</td>
<td>ntp9.cloud.aliyuncs.com</td>
<td>ntp4.aliyun.com</td>
</tr>
<tr>
<td>ntp4.cloud.aliyuncs.com</td>
<td>ntp10.cloud.aliyuncs.com</td>
<td>ntp5.aliyun.com</td>
</tr>
<tr>
<td>ntp5.cloud.aliyuncs.com</td>
<td>ntp11.cloud.aliyuncs.com</td>
<td>ntp6.aliyun.com</td>
</tr>
<tr>
<td>ntp6.cloud.aliyuncs.com</td>
<td>ntp12.cloud.aliyuncs.com</td>
<td>ntp7.aliyun.com</td>
</tr>
</tbody>
</table>

Other public services of Alibaba Cloud ECS

See the following list for some public services provided by Alibaba Cloud ECS.

<table>
<thead>
<tr>
<th>Public service</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public DNS: 223.5.5.5 / 223.6.6.6</td>
<td>Domain name: <a href="http://www.alidns.com">http://www.alidns.com</a></td>
</tr>
<tr>
<td>Open source images: <a href="http://mirrors.aliyun.com">http://mirrors.aliyun.com</a></td>
<td>Update frequency: The image files are updated at everyday 02:00–04:00 (UTC+8:00), including a lot of Linux distributions and open source applications.</td>
</tr>
</tbody>
</table>

8.14.2 Time setting: Synchronize NTP servers for Windows instances

Network Time Protocol (NTP) is a networking protocol for clock synchronization between computer systems over networks. For highly time-sensitive applications (such as those in the communication industry), clock variation between different computers may lead to serious data inconsistencies. You can use the NTP service to synchronize clocks of all servers within the network. The current default time zone for Alibaba Cloud ECS instances across all regions is CST (China Standard Time).

This article describes how use the NTP service to synchronize the clock of a Windows ECS instance running Windows Server 2008 R2 Enterprise Edition x64.

Windows Time service is enabled by default on Windows Server. You must enable the NTP service in the instance to make sure that the NTP service can normally
synchronize time after successful NTP service configuration. To check and enable the NTP service, follow these steps:

1. **Connect to a Windows instance.** Select Start > All Programs > Accessories > Run to open the Run dialog box, and run `services.msc`.

2. In the Services window, double click the Windows Time service.

3. In the Windows Time Properties (Local Computer) dialog box, follow these steps:
   a. Set Startup type to Automatic.
   b. Check if the Service status is Started. If not, click Start.

After completing the settings, click Apply, and then click OK.

Modify the default NTP server address

`time.windows.com` is used as the default NTP server in Windows Server, but synchronization errors may frequently occur due to network issues. When using a Windows instance, you can replace the default NTP server with the intranet NTP server.
server provided by Alibaba Cloud. For more information, see *Internet and intranet NTP servers*. To modify the default NTP server address, follow these steps:

1. *Connect to a Windows instance*.
2. In the notification area of the task bar, click Date and Time, and then click Change date and time settings.
3. In the Date and Time dialog box, click the Internet Time tab, and then click Change settings.
4. In the Internet Time Settings dialog box, select Synchronize with an Internet time server, type an Alibaba Cloud intranet NTP server address (for detailed list, see *Internet and intranet NTP servers*), and then click Update now.

You are prompted if the synchronization is successful.

**Modify NTP synchronization interval**

The default NTP synchronization interval is 5 minutes. To modify the NTP synchronization interval, follow these steps:

1. *Connect to a Windows instance*.
2. Select Start > All Programs > Accessories > Run to open the Run dialog box, and run *regedit*.
3. On the left-side navigation pane of the Registry Editor, find `HKEY_LOCAL_MACHINE/` `SYSTEM/CurrentControlSet/services/W32Time/TimeProviders/NtpClient`, and then double click `SpecialPollInterval`.
4. In the Edit DWORD (32-bit) Value dialog box, select Decimal as the Base, and then type the Value data as needed. The number you typed is the synchronization interval you need. Unit: seconds.

**8.14.3 Time setting: Synchronize NTP servers and change time zone for Linux instances**

The current default time zone for Alibaba Cloud ECS instances across all regions is CST (China Standard Time). In addition, the NTP (Network Time Protocol) service guarantees that your instances are synchronized with the standard time. Follow these steps in this topic to change the time zone for your ECS instances and configure your NTP service.

**Context**
Synchronizing time and the time zone is crucial for Elastic Compute Service (ECS) instances, for example, an inaccurate time may have a significant impact on business when updating your database. To avoid both business disruptions running on your instances and networking request errors, you must configure one or more instances in the same time zone, such as Asia/Shanghai or America/Los Angeles. Take CentOS 6.5 as an example to demonstrate how to change the time zone by modifying configuration file.

Note:
After you change the time zone for an instance, always run `hwclock -w` to update the real-time clock (RTC) of the instance.

Procedure

1. **Connect** to the Linux instance.

   **Note:**
   Only a root user can open and edit time zone configuration files, so we use the `sudo` command here.

2. Run `sudo rm /etc/localtime` to delete the local time in the instance.

3. Run `sudo vi /etc/sysconfig/clock` to edit the configuration file `/etc/sysconfig/clock`.

4. Enter `i` to add the time zone and city. For example, add `Zone=Asia/Shanghai`. Press Esc to exit the edit and enter `:wq` to save and exit.

   Optional. Run `ls /usr/share/zoneinfo` to query the list of available time zones. For example, Shanghai is one of them.

5. Run `sudo ln -sf /usr/share/zoneinfo/XXXX/XXXXXXX /etc/localtime` to update the time zone change, for example, run `sudo ln -sf /usr/share/zoneinfo/Asia/Shanghai /etc/localtime`.

6. Run `hwclock -w` to update the RTC.

7. Run `sudo reboot` to restart the instance.

8. Run `date -R` to check whether the new time zone is effective or not. If not, repeat the preceding steps.

What's next
The Linux instance offers the `ntpd` and the `ntpd` two approaches of synchronizing the NTP service. The `ntpd` can be used to force an immediate update and the `ntpd` offers a systematic approach. The `ntpdate` service can be used for new instances, whereas `ntpd` is recommended for instances that run your business. Both standard and custom NTP service configurations are provided in this section. For more information about the NTP service, see *internal and public NTP server*.

**Prerequisites**

The communication port of the NTP service is UDP 123. Before configuring the service, make sure that you enabled the UDP port 123. You can use `netstat -nupl` in the Linux instance to make sure whether the UDP port 123 is enabled or not. For more information, see *add a security group rule*.

**Set up standard NTP service**

1. *Connect* to the Linux instance.
2. Run `sudo service ntpd start` to enable the NTP service.
3. Run `chkconfig ntpd on` to enable the NTP service.
4. Run `ntpq -p` to check whether the NTP service is enabled or not.
5. Optional. Run `ntpq -p` to view a list of NTP service peers. Run `sudo chkconfig --list ntpd` to view the NTP service running level.

**Set up custom NTP service**

1. *Connect* to the Linux instance.
2. Run `sudo vi /etc/ntp.conf` to edit the NTP service configuration files.
3. After finding the information about `ntp server XXXX iburst`, enter `i` and start editing the file. NTP servers that are not currently needed can be hidden by adding a pound (`#`) at the beginning of the lines.
4. Add a new line of NTP server information in the format of `server XXXX iburst`, and the XXXX is the custom NTP endpoint. For more information, see Internet and intranet NTP servers. After editing, press Esc and enter `:wq` to save and exit.
5. Run `sudo service ntpd start` to enable the customized NTP service.
6. Run `chkconfig ntpd on` to enable the NTP service.
7. Run `ntpq -p` to check whether the NTP service is enabled or not.
9 Renew Subscription instances

9.1 Renewal overview

When a subscription instance expires, the instance stops providing services. To continue using the instance after it expires, you must renew it within the designated period. Otherwise, instance resources such as vCPUs, memory, and disks are automatically released and the stored data is permanently lost. This topic describes the methods of ECS instance renewal.

Renewal overview

The renewal feature is only applicable to subscription ECS instances. Pay-as-you-go instances do not need to be renewed, but you must ensure that you have sufficient balance in your linked bank card, PayPal, or Paytm (India) account to cover the related costs.

If you renew the instance before it expires, the instance continues to work as expected and all its resources are retained. For information about the status of an instance after it expires, see Subscription.

You cannot cancel a renewal order for a subscription instance after the payment is made. To renew an instance, use one of the following methods:

- **Manual renewal**: Manually renew the instance in the ECS console before the instance is automatically released. For more information, see Manual renewal.

- **Auto renewal**: After the auto renewal feature is enabled, the instance is automatically renewed before it expires. You can enable this feature on instances to reduce management costs and prevent instances from being released. For more information, see Auto renewal.

- **Renew and downgrade**: If the current ECS instance configurations exceed your requirements, you can downgrade the instance configurations when you renew the instance to reduce costs. The new configurations take effect starting from the next billing cycle. For more information, see Renew and downgrade.

These three methods have the following differences, as shown in the following table.
<table>
<thead>
<tr>
<th>Renewal method</th>
<th>Change configurations</th>
<th>Renewal time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual renewal</td>
<td>Not supported</td>
<td>Before the ECS instance is automatically released.</td>
</tr>
<tr>
<td>Auto renewal</td>
<td>Not supported</td>
<td>Renew the instance five times on the following days:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• The 3rd day and the 1st day before expiration</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• The expiration day</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• The 7th day and 15th day after expiration</td>
</tr>
<tr>
<td>Renew and downgrade</td>
<td>Supported</td>
<td>• Within 15 days before the ECS instance expires.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Within 15 days after the ECS instance expires, but before the instance is</td>
</tr>
<tr>
<td></td>
<td></td>
<td>automatically released.</td>
</tr>
</tbody>
</table>

For example, if you have a subscription instance that is set to expire on April 30, 2019, you can downgrade the specifications of the instance and renew the instance between April 16, 2019 and April 30, 2019. If you do not renew the instance during this time period, it enters the To Be Released state. If the instance enters this state, you can still renew the instance between May 1, 2019 and May 15, 2019. If you do not renew the instance, it is automatically released on May 16, 2019.

**Manual renewal**

The renewal duration options are:
- One month, two months, three months, four months, five months, six months, seven months, eight months, and nine months
- One year

Manual renewal only renews the basic Internet bandwidth of an instance, but not its temporarily upgraded Internet bandwidth. For information about how to upgrade the basic Internet bandwidth, see Upgrade configurations of subscription instances.

The status of a subscription ECS instance after expiration depends on whether the auto renewal feature is enabled. The following table describes the effect of manual renewal for instances under different statuses:

<table>
<thead>
<tr>
<th>Whether auto renewal is enabled</th>
<th>Time period after expiration</th>
<th>Instance status</th>
<th>Effect of manual renewal</th>
</tr>
</thead>
</table>
| Not enabled                     | Within 15 days after expiration | The instance is shut down. | If the instance is manually renewed, the start of the next billing cycle will be the day of renewal.
For example, if your instance was shut down at 00:00:00 on May 10, 2017, but you successfully renewed it for one month at 08:09:35 on May 23, 2017, the billing cycle for this renewal is from 08:09:35 on May 23, 2017 to 00:00:00 on June 24, 2017. |
<p>| 15 days after expiration        | The instance and its resources are being released or unbound. | Manual renewal cannot be performed. |
| 30 days after expiration        | The instance and its resources have been released or unbound. | Manual renewal cannot be performed. |</p>
<table>
<thead>
<tr>
<th>Whether auto renewal is enabled</th>
<th>Time period after expiration</th>
<th>Instance status</th>
<th>Effect of manual renewal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enabled</td>
<td>Within 15 days after expiration</td>
<td>The instance is working properly.</td>
<td>If the instance is manually renewed, the start of the next billing cycle will be the day the instance expired. For example, if your instance is set to expire at 00:00:00 on April 25, 2017, but you successfully renewed it for one month on May 9, 2017, the billing cycle for this renewal is from April 25, 2017 to 00:00:00 on May 25, 2017.</td>
</tr>
<tr>
<td></td>
<td>15 days after expiration</td>
<td>The instance is shut down.</td>
<td>If the instance is manually renewed, the start of the next billing cycle will be the day of renewal. For example, if your instance was shut down at 00:00:00 on May 10, 2017, but you successfully renewed it for one month at 08:09:35 on May 23, 2017, the billing cycle for this renewal is from 08:09:35 on May 23, 2017 to 00:00:00 on June 24, 2017.</td>
</tr>
<tr>
<td></td>
<td>30 days after expiration</td>
<td>The instance and its resources are being released or unbound.</td>
<td>Manual renewal cannot be performed.</td>
</tr>
</tbody>
</table>
Auto renewal

Auto renewal cannot be enabled on expired instances.

You can enable auto renewal on the Create Instance or Renew page. The renewal period options are as follows:

- When you enable auto renewal on the Create Instance page:
  - If the subscription of the instance that is created is one month, two months, three months, or six months, the instance automatically renews itself every month after the subscription ends. This continues until you cancel auto renewal.
  - If the subscription of the instance that is created is one year, the instance automatically renews itself every year after the subscription ends. This continues until you cancel auto renewal.

- If you enable auto renewal for an existing instance on the Renew page, you can set the auto renewal period to one month, two months, three months, six months, one year, two years, or three years. When the subscription period ends, the instance will renew for the period you select and you are billed for the new cycle. The instance will then continue to automatically renew for the period you select until you cancel auto renewal. For example, if you select three months, the instance will renew every three months until you cancel auto renewal.

Note:
You can modify the auto renewal period for an existing instance at any time on the Renew page.

After auto renewal is enabled, the instance will be automatically renewed before it expires.

- Alibaba Cloud sends an email reminder on the 7th day before the instance expires (T-7).
- Alibaba Cloud deducts the payment for the next billing cycle from your bank card, PayPal, or Paytm (India) account on the 3rd day before the instance expires (T-3). If the payment deduction fails, Alibaba Cloud will attempt to deduct the payment again up to five times until the deduction is successful, on the following days: the 1st day before the instance expires (T-1), the expiration day (T), the 7th
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day after the instance expires \((T+6)\), and the 15th day after the instance expires \((T+14)\).

- At 08:00:00 (UTC+8) on the deduction day, Alibaba Cloud performs auto renewal on all the ECS instances that are set to expire in succession. This causes the actual renewal time to be between 08:00:00 (UTC+8) and 18:00:00 (UTC+8).

- If the payment is deducted before \(T+14\), the instance will start the next billing cycle from the day the instance is set to expire.

- Otherwise, the instance will be in the expired state from \(T+15\). Instances in the expired state cannot be logged on to or remotely connected to. If the instance has expired, you can only manually renew the instance. If the instance is not manually renewed within 15 days after it enters the expired state, the instance will be released and its data will be permanently lost. For more information, see [Manually renew an instance](#).

- If the payment for auto renewal fails, Alibaba Cloud will send you an email reminder. Check whether you have received any reminder to avoid unexpected expiration of instances.

- If manual renewal has been completed before auto renewal, auto renewal will take effect starting from the next billing cycle.

Assume that you purchased an instance at 10:00:00 November 8, 2017, with a subscription period of one month and auto renewal enabled. The instance is set to expire at 00:00:00 December 9, 2017. The following figure describes the actions performed in the first auto renewal round. For information about status changes that occur after subscription resources expire, see [Subscription](#).
Renew and downgrade

You can use the Renewal and Downgrade feature to complete the following tasks:

- Downgrade the specifications of a subscription instance.
- Change the billing method of data disks from subscription to pay-as-you-go.
- Change the billing method of Internet bandwidth and set the bandwidth value.

The renewal duration options are:

- One month, two months, three months, four months, five months, six months, seven months, eight months, and nine months
- One year

When you use the Renewal and Downgrade feature, the following limits apply:

- After you renew and downgrade an instance, the new configurations take effect starting from the next billing cycle. The current configurations continue until the end of the current billing cycle.
- If you perform the following operations during the renewal, you must restart the instance by using the ECS console or by calling the `#unique_264` operation within the first seven days of the new billing cycle to make the new configurations take effect.
effect. If you restart the instance on the seventh day of the new billing cycle, the instance continues to use the original configurations for the first six days.

- Change the instance specifications.
- Change the bandwidth value of a classic network-type instance from 0 Mbit/s to a non-zero value for the first time.

Note:
For a VPC-type instance, if you change its bandwidth from 0 Mbit/s to a non-zero value for the first time, you do not need to restart it.

- After you downgrade an instance when renewing it, you cannot perform the following operations within the rest of the current billing cycle:
  - Upgrade configurations of subscription instances
  - Resize a cloud disk
  - #unique_265
  - #unique_266

9.2 Manually renew an instance
This topic describes how to manually renew a subscription instance. Before a subscription instance is automatically released, you can manually renew the instance to extend its service duration.

Context
Manual renewal only renews the basic Internet bandwidth of an instance, but not its temporarily upgraded Internet bandwidth. For information about how to upgrade the basic Internet bandwidth, see Upgrade configurations of subscription instances.

Options for renewal duration vary based on the number of instances that you select for renewal. For more information, see the purchase page.

Renew one instance
1. Log on to the ECS console.
2. In the left-side navigation pane, choose Instances & Images > Instances.
3. In the top navigation bar, select a region.
4. Find the instance you want to renew and click Renew in the Actions column.
5. Select a value for the renewal duration.

6. Select *ECS Terms of Service* and click *Create Order*.

7. Follow the instructions to complete the payment.

Renew multiple instances

1. Log on to the *ECS console*.

2. In the left-side navigation pane, choose *Instances & Images > Instances*.

3. In the top navigation bar, select a region.

4. Select multiple ECS instances you want to renew.

5. At the bottom of the page, click *Renew*.

6. On the page that appears, click *Batch Change*.

7. Select a renewal duration for the instances, and click *OK*.

8. Select *ECS Terms of Service* and click *Create Order*.

9. Follow the instructions to complete the payment.

Related topics

#unique_267

9.3 Auto renewal

Auto renewal is only applicable to subscription instances. If subscription instances and disks are not renewed within the specified time period, they will be released automatically and all of their data will be permanently lost. You can enable auto renewal for instances to reduce renewal management costs and prevent instances from being released.

Application scope

- Auto renewal can only be enabled on subscription instances.
- Auto renewal cannot be enabled on instances in the expired state.

Auto renewal periods

You can enable auto renewal on the Create Instance page when you create a subscription instance, or on the Renew page for an existing subscription instance. The renewal period options are as follows:
• If you create a new instance and you enable auto renewal on the Create Instance page, the renewal process is as follows:
  - If the subscription period of an instance is one month, two months, three months, or six months, the instance will continue to automatically renew on a monthly basis after the subscription period ends until you cancel auto renewal. You are billed for each monthly renewal.
  - If the subscription period of an instance is one year, the instance will continue to renew on a yearly basis after the subscription period ends until you cancel auto renewal. You are billed for each yearly renewal.

• If you enable auto renewal for an existing instance on the Renew page, you can set the auto renewal period as one month, two months, three months, six months, one year, two years, or three years. When the subscription period ends, the instance will renew for the period you select and you are billed for the new cycle. The instance will then continue to automatically renew for the period you select until you cancel auto renewal. For example, if you select three months, the instance will renew every three months until you cancel auto renewal.

Note:
You can modify the auto renewal period for an existing instance at any time on the Renew page.

Auto renewal rules

After auto renewal is enabled, the instance will be automatically renewed before it expires. Specifically,

• Alibaba Cloud sends an email reminder on the 7th day before the instance expires (T-7).
• Alibaba Cloud collects payment for the next billing cycle from your credit card or PayPal account on the 3rd day before the instance expires (T-3). If the payment collection fails, Alibaba Cloud will attempt to collect automatic payment again up to five times until collection is successful, on the following days: the 1st day before the instance expires (T-1), the expiration day (T), the 7th day after the instance expires (T+6), and the 15th day after the instance expires (T+14).
  - At 08:00:00 (UTC+8) on the collection day, Alibaba Cloud performs auto -renewal in turn on all the ECS instances that is set to expire. The actual
renewal time may be later than 08:00:00 (UTC+8), but earlier than 18:00:00 (UTC+8).

- If payment is collected before T+14, the instance will start the billing cycle from the day the instance was set to expire.

- Otherwise, the instance will be in the expired state from T+15. Instances in the expired state cannot be logged on or remotely connected to. If the instance has expired, you must use manual renewal. If the instance is not manually renewed within 15 days after it enters the expired state, the instance will be released and its data will be permanently lost.

- If the auto renewal payment fails, Alibaba Cloud will send you an email reminder. Check whether you have received any reminder to avoid expiration of instances.

- If manual renewal has been completed before auto renewal, auto renewal will take effect in the next billing cycle.

Assume that you purchased an instance at 10:00:00 November 8, 2017, with a subscription period of one month and auto renewal enabled. The instance is set to expire at 00:00:00 December 9, 2017. The following figure describes actions involved in the first auto renewal round. For more information about the states of a subscription resource after it expires, see Subscription.
Enable auto renewal

Before enabling auto renewal, make sure you have read and understood Limits.

You can enable auto renewal on the Create Instance page. For more information about how to create an instance, see Create an instance by using the wizard.

On the Renew page, you can enable auto renewal for one or more instances or change the renewal period.

1. Log on to the ECS console.
2. In the top navigation bar, choose Billing Management > Renew.
3. In the left-side navigation pane, click Elastic Compute Service.
4. Click the Manually Renew tab.
5. Find the instance and click Enable Auto Renewal in the Actions column.

To enable auto renewal for multiple instances, select multiple instances that have not expired and click Enable Auto Renewal at the bottom of the page.
6. Confirm the instance information and renewal period, and then click Enable Auto Renewal.

Click the Auto-Renewal tab. The previously selected instances are displayed on the page, indicating that auto renewal has been enabled.

![Enable Auto-Renew](image)

**Disable auto renewal**

1. Log on to the *ECS console*.
2. In the top navigation bar, choose Billing Management > Renew.
3. In the left-side navigation pane, click Elastic Compute Service.
4. Click the Auto-Renew tab.
5. Find the instance and click Modify Auto Renewal in the Actions column.

   To enable auto renewal for multiple instances, select multiple instances and click Modify Auto Renewal at the bottom of the page.
6. Select Disable Auto Renewal and click OK.

   Click the Manually Renew tab. The previously selected instances are displayed on the page, indicating that auto renewal has been enabled.
9.4 Downgrade an instance during renewal

This topic describes how to downgrade the specifications of a subscription instance when you renew the instance. The new specifications take effect in the next billing cycle. The original specifications remain unchanged for the rest of the current billing cycle.

Context

You can also use the Renewal and Downgrade feature to complete the following tasks:

- Downgrade the instance specifications.
- Change the billing method of data disks from subscription to pay-as-you-go.
- Change the billing method for network usage from Pay-By-Bandwidth to Pay-By-Traffic.
- Adjust the Internet bandwidth.

When you use the Renewal and Downgrade feature, the following limits apply:

- If you perform the following operations during the instance renewal, you must restart the ECS instance in the ECS console or by calling the #unique_264 operation within the first seven days of the next billing cycle for the new specifications to take effect. If you restart the instance on the seventh day of the new billing cycle, the ECS instance uses the original high specifications for the first six days.
  - Downgrade the instance specifications.
  - Adjust the Internet bandwidth. The first time you increase the bandwidth value of a classic network-type instance from 0 Mbit/s, you must restart the ECS instance.
- You cannot perform the following operations after the renewal and downgrade:
  - Upgrade configurations of subscription instances
  - Resize a cloud disk
  - #unique_265
  - #unique_266

Procedure

1. Log on to the ECS console.
2. In the left-side navigation pane, choose Instances & Images > Instances.

3. In the top navigation bar, select a region.

4. Find the target subscription instance. In the Actions column, click Upgrade/Downgrade.

5. In the Upgrade/Downgrade Wizard dialog box, select Renewal and Downgrade and click Continue.

6. On the Renewal and Downgrade page, complete the following operations:
   a) Select an instance type.
      For instance types that support specifications change, see the information displayed on the page.
   b) Set the instance restart time.
      This setting is only mandatory when you change the instance specifications. The restart time cannot be later than the 7th day of the next billing cycle. We recommend that you set the restart time to a point in time during off-peak hours.
   c) Change the billing method of data disks from subscription to pay-as-you-go.
      If the billing method remains unchanged, the data disks have the same billing cycle as the instance in the next billing cycle.
   d) Set Internet bandwidth.

<table>
<thead>
<tr>
<th>Current billing method</th>
<th>Supported operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pay-By-Bandwidth</td>
<td>· Reduce the bandwidth value.</td>
</tr>
<tr>
<td></td>
<td>Reducing the bandwidth value to 0 Mbit/s has the following impacts on public IP addresses:</td>
</tr>
<tr>
<td></td>
<td>- For classic network-type ECS instances, public IP addresses remain unchanged.</td>
</tr>
<tr>
<td></td>
<td>- For VPC-type ECS instances, public IP addresses are released when the next billing cycle begins.</td>
</tr>
<tr>
<td></td>
<td>· Change the billing method to Pay-By-Traffic and set peak bandwidth.</td>
</tr>
<tr>
<td>Current billing method</td>
<td>Supported operation</td>
</tr>
<tr>
<td>------------------------</td>
<td>---------------------</td>
</tr>
<tr>
<td>Pay-By-Traffic</td>
<td>You can set the peak bandwidth based on your specific needs.</td>
</tr>
</tbody>
</table>

e) Set the renewal duration.

7. Read and confirm *ECS Terms of Service*. Then, click Create Order.

8. Follow the instructions to complete payment.
10 Change configurations

10.1 Overview of instance upgrade and downgrade

This topic describes methods for changing the specifications of an ECS instance. After an instance is created, you can change its type (amount of memory and vCPUs), billing method for data disks, and Internet bandwidth.

Upgrade or downgrade instance specifications

You must simultaneously upgrade or downgrade the specifications of vCPUs and memory. For more information, see Instance families. The following table summarizes the change methods best suited for the billing method applied to your instance.

Note:

Before changing instance specifications, check Instance families that support instance type changes and confirm the target instance type supported by a specific instance family.
<table>
<thead>
<tr>
<th>Billing method</th>
<th>Upgrade method</th>
<th>Downgrade method</th>
</tr>
</thead>
</table>
| Subscription  | Upgrade configurations of subscription instances  
The new specifications take effect after you restart the instance in the ECS console or by calling the RebootInstance operation. |  
• Downgrade configurations of Subscription instances (Whether this feature is supported depends on your ECS resource usage.)  
The new specifications take effect after you restart the instance in the ECS console or by calling the RebootInstance operation.  
• Downgrade specifications during renewal  
The new specifications take effect after you restart the instance in the ECS console or by calling the RebootInstance operation within the first seven days of the new billing cycle. |
| Pay-as-you-go  | Change configurations of Pay-As-You-Go instances  
The new specifications take effect after you restart the instance. | Change configurations of Pay-As-You-Go instances  
The new specifications take effect after you restart the instance. |

Change the billing methods of data disks

Only pay-as-you-go data disks can be attached to pay-as-you-go instances. Therefore, you can only change the billing methods of data disks for subscription instances.
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<table>
<thead>
<tr>
<th>Billing method change</th>
<th>Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pay-as-you-go to subscription</strong></td>
<td>Upgrade configurations of subscription instances. The new billing method takes effect immediately after you select subscription.</td>
</tr>
</tbody>
</table>
| **Subscription to pay-as-you-go**      | • Change subscription data disks to pay-as-you-go data disks. The new billing method takes effect immediately after you select pay-as-you-go.  
• Downgrade an instance during renewal. The new billing method takes effect when the new billing cycle begins. |

### Change the billing method for network usage

You can change the billing method for network usage. The methods depend on the billing method of the instance. The following table describes these methods.

#### Note:

The operations to change billing methods only apply to classic network-type ECS instances and VPC-type ECS instances with no associated EIPs.

<table>
<thead>
<tr>
<th>Instance billing method</th>
<th>Change the bandwidth billing method</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Subscription</strong></td>
<td>From Pay-By-Traffic to Pay-By-Bandwidth</td>
<td>Upgrade configurations of subscription instances, the new billing method takes effect immediately.</td>
</tr>
</tbody>
</table>
|                         | From Pay-By-Bandwidth to Pay-By-Traffic | • Downgrade the Internet bandwidth of subscription instances, the new billing method takes effect immediately.  
• Downgrade an instance during renewal, the new billing method takes effect from the next billing cycle. |
| **Pay-as-you-go**        | From Pay-By-Traffic to Pay-By-Bandwidth | Change the Internet bandwidth of a pay-as-you-go instance, the new billing method takes effect immediately. |
### Instance billing method

<table>
<thead>
<tr>
<th>Change the bandwidth billing method</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>From Pay-By-Bandwidth to Pay-By-Traffic</td>
<td>Change the Internet bandwidth of a pay-as-you-go instance, the new billing method takes effect immediately.</td>
</tr>
</tbody>
</table>

### Adjust Internet bandwidth

You can adjust the Internet bandwidth of an instance. The methods depend on your business needs and the billing method of the instance. The following table lists the methods.

Reducing the Internet bandwidth of an instance to 0 Mbit/s has the following impacts on fixed public IP addresses:

- For a VPC-type ECS instance, its fixed public IP address is released immediately.
- A classic network-type instance cannot access the Internet but its fixed public IP address is retained.

You can set the Internet bandwidth to a non-zero value when creating an instance. The system will allocate a fixed public IP address to your instance. If you choose not to assign Internet bandwidth when creating an instance, that is, the Internet bandwidth is set to 0 Mbit/s, you can assign a fixed public IP address to the instance by using the upgrade or downgrade feature after you create the instance.
<table>
<thead>
<tr>
<th>Billing method</th>
<th>Upgrade basic Internet bandwidth</th>
<th>Change method</th>
</tr>
</thead>
</table>
| Subscription   | Yes                              | - Upgrade specifications of subscription instances  
This method is suitable for classic network-type ECS instances and VPC-type ECS instances with no associated EIPs. The new bandwidth takes effect immediately after you change the bandwidth.  
- Downgrade specifications during renewal  
This method is suitable for classic network-type ECS instances and VPC-type ECS instances with no associated EIPs. You can adjust the Internet bandwidth when you renew the instance. The new bandwidth takes effect when the next billing cycle begins.  
- If the Pay-By-Bandwidth billing method is used, you can only reduce the Internet bandwidth.  
- If the Pay-By-Traffic billing method is used, you can increase or reduce the peak Internet bandwidth. |
| Pay-as-you-go   | Yes                              | Change the EIP bandwidth  
This method is suitable for VPC-type ECS instances with no associated EIPs. The new bandwidth takes effect immediately after you change the bandwidth. |
10.2 Instance families that support instance type changes

If your instance type cannot meet current business needs, check whether the instance type or family of your instance can be changed and which options are available for the change in this topic. Then select a method to change the instance type.

Impacts

The impacts of instance type changes vary with network type of the instance:

- Classic network-type instances:
  - For phased-out instance types, when a non-I/O optimized instance is upgraded to an I/O optimized instance, instance information including the private IP address, disk device name, and software authorization code is changed. For Linux instances, device names of basic disks (cloud) are changed to the form of xvda or xvdb, while device names of ultra disks (cloud_efficiency) and standard SSDs (cloud_ssd) are changed to the form of vda or vdb.
  - If the instance belongs to an available instance family, the private IP address of the instance is changed.

- VPC-type instances:
  For phased-out instance types, when a non-I/O optimized instance is upgraded to an I/O optimized instance, the software authorization code and the device name of the disk are changed. For Linux instances, device names of basic disks (cloud, cloud_efficiency, cloud_ssd) are changed to the form of vda or vdb.
cloud) are changed to the form of xvda or xvdb, while device names of ultra disks (cloud_efficiency) and standard SSDs (cloud_ssd) are changed to the form of vda or vdb.

Supported instance families

The supported instance families listed in the following table apply to both subscription and pay-as-you-go instances.

Note:

- Some instance types may not be available in all zones. Before changing the instance type, check whether the destination instance type or instance family is available in the current zone.
- The following instance families do not support instance type changes between instance families or within an instance family:
  - d1 and d1ne
  - i1, i2, and i2g
  - vgn5i, gn5, and gn6i
  - ga1
  - f1 and f3
  - ebmgn6v, ebmgn6i, ebmc6, ebm6, ebr6, ebmhf6c, ebmhf6, ebmhf6r, ebmcs, eblog5s, ebmrs5, ebmhf55, ebmc4, and ebmg5
  - sccg5, scch5, and sccg6

Table 10-1: Entry-level instance families

<table>
<thead>
<tr>
<th>Source instance family</th>
<th>Destination instance family (type)</th>
</tr>
</thead>
<tbody>
<tr>
<td>t6</td>
<td>t6</td>
</tr>
<tr>
<td>t5</td>
<td>t5</td>
</tr>
<tr>
<td></td>
<td>sn1ne, sn2ne, se1ne, c4, cm4, ce4, hfc5, hfg5, g5, r5, c5, ic5, re4, n4, mn4, xn4, and e4</td>
</tr>
<tr>
<td>n4, mn4, xn4, and e4</td>
<td>n4, mn4, xn4, and e4</td>
</tr>
<tr>
<td></td>
<td>sn1, sn2, se1, n1, n2, e3, sn1ne, sn2ne, se1ne, c4, cm4, ce4, hfc5, hfg5, g5, r5, c5, ic5, re4, and t5</td>
</tr>
</tbody>
</table>
### Table 10-2: Enterprise-level instance families

<table>
<thead>
<tr>
<th>Source instance family</th>
<th>Destination instance family (type)</th>
</tr>
</thead>
<tbody>
<tr>
<td>g6, c6, and r6</td>
<td>· g6, c6, and r6&lt;br&gt;· hfc6, hfg6, and hfr6</td>
</tr>
<tr>
<td>g5, r5, c5, and ic5</td>
<td>· g5, r5, c5, and ic5&lt;br&gt;· sn1ne, sn2ne, se1ne, c4, cm4, ce4, hfc5, hfg5, re4, t5, n4, mn4, xn4, and e4</td>
</tr>
<tr>
<td>sn1ne, sn2ne, and se1ne</td>
<td>· sn1ne, sn2ne, and se1ne&lt;br&gt;· c4, cm4, ce4, hfc5, hfg5, g5, r5, c5, ic5, re4, t5, n4, mn4, xn4, and e4</td>
</tr>
<tr>
<td>se1</td>
<td>· se1&lt;br&gt;· sn1, sn2, n1, n2, e3, sn1ne, sn2ne, se1ne, c4, cm4, ce4, hfc5, hfg5, g5, r5, c5, ic5, re4, t5, n4, mn4, xn4, and e4</td>
</tr>
<tr>
<td>re4</td>
<td>· re4&lt;br&gt;· sn1ne, sn2ne, se1ne, c4, cm4, ce4, hfc5, hfg5, g5, r5, c5, ic5, t5, n4, mn4, xn4, e4, and ecs.se1.14xlarge</td>
</tr>
<tr>
<td>hfc6, hfg6, and hfr6</td>
<td>· hfc6, hfg6, and hfr6&lt;br&gt;· g6, c6, and r6</td>
</tr>
<tr>
<td>hfc5 and hfg5</td>
<td>· hfc5 and hfg5&lt;br&gt;· sn1ne, sn2ne, se1ne, c4, cm4, ce4, g5, r5, c5, ic5, re4, t5, n4, mn4, xn4, and e4</td>
</tr>
<tr>
<td>gn4</td>
<td>gn4</td>
</tr>
<tr>
<td>gn5i</td>
<td>gn5i</td>
</tr>
<tr>
<td>gn6v</td>
<td>gn6v</td>
</tr>
<tr>
<td>t1, s1, s2, s3, m1, m2, c1, and c2</td>
<td>· t1, s1, s2, s3, m1, m2, c1, and c2&lt;br&gt;· sn1, sn2, se1, n1, n2, e3, sn1ne, sn2ne, se1ne, c4, cm4, ce4, hfc5, hfg5, g5, r5, c5, ic5, re4, t5, n4, mn4, xn4, and e4</td>
</tr>
<tr>
<td>n1, n2, and e3</td>
<td>· n1, n2, and e3&lt;br&gt;· sn1, sn2, se1, sn1ne, sn2ne, se1ne, c4, cm4, ce4, hfc5, hfg5, g5, r5, c5, ic5, re4, t5, n4, mn4, xn4, and e4</td>
</tr>
<tr>
<td>Source instance family</td>
<td>Destination instance family (type)</td>
</tr>
<tr>
<td>------------------------</td>
<td>-----------------------------------</td>
</tr>
<tr>
<td>sn1 and sn2</td>
<td>• sn1 and sn2</td>
</tr>
<tr>
<td></td>
<td>• se1, n1, n2, e3, sn1ne, sn2ne, se1ne, c4, cm4, ce4, hfc5, hfg5, g5, r5, c5, ic5, re4, t5, n4, mn4, xn4, and e4</td>
</tr>
<tr>
<td>c4, ce4, and cm4</td>
<td>• c4, ce4, and cm4</td>
</tr>
<tr>
<td></td>
<td>• sn1ne, sn2ne, se1ne, hfc5, hfg5, g5, r5, c5, ic5, re4, t5, n4, mn4, xn4, and e4</td>
</tr>
</tbody>
</table>

10.3 Upgrade configurations

10.3.1 Upgrade configurations of subscription instances

This topic describes how to upgrade the configurations of a subscription instance, including the instance type and Internet bandwidth.

Context

After upgrading the configurations of a subscription instance, you are charged the price difference for the rest of the current billing cycle.

You can also use the configuration upgrading feature to perform the following operations:

- Change the billing method of data disks from pay-as-you-go to subscription. The billing method of system disks cannot be changed.
- Adjust the Internet bandwidth of VPC-type instances with no EIPs associated and classic network-type instances. If you do not purchase Internet bandwidth during instance creation, no public IP address is allocated. You can use this feature to assign a public IP address to the instance when needed.
- Change the billing method of Internet bandwidth: If the current billing method is Pay-By-Traffic, you can use this feature to change the billing method to Pay-By-Bandwidth.

The following limits apply to the configuration upgrading feature:

- It is only applicable to subscription instances.
- You can upgrade an instance multiple times, but the interval between two consecutive upgrades must be at least five minutes.
• The vCPUs and memory size of an instance type must be upgraded at the same time. You cannot upgrade them separately.

• For information about the instance families that support configuration upgrading and the rules for upgrading instance types, see Instance families that support instance type changes.

• This feature can be used to change the Internet bandwidth or the billing method of the Internet bandwidth only for VPC-type instances with no EIPs associated and classic network-type instances.

• You can change the billing method from pay-as-you-go to subscription for data disks. The billing method of system disks cannot be changed.

• If you have renewed and downgraded the instance within the current billing cycle, you cannot upgrade the instance configurations until a new billing cycle begins.

• After upgrading an instance type or changing the Internet bandwidth of a classic network-type instance from 0 Mbit/s for the first time, you must restart the instance by using the console or by calling the RebootInstance operation to make the new configurations take effect.

Procedure

1. Log on to the ECS console.

2. In the left-side navigation pane, choose Instances & Images > Instances.

3. In the top navigation bar, select a region.

4. Find the subscription instance to upgrade. In the Actions column, click Upgrade/Downgrade.

5. In the Upgrade/Downgrade Wizard dialog box, select Upgrade, and click Continue.

6. On the Upgrade page, perform one of the following operations:

   • Select an Instance Type.

   Note:

   - Instances that can be upgraded and the types they can be upgraded to are listed on the Upgrade page.
- You can use developer tools such as Alibaba Cloud CLI, OpenAPI Explorer, and Alibaba Cloud SDK to call the DescribeResourcesModification operation to query the instance types that can be changed.

- If a pay-as-you-go data disk is attached to your instance, you can select this data disk and change its billing method to subscription.
- If the instance is a VPC-type instance with no EIP associated or a classic network-type instance, you can adjust its Internet bandwidth.

**Note:**
If you do not purchase Internet bandwidth during instance creation, no public IP address is allocated. You can set the Internet bandwidth to a non-zero value to allocate a public IP address to the instance.

- If the billing method of the Internet bandwidth is Pay-By-Traffic, you can adjust the peak bandwidth or change the billing method to Pay-By-Bandwidth.
- If the billing method of the Internet bandwidth is Pay-By-Bandwidth, you can adjust the bandwidth.

7. Confirm the order details, and then click Create Order. Follow additional instructions as required.

8. After upgrading an instance type or changing the Internet bandwidth of a classic network-type instance from 0 Mbit/s for the first time, you must restart the instance by using the console or by calling the RebootInstance operation to make the new configurations take effect.

**Note:**
If you increase the bandwidth for a VPC-type instance from 0 Mbit/s for the first time, you do not need to restart the instance.

Related topics

#unique_264
#unique_274

10.4 Downgrade configurations

10.4.1 Downgrade an instance during renewal

This topic describes how to downgrade the specifications of a subscription instance when you renew the instance. The new specifications take effect in the next billing
cycle. The original specifications remain unchanged for the rest of the current billing cycle.

Context

You can also use the Renewal and Downgrade feature to complete the following tasks:

- Downgrade the instance specifications.
- Change the billing method of data disks from subscription to pay-as-you-go.
- Change the billing method for network usage from Pay-By-Bandwidth to Pay-By-Traffic.
- Adjust the Internet bandwidth.

When you use the Renewal and Downgrade feature, the following limits apply:

- If you perform the following operations during the instance renewal, you must restart the ECS instance in the ECS console or by calling the #unique_264 operation within the first seven days of the next billing cycle for the new specifications to take effect. If you restart the instance on the seventh day of the new billing cycle, the ECS instance uses the original high specifications for the first six days.
  - Downgrade the instance specifications.
  - Adjust the Internet bandwidth. The first time you increase the bandwidth value of a classic network-type instance from 0 Mbit/s, you must restart the ECS instance.
- You cannot perform the following operations after the renewal and downgrade:
  - Upgrade configurations of subscription instances
  - Resize a cloud disk
  - #unique_265
  - #unique_266

Procedure

1. Log on to the ECS console.
2. In the left-side navigation pane, choose Instances & Images > Instances.
3. In the top navigation bar, select a region.
4. Find the target subscription instance. In the Actions column, click Upgrade/Downgrade.
5. In the Upgrade/Downgrade Wizard dialog box, select Renewal and Downgrade and click Continue.

6. On the Renewal and Downgrade page, complete the following operations:
   a) Select an instance type.
      For instance types that support specifications change, see the information displayed on the page.
   b) Set the instance restart time.
      This setting is only mandatory when you change the instance specifications. The restart time cannot be later than the 7th day of the next billing cycle. We recommend that you set the restart time to a point in time during off-peak hours.
   c) Change the billing method of data disks from subscription to pay-as-you-go.
      If the billing method remains unchanged, the data disks have the same billing cycle as the instance in the next billing cycle.
   d) Set Internet bandwidth.

<table>
<thead>
<tr>
<th>Current billing method</th>
<th>Supported operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pay-By-Bandwidth</td>
<td>• Reduce the bandwidth value.</td>
</tr>
<tr>
<td></td>
<td>Reducing the bandwidth value to 0 Mbit/s has the following impacts on public IP addresses:</td>
</tr>
<tr>
<td></td>
<td>- For classic network-type ECS instances, public IP addresses remain unchanged.</td>
</tr>
<tr>
<td></td>
<td>- For VPC-type ECS instances, public IP addresses are released when the next billing cycle begins.</td>
</tr>
<tr>
<td></td>
<td>• Change the billing method to Pay-By-Traffic and set peak bandwidth.</td>
</tr>
<tr>
<td>Pay-By-Traffic</td>
<td>You can set the peak bandwidth based on your specific needs.</td>
</tr>
</tbody>
</table>

e) Set the renewal duration.

7. Read and confirm *ECS Terms of Service*. Then, click Create Order.

8. Follow the instructions to complete payment.
10.4.2 Downgrade configurations of Subscription instances

This topic describes how to downgrade configurations of Subscription instances, including the memory size and the number of vCPUs. The changes take effect immediately after an instance is restarted.

Limits

- Whether you can downgrade the configurations of a Subscription instance is determined by your ECS instance resource usage.
- You can downgrade configurations of only one instance at a time.
- You can change the instance configurations only to lower-level configurations. Changes to configurations of the same level or a higher level are not allowed.
- You can only downgrade the configurations of each instance a maximum of three times. Configuration downgrade operations include instance configuration downgrades, bandwidth configuration downgrades, and cloud disk billing method adjustments.
- The time interval between two downgrade operations must be at least 5 minutes.

Prerequisites

The configurations of an instance can be downgraded only if the instance meets the following conditions:

- The instance is in the Stopped state.
- The instance works properly. That is, the instance cannot be in an abnormal state, such as overdue, outdated, locked, or to be released.
- The instance cannot have any ongoing configuration downgrade renewal process.

Procedure

1. Find the target instance. In the Actions column, choose More > Change Configuration.
2. In the displayed dialog box, select Configuration downgrade and Instance Type.
3. Select a desired instance type, confirm the refund amount, and read and confirm that you agree with the ECS Service Terms.
4. Click Downgrade Now.

What to do next

Restart the instance for the new configurations to take effect.
10.4.3 Downgrade the Internet bandwidth of subscription instances

You can downgrade the Internet bandwidth of subscription instances.

Prerequisites

An instance can be downgraded only when the instance meets the following conditions:

- The billing method of the instance is subscription.
- The instance is in the Running or Stopped state.
- The instance has no ongoing downgrade or renewal process.

Context

A downgrade may result in a refund. The refund amount is the result of the following formula: Refund amount = Remaining amount of the configuration fee before the downgrade - Price of the new configurations.

You can use the bandwidth downgrade feature to perform the following operations:

- If the current bandwidth billing method is Pay-By-Bandwidth, you can:
  - Lower the fixed bandwidth.
  - Change the billing method to Pay-By-Traffic and set the peak bandwidth.
- If the current bandwidth billing method is Pay-By-Traffic, you can change the peak bandwidth, but you cannot change the billing method to Pay-By-Bandwidth.

Note:

For a VPC-type instance, when its bandwidth is lowered to 0 Mbit/s, its public IP address will be detached.

When you downgrade the bandwidth, the following limits apply:

- Whether the bandwidth of a subscription instance can be downgraded is determined by your ECS instance usage.
- You can downgrade only one subscription instance at a time.
- Each subscription instance can be downgraded a maximum of three times.
  Downgrade operations include instance specifications downgrades, bandwidth downgrades, and the change of the disk billing method from subscription to pay-as-you-go.
- The interval between two downgrade operations must be at least 5 minutes.
• If a VPC-type instance has an EIP bound, its configurations cannot be downgraded.

Procedure

1. Log on to the ECS console.
2. In the left-side navigation pane, choose Instances & Images > Instances.
3. Find the subscription instance and click Upgrade/Downgrade in the Action column.
4. In the dialog box, select Configuration Downgrade and Bandwidth Configuration, and click Continue.
5. Set the bandwidth, and select ECS Terms of Service. 
6. Click Downgrade Now.

Note:
The downgrade takes effect immediately. You do not need to restart your instance.

Related topics

10.5 Change configurations of Pay-As-You-Go instances

10.5.1 Change configurations of Pay-As-You-Go instances

This topic describes how to change configurations of Pay-As-You-Go instances, including the number of vCPUs and memory size.

Note:
Changing instance configurations requires stopping your instance, which disrupts services. Exercise caution when performing this action. We recommend that you perform this operation during off-peak hours.

Limits

• You can change the configurations of an instance multiple times, but the interval between two change operations must be at least five minutes.
• You cannot change the configurations of instances within or between such instance type families: d1, d1ne, i1, i2, ga1, gn5, f1, f2, f3, ebmc4, ebmg5, sccg5,
Elastic Compute Service

and scch5. For more information, see *instance type families that support upgrading instance types*.

Prerequisites

The instance has been stopped.

Procedure

To change configurations of an instance, follow these steps:

1. Log on to the *ECS console*.
2. In the left-side navigation pane, choose Instances & Images > Instances.
3. In the top navigation bar, select a region.
4. Find the target instance. In the Actions column, click Change Instance Type.
5. On the Instance Type page, select the desired instance type and click Confirm.

**Note:**

You can also call the *DescribeResourcesModification* API action to query the instance types that can be changed.

The new configuration takes effect immediately after the change is complete. You can view the instance type information in the Basic Information area of the Instance Details page, as shown in the following figure.
10.5.2 Change the Internet bandwidth of a pay-as-you-go instance

You can change the Internet bandwidth of your pay-as-you-go instance if it does not meet or exceeds your business requirements.

Context

You can change the Internet bandwidth of a pay-as-you-go instance based on the network type and the public IP category of the instance, as listed in the following table.

<table>
<thead>
<tr>
<th>Network type</th>
<th>Public IP category</th>
<th>Available feature</th>
</tr>
</thead>
<tbody>
<tr>
<td>VPC</td>
<td>Elastic IP address (EIP)</td>
<td>Change the bandwidth of the EIP</td>
</tr>
</tbody>
</table>
### Network type | Public IP category | Available feature
--- | --- | ---
Classic network | Allocated public IP address | Change the bandwidth of the pay-as-you-go instance

After you change the bandwidth of a pay-as-you-go instance, you cannot change it again in the next 5 minutes. When you change the bandwidth of a pay-as-you-go instance, you can perform the following operations:

- Change the billing method of Internet bandwidth: Select Pay-By-Bandwidth or Pay-By-Traffic.
- Set a new Internet bandwidth value. After the Internet bandwidth is set to 0 Mbit/s,
  - For a VPC-type instance, its public IP address is released immediately.
  - The public IP addresses of classic network-type instances are retained, but do not provide public access.

### Change the bandwidth of an EIP

For a VPC-type instance to which an EIP is attached, perform the following steps to change the Internet bandwidth of the EIP:

1. Log on to the *ECS console*.
2. In the left-side navigation pane, choose *Instances & Images > Instances*.
3. In the top navigation bar, select a region.
4. Find the pay-as-you-go instance that is bound to an EIP, and click Upgrade/Downgrade in the Actions column.
5. In the Upgrade/Downgrade Wizard dialog box, select Bandwidth Adjustment, and click Continue.
6. Select the new peak bandwidth.
   For more information, see *Modify the peak bandwidth of an EIP*.
7. Select *Elastic IP Agreement of Service*, and click Activate.
8. Complete the configuration as instructed.
Change the bandwidth of a pay-as-you-go instance

1. Log on to the *ECS console*.

2. In the left-side navigation pane, choose *Instances & Images > Instances*.

3. In the top navigation bar, select a region.

4. Different methods are required to change the Internet bandwidth based on the number of target pay-as-you-go instances.
   
   - For one instance: Find the pay-as-you-go instance, and choose More > Configuration Change > Change Bandwidth from the Actions column.
   - For multiple instances: Select the pay-as-you-go instances. At the bottom of the instance list, choose More > Configuration Change > Change Bandwidth.

5. Click Batch Change.

6. Modify the bandwidth settings, and click OK.

7. Select *ECS Terms of Service*, and click OK.

   After the change is completed, the new Internet bandwidth setting takes effect immediately.

Related topics

#unique_274
#unique_281
11 Phased-out instance types

This topic describes all phased-out instance types on the China site (aliyun.com). However, the instance types sn1, sn2, n1, n2 and e3 are still available for purchase on the International site (alibabacloud.com).

Specifications

- The packet forwarding rate refers to the maximum sum of inbound and outbound packet forwarding rates. For more information about how to test the packet forwarding rate, see Test network performance.
- NIC queues refer to the maximum number of NIC queues supported by the current instance type. By default, the CentOS 7.3 image uses the maximum number of NIC queues.
- Enterprise-level instance types that are equipped with two or more vCPUs support Elastic Network Interfaces (ENIs). Entry-level instance types that are equipped with four or more vCPUs support ENIs. For more information about ENIs, see ENI overview.

Instance type upgrade

For information about the phased-out instance types that can be upgraded to newer instance types, see Instance families that support instance type changes.

sn2, general purpose instance family

Features

- CPU-to-memory ratio of 1:4
- 2.5 GHz Intel Xeon E5-2682 v4 (Broadwell), or E5-2680 v3 (Haswell) processor, with stable computing performance
- Provides strong network performance proportional to computing capacity
- Suitable for the following scenarios:
  - Enterprise-level applications of various types and scales
  - Small and medium-sized database systems, caches, and search clusters
  - Data analysis and computing

Instance types
<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPUs</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>Bandwidth (Gbit/s)</th>
<th>Packet forwarding rate (Kpps)</th>
<th>NIC queues</th>
<th>ENIs (including one primary ENI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs.sn2. medium</td>
<td>2</td>
<td>8.0</td>
<td>N/A</td>
<td>0.5</td>
<td>100</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>ecs.sn2. large</td>
<td>4</td>
<td>16.0</td>
<td>N/A</td>
<td>0.8</td>
<td>200</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>ecs.sn2. xlarge</td>
<td>8</td>
<td>32.0</td>
<td>N/A</td>
<td>1.5</td>
<td>400</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>ecs.sn2. 3xlarge</td>
<td>16</td>
<td>64.0</td>
<td>N/A</td>
<td>3.0</td>
<td>500</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>ecs.sn2. 7xlarge</td>
<td>32</td>
<td>128.0</td>
<td>N/A</td>
<td>6.0</td>
<td>800</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>ecs.sn2. 13xlarge</td>
<td>56</td>
<td>224.0</td>
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<td>1,200</td>
<td>4</td>
<td>8</td>
</tr>
</tbody>
</table>

sn1, compute optimized instance family

**Features**

- CPU-to-memory ratio of 1:2
- 2.5 GHz Intel Xeon E5-2682 v4 (Broadwell), or E5-2680 v3 (Haswell) processor, with stable computing performance
- Provides strong network performance proportional to computing capacity
- Suitable for the following scenarios:
  - Web frontend servers
  - Frontends of massively multiplayer online (MMO) games
  - Data analysis, batch processing, and video encoding
  - High-performance scientific and engineering applications

**Instance types**
### Instance / 11 Phased-out instance types

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPUs</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>Bandwidth (Gbit/s)</th>
<th>Packet forwarding rate (Kpps)</th>
<th>NIC queues</th>
<th>ENIs (including one primary ENI)</th>
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</thead>
<tbody>
<tr>
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<td>2</td>
<td>4.0</td>
<td>N/A</td>
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<td>100</td>
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<td>2</td>
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<tr>
<td>ecs.sn1. large</td>
<td>4</td>
<td>8.0</td>
<td>N/A</td>
<td>0.8</td>
<td>200</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>ecs.sn1. xlarge</td>
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<td>16.0</td>
<td>N/A</td>
<td>1.5</td>
<td>400</td>
<td>1</td>
<td>4</td>
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<tr>
<td>ecs.sn1. 3xlarge</td>
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<td>32.0</td>
<td>N/A</td>
<td>3.0</td>
<td>500</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>ecs.sn1. 7xlarge</td>
<td>32</td>
<td>64.0</td>
<td>N/A</td>
<td>6.0</td>
<td>800</td>
<td>3</td>
<td>8</td>
</tr>
</tbody>
</table>

c4, ce4, and cm4, compute optimized instance families with high clock speed

**Features**

- I/O optimized
- Support standard SSDs and ultra disks
- Stable computing performance
- 3.2 GHz Intel Xeon E5-2667 v4 (Broadwell) processor
- Provide strong network performance proportional to computing capacity
- Suitable for the following scenarios:
  - High-performance web frontend servers
  - High-performance scientific and engineering applications
  - MMO gaming and video encoding

c4
### Elastic Compute Service

**Instance type**

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPUs</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>Bandwidth (Gbit/s)</th>
<th>Packet forwarding rate (Kpps)</th>
<th>NIC queues</th>
<th>ENIs (including one primary ENI)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ecs.c4. xlarge</strong></td>
<td>4</td>
<td>8.0</td>
<td>N/A</td>
<td>1.5</td>
<td>200</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td><strong>ecs.c4. 2xlarge</strong></td>
<td>8</td>
<td>16.0</td>
<td>N/A</td>
<td>3.0</td>
<td>400</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td><strong>ecs.c4. 3xlarge</strong></td>
<td>12</td>
<td>24.0</td>
<td>N/A</td>
<td>4.5</td>
<td>600</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td><strong>ecs.c4. 4xlarge</strong></td>
<td>16</td>
<td>32.0</td>
<td>N/A</td>
<td>6.0</td>
<td>800</td>
<td>2</td>
<td>8</td>
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</tbody>
</table>

### ce4

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPUs</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>Bandwidth (Gbit/s)</th>
<th>Packet forwarding rate (Kpps)</th>
<th>NIC queues</th>
<th>ENIs (including one primary ENI)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ecs.ce4. xlarge</strong></td>
<td>4</td>
<td>32.0</td>
<td>N/A</td>
<td>1.5</td>
<td>200</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td><strong>ecs.ce4. 2xlarge</strong></td>
<td>8</td>
<td>64.0</td>
<td>N/A</td>
<td>3.0</td>
<td>400</td>
<td>1</td>
<td>3</td>
</tr>
</tbody>
</table>

### cm4

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPUs</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>Bandwidth (Gbit/s)</th>
<th>Packet forwarding rate (Kpps)</th>
<th>NIC queues</th>
<th>ENIs (including one primary ENI)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ecs.cm4. xlarge</strong></td>
<td>4</td>
<td>16.0</td>
<td>N/A</td>
<td>1.5</td>
<td>200</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td><strong>ecs.cm4. 2xlarge</strong></td>
<td>8</td>
<td>32.0</td>
<td>N/A</td>
<td>3.0</td>
<td>400</td>
<td>1</td>
<td>4</td>
</tr>
</tbody>
</table>
### Elastic Compute Service

#### Instance / 11 Phased-out instance types

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPUs</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>Bandwidth (Gbit/s)</th>
<th>Packet forwarding rate (Kpps)</th>
<th>NIC queues</th>
<th>ENIs (including one primary ENI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs.cm4.3xlarge</td>
<td>12</td>
<td>48.0</td>
<td>N/A</td>
<td>4.5</td>
<td>600</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>ecs.cm4.4xlarge</td>
<td>16</td>
<td>64.0</td>
<td>N/A</td>
<td>6.0</td>
<td>800</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>ecs.cm4.6xlarge</td>
<td>24</td>
<td>96.0</td>
<td>N/A</td>
<td>10.0</td>
<td>1,200</td>
<td>4</td>
<td>8</td>
</tr>
</tbody>
</table>

n1, n2, and e3, entry-level instance families

**Features**

- 2.5 GHz Intel Xeon E5-2680 v3 (Haswell) processor
- Provide strong network performance proportional to computing capacity
- I/O optimized
- Support the following categories of disks:
  - Standard SSDs
  - Ultra disks

<table>
<thead>
<tr>
<th>Instance family</th>
<th>Feature</th>
<th>CPU-to-memory ratio</th>
<th>Scenario</th>
</tr>
</thead>
<tbody>
<tr>
<td>n1</td>
<td>Shared compute optimized instances</td>
<td>1:2</td>
<td>Small and medium-sized web servers, Batch processing, Distributed analysis, Advertising services</td>
</tr>
<tr>
<td>Instance family</td>
<td>Feature</td>
<td>CPU-to-memory ratio</td>
<td>Scenario</td>
</tr>
<tr>
<td>-----------------</td>
<td>----------------------------------------</td>
<td>---------------------</td>
<td>--------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| n2              | Shared general purpose instances       | 1:4                 | • Medium-sized web servers  
• Batch processing  
• Distributed analysis  
• Advertising services  
• Hadoop clusters      |
| e3              | Shared memory optimized instances       | 1:8                 | • Cache and Redis  
• Search applications  
• In-memory databases  
• Databases with high I/O requirements, such as Oracle and MongoDB  
• Hadoop clusters  
• Computing scenarios that involve large-volume data processing |

### n1

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPUs</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>ENIs (including one primary ENI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs.n1.tiny</td>
<td>1</td>
<td>1.0</td>
<td>N/A</td>
<td>1</td>
</tr>
<tr>
<td>ecs.n1.small</td>
<td>1</td>
<td>2.0</td>
<td>N/A</td>
<td>1</td>
</tr>
<tr>
<td>ecs.n1.medium</td>
<td>2</td>
<td>4.0</td>
<td>N/A</td>
<td>1</td>
</tr>
<tr>
<td>ecs.n1.large</td>
<td>4</td>
<td>8.0</td>
<td>N/A</td>
<td>2</td>
</tr>
<tr>
<td>ecs.n1.xlarge</td>
<td>8</td>
<td>16.0</td>
<td>N/A</td>
<td>2</td>
</tr>
<tr>
<td>Instance type</td>
<td>vCPUs</td>
<td>Memory (GiB)</td>
<td>Local storage (GiB)</td>
<td>ENIs (including one primary ENI)</td>
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<tr>
<td>----------------</td>
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<td>--------------</td>
<td>---------------------</td>
<td>---------------------------------</td>
</tr>
<tr>
<td>ecs.n1.3xlarge</td>
<td>16</td>
<td>32.0</td>
<td>N/A</td>
<td>2</td>
</tr>
<tr>
<td>ecs.n1.7xlarge</td>
<td>32</td>
<td>64.0</td>
<td>N/A</td>
<td>2</td>
</tr>
</tbody>
</table>

**n2**

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPUs</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>ENIs (including one primary ENI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs.n2.small</td>
<td>1</td>
<td>4.0</td>
<td>N/A</td>
<td>1</td>
</tr>
<tr>
<td>ecs.n2.medium</td>
<td>2</td>
<td>8.0</td>
<td>N/A</td>
<td>1</td>
</tr>
<tr>
<td>ecs.n2.large</td>
<td>4</td>
<td>16.0</td>
<td>N/A</td>
<td>2</td>
</tr>
<tr>
<td>ecs.n2.xlarge</td>
<td>8</td>
<td>32.0</td>
<td>N/A</td>
<td>2</td>
</tr>
<tr>
<td>ecs.n2.3xlarge</td>
<td>16</td>
<td>64.0</td>
<td>N/A</td>
<td>2</td>
</tr>
<tr>
<td>ecs.n2.7xlarge</td>
<td>32</td>
<td>128.0</td>
<td>N/A</td>
<td>2</td>
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</tbody>
</table>

**e3**

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPUs</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>ENIs (including one primary ENI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs.e3.small</td>
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<td>8.0</td>
<td>N/A</td>
<td>1</td>
</tr>
<tr>
<td>ecs.e3.medium</td>
<td>2</td>
<td>16.0</td>
<td>N/A</td>
<td>1</td>
</tr>
<tr>
<td>ecs.e3.large</td>
<td>4</td>
<td>32.0</td>
<td>N/A</td>
<td>2</td>
</tr>
<tr>
<td>ecs.e3.xlarge</td>
<td>8</td>
<td>64.0</td>
<td>N/A</td>
<td>2</td>
</tr>
<tr>
<td>ecs.e3.3xlarge</td>
<td>16</td>
<td>128.0</td>
<td>N/A</td>
<td>2</td>
</tr>
</tbody>
</table>

**Generation I instance types**

Generation I instance types include t1, s1, s2, s3, m1, m2, c1, and c2. All of these instance types are legacy shared instance types. They are categorized based on the number of vCPUs, 1, 2, 4, 8 or 16, and are not sensitive to instance family.

**Features**
• Intel Xeon E5-2420 processor with the clock speed no less than 1.9 GHz
• New generation DDR3 memory
• Provides optional I/O optimized performance or non-I/O optimized performance

I/O optimized instance types

I/O optimized instances support the following two types of disks:
• Standard SSDs
• Ultra disks

<table>
<thead>
<tr>
<th>Category</th>
<th>Instance type</th>
<th>vCPUs</th>
<th>Memory (GiB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard</td>
<td>ecs.s2.large</td>
<td>2</td>
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</tr>
<tr>
<td></td>
<td>ecs.s2.xlarge</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>ecs.s2.2xlarge</td>
<td>2</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>ecs.s3.medium</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>ecs.s3.large</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>High Memory</td>
<td>ecs.m1.medium</td>
<td>4</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>ecs.m2.medium</td>
<td>4</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>ecs.m1.xlarge</td>
<td>8</td>
<td>32</td>
</tr>
<tr>
<td>High CPU</td>
<td>ecs.c1.small</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>ecs.c1.large</td>
<td>8</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>ecs.c2.medium</td>
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<td>16</td>
</tr>
<tr>
<td></td>
<td>ecs.c2.large</td>
<td>16</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>ecs.c2.xlarge</td>
<td>16</td>
<td>64</td>
</tr>
</tbody>
</table>

Non-I/O optimized instance types

Non-I/O optimized instances can only be equipped with basic disks.

<table>
<thead>
<tr>
<th>Category</th>
<th>Instance type</th>
<th>vCPUs</th>
<th>Memory (GiB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tiny</td>
<td>ecs.t1.small</td>
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<td>1</td>
</tr>
<tr>
<td>Standard</td>
<td>ecs.s1.small</td>
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<td>2</td>
</tr>
<tr>
<td></td>
<td>ecs.s1.medium</td>
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<td>4</td>
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<tr>
<td></td>
<td>ecs.s1.large</td>
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<td>8</td>
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12 FAQs about ECS instances

This topic provides answers to FAQ about ECS instances.

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  - What can I do if no resources are available for purchase when I am trying to create an ECS instance?
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  - How long after the order is paid does it take to change the billing method from pay-as-you-go to subscription?
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  - Why can’t I change a pay-as-you-go instance to a subscription one?
  - How do I view the expiration time of my subscription instances?
How do I check whether instances are available for purchase in a specific region or zone?

You can go to the ECS Instance Types Available for Each Region page to view the instance types available in each region.

What can I do if no resources are available for purchase when I am trying to create an ECS instance?

If no resources are available for purchase when you are trying to create an ECS instance in a specific region or zone, take one of the following measures:

- Select another region
- Select another zone
- Change resource configurations

If still no resources are available for purchase after you take all the preceding measures, try again later. Instance resources are dynamic. Alibaba Cloud replenishes resources as soon as we can when resources are insufficient.

You can also use the arrival notice feature to be notified when resources are available.

How do I select an ECS instance that is suitable for my business?

- Determine your business requirements.
- Determine your website type.
- Determine the average number of page views per day on your website.
- Determine the size of your homepage.
- Determine the data capacity of your business.

How long does it take to create an ECS instance?

It takes one or two minutes to create an ECS instance. After the instance is created:
• For an ECS instance that runs the Linux system, you can connect to the instance without any other configurations. For more information, see Connect to an ECS instance.

• For an ECS instance that runs the Windows system, you need to use the Sysprep tool to initialize the operating system. Do not restart the instance during initialization. After initialization, you can connect to the instance. For more information, see Connect to an ECS instance. The time of initialization is determined by the type of ECS instances.
  - For an I/O-optimized instance that runs the Windows system, two to three minutes are needed for initialization.
  - For a non-I/O optimized instance that runs the Windows system, ten minutes are needed for initialization.

Note:
If an error occurs when you create an ECS instance, submit a ticket.

I paid for an ECS instance but no ECS instance was created. Why?

If resources in the specified zone are insufficient to create instances of your selected type, the ECS instance will fail to be created. Your account will automatically be refunded for the cost of the ECS instance. If you do not receive a refund within half an hour, submit a ticket.

You can go to the ECS Instance Types Available for Each Region page to view the instance types available in each region.

Why are some types of pay-as-you-go instances not available on the instance purchase page when I attempt to purchase an ECS instance?

Some types of pay-as-you-go instances with 16 or more vCPUs are available only to authorized accounts on the instance purchase page. If subscription instances of an instance type are available but pay-as-you-go instances of the same instance type are not, submit a ticket to check whether your account has been authorized to purchase pay-as-you-go instances of the instance type.

If your account has been authorized but pay-as-you-go instances still are not available, the pay-as-you-go resources within the current region may be insufficient. For more information, see What can I do if no resources are available for purchase when I am trying to create an ECS instance?
What are enterprise-level instances? What are entry-level instances?

**Enterprise-level instances** are a series of instance families released by Alibaba Cloud in September 2016. Enterprise-level instances feature high performance, consistent computing power, and balanced network performance. These instances have exclusive and consistent computing, storage, and network resources, and are suitable for enterprise scenarios with high business stability requirements.

**Entry-level instances** are a series of instance families that are targeted at small and medium-sized websites or individuals. Compared with enterprise-level instances that have exclusive resources, entry-level instances share resources. Therefore, entry-level instances do not provide consistent computing performance but they have a lower cost.

What are the differences between enterprise-level and entry-level instances?

**Enterprise-level instances** use a CPU-bound scheduling scheme. Each vCPU is bound to a CPU hyperthread. Instances do not compete for CPU resources and provide consistent computing performance as guaranteed in the SLA.

**Entry-level instances** use a CPU-unbound scheduling scheme. Each vCPU is randomly allocated to an idle CPU hyperthread. vCPUs of different instances compete for CPU resources. This results in fluctuations in computing performance when traffic loads are heavy. Entry-level instances can only guarantee availability. They cannot guarantee the performance that may be required in the SLA.

Which are enterprise-level instance families? Which are entry-level instance families?

Among the instance families that are available for purchase, n4, mn4, xn4, and e4 are entry-level instance families, and the others are enterprise-level instance families.

In what business scenarios do I need to purchase enterprise-level instances?

For business scenarios to which different enterprise-level instances are applicable, see Instance families.

How is the network performance of enterprise-level instances?

The network performance of enterprise-level instances depends on their specifications. The higher their specifications, the stronger network performance the instances can provide. For more information about the network performance of different instance types, see Instance families.
What categories of disks do enterprise-level instances support?

For the disk categories that enterprise-level instances support, see #unique_85/unique_85_Connect_42_section_d9f_cog_644.

What types of images do enterprise-level instances support?

For the public images that enterprise-level instances support, see #unique_283.

You can also import custom images. For more information, see #unique_284.

What are the limits on upgrading or downgrading enterprise-level instances?

For the limits on upgrading or downgrading enterprise-level instances, see Instance families that support instance type changes.

Can I upgrade an entry-level instance to an enterprise-level instance?

Yes, you can upgrade an entry-level instance to an enterprise-level instance. For more information, see Instance families that support instance type changes.

After the NVIDIA driver is installed, nvidia-smi no longer works and an error message is returned indicating that the NVIDIA driver has not been installed. Why?

Cause: The versions of the kernel and kernel-devel package are inconsistent. This results in a driver compilation error when the driver is installed from the .rpm file.

Resolution: Check the kernel version and download the correct kernel-devel package version. Then, run the rpm -qa | grep kernel command on the instance to check whether the kernel-devel package version matches the kernel version. Make sure that they match and then reinstall the driver.

Why doesn't the Windows Graphics support graphics-related applications such as DirectX?

Problem description: On Windows instances where the installed GPU drivers have taken effect, the Windows Remote Desktop Protocol (RDP) does not support DirectX, OpenGL, or other graphics-related applications.

Solution: Install the Virtual Network Computing (VNC) service and clients or other protocols that support these applications, such as PC over IP (PCoIP) and XenDesktop HDX 3D.
A ga1 Windows instance uses an Alibaba Cloud Marketplace image that is pre-installed with an AMD driver. However, the Windows Device Manager window shows that the GPU driver does not load properly. Why?

1. Log on to the instance.
2. Open the Device Manager.
3. Right-click the GPU device.
4. Select Update Driver Software from the shortcut menu.
5. Then, select Search automatically for updated driver software.
6. After the device driver is updated, restart the instance.

Why do I encounter a blue-screen error when starting an instance that uses an Alibaba Cloud Marketplace image pre-installed with an AMD driver?

Alibaba Cloud will update the driver included in the Alibaba Cloud Marketplace image to solve this problem. If you are using an image of an earlier version, update the GPU driver to avoid this issue.

If you encounter a blue-screen error and cannot start an instance, you must enter Safe Mode. In Safe Mode, uninstall the existing driver, start Windows normally, and then install the latest version of the GPU driver.

Do GPU instances support Android emulators?

No, Android emulators are not supported on GPU instances.

Can I upgrade or downgrade GPU instances?

No, GPU instances that are equipped with local disks, such as ga1 and gn5, cannot be upgraded or downgraded. For the GPU instances that are not equipped with local disks but can be upgraded or downgraded, see Instance families that support instance type changes.

Do pay-as-you-go GPU instances support the No Fees for Stopped Instances (VPC-Connected) feature?

GPU instances that are not equipped with local disks support the No Fees for Stopped Instances (VPC-Connected) feature. Such GPU instances include gn4 (with NVIDIA M40 GPU processors), gn5i (with NVIDIA P4 GPU processors), and gn6v (with NVIDIA V100 GPU processors) instances. For more information, see #unique_150.
How do I view GPU monitoring data?

You can log on to the CloudMonitor console or call the operation to view GPU monitoring data. For more information, see.

What are the differences between ECS Bare Metal Instances, traditional cloud hosts (virtual machines), and traditional physical machines?

For information on the differences, see ECS Bare Metal Instance.

How is the network performance of ECS Bare Metal Instances?

The network performance of ECS Bare Metal Instances depends on their specifications. The higher their specifications, the stronger network performance the instances can provide. For more information about the network performance of different ECS Bare Metal Instance types, see Instance families.

What categories of disks are supported on ECS Bare Metal Instances? How many data disks can be attached to an ECS Bare Metal Instance?

Ultra disks and standard SSDs are supported on ECS Bare Metal Instances. Up to 16 data disks can be attached to each ECS Bare Metal Instance.

Can ECS Bare Metal Instances be upgraded or downgraded? Do they support the failover feature?

ECS Bare Metal Instances cannot be upgraded or downgraded. They support the failover feature. If a hardware fault occurs to an ECS Bare Metal Instance, a failover occurs and data is retained in the disks of the ECS Bare Metal Instance.

How do I create an SCC instance?

You can create an SCC instance in one of the following ways:

- If you only need to use RDMA, log on to the ECS console to create an SCC instance.
- If you need to use the HPC scheduler and cluster resizing service in addition to RDMA, log on to the E-HPC console. Create an SCC and then create an SCC instance.

How are SCC instances billed?

SCC instances can be billed on a weekly, monthly, or yearly subscription basis.

How do I create an SCC by using E-HPC?

You can log on to the E-HPC console or call the CreateCluster operation to create an SCC.
How is SCC RDMA used?

When you create an SCC instance, select a custom image for SCC that supports the RDMA RoCE driver and OFED stack. You can use SCC RDMA through the IB Verbs API and manage RDMA communication through the MPI.

My account has no overdue payments. Why have my preemptible instances been released?

You can reserve a preemptible instance without interruptions for at least one hour. After one hour, your bid is compared with the market price. If the market price exceeds your bid or if resources are insufficient, your preemptible instance is automatically released.

Will I be notified when my preemptible instance is released? How?

Yes, you will be notified when your preemptible instance is released. When your preemptible instance needs to be released due to a market price change or due to insufficient resources, the instance will first enter the To Be Released state. After 5 minutes, the instance is automatically released. You can check whether an instance is in the To Be Released state based on the instance metadata or OperationLocks information returned by the DescribeInstances operation.

Can data be retained automatically after a preemptible instance is released?

No, data cannot be automatically retained. When you no longer need a preemptible instance, we recommend that you create snapshots to back up your data and environment and then release the instance. You can purchase new preemptible instances at any time.

Can I cancel or reschedule the automatic release of my preemptible instance?

Yes, you can cancel or reschedule the automatic release of your preemptible instance at any time.

Can preemptible instances be converted into subscription instances?

No, preemptible instances cannot be converted into subscription instances.
To what resources are the preemptible instance prices applicable?

The preemptible instance prices are applicable only to instance types. Other instance resources, such as system disks, data disks, and network bandwidth, are billed at the same rates as those of pay-as-you-go instances.

How do I bid for a preemptible instance?

To create a preemptible instance, you must set the highest hourly price you are willing to pay for an instance type. If your bid is higher than or equal to the current market price, your instance is created and billed based on the current market price. For more information, see Create a preemptible instance.

What is the relationship between the highest bid for a preemptible instance and the current market price?

The highest bid for a preemptible instance must be greater than or equal to the current market price. The highest bid for a preemptible instance must be higher or equal to the current market price. If the highest bid falls below the market price, no preemptible instances are created or running preemptible instances may be released. Preemptible instance will be billed based on the market price regardless of your bid.

Will I be charged at the same price for all preemptible instances that start at the same time?

Yes, you will be charged at the same price for all preemptible instances that start at the same time.

Will I be charged at a price that fluctuates with the market price within an hour of my preemptible instance starting?

No, the hourly price of your preemptible instance is set at the beginning of each hour and is applied to the instance for that hour.

Can I view the current market price of an instance type when I purchase a preemptible instance?

Yes. When creating a preemptible instance in the ECS console, you can select an instance type to view its current and historical market prices. The total cost, including the instance type price, storage price, and bandwidth price, is displayed at the lower-left corner of the instance creation page. The instance type price is the current market price of the specified instance type.
Can I view the historical prices of a preemptible instance type? How?

Yes, you can select a preemptible instance type to view its historical prices in the ECS console. You can also call the `DescribeSpotPriceHistory` operation to view the historical prices of a preemptible instance type.

Will preemptible instances continue to be billed after they are stopped?

Yes. When you no longer need a preemptible instance, we recommend that you create snapshots to back up your data and environment and then release the instance. You can purchase new preemptible instances at any time.

Note:
Preemptible instances will continue to be billed after you stop them from the ECS console or by calling the StopInstance operation.

How do I view the consumption details of my preemptible instance?

See View bills of a preemptible instance.

Note:
The total cost to create a pay-as-you-go instance is the hourly price to be charged for usage. However, the total cost to create a preemptible instance is the actual transaction price.

How many preemptible instances can be purchased under one account?

There is a limit on the maximum number of vCPUs that can be allocated to preemptible instances for each account. When you create a preemptible instance, you can view the number of available vCPUs after you select an instance type. For more information, see #unique_155/unique_155_Connect_42_section_tbg_zdx_wdb.

How do I increase the maximum number of vCPUs?

Submit a ticket.

Can I change the instance type of a preemptible instance?

No, the instance types of preemptible instances cannot be changed.
Which instance families support preemptible instances?

> **Instance families that support the pay-as-you-go billing method also support preemptible instances. If a preemptible instance of a specified type cannot be created due to insufficient resources, try a different instance type.**

In which regions can I create preemptible instances?

> **Preemptible instances can be created in all regions. If preemptible instances cannot be created in a region due to insufficient resources, try a different region.**

Why is the Preemptible Instance option unavailable when I purchase an ECS instance?

> **Whether the Preemptible Instance option is available depends on your ECS usage.**

What is a reserved instance?

> **Reserved instances automatically match pay-as-you-go instances, excluding preemptible instances, in your account to provide a billing discount. Reserved instances can also be used to reserve resources for pay-as-you-go instances. A combination of reserved instances and pay-as-you-go instances provides a similar cost-effectiveness to subscription instances but with a higher degree of flexibility.**

Will a reserved instance provide a resource reservation?

> **Zonal reserved instances provide resource reservations, but regional reserved instances do not.**

What operating systems do reserved instances support?

> **Reserved instances support both Windows and Linux. For example, a Linux reserved instance can be applied to any pay-as-you-go Linux instances that match its attributes regardless of image types (public images, custom images, shared images, and Alibaba Cloud Marketplace images). To apply a reserved instance to pay-as-you-go instances created from Bring Your Own License (BYOL) images, submit a ticket.**

Which instance families do reserved instances support?

> **Reserved instances support the following instance families: sn1ne, sn2ne, se1ne, ic5, c5, g5, r5, c6, g6, r6, i2, i2g, hfc5, hfg5, and t5.**
Reserved instances matching *t5 burstable instances* are only available at the zone level. These reserved instances cannot be merged or split, and their scopes cannot be changed.

Can reserved instances be applied to preemptible instances?

**No, reserved instances cannot be applied to preemptible instances.**

Can I change the instance families of reserved instances?

**No, the instance families of reserved instances cannot be changed.**

To what scenarios are zonal reserved instances applicable?

We recommend that you purchase zonal reserved instances when you have clear requirements to reserve resources.

To what scenarios are regional reserved instances applicable?

We recommend that you purchase regional reserved instances if you want to enjoy better zone and instance size flexibility.

How is the zone flexibility of reserved instances applied?

Only regional reserved instances provide zone flexibility. Example:

You have the following pay-as-you-go instance running:

One ecs.c5.xlarge Linux instance in Qingdao Zone B. The instance name is C5PAYG-b.

You have purchased the following reserved instance:

One regional ecs.c5.xlarge reserved instance in the China (Qingdao) region. The name of the reserved instance is C5RI.

C5RI matches C5PAYG-b to apply a discount.

You release C5PAYG-b and start another Linux instance named C5PAYG-c, which is of the same instance type as C5PAYG-b. C5RI then matches C5PAYG-c.

How is the instance size flexibility of reserved instances applied?

Only regional reserved instances provide instance size flexibility. Example:

You have one regional ecs.g5.4xlarge reserved instance. It can match one ecs.g5.4xlarge pay-as-you-go instance, two ecs.g5.2xlarge pay-as-you-go instances, or four ecs.g5.xlarge pay-as-you-go instances.
You have a one-year regional ecs.g5.xlarge reserved instance. It can match one ecs.g5.xlarge instance running for one year, or one ecs.g5.2xlarge instance running for six months.

Do zonal reserved instances provide instance size flexibility?

No. A zonal reserved instance can only match pay-as-you-go instances of the same instance type.

Do zonal reserved instances provide zone flexibility?

No. A zonal reserved instance can only match pay-as-you-go instances in the same zone.

Can I change a zonal reserved instance to a regional one?

Yes, a zonal reserved instance can be changed to a regional one. You can change the scope of a reserved instance you purchased as follows:

- From a zone to a region
- From a region to a zone
- From one zone to another within the same region for a zonal reserved instance

Can I change the scope of a reserved instance from one region to another?

No, the scope of a reserved instance cannot be changed from one region to another. For example, if you have a zonal reserved instance in Hangzhou Zone B, you can change the instance scope to another zone or change the instance to a regional reserved instance within the China (Hangzhou) region. However, you cannot change the zonal reserved instance to a regional or zonal reserved instance within another region.

Can I use reserved instances across accounts?

No, reserved instances cannot be used across accounts.

Can I use reserved instances to cover the storage and network charges of pay-as-you-go instances?

No, reserved instances cannot be used to cover the storage and network charges of pay-as-you-go instances. Reserved instances cover the vCPU and memory costs of pay-as-you-go instances. For Windows pay-as-you-go instances, reserved instances also cover the image costs.
Can I configure a reserved instance to apply its discount to a specific pay-as-you-go instance?

No. When multiple pay-as-you-go instances match the attributes of a reserved instance, the discount is applied automatically based on the optimized matching scheme.

How are reserved instances billed?

Reserved instances are billed separately and support the All Upfront, Partial Upfront, and No Upfront payment options.

The term of a reserved instance starts immediately after purchase. You are charged based on your selected payment option regardless of whether the reserved instance matches pay-as-you-go instances. The All Upfront option is the most cost-effective.

When does a reserved instance take effect after I purchase it?

The reserved instance takes effect and is billed starting from the top of the hour during which it is purchased. It expires at 00:00:00 of the day after the term end date. For example, if you purchase a one-year reserved instance at 2019-02-26 13:45:00, the reserved instance takes effect and is billed starting at 2019-02-26 13:00:00 and is set to expire at 2020-02-27 00:00:00. If you purchase a reserved instance that matches your existing pay-as-you-go instances, the discount is applied to the bills generated for the pay-as-you-go instances starting from 13:00 to 14:00 on February 26, 2019 until the reserved instance expires.

When do reserved instances take effect after I modify, split, or merge them?

After a reserved instance is modified, split, or merged, a new reserved instance is generated and the original one becomes invalid. The new reserved instance takes effect and the original reserved instance becomes invalid. Both occur on the hour. Assume that you split ecs.g5.2xlarge zonal reserved instance RI1 into two zonal ecs.g5.xlarge reserved instances RI2 and RI3 at 2019-02-26 13:45:00. The term of RI1 ends and the terms of RI2 and RI3 starts at 2019-02-26 13:00:00. As of 2019-02-26 13:00:00, the eligible reserved instance type is ecs.g5.xlarge, not ecs.g5.2xlarge any more. If RI2 and RI3 match pay-as-you-go instances immediately after they take effect, the discounts provided by RI2 and RI3 are also applied to the hourly bills of ecs.g5.xlarge pay-as-you-go instances as of 2019-02-26 13:00:00.

Why isn't the No Upfront payment option displayed on the purchase page?

The availability of this option depends on your ECS usage.
Can I change the payment option of a reserved instance?

**No, the payment options of reserved instances cannot be changed.**

Are reserved instances resalable?

**No, reserved instances are not resalable.**

Can I use reserved instances to cover the image costs of Windows pay-as-you-go instances?

**Yes. Windows reserved instances already include Windows image costs. Therefore, you can use them to cover the image costs of your Windows pay-as-you-go instances.**

Can I use reserved instances to cover the image costs of Linux pay-as-you-go instances?

**No, reserved instances cannot be used to cover the image costs of Linux pay-as-you-go instances.**

Can multiple users simultaneously log on to the Management Terminal?

**No, only a single user can log on to the Management Terminal at a time.**

What can I do if I forget the password for remote connection?

**You can reset your password for remote connection. For more information, see #unique_93/unique_93_Connect_42_section_nmj_5mx_wdb.**

Why can’t I log on to the Management Terminal even after I reset my password for remote connection?

**If the ECS instance to which you are connecting is not I/O optimized, you must restart the instance in the ECS console for the new password to take effect. For more information, see Restart an instance.**

- **Note:**
  If the ECS instance is restarted from within the instance itself, the new password will not take effect.

Authentication failed on the Management Terminal. What can I do?

**If you enter an incorrect password, authentication fails on the Management Terminal. Perform the following steps to troubleshoot the problem:**

1. Enter the correct password.
2. If you forget your password, reset your password for remote connection and try again.
3. If the ECS instance to which you are connecting is not I/O optimized, you must restart the instance in the ECS console for the new password to take effect.

What can I do if a black screen appears while I am connected to the Management Terminal?

A black screen indicates that the instance is in sleep mode. Perform the following operations based on your operating system:

- For a Linux instance, click your mouse or press any key to activate the instance.
- For a Windows instance, in the upper-left corner of the Management Terminal page, choose Send Remote Call > CTRL+ALT+DELETE to open the logon dialog box.

What can I do if I am unable to access the Management Terminal?

Use Google Chrome to access the Management Terminal, and press F12 to open the developer tools pane. Then click the Console tab and analyze the information displayed to identify errors.

Why can’t I use Internet Explorer 8 to access the Management Terminal?

The Management Terminal supports Internet Explorer 10 and later.

We recommend that you use Google Chrome because it is the most compatible browser.

When I use Firefox to access the Management Terminal, an error message is returned indicating that the secure connection has failed. What can I do?

This problem occurs if the encryption algorithm of your Firefox version is different from that of the Management Terminal.

We recommend that you use Google Chrome because it is the most compatible browser.

How do I remotely log on to a Linux instance?

Linux instances use SSH for remote connection. You can use one of the following methods to remotely log on to a Linux instance:

- Connect to a Linux instance by using the Management Terminal.
- Connect to a Linux instance by using a password.
- Connect to a Linux instance by using an SSH key pair.
- Connect to an instance on a mobile device.
What are the default username and password for remote logon to the operating system of an ECS instance?

The default username depends on the operating system.

- For a Windows instance, the default username is administrator.
- For a Linux instance, the default username is root.

The password for remote logon to the operating system is set by you during instance creation. For more information, see Create an instance by using the provided wizard. If you forget your password, you can reset it. For more information, see Reset an instance logon password.

Note:
This password is used to remotely log on to the operating system of an ECS instance, not to the Management Terminal.

Can I upgrade subscription instances?

Yes, you can. For more information, see Upgrade configurations of subscription instances.

Can I upgrade pay-as-you-go instances?

Yes, but you must stop pay-as-you-go instances before you can upgrade them. You can upgrade pay-as-you-go instances by following the instructions in Change configurations of Pay-As-You-Go instances or by calling the ModifyInstanceSpec operation.

How long does it take to upgrade an ECS instance?

- Subscription instances do not need to be stopped to be upgraded. The upgrade process takes about 15 minutes.
- Pay-as-you-go instances must be stopped before they can be upgraded. The upgrade process takes about 15 minutes.
- Instances must be stopped before their bandwidths can be upgraded. The upgrade process takes about 5 minutes.

How is the fee for upgrading an ECS instance calculated?

The upgrade fee and its calculation method are displayed when you upgrade the instance. You can also view the fee details on the Account Overview page.
Does upgrading my ECS instances affect my cloud service configurations?

Pay-as-you-go instances must be stopped before they can be upgraded. After you upgrade a subscription instance, you must restart it for the new specifications to take effect. The upgrade operation will interrupt your services for a short period of time. We recommend that you upgrade instances during off-peak hours. Instances can seamlessly resume services after upgrades without server environment reconfiguration.

How do I upgrade ECS resources?

For details about how to upgrade ECS resources, see Overview of instance upgrade and downgrade.

- With the exception of ECS instances that use local storage, ECS instances allow their CPU and memory resources to be scaled and their bandwidths to be upgraded while they are running. You can also downgrade ECS instances as needed.
- A maximum of 16 data disks can be attached to each ECS instance. You cannot reduce the size of a data disk after it is extended.
- ECS bandwidth is measured in megabits per second (Mbit/s) and ranges from 0 Mbit/s to 200 Mbit/s. You can also temporarily upgrade the bandwidth of an ECS instance, or downgrade the instance when you renew it.

I have upgraded an instance but no changes have taken effect yet. Why?

After you upgrade an instance, you must restart the instance in the ECS console for the new specifications to take effect.

My ECS instance is stuck in the Starting state, and AliyunService is disabled or has been deleted. What can I do?

Problem description: After you start an ECS instance, it remains in the Starting state for an extended period of time and then automatically stops. You log on to the instance and find that AliyunService has been deleted or is disabled in the system services.

Solution:
• If AliyunService is disabled:
  1. Change the state of AliyunService to Automatic.
  2. Restart the instance.

• If AliyunService is deleted:
  1. Run the following command to add AliyunService to the instance:

```
sc create AliyunService type= "own" start= "auto" binPath= "C:\Program Files\AliyunService\AliyunService.exe -d" tag= "no"
DisplayName= "AliyunService"
```

**Note:**
Make sure that you leave a space character after the equal signs (=).

  2. Find the registry key `HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\services\AliyunService`, and change `c:\Program Files\AliyunService\AliyunService.exe -d` to `"c:\Program Files\AliyunService\AliyunService.exe" -d`.

  3. Restart the instance.

How do I use f1 instances?

After you create an f1 instance, Alibaba Cloud shares an FPGA development image to you. Only CentOS 7u2 images are supported. The FPGA development image includes the complete Intel Quartus development suite and the constraint files for the f1 instance to provide a complete cloud development environment.

**Note:**
You can go to the *ECS Instance Types Available for Each Region page* to view the instance types available in each region.

The basic workflow for using f1 instances is as follows:

1. After development, generate an intermediate QAR file during the compilation stage and upload the file to an OSS bucket. You can upload this file only to an OSS bucket in the China (Hangzhou) region. Then, register the QAR file information with Alibaba Cloud by calling an API operation.

   We recommend that you use the free Intel Quartus development suite to perform development, compilation, and simulation operations on the cloud.
2. Alibaba Cloud verifies the registration request for the QAR file and then sends you an email that includes an FPGA image ID.

3. When you deploy the image, call an API operation with the f1 instance ID and FPGA image ID specified to associate the instance with the image.

   You can initiate the association operation in any scenario where ECS API is available.
   
   • If the f1 instance has never been associated with any FPGA images, initiate the association operation.
   
   • If the f1 instance was previously associated with an FPGA image and had the image loaded, erase the FPGA image from the f1 instance before initiating the association operation.

4. After you associate the FPGA image with the instance, call an API operation to load the image.

   You must initiate the load operation from the f1 instance. Then the underlying service of Alibaba Cloud burns the associated FPGA image to the corresponding FPGA on the instance.

If you want to restore the f1 instance to its initial state, call an API operation to erase the burned FPGA image from the f1 instance.

For more instructions on f1 instances, see:

   • Create an f1 instance
   
   • #unique_288
   
   • #unique_289

How do I upload files by using the FTP tool in macOS?

Upload files by using the Terminal in macOS

Open the Terminal in macOS or iTerm2 for Mac (click here to download iTerm2). Make sure that you select the correct destination path.
1. Connect to the FTP server.

2. Open the destination directory. In Windows, use the working directory as the destination directory. In Linux, change the working directory to `htdocs` and use the `htdocs` directory as the destination directory.

3. Run the `put` command to upload files.

Upload files by using a third-party tool

1. Download Yummy FTP.
2. Install Yummy FTP.
3. Enter the server IP address, username, and password. Set Protocol to Standard (FTP) and Port to 21 or a port number you are using, and leave the SSH key field unselected.
4. Click Connect.
5. In the right section, select the destination directory. In Windows, use the current working directory. In Linux, select the htdocs directory. In the left section, select the files and click the upload icon to upload files.

Note:
If you are prompted with a message similar to "Your security preferences only allow the installation of applications from the Mac App Store and from authorized developers" when you try to install Yummy FTP, perform these steps:

b. Click the security lock in the lower-left corner of the window and enter the administrator password.
c. Set Allow apps download from to Anywhere.

Then, you can upload files by using Yummy FTP.

If you have further questions, submit a ticket.

How do I apply for an ICP filing for my domain name after purchasing an ECS instance?

You can apply for a limited number of ICP filing service numbers for each ECS instance. For more information, see #unique_290.

For information about how to apply for an ICP filing, see #unique_291.

Why can’t I start an ECS instance by loading the kernel?

Problem description: When the system is starting, it does not respond when you select an option from the GRUB menu. After the LiveCD image is mounted to the ECS instance, you log on to the ECS instance and find that file system privileges are correct and that message logs show no exceptions.

Cause: The system is attacked by ransomware.

Solution: Back up your data and reinitialize the system.

How do I change the logon password within an instance?

See Change the instance logon password by connecting to the instance.

Why can’t I add sound or video cards to ECS instances?

This is because the servers that Alibaba Cloud provides are not multimedia servers and do not provide sound card or video card components.
Can I transfer the unused time of an ECS instance to another ECS instance?

No, the unused time of an ECS instance cannot be transferred to others. If you want both higher flexibility and cost-effectiveness, we recommend that you use a combination of reserved instances and pay-as-you-go instances. For more information, see Reserved instance overview.

Do ECS instances provide database capabilities by default?

No, ECS instances do not provide database capabilities by default. To use database services, perform the following operations:

- Deploy your own database.
- Purchase ApsaraDB for RDS provided by Alibaba Cloud.
- Use a database image provided in Alibaba Cloud Marketplace.

Can I build a database on an ECS instance?

Yes, you can install database software and configure a database environment on an ECS instance as needed. You can also separately purchase ApsaraDB for RDS.

Do ECS instances support Oracle databases?

Yes, ECS instances support Oracle databases. We recommend that before installing an Oracle database, you perform stress testing on the intended host ECS instance to ensure that it can handle the read/write requirements of the database.

Are public IP addresses and private IP addresses independent? Can I specify or add IP addresses?

In classic networks, public and private IP addresses are independent of each other. Private IP addresses in classic networks are used for communication between ECS instances and communication between ECS instances and OSS or RDS instances. When the 0 Mbit/s bandwidth is selected for an ECS instance, no public IP address is allocated to the instance. Typically, public and private IP addresses in classic networks do not change. You cannot specify, select, or add IP addresses in classic networks.

In VPCs, NAT gateways map public IP addresses to private IP addresses. You can specify secondary private IP addresses, or add IP addresses by assigning multiple private IP addresses to a single ENI.
Can an ECS instance be used for load balancing?

ECS Linux and Windows instances can be used for load balancing. You must ensure that the configurations of ECS instances serving as Web servers meet the requirements for website code to run. Load balancing can be implemented with as few as one ECS instance under an account. However, we recommend you use two or more ECS instances for load balancing.

Can I change the region of an ECS instance?

No, you cannot change the region of an ECS instance.

Can I adjust the partition size of a purchased disk?

For system security and stability purposes, system disks do not support secondary partitioning on either Windows or Linux instances. If you use a third-party tool to perform secondary partitioning, unknown exceptions such as system failure and data loss might occur.

Secondary partitioning of data disks may cause data loss. We do not recommend that you perform secondary partitioning on data disks.

How do I replace the public IP address of my ECS instance with an Elastic IP Address (EIP)?

To replace the public IP address of your ECS instance with an EIP, ensure that you have selected pay-by-bandwidth as the bandwidth billing method for you ECS instance and that you have purchased an EIP. Then, perform the following steps:

1. Change the bandwidth billing method from pay-by-bandwidth to pay-by-traffic. For more information, see #unique_147/unique_147_Connect_42_section_nxl_ntk_zdb.
2. Convert the public IP address of the ECS instance to an EIP. For more information, see #unique_292.
3. Disassociate the EIP obtained in the previous step from the ECS instance. For more information, see #unique_293.
4. Associate the EIP you purchased to the ECS instance. For more information, see #unique_94.

How do I view subscription instances in all regions under my account?

You can go to the renewal page to view subscription instances in all regions under your account.

1. Log on to the ECS console.
2. In the top navigation bar, choose Billing Management > Renew.

When can I forcibly stop an ECS instance? What are the consequences?

If an instance cannot be stopped with a proper shutdown procedure, you can forcibly stop it. Forcible stop is equivalent to a physical shutdown, and may cause data loss if instance data has not been written to disks.

Why can't I reactivate my ECS instance?

You may fail to reactivate an ECS instance due to any of the following reasons:

- Your account has overdue payments. Pay the outstanding bills and try again.
- The system is busy. Try again later.
- Not resources are available.

Note:
You can go to the ECS Instance Types Available for Each Region page to view the instance types available in each region.

Why has an ECS instance with release protection enabled been automatically released from a scaling group?

Auto Scaling can automatically release an ECS instance created in a scale-out event, even if you enable instance release protection for the instance by using the ECS console or by calling the ModifyInstanceAttribute operation.

What is the AliVulfix process in an ECS instance?

The AliVulfix process is an Alibaba Cloud Security program that detects vulnerabilities in ECS instances.

How do I defend ECS instances against attacks?

ECS instances use Alibaba Cloud Security to defend against DDoS attacks. CloudMonitor deployed on ECS instances can automatically detect network attacks and scrub suspicious traffic. Alibaba Cloud implements black hole filtering to protect ECS instances against high-volume attacks. To strengthen security protection, we recommend that you install security software and disable ports that are not commonly used.
What security services does Alibaba Cloud provide?

Alibaba Cloud Security is powered by the robust data analysis capabilities of the Alibaba Cloud cloud computing platform to provide a comprehensive set of security services, such as security vulnerability detection, website trojan detection, host intrusion detection, and DDoS protection.

For information about more security services, see Security.

After I renew an ECS Linux subscription instance that has expired, I am still unable to access the website it hosts. What can I do?

Problem description: The ECS instance is in the Stopped state after it expires. After you renew and restart the instance, you cannot access the website it hosts.

Cause: This may be because the website service has not been started.

Solution:

1. Connect to the ECS instance remotely and run the following command to check whether the website service has been started:

   ```bash
   # netstat -nltp //Check whether port 80 on the ECS instance is being listened on.
   ```

2. If no information about port 80 is displayed in the command output, the website service has not been started. Run a command to manually start the website service and relevant services.

   In Linux, websites are typically developed based on PHP and MySQL.
   
   • In Apache, you only need to start the website service and MySQL.

     ```bash
     #/etc/init.d/httpd start //Start the website service.
     #/etc/init.d/mysqld start //Start MySQL.
     ```

   • In NGINX, you must start the website service, PHP, and MySQL.

     ```bash
     #/etc/init.d/nginx start //Start the website service.
     This command is applicable to NGINX.
     #/etc/init.d/php-fpm start //Start PHP.
     ```
Elastic Compute Service

3. Re-check whether the website service has been started.

```bash
#netstat -nltp //Check whether port 80 on the ECS instance is being listened on.
```

4. After the website service has been started, access the website again.

If the problem persists, submit a ticket.

How do I check, partition, and format the data disks of a Linux instance?

You can run the `df -h` command to check the capacity and usage of disks, and run the `fdisk -l` command to view disk information. For details about how to partition and format disks in Linux instances, see #unique_192.

How do I upload files to a Linux instance?

You can use the FTP service to upload files to a Linux instance.

How do I change the owner and owner group of directories and files on a Linux instance?

If the file or directory permissions are not correctly configured on the Web server, a 403 error will occur when you access a website hosted on the instance. Therefore, before you adjust a file or directory, you must identify the identity under which the file or directory process is running.

You can run the `ps` and `grep` commands to query the identities under which processes are running.

You can run the `ls -l` command to query the owners and owner groups of files and directories.

To change the owners and owner groups, run the `chown` command. For example, you can run the `chown -R www.www /alidata/www/phpwind/` command to change the owner and owner group of all files and directories under directory `/alidata/www/phpwind` to account www.

How do I update the software source of Linux instances?

You can use an automatic software source updating tool. For more information, see Automatic source updating tool for Linux ECS.
What limits apply to the transfer and change of public IP addresses of ECS instances?

The following limits apply to the transfer and change of public IP addresses of ECS instances:

- **In classic networks:**
  - You cannot transfer public IP addresses across accounts.
  - The public IP address of an ECS instance is mutable within 6 hours after the instance is created, and can be changed a maximum of 3 times. For more information, see #unique_295.
  - If Anti-DDoS Pro is deployed on your instance, you can change the IP address of an ECS instance a maximum of 10 times in the Anti-DDoS Pro console. For more information, see #unique_296 of the Anti-DDoS Pro User Guide.

- **In VPCs:**
  - You cannot transfer public IP addresses or EIPs across accounts.
  - If no public IP address is assigned to your instance, you can bind an EIP to the instance. You can replace the public IP address of your instance with an EIP.
  - If a public IP address is assigned to your instance:
    - This public IP address is mutable within 6 hours after the instance is created, and can be changed a maximum of 3 times. For more information, see #unique_295.
    - You can replace this public IP address by converting it into an EIP. For more information, see #unique_297.

If you have further questions, submit a ticket.

Can I access amazon.com from my ECS instance?

You can access amazon.com from your ECS instance if your ECS instance can connect to the public network properly.

Why can’t I access a website hosted outside of China after I log on to my ECS instance?

You can access a website hosted outside of China from your ECS instance only when the website complies with the local regulatory policies of the country or region where your instance is located. Make sure that your ECS instance can connect to the public network properly and that the website complies with the preceding local regulatory policies.
I cannot purchase more pay-as-you-go instances. What can I do?

If you have reached the maximum number of pay-as-you-go instances that you can purchase, you cannot purchase more pay-as-you-go instances. For more information, see #unique_155/unique_155_Connect_42_section_tbg_zdx_wdb. You can log on to the ECS console and view your resource quotas on the Privileges & Quotas page. For more information, see #unique_298.

How can I view the resource quota?

For more information about how to view the limits and quotas of resources, see #unique_155.

Are fees still incurred after a pay-as-you-go ECS instance is stopped automatically due to an overdue payment or is manually stopped?

When the payment for a pay-as-you-go instance becomes overdue, the instance is automatically stopped and taken out of service.

You can stop a running pay-as-you-go instance in the ECS console or by calling the StopInstance operation. When the instance is stopped, its status changes to Stopped. Billing of pay-as-you-go instances in the Stopped state depends on their network types.

- VPC: The No Fees for Stopped Instances (VPC-Connected) feature takes effect on pay-as-you-go instances in VPCs. After the feature is enabled, pay-as-you-go instances in VPCs start being billed when they are created, stop being billed when they enter the Stopped state, and resume being billed when they are started again. With the feature enabled, the vCPUs, memory, and public IP addresses of a VPC-type ECS instance in the Stopped state will not incur any additional costs, but its data disks will continue to be billed. For more information, see #unique_150.

- Classic network: ECS instances in classic networks will continue to be billed, even when they are in the Stopped state.

What can I do if an order to change the billing method from pay-as-you-go to subscription cannot be placed?

Your order may fail to be placed due to any of the following reasons:

- The instance is in a state that does not support changing billing methods.
• The instance is scheduled for an automatic release at a specific point in time and does not support changing billing methods.
• The instance is in the Expired state.
• The instance information has changed.
• A change order for the instance has not been paid.

If you are prompted with any of the preceding error messages, adjust the instance accordingly.

How long after the order is paid does it take to change the billing method from pay-as-you-go to subscription?

After you pay for the order, the billing method of your ECS instance is changed. It takes 1 to 4 seconds to change the billing method of up to 20 instances. After the change is complete, the billing method of your instance is changed to Subscription in the console.

What can I do if the billing method cannot be changed from pay-as-you-go to subscription?

Submit a ticket.

When I change the billing method of an instance from pay-as-you-go to subscription, will the billing method of the instance bandwidth change?

No, the billing method of the instance bandwidth will not change. Only the billing method of instances and disks can be changed from pay-as-you-go to subscription. For information about how to change the bandwidth billing method, see #unique_132/unique_132_Connect_42_ChangeBilling.

I have an unpaid order to change the billing method of an instance from pay-as-you-go to subscription. If I upgrade the instance, will the order still be valid?

An order is created when you change the billing method of your instance from pay-as-you-go to subscription. You must complete the payment for this order for the change to take effect. If you upgrade the instance before the order is paid for, the order payment cannot be completed because the instance components change and the original order amount does not meet the requirements of the new billing method. If you still need to change the billing method, you must cancel the unpaid order and place a new order.
What can I do if the billing method cannot be changed from subscription to pay-as-you-go?

The billing method cannot be changed from subscription to pay-as-you-go due to one of the following reasons:

• The instance is in a state that does not support changing billing methods.
• The instance is in the Expired state.
• The instance information has changed.

If you are prompted with any of the preceding error messages, adjust the instance accordingly. If this problem persists, submit a ticket.

When I try to change the billing method of a disk in an ECS instance, an error message appears indicating that I have already changed the billing method three times. What does this mean?

Each ECS instance can be downgraded a maximum of three times. Downgrade operations include instance specifications downgrades, bandwidth downgrades, and the change of the disk billing method from subscription to pay-as-you-go.

Why can't I change a pay-as-you-go instance to a subscription one?

• The instance belongs to your account.
• The following instance types are not applicable:
  - Generation I: t1, s1, s2, s3, m1, m2, c1, or c2
  - Generation n1, n2, or e3

Note:
For more information about these instance types, see Phased-out instance types.

• The instance cannot be a preemptible instance.
• There is no unpaid switch order for the instance.

If there is an unpaid switch order, you must cancel the unpaid order and then place another order to switch the billing method.

• Auto release is not set for the instance.

If auto release has been set for an instance, you must disable the auto release configuration and then switch the billing method. For more information, see Release an instance.
The instance is in the Running or Stopped state.

Example: An order to switch the billing method has been placed when the ECS instance is in the Running or Stopped state. However, the instance status has changed when payment is attempted for the order. The preceding requirement is not met. The order fails and the billing method remains unchanged. You can go to the billing center and pay for the order when the instance is in the Running or Stopped state again.

How do I view the expiration time of my subscription instances?

You can log on to the ECS console and go to the Instances page. View the expiration time of your subscription instances in the Billing Method column.

Note:
If the Billing Method column is not displayed, click in the upper-right corner. In the dialog box that appears, select Billing Method and click OK.